A joint meeting between the Experimental Psychology Society and the Canadian Society for Brain, Behaviour and Cognitive Science.

DUNDEE MEETING

8-11 July 2025

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 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 joint scientific meeting between the EPS and CSBBCS will be held at the University of Dundee, Dalhousie Building, Old Hawkhill, Dundee, DD1 5EN, between 8th – 11th July 2025. The local organiser is Lizzie Bradford.

CSBBCS Vincent Di Lollo Early Career Prize Talk
Tuesday 8th July, 4:30pm

> Investigating how environmental context, goals, other people and individual traits shape attention.
> Dana Hayward, University of Alberta

CSBBCS Mid-Career Prize Talk
Tuesday 8th July, 5:30pm

> Duped by the pseudo-profound: Why we fall for BS, and how to protect against it.
> Jonathan Fugelsang (University of Waterloo)

2025 EPS / BSA Undergraduate Prize Talk
Wednesday 9th July, 5.15pm

> Large language models surpass human experts in predicting neuroscience results.
> Akilles Rechardt, Royal Holloway University of London

CSBBCS Hebb Distinguished Contribution Award Lecture
Wednesday 9th July, 6:15pm

> The Reluctant Thinker: Why We Hesitate to Reflect- and to Stop.
> Valerie Thompson, University of Saskatchewan

53rd EPS Bartlett Prize Lecture
Thursday 10th July, 5.30pm

> Face Recognition: Familiarity, idiosyncrasy and representation.
> Mike Burton, University of York

53rd EPS Bartlett Prize Lecture Symposium
Thursday 10th July, 1.45pm – 5.15pm
Organised by Rob Jenkins.

Poster Sessions

There will be two poster sessions, Poster Session One will be held on Tuesday 8th July between 6.30pm and 7.30pm in the Dalhousie Building Atrium with an accompanying wine reception. Poster Session Two will be held on Wednesday 9th July between 7.15pm and 8.15pm in the Dalhousie Building Atrium with an accompanying wine reception.

Conference Dinner

The conference dinner will be at The Apex Quay Hotel, 1 West Victoria Dock Road, Dundee, DD1 3JP on Thursday 10th July, with arrivals from 7.00pm and the dinner starting at 7.30pm.

For more details on how to book a place at the conference dinner, please see page 207.

Pre-Conference Meeting: Women in Cognitive Science Canadian Chapter (WiCSC+)
Tuesday 8th July, 9am – 12pm – Lecture Theatre 4, Dalhousie Building, University of Dundee

09:00 - 10:00 Welcome & Introduction to WiCSC+, WiCSE, WiCSC+ Trainee Board and Award Ceremony.

10:00 - 11:00 Panel discussion and Q&A: Parallel Paths Across Continents: Demystifying Cognitive Science Research across Canada and Europe.

11:00 - 12:00 WiCSC+ Trainee Board Speed Mentoring (registration required – open to all conference attendees).

WiCS Canada+ is the Canadian Chapter of Women in Cognitive Science+, an NSF-funded organization in the U.S. affiliated with the Psychonomic Society. The WiCS Canada+ was cofounded by Penny Pexman and Debra Titone in 2016. WiCSC+ has received fundings from the NSERC and the Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS). WiCSC+ provides important professional development and networking opportunities for scientists in cognitive science, cognitive neuroscience, and related fields, with a focus on the unique needs of the Canadian research context. Like its parent organization, WiCS+, it aims to foster a supportive environment for both women and men in these disciplines. This meeting is in collaboration with WICS+ Europe.

All are welcome to attend this WiCSC+ meeting, which will focus on Parallel Paths Across Continents: Demystifying Cognitive Science Research across Canada and Europe. We will discuss the similarities, and differences, in academic systems, research collaboration, and professional networking across regions.

Panelists:
Dagmar der Weduwen, University of St Andrews
Sabrina M. Di Lonardo Burr, University of Sheffield
Nura Sidarus, Royal Holloway University of London

If you have any questions on this topic you'd like us to cover, would like to volunteer to contribute resources to the event, or serve as a "WICSC+ Ambassador" to help provide insights to attendees about working across these different geographic regions, please let us know at the following link: https://forms.gle/DTYpGh27etgqK5qj7

WiCSC+ Trainee Board Speed Mentoring.
All conference attendees are welcome to register (including EPS members).

Mentor Form: https://forms.gle/s4E941NrsKDCWTRSA
Mentee Form: https://forms.gle/9coN5rFVCGe78UnG6

More information will be shared on the WICSC+ website: https://wicsc.ca/

09:00 **Women in Cognitive Science Canadian Chapter (WiCSC+) – Lecture Theatre 4**

12:00 **Lunch (Not Supplied)**

START OF PARALLEL SESSIONS

Session A **– Lecture Theatre 4**

CSBBCS Symposium: Current perspectives on reading.

12:45 **Irys-Amelie Champagne, Ray Wen, Mark Pitt, Nicolas Dumay and Blair Armstrong** (University of Toronto, The Ohio State University, University of Exeter, University of Toronto Scarborough) Factors that Impact the Learning and Generalization of Newly Learned Pronunciations in Reading Aloud.

13:00 **Deanne Tak On Wah and Marc Joanisse** (University of Western Ontario) Representational Similarity Analysis of the Neural Codes in Word Reading.

13:15 **Anastasiya Lopukhina, Walter van Heuven, Holly Cooper, Cheng-Yu Hsieh, Rebecca Crowley and Kathleen Rastle** (University of London) Can same-language subtitles help children become better readers?

13:30 **Adam Parker and Costanza Carra** (University College London) Word-meaning priming during sentence reading for non-homographs

CSBBCS-Symposium: The intersection of language, cognition and the schizophrenia spectrum.

13:45 **Chaimaa El Mouslih, Vegas Hodgins, Debra Titone and Lena Palaniyappan** (McGill University) From Words to Diagnosis: The Potential Value of Speech Analysis in Schizophrenia.

14:00 **Veronica Whitford, Victoria Matthews, Narissa Byers, Gillian O'Driscoll and Debra Titone** (University of New Brunswick, McGill University) Comparing Oculomotor Indicators of Local and Global Reading Difficulty in Schizophrenia and Developmental Dyslexia.

14:15 **Rosa Ayesa Arriola** (Valdecilla Research Institute) Language Use and Cognitive Function in Schizophrenia Spectrum Disorders: Insights from Patients, First-Degree Relatives, and Healthy Controls.

14:30 **Jens Kreitewolf and Hannah Ziesenies** (McGill University, Leipzig University) Understanding the Emergence of Auditory Verbal Hallucinations: Linking Voice Perception to Speech Comprehension in Hallucination-Prone Individuals.

14:45 **Tea / Coffee**

09:00 **Women in Cognitive Science Canadian Chapter (WiCSC+) – Lecture Theatre 4**

12:00 **Lunch (Not Supplied)**

START OF PARALLEL SESSIONS

Session B **– Lecture Theatre 1**

CSBBCS-Symposium: Zooming out to dive in deeper: Recent findings in cognitive aging and their implications for past and current theories.

12:45 **Andrew Westbrook** (Rutgers University) Aging alters brain criticality with implications for cognitive effort in older adults.

13:00 **Berkley Petersen, Isabel Rangel Garcia, Talyssa Anderson, Carolynn Boulanger, Konka Paul, Eugenie Roudaia, Jocelyn Faubert, Allison Sekuler, Nicole Anderson and Karen Li** (Concordia University**,** Rotman Research Institute**,** Université de Montréal, McMaster University**,** University of Toronto) iTrain my Brain: Evaluating the effects of six weeks of multiple object tracking training on older adults' cognition, mobility and dual-task abilities.

13:15 **Alexa Ruel, Sukran Karaosmanoglu, Frank Steinicke and Nicolas Schuck** (University of Hamburg) Getting the full picture: Examining successor representation learning in older adults.

CSBBCS Symposium: Cognitive listening.

13:45 **Sven Mattys, Sarah Knight, Yue Zheng, Georgie Maher and Ronan McGarrigle** (University of York, Newcastle University**,** University of Leeds) A data-limit account of spatial and spectral release from masking during speech-on-speech listening.

14:00 **Carolyn McGettigan, Amrita Bains, Hannah Jones, Victor Rosi and Saloni Krishnan** (University College London, Royal Holloway University of London) Investigating motivation and reward in audiobook listening.

14:15 **Ingrid Johnsrude, Stephen van Hedger, Jaimy Hannah, Ronak Mohammedi, Jenni Rodd and Joseph Rovetti** (University of Western Ontario, Huron University College, University College London) Individual differences in cognition and speech-in-noise intelligibility.

14:30 **Björn Herrmann, Ryan Panela, Yulia Lamekina, Aysha Motala, and Ingrid Johnsrude** (Rotman Research Institute, University of Stirling, University of Western Ontario) Leveraging large language models to advance assessments of naturalistic speech listening.

14:45 **Tea / Coffee**

09:00 **Women in Cognitive Science Canadian Chapter (WiCSC+) – Lecture Theatre 4**

12:00 **Lunch (Not Supplied)**

START OF PARALLEL SESSIONS

Session C **– Lecture Theatre 2**

CSBBCS-Symposium: Math development across the lifespan.

13:45 **Liza Kahwaji, Shuyuan Yu, Taeko Bourque, Heather Douglas, Jo-Anne LeFevre and Rebecca Merkley** (Carleton University) One and Done? Testing the Need for Repetition in a Counting Task.

14:00 **Rosie O'Connor, Jaqueline Nakahara, Toni Loveridge, Emma Blakey, Iram Siraj and Gaia Scerif** (University of Oxford, University of Sheffield) The Interplay Between the Preschool Environment and Child Characteristics in Supporting Mathematical Development in Three- to Four-Year-Olds.

14:15 **Fraulein Retanal, Elora Wales, Diya Kamineni, Emily Larkin, Jean-Francois Bureau, Jo-Anne Lefevre, Helena Osana, Sheri-Lynn Skwarchuk and Erin Maloney** (University of Ottawa, Carleton University, Concordia University, University of Winnipeg) Parent-Child Math Interactions: How Emotional Quality Relates to Math Attitudes and Performance.

14:30 **Lisa Rogers, Sabrina Di Lonardo Burr, Judith Wylie and Chang Xu** (Queen's University Belfast, University of Sheffield) The Development of Arithmetic Fluency: Investigating the Effects of Format and Task Order.

14:45 **Tea / Coffee**

Session A **– Lecture Theatre 4**

15:15 ~~**Adrian Safati and Daniel Smilek** (University of Waterloo) Examining various experience sampling techniques for repeated measures of attentional disengagement.~~ ***Withdrawn***

15:30 **Alyssa Smith, Daniel Smilek and Mark Fenske** (University of Waterloo) Oral contraceptive use and cognition: A review of the current literature and future directions.

15:45 **Sandra Thomson and Lila Danis** (St. Thomas University) Assessing the Reliability of Dual-Task Processing Measures.

16:00 **Khalil Husein, Lakshay Goel and Eric Anderson** (University of Waterloo) Can computational sentiment analysis classify autobiographical memories? Comparing VADER and TextBlob.

16:15 **Break**

16:30 **Vincent Di Lollo Early Career Prize Talk (CSBBCS) - Lecture Theatre 3**
Investigating how environmental context, goals, other people and individual traits shape attention.
Dana Hayward (University of Alberta)

17:30 **Mid-Career Prize Talk (CSBBCS) - Lecture Theatre 3**
Duped by the pseudo-profound: Why we fall for BS, and how to protect against it.
Jonathan Fugelsang (University of Waterloo)

18:30 **Poster Session One**

Session B **– Lecture Theatre 1**

15:15 **Mathew Rocha Hammerstrom** (University of Victoria) Let me gamble your money: Agency overcomes earning in reward processing signals.

15:30 **Jacob Oliveira** (University of Waterloo) Putting the breaks on slot machine gambling: Reducing gambling engagement through strategic applications of friction.

15:45 **Monica Tsang** (University of Waterloo) Psychophysiological and subjective measures of flow, depression & gaming addiction in role-playing games.

16:00 **Lindsay Santacroce** (Toronto Metropolitan University) Event-related potentials reveal age-related differences in sensitivity to positive and negative feedback from social and non-social sources.

16:15 **Break**

16:30 **Vincent Di Lollo Early Career Prize Talk (CSBBCS) - Lecture Theatre 3**
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Dana Hayward (University of Alberta)

17:30 **Mid-Career Prize Talk (CSBBCS) - Lecture Theatre 3**
Duped by the pseudo-profound: Why we fall for BS, and how to protect against it.
Jonathan Fugelsang (University of Waterloo)

18:30 **Poster Session One**

START OF PARALLEL SESSIONS

Session A **– Lecture Theatre 4**

09:00 **Lixia Yang, Angela Xiang and Sarah Sweigman** (Toronto Metropolitan University) Does video presence matter in associative and source memory during virtual socialization?

09:15 **Kaiden Stewart and Jonathan Fugelsang** (University of Waterloo) Unspoken Confidence: On the effects of explicit judgments of metacognition in reasoning.

09:30 **Dana Hayward and Beth Jantz** (University of Alberta) What's your game? Investigating whether social context affects intention prediction when interacting online or in-person.

09:45 **Amrita Ahluwalia-McMeddes*, Adam Moore*, Calum Marr* and Zara Kunders*** (Sponsor: Josephine Ross) (University of Dundee, University of Edinburgh, Queen's University Belfast) Measuring intuitive moral trade-offs using the Moral Foundations Conflict Task.

10:00 **Elisabeth Bradford and Sofia Villoria** (University of St Andrews, University of Dundee) Mentalizing Biases: More efficient perspective-taking for same-age versus other-age others.

10:15 **Tigan Schofield* and Giorgio Ganis** (Sponsor: Mila Mileva) (University of Plymouth) Truth, Lies, and Social Risk: Neural responses during decision-making and feedback.

10:30 **Tea / Coffee**

11:00 ~~**Stephanie Hartgen-Walker* and Giorgio Ganis** (Sponsor: Mila Mileva) (University of Plymouth) Extreme mental imagery in mental rotation.~~ ***Withdrawn***

11:15 **Sebastian Suggate, Fraser Milton and Jeremy Tree** (University of Regensburg, Germany, University of Exeter, Swansea University) Advantage aphantasia! Multimodal mental comparisons in those with and without mental imagery.

11:30 **Jessica Teed*, Catriona Scrivener, Robert McIntosh, Adam Zeman and Edward Silson** (Sponsor: Robert McIntosh) (University of Edinburgh, University of Glasgow, University of Exeter) Visual imagery and the brain mechanisms underpinning aphantasia.

11:45 **Erica Li, Aidan Knights, Sarah Armstrong, Dhwani Bhavsar, Cameron Clarke, Markus Mendes, Bianca Nicole Padilla, Maxwell Schaub and David Shore** (McMaster University) Do psychedelics enhance the mind's eye? Investigating their influence on visual mental imagery.

12:00 **Brady Roberts, Muhan Yan and Wilma Bainbridge** (University of Chicago) Picture superiority in memory is preserved in aphantasia.

12:15 **Lorielle Dietze, Sean McWhinney, Pauline Favre, Elizabeth MacKinnon, Ole Andreassen, Christopher Ching, Paul Thompson and Tomas Hajek** (Dalhousie University) White matter diffusion metrics are differentially sensitive to obesity and bipolar disorders: An ENIGMA bipolar disorders study in 2166 individuals.

12:30 **Lunch (Not Supplied)**

START OF PARALLEL SESSIONS

Session B **- Lecture Theatre 1**

09:00 **Qingqing Qu*** (Sponsor: Kevin Paterson) (Chinese Academy of Sciences, China) Finding linguistic relativity in classifiers.

09:15 **Clara Seyfried* and Yuki Kamide** (Sponsor: Yuki Kamide) (University of Dundee) Causality and coherence in discourse processing and recall.

09:30 **Joost Rommers** (University of Aberdeen) Electrophysiology reveals malleable predictions during language comprehension.

09:45 **David Sidhu, Pragati Parajuli and Emiko Muraki** (Carleton University) An emotional bouba/kiki effect: Congruence between sound and emotional arousal facilitates word processing and recall.

10:00 **Gabrielle Levasseur, Courtney Stacey, Erika Guedea, Kate MacGregor, Sarah MacIsaac, Marc Joanisse and Veronica Whitford** (University of New Brunswick) An eye-tracking study of word predictability effects in L1 and L2 reading in children and adults.

10:15 **Pei-Chu Liaw and David Sidhu** (Carleton University) Visual and Auditory Processing in Sound Symbolism: The Impact of Modality on Ratings.

10:30 **Tea / Coffee**

11:00 **Cheryl Techentin, Stephie Gagnon and Malinda Desjarlais** (Mount Royal University) Flashbulb or Snapchat Memories? Age differences in the phenomenological experience for highly emotional public events.

11:15 **Michelle Dollois and Chris Fiacconi** (University of Guelph) Revisiting the retrieval state account of sequential dependencies in memory judgments.

11:30 **Jessica Kespe, Marielle Noack and Naseem Al-Aidroos** (University of Guelph) Control over the timing of LTM reinstatement.

11:45 **Eva Rubínová, Heather Price and Sonja Brubacher** (University of Aberdeen, Thompson Rivers University, Canada, Griffith University, Australia) The impact of prior knowledge on memory for single and repeated events: A registered report.

12:00 **Hannah Kirsop*, Scott Cairney and Lisa Henderson** (Sponsor: Lisa Henderson) (University of York) Investigating memory control using the Think/No-Think task and its relationship with sleep and mental health.

12:15 **Anna Klets*, Marcus Harrington, Aidan Horner and Scott Cairney** (Sponsor: Angela De Bruin) (University of York, University of East Anglia) Effects of sleep on emotional memory suppression.

12:30 **Lunch (Not Supplied)**

START OF PARALLEL SESSIONS

Session C **- Lecture Theatre 2**

09:00 **Skylar Laursen and Chris Fiacconi** (University of Guelph) Retrieval Outcomes Predict Restudy Decision Efficacy.

09:15 **Ver-Se Denga, Hanae David and Bruce Milliken** (McMaster University) Perceptual difficulty, encoding of meaning, and recognition memory.

09:30 **Katherine Churey and Chris Fiacconi** (University of Guelph) Remindings facilitate confident and correct rejection of false memories.

09:45 **Lívia Valenti*, Patrícia Waltz Schelini*, Cesar Galera* and Sarah Laurence** (Sponsor: Sarah Laurence) (Federal University of São Carlos, Brazil, University of São Paulo, Brazil, Open University) Metacognition of working memory for emotional faces.

10:00 **Ruolan Zhang*, Colette Hirsch and Charlotte Russell** (Sponsor: Charlotte Russell) (King's College London) The impairing effects of positive and negative faces on memory for spatial details.

10:15 **Stefana Juncu*, Ryan Fitzgerald, Eva Rubínová and Eva Ribbers** (Sponsor: Eva Rubínová) (University of Portsmouth, Simon Fraser University, Canada, University of Aberdeen) Eyewitness Line-up Identity (ELI) database: Crime videos and mugshots for eyewitness identification research.

10:30 **Tea / Coffee**

11:00 **Hae-Sung Jeon* and John Marsh** (Sponsor: John Marsh) (University of Central Lancashire) Pitch variation and task-irrelevant auditory distraction: Exploring the effects of irregularity and directional change.

11:15 **John Marsh, Kathleen McCulloch, Cleopatra Moshona, Julia Focker, Matthew Kershaw and Florian Kattner** (University of Central Lancashire, Luleå University of Technology, Sweden, Technische Universität Berlin, Germany, University of Lincoln, Institute for Mind, Brain and Behavior, Germany) When whispering speaks louder: The impact of comprehensibility on short-term memory disruption by hushed speech.

11:30 **Rocco Chiou*, Francesca Branzi and Beth Jefferies** (Sponsor: Jeremy Tree) (University of Surrey, University of Liverpool, University of York) Theta-burst stimulation shows angular gyrus preferences in semantic processing: Abstract over concrete, buffered over immediate.

11:45 **Colin MacLeod** (University of Waterloo) The production effect: A distinctive memory advantage.

12:00 **Dylan Tan, Samridhi Singh, Greg Shikevich, Divnoor Ruprai and Mike Nixon** (University of Waterloo) Finding the Beat: How sound-movement alignment boosts flow, performance, and enjoyment in gaming.

12:15 **Carson Rumble-Tricker, Gurjit Singh and Mark Fenske** (University of Guelph) Physical exertion as an in-the-moment index of listening effort.

12:30 **Lunch (Not Supplied)**

Session A **– Lecture Theatre 4**

13:30 **Andrew Surtees** (University of Birmingham) Does anxiety induce egocentric mentalizing?

14:00 **Robert Lee*, Danyang Li, Sanne van der Kleij, Rory Devine and Ian Apperly** (Sponsor: Andy Surtees) (University of Birmingham) Developing the Birmingham Advanced Mindreading Stories (BAMS): A valid and reliable measure of mindreading for adults that advances our understanding of how mindreading continues to vary beyond childhood.

14:30 **Patrick Haggard, Ivan Ezquerra-Romano, Jo Foster and Josh Solomon** (University College London, City St George's) Testing fundamental theories of consciousness science using psychophysical models: The case of warm and cold.

15:00 **Tea / Coffee**

CSBBCS-Past President's Symposium

15:30 **Simon Handley, Marzie Qaen and Erik Reichle** (Macquarie University) Intuitive processes and Rational Thought: Exploring the role of probabilistic reasoning in intuitive logic.

16:00 **Zoe Purcell, Jérémie Buecler, Wim De Neys and Kobe Desender** (Université Paris Cité, France, KU Leuven, Belgium) From intuition to deliberation: Mechanisms for Engaging Effortful Thought.

16:30 **Valerie Thompson, Sundre Nerbas, Diane Prokop, Hannah Smith and Trinity Thibault** (University of Saskatchewan) The pernicious difficulty of giving up: A meta-reasoning analysis.

17:00 **Break**

17:15 **2025 EPS / BSA Undergraduate Project Prize Talk - Lecture Theatre 3**
Large language models surpass human experts in predicting neuroscience results.
Akilles Rechardt, Royal Holloway University of London

18:15 **Hebb Distinguished Contribution Award Lecture (CSBBCS) - Lecture Theatre 3**
The Reluctant Thinker: Why We Hesitate to Reflect- and to Stop.
Valerie Thompson (University of Saskatchewan)

19:15 **Poster Session Two**

Session B **- Lecture Theatre 1**

13:30 ~~**Alex Jones** (Swansea University) Generative modelling of face processing tasks reveals improved task reliability and ability measurement.~~ ***Withdrawn***

14:00 **Nikolas Pautz, Thom Baguley and Harriet Smith** (Nottingham Trent University) Seeing and hearing age: Estimating child age from faces and voices.

14:30 **Ryan Elson*, Denis Schluppeck and Alan Johnston** (Sponsor: Emily Crowe) (University of Nottingham) Cross-view facial motion reconstruction with a 2-step Multi-view Face Space (2sMVFS).

15:00 **Tea / Coffee**

15:30 **Brandi Lee Drisdelle and Martin Eimer** (University of Bristol, Birkbeck, University of London) Influence of perceptual grouping on multiple salient distractor inhibition during visual search.

16:00 **Tim Andrews and David Watson** (University of York) A data-driven analysis of the perceptual and neural responses to natural objects reveals organising principles of visual cognition.

16:30 **Mahmoud Elsherif, Isabel Blackie, Anisah Islam and Andrew Surtees** (University of Birmingham, University of Leicester) A Competitive Edge: How social cues and spatial congruence influence joint attention in addressed or witnessed interactions.

17:00 **Break**

17:15 **2025 EPS / BSA Undergraduate Project Prize Talk - Lecture Theatre 3**
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Valerie Thompson (University of Saskatchewan)

19:15 **Poster Session Two**

Session C **- Lecture Theatre 2**

13:30 **Daniel Smith, Alexis Cheviet, Anthony Atkinson and Alison Lane** (Durham University) Deficits of visuospatial attention and short-term memory progressive supranuclear palsy and Parkinson's disease.

14:00 **Gerard Campbell*, Rebecca Hart, Richard Allen, Claudia von Bastian, Melanie Burke, Mario Parra Rodriguez, Victor Shiramizu and Louise Brown Nicholls** (Sponsor: Louise Brown Nicholls) (University of Strathclyde, University of Leeds, University of Sheffield) The impact of age and spontaneous strategy use on real-world visual memory tasks.

14:30 **Snehlata Jaswal and Urvashi Chittodiya** (Sikkim University, India, Chaudhary Charan Singh University, India) Development of Visual Feature Binding: Comparing 4-year-olds and 8-year-olds.

15:00 **Tea / Coffee**

15:30 **Ewan Murray* and Steven Pan** (Sponsor: Angela De Bruin) (University of York, National University of Singapore, Singapore) Bolding and the broader benefits of pretesting.

16:00 **Sebastian Tustanowski*, Joseph Brooks, Susan Sherman and Helen Williams** (Sponsor: Daniel Smith) (Keele University, University of Sheffield) Metamemory monitoring in real-world scenes: Integration of and competition between cues.

16:30 **Harrison Paff*, Alissa Melinger, Sheila Cunningham and Josephine Ross** (Sponsor: Josephine Ross) (University of Dundee, Abertay University) Am I sigma, NPC or skibidi? Mnemonic self-enhancement biases rely on explicit self-evaluation, but we preferentially encode all self-referential stimuli.

17:00 **Break**

17:15 **2025 EPS / BSA Undergraduate Project Prize Talk - Lecture Theatre 3**
Large language models surpass human experts in predicting neuroscience results.
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18:15 **Hebb Distinguished Contribution Award Lecture (CSBBCS) - Lecture Theatre 3**
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Valerie Thompson (University of Saskatchewan)

19:15 **Poster Session Two**

START OF PARALLEL SESSIONS

Session A **- Lecture Theatre 4**

09:00 **Silvia Shiwei Zhou, Jonathan Smallwood and Jeffrey Wammes** (Queens University) From classroom to daily life: The impact of attentional stability on real-world learning performance.

09:15 **Anna Kazatchkova, Joshua Skorburg and Christopher Fiacconi** (University of Guelph) The cognitive cost of convenience: Offloading generative tasks to ChatGPT impacts learning outcomes.

09:30 **Ayushi Chitranshi, Jo-Anne LeFevre and Rebecca Merkley** (Carleton University) Exploring profiles of early math achievement in Canadian students.

09:45 **Linda Arrighi*, H. Moriah Solokowski, Markus Hausmann and Anna Matejko** (Sponsor: Dan Smith) (Durham University, Toronto Metropolitan University, Canada) Are sex/gender differences in math anxiety mediated by spatial anxiety and performance in 8- to 11-year-olds?

10:00 **Martin Fischer, Farhad Farkhondeh Tale Navi, Taisia Ulianova and Saied Sabaghypour** (University of Potsdam, Germany, University of Tabriz, Iran, University of Western Ontario, Canada) The emotional space of arithmetic: Exploring affective influences on verification.

10:15 **Joshua March*, David Hamilton and Alex Bourke** (Sponsor: Sheila Cunningham) (University of Strathclyde) Investigating the impact of Gen-AI source on HE students' perceptions of learning.

10:30 **Tea / Coffee**

11:00 **Anthony Lee*, Amy Zhao*, Morgan Sidari* and Brendan Zietsch*** (Sponsor: Thora Bjornsdottir) (University of Stirling, University of Queensland, Australia) Do social judgements made from facial photographs predict those made in-person?

11:15 **Kristen Baker and Catherine Mondloch** (University of Kent, Brock University, Canada) Individual differences in older and younger adults' face learning efficiency.

11:30 **Thora Bjornsdottir** (University of Stirling) Clothing cues to status moderate face recognition.

11:45 **Logan Ueckert, Yaren Koca and Chris Oriet** (University of Regina) The importance of context in face recognition.

12:00 **Rebekah Corpuz, Amanpreet Sidhu and Chris Oriet** (University of Regina) The confidence-accuracy relationship and own-age bias when recognizing unfamiliar faces.

12:15 **Kathleen Hourihan and Daniel Gonsalves** (Memorial University of Newfoundland) Does experiencing a recognition test improve metamemory accuracy for emotional images?

12:30 **EPS Business Meeting for Ordinary and Postgraduate Members**
Lecture Theatre 4

START OF PARALLEL SESSIONS

Session B **- Lecture Theatre 1**

09:00 **Naomi Nota*, Margaret Swanson, Rhona Amos, Ruth Corps, Lauren Hadley, Graham Naylor and Martin Pickering** (Sponsor: Martin Pickering) (University of Edinburgh, University of Geneva, Switzerland, University of Sheffield, University of Nottingham) Examining prediction stages with accented speech using the visual-world paradigm.

09:15 **Shaun Dordoy* and Alastair Smith** (Sponsor: Mila Mileva) (University of Plymouth) Awareness of large-scale spatial statistics: Exploring the role of awareness in the allocation of attentional resources.

09:30 **Ziyi Wang* and Anna Grubert** (Sponsor: Anna Grubert) (Durham University) Capacity Bottlenecks in visual search: Evidence from event-related potentials.

09:45 **Sevda Montakhaby Nodeh and Bruce Milliken** (McMaster University) Training to attend selectively: Task demands shape the learning of cognitive control.

10:00 **Raymond Klein, Şimal Dölek, Seema Prasad and John Christie** (Dalhousie University) Are cuing effects really "negligible" when accuracy is emphasized and single masks eliminate uncertainty about target location?

10:15 **Samantha Joubran, Rebecca McCabe, Kelyn Young and Naseem Al-Aidroos** (University of Guelph) Searched but never found: Attentional control settings are pruned based on interactions with the external environment.

10:30 **Tea / Coffee**

11:00 **Anvita Gopal and James Danckert** (University of Waterloo) Boredom proneness, social media use and its implications on mental health.

11:15 **Anthony Cruz and Jean-Paul Minda** (Western University) Are there two distinct mechanisms of JOL reactivity?

11:30 **Anna Kazatchkova and Christopher Fiacconi** (University of Guelph) How to study and how long to study: Effectiveness of self-regulated study decisions.

11:45 **Neil Kirk*** (Sponsor: Sheila Cunningham) (Abertay University) Defence Against the Dark Arts: Simple nudges can make listeners more vigilant towards identifying AI voices.

12:00 ~~**Courteney Fisher*, Aakriti Bhardwaj and Gonzalo Urcelay** (Sponsor: Gonzalo Urcelay) (University of Nottingham) Time passage broadens generalization of instrumental avoidance in humans.~~ ***Withdrawn***

12:15 **Kalvin Roberts*, Elyse Edwards, Ines Jentzsch and Thomas Otto** (Sponsor: Ines Jentzsch) (University of St Andrews) Multisensory benefits measured with distinct motor actions: Introducing a novel paradigm with redundant signals.

12:30 **EPS Business Meeting for Ordinary and Postgraduate Members**
Lecture Theatre 4

START OF PARALLEL SESSIONS

Session C **- Lecture Theatre 2**

09:00 **Jessica Lammert, Blake Butler, Emiko Osborne and Sreethan Vuppala** (Western University) Learning through stories: Exploring the neurocognitive correlates of narrative processing in school-aged children.

09:15 **Jisoo Kim, Samuel Johnson and Ori Friedman** (University of Waterloo) Crime, Punishment, and Utility: How we weigh justice and economics.

09:30 **Jeremy Marty-Dugas and Daniel Smilek** (University of Waterloo) Media multitasking during online lectures: Varying volition and the interactivity of distracting media.

09:45 **Glenn Williams*, Jake Allen, Amy Pearson and Glenn Patrick Williams** (Sponsor: Yuki Kamide) (Northumbria University, Durham University) The double empathy problem in ambiguous communication: How perceived neurotype shapes interpretation of paralinguistic communication.

10:00 **Ruth Lee*, Patrycia Jarosz and Patricia Ganea** (Sponsor: Sven Mattys) (York St John University, University of Toronto, Canada) Young children's updating of mental representations of story characters and events based on verbal and pictorial information.

10:15 **Siobhan Caughey*, Marius Golubickis and Neil Macrae** (Sponsor: Neil Macrae) (University of Manchester, University of Aberdeen) Social mindfulness and prioritisation effects.

10:30 **Tea / Coffee**

11:00 **Aidan Knights, Sarah Armstrong, Dhwani Bhavsar, Cameron Clarke, Markus Mendes, Bianca Padilla, Maxwell Schaub and David Shore** (McMaster University) Indexing mental imagery using a colour identification paradigm.

11:15 **Sho Ishiguro, Domonic Guitard and Jean Saint-Aubin** (Université de Moncton) Lion–tiger–stripes: A test of the mediated association effect on working memory.

11:30 ~~**Liam Yeo and Nicholaus Brosowsky** (University of Manitoba) Exploring the attentional cycling model of mind wandering through the lens of time perception.~~

11:45 **Chi Yan*, Geoffrey Bird, Maria Elena Stefanou and Caroline Catmur** (Sponsor: Caroline Catmur) (Department of Psychology, King's College London, Department of Neuroimaging, King's College London, University of Oxford, University College London) N2pc as an index of attention shifting for emotional faces: The role of task type.

12:00 **Brent Pitchford*, Marelle Mäekalle*, Inga Ólafsdóttir* and Heida Sigurdardottir*** (Sponsor: Kristen Baker) (University of Iceland, Iceland, Reykjavik University, Iceland, KU Leuven, Belgium) Shifting into High-Level Vision: Tracking visual object foraging across development.

12:15 **Marina Wimmer, Michael Verde and Melissa McMullan** (Edinburgh Napier University, University of Plymouth) Zooming out: Extending the boundaries of children's and adults' visual memories.

12:30 **EPS Business Meeting for Ordinary and Postgraduate Members**
Lecture Theatre 4

Session A **– Lecture Theatre 4**

EPS Bartlett Prize Lecture Symposium.
People in mind.
Organised by Rob Jenkins.

13:45 **Catherine Mondloch** (Brock University, Canada) Noisy variability in face learning: A role for context and augmentation?

14:15 **Mila Mileva, Clare Sutherland, Fraser Gill, Mio Harkin, Talia Powell and Karin Wilkko** (University of Plymouth, University of Aberdeen) Gender stereotypicality in multimodal first impressions.

14:45 **David White, James Dunn, Monique Piggott, Bojana Popovic, Victor Varela, Sebastien Miellet and Alice Towler** (University of New South Wales, Australia, University of Sydney, Australia, Centro Universitário da FEI, Brazil, University of Wollongong, Australia, University of Queensland, Australia) Are individual differences in face recognition ability linked to social attention in natural settings?

15:15 **Tea / Coffee**

15:45 **Maria Ida Gobbini** (University of Bologna) Role of naturalistic stimuli to investigate the neural mechanisms for face perception and recognition.

16:15 **Rob Jenkins and Scarlett Syme** (University of York) Cyranoids reveal attribution of consciousness to artificial minds.

16:45 **Alan Kingstone and Rob Jenkins** (University of British Columbia, Canada, University of York) Abstraction of mind and the medusa effect.

17:15 **Break**

17:30 **EPS Bartlett Prize Lecture - Lecture Theatre 3**
Face Recognition: Familiarity, idiosyncrasy and representation.
Mike Burton, University of York

19:00 **Conference Dinner**

Session B **- Lecture Theatre 1**

13:45 **Chengjie Jiang*, Walter van Heuven and Ruth Filik** (Sponsor: Ruth Filik) (University of Nottingham) Is world knowledge activation exhaustive or selective during language comprehension? Evidence from bidirectional self-paced reading.

14:15 **Kumiko Fukumura** (University of Stirling) Interplay between animacy and thematic role in structure building.

14:45 **Roger van Gompel, Robert Hartsuiker and Leila Kantola** (University of Dundee, Ghent University, Belgium, Umeå University, Sweden) The head boost effect in structural priming: The position of the head does not matter.

15:15 **Tea / Coffee**

15:45 **Teng Guo*, Davide Crepaldi and Kathy Rastle** (Sponsor: Adam Parker) (Royal Holloway, University of London, University of Pavia, Italy) Discovering affixes in visual word processing: The role of explicit instruction in statistical learning.

16:15 **Estelle Ardanouy*, Lynne Duncan and Elise Lefèvre** (Sponsor: Lynne Duncan) (University of Dundee, KU Leuven, Belgium) Does education matter? Spelling among adults with and without dyslexia.

16:45 **Matthew Mak and Lukasz Walasek** (University of Warwick) Style and quality of undergraduate writing in the AI era: A cross-sectional and longitudinal analysis.

17:15 **Break**

17:30 **EPS Bartlett Prize Lecture - Lecture Theatre 3**
Face Recognition: Familiarity, idiosyncrasy and representation.
Mike Burton, University of York

19:00 **Conference Dinner**

Session C **- Lecture Theatre 2**

13:45 **Room available as a quiet space.**

15:15 **Tea / Coffee**

15:45 **Room available as a quiet space.**

17:15 **Break**

17:30 **EPS Bartlett Prize Lecture - Lecture Theatre 3**
Face Recognition: Familiarity, idiosyncrasy and representation.
Mike Burton, University of York

19:00 **Conference Dinner**

START OF PARALLEL SESSIONS

Session A **- Lecture Theatre 4**

09:30 **Domenic Au, Laurie Wilcox and Robert Allison** (York University, Canada) Distortions in perceived depth from conflicting ordinal and metric depth cues.

09:45 **Niyatee Narkar, Cassidy Darechuk and Mark Fenske** (University of Guelph) Don't look, don't like: Stimulus devaluation by oculomotor inhibition.

10:00 **Fermin Retnavarathan, Tara Nichols, Lynn Turkstra, Riley Morgan, Dasnoor Saini Andrew Silva, Xiaoxin Chen, Ben Thompson, Xiaoqing Gao, Haotian Lin, Agnes Wong, Daphne Maurer, Ewa Niechwiej-Szwedo and David Shore** (McMaster University) Developing measures of hidden binocularity: Evaluating test–retest reliability.

10:15 **Laurence Harris, John Jong-Jin Kim and Björn Jörges.** (York University, Canada) Assessing the integration of visual and audio cues used for heading perception.

10:30 **François Vachon, Sacha-Michelle Dubois-Sénéchal, Katherine Labonté, Clara Morais-Cormier and John Marsh** (Université Laval) Hemispheric asymmetries in auditory distraction by acoustic and semantic deviations.

10:45 **Danica Robichaud, Heath Matheson and Benjamin Zendel** (Memorial University of Newfoundland) How involved is the motor system in memory.

11:00 **Tea / Coffee**

11:30 **Raheleh Saryazd and Si On Yoon** (Trent University) How modifiers in language production and comprehension affect younger and older adults' memory.

11:45 **Randall Jamieson, Matthew Crump, Brendan Johns and Michael Jones** (University of Manitoba) An episodic model of semantic memory.

12:00 **Antonio Iniesta, Marco Senaldi, Teva Alon and Debra Titone** (McGill University) Exploring comprehension and production symmetry in idiom processing: Effects of familiarity and color coding on L1 and L2 typing production.

12:15 **Olivia Ward and Deanna Friesen** (University of Western Ontario) Using an error detection paradigm to examine individual differences in reading comprehension performance.

12:30 **CSBBCS Business Meeting**
Lecture Theatre 4

13:30 **End of Meeting**

START OF PARALLEL SESSIONS

Session B **- Lecture Theatre 1**

09:30 ~~**Alexander Cameron*, Teresa Tavassoli* and David Field** (Sponsor: David Field) (University of Reading) Touch activated capillary phlebotomy as an alternative to venepuncture for collecting blood samples from autistic adults.~~ ***Withdrawn***

09:45 **Corinne Jola* and Andrea Frick** (Sponsor: Sheila Cunningham) (Abertay University, Zurich University of Applied Sciences, Switzerland) Twisting bodies and turning minds: Children's engagement in aesthetic physical activity and their spatial cognition performance.

10:00 **Sarah Salo* and Alastair Smith** (Sponsor: Alastair Smith) (University of Bristol, University of Plymouth) Does size matter? Clock contours in ageing.

10:15 **Thomas Otto* and Kalvin Roberts** (Sponsor: Ines Jentzsch) (University of St Andrews) When one race is not enough: Introducing the relay model to explain multisensory response times.

10:30 **Shalmali Joshi*, Alicia Thompson, Amelia Bell, Anina Vrioni, Anna Birkett, Christen Obel, Giulia Bassetta, Junge Wang, Naz Oz, Palomi Sawant, Su Lin Lee and Antony Trotter** (Sponsor: Antony Trotter) (University of Nottingham, King's College London) Many hands make for light work: Student-led projects are unaffected by sampling population and testing platform.

11:00 **Tea / Coffee**

11:30 **Olave Krigolson, Mathew Hammerstrom, Katherine Boere, Gordon Binsted and Kenton Hecker** (University of Victoria) Neuroimaging in 5 minutes or less.

11:45 **Brian Kim, Katherine White and Myra Fernandes** (University of Waterloo) Using sentiment analysis to characterize narrative memory for emotional videos: The role of language proficiency.

12:00 **Keanna Rowchan, Hala Rahman and Jeffrey Wammes** (Queen's University) Multimodal components and evolving brain-states underlie learning during drawing tasks.

12:15 **Zoey Stark and Aaron Johnson** (Concordia University) Investigating sequential letter reversals in adults with dyslexia using the oddball paradigm.

12:30 **CSBBCS Business Meeting**
Lecture Theatre 4

13:30 **End of Meeting**

START OF PARALLEL SESSIONS

Session C **- Lecture Theatre 2**

09:30 **Melissa van Dijk-Allen, Bruno Korst-Fagundes and Daniel Smilek** (University of Waterloo) The effects of previewed instructor enthusiasm on attentional forecasting.

09:45 **Hala Rahman, Shaela Jalava, Meghan DeBettencourt, Jonathan Smallwood and Jeffrey Wammes** (Queen's University) Real-time triggering identifies thought patterns using dynamic behavioral variability.

10:00 **Niki Sinha and Marc Joanisse** (University of Western Ontario) Reading with intent: Phonological processing is not always automatic.

10:15 **Samantha Ayers-Glassey, Effie Pereira, Jeffrey Wammes and Daniel Smilek** (University of Waterloo) How accurate are retrospective reports of attention following a 24 hr delay?

10:30 **Kathryn Bolton, Lixia Yang, Peter Yan and Lily Zhang** (Toronto Metropolitan University) The immediate benefits of an enhanced music program on the psychosocial and cognitive functions of older adults.

10:45 **Vanessa Cunha, Patrick Davidson, Alex Castro, Steven Carton and Charles Collin** (University of Ottawa) The Second Database of emotional videos from Ottawa (DEVO-2): Over 1300 brief video clips rated on valence, arousal, impact, and familiarity.

11:00 **Tea / Coffee**

11:30 **Room available as a quiet space.**

12:30 **CSBBCS Business Meeting**
Lecture Theatre 4

13:30 **End of Meeting**

The first poster session will be held on Tuesday 8th July between 6.30pm and 7.30pm in the Dalhousie Building Atrium with an accompanying wine reception.

1. **Matthew Kershaw*, John Marsh and Philipp Ruhnau** (Sponsor: John Marsh) (University of Central Lancashire) Investigating the cognitive underpinnings of distracter complexity effects.

2. **Tabea-Maria Haase*, Richard Aveyard and Silke Goebel** (Sponsor: Rob Jenkins) (University of York, University of Oslo, Norway) Research Plan - Investigating how we represent mirrors of alphanumeric characters using OPM - MEG.

3. **Barbora Illithova*, Rama Chakravarthi and Clare Sutherland** (Sponsor: Clare Sutherland) (University of Aberdeen, University of Western Australia, Australia) Impressions are in the mind of the beholder: Idiosyncratic associations unite domains of naturalistic whole-person perception.

4. **Leoni Masroujah*, C. Neil Macrae, Mary El Champsi, Poppy Wilkinson, Pinja Pyorret and Clare Sutherland** (Sponsor: Clare Sutherland) (University of Aberdeen, University of Western Australia, Australia) Women are perceived as competent, but only in 'pink' locations: How gender stereotyped locations affect face impressions.

5. **Arran Reader and Emily Cheah McCorry** (University of Stirling) No size-order preference for low mass objects during multiple object handling.

6. **Sümeyye Şen Alpay*, Christian Keitel, Yuki Kamide and Anne Keitel** (Sponsor: Yuki Kamide) (University of Dundee) Pupil dilation and eye movements track emotion content in natural speech.

7. **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.

8. **Emily Cunningham*, Magdalena Ietswaart and Christian Keitel** (Sponsor: Thora Bjornsdottir) (University of Stirling, University of Dundee) Around the clock: Physiological markers of lapses in attention during sustained task performance.

9. **Hio Tong Pang*, Louise Phillips and Min Hooi Yong** (Sponsor: Louise Phillips) (University of Aberdeen, University of Bradford) The relationships between empathy and problem solving in social advice task amongst older adults.

10. **Jessica De La Mare*, Benedict Jones and Anthony Lee** (Sponsor: Thora Bjornsdottir) (University of Stirling, University of Strathclyde) The role of stimuli trustworthiness, dominance, and attractiveness on overall impressions of online dating profiles.

11. **Sarah Laurence, Camilla Düring, Jennifer Pink, Lucy Wilson, Mike Burton and Mila Mileva** (The Open University, University of Plymouth, University of York) Exploring representations of familiar faces using weighted averages.

12. **Rosanne Timmerman*, Saara Varjopuro, Tanja Atanasova, Sarah Allen, Efstratios Koukouvinis and Anne Keitel** (Sponsor: Lynne Duncan) (University of Dundee, University of Glasgow) The effect of preference, enjoyment and familiarity on neural music processing.

13. **Tanja Atanasova*, Rosanne Timmerman and Anne Keitel** (Sponsor: Lizzie Bradford) (University of Dundee) The influence of endogenous brain rhythms on speech comprehension.

14. **Nancy Wenyao Zheng*, Akira O'Connor and David Donaldson** (Sponsor: Lizzie Bradford) (University of St Andrews) Exploring the effect of inertial perception on auditory attention allocation using mobile EEG: Does neuroimaging work in the real world?

15. **Maria Nygaard* and Louise Phillips** (Sponsor: Louise Phillips) (University of Aberdeen) The role of social factors on motivation in prospective memory amongst older adults.

16. **Maryam AlJassmi*, Fatma Al-Raeesi, Sami Boudelaa, Yuan Meng and Kevin Paterson** (Sponsor: Kevin Paterson) (United Arab Emirates University, United Arab Emirates, University of Leicester, Zayed University, United Arab Emirates) How morphological structure modulates the optimal viewing position: Eye-tracking evidence from Arabic.

17. **Sarah Allen*, Stratos Koukouvinis, Saara Varjopuro, Lynne Duncan and Anne Keitel** (Sponsor: Lynne Duncan) (University of Dundee, University of Glasgow, University of Turku, Finland) The Relationship between reading ability and neural synchronisation to speech and music.

18. **Mihaela Lyutskanova*, Sanna Fraser*, Christian Keitel, Tom Gilbertson, Douglas Steele and Christopher Benwell** (Sponsor: Yuki Kamide) (University of Dundee, Ninewells Hospital, Dundee) Facilitating early diagnosis of neurodegenerative diseases through normative modelling of healthy brain states.

19. **Judith Lowes*, Peter Hanacok and Anna Bobak** (Sponsor: Anna Bobak) (University of Stirling) An in-depth investigation of face processing in developmental prosopagnosia.

20. **Alyssa Giovannangeli, Ben Sclodnick, Melina Solomon and Bruce Milliken** (McMaster University) Are task set preparation effects in singleton search context-specific?

21. **Rachel Eng, Naseem Al-Aidroos and Lana Trick** (University of Guelph) Does Feature Instability Affect Multiple Object Tracking?

22. **Rachel Yapp, Nadja Janjovic, Aaron Richardson, Vincent Di Lollo and Tomas Spalek** (Simon Fraser University) Is an increase in space-averaged luminance necessary to elicit alerting?

23. **Samantha Good, Paris Yuexiao Wang, Alan Kingstone and James Enns** (University of British Columbia) Cognitive decline or strategic choice? Measuring attentional control in healthy aging.

24. **Dana Murphy, Paige Armstrong, Rebecca Landry and Dialaxmi Mallela** (Nipissing University) Implicit memory for unattended background speech in monolingual / bilingual and aging adults.

25. **Ella Shantz and Dana Murphy** (Nipissing University) Effects of Temporal Delay in Auditory Integration in Younger and Older Adults.

26. **Daria Chernova and Austen Smith** (University of Regina) The Effects of Mood on the Lateralization of Visuospatial Attention: Testing the Valence Hypothesis.

27. **Tara Nichols, Fermin Retnavarathan, Andrea Silva, Xiaozin Chen and Benjamin Thompson, Xiaoqing Gao, Haotian Lin, Agnes Wong, Daphne Maurer, Ewa Niechwiej-Szwedo, and David Shore.** (McMaster University, University of Waterloo, Zhejiang University, Zhongshan Ophthalmic Center, The Hospital for Sick Children, Toronto) Hidden Binocularity: Searching for Measures in Controls and Individuals with Amblyopia.

28. **Madison Prudencio and Stefon Van Noordt** (Mount Saint Vincent University) Examining Neural Responses to Social Rejection: Developmental and Individual Differences in Anxiety.

29. **Alex Castro, Violeta Chitgian Urzua, Matthieu Mallet, Patrick Davidson and Sara Tremblay** (University of Ottawa) CASTRO (Culturally Adaptive & Sensitive Test for Recognizing Others) Memory Task.

30. **Francesca Carraro, Annick Tanguay and Shanna Kousaie** (University of Ottawa) Bilingual Language Experience Predicts Larger Hippocampal Subfield Volume in Older Adults.

31. **Aalim Makani, Sarah Shahrour and Julia Spaniol** (Toronto Metropolitan University) A test of arousal-biased competition theory in the context of risky choice.

32. **Zuleika Gasimova, Amiya Aggarwal, Jonathan Fugelsang and Alexander Walker** (University of Western Ontario) The Social Cost of Impartiality: Moral perceptions of helping are influenced by relationship obligations.

33. ~~**Avory Zienowicz, Supretta Ranchod, Amira Jensen, Nisa Hofer, Candace Burke, Jenni Karl and Claudia Gonzalez** (Thompson Rivers University) Examining Brain Function and Behaviour in Infants During Prehension and Play: A fNIRS Study.~~ ***Withdrawn***

34. **Hannah May and Marcie Penner** (University of Western Ontario) Quantitative and Linguistic Pathways to Early Numeracy: The Importance of Parental Attitudes, Home Experiences, and Early Skills.

35. **Emily Larkin, Véronic Delage, Marie Piere Grégoire-Gaul, Cristina Atrace and Erin Maloney** (University of Ottawa) Puzzle Play and Amount of Parental Spatial Talk in a Digital Age.

36. **Kate McCrimmon, Jasmine Tossan and Katherine White** (University of Waterloo) Age-based Prediction in Language Processing.

37. **Arya Karki, Melissa Pinto and Chantal Lemieux** (Algoma University) Gender Difference in Spatial Cue Utilization and Local Metacognition.

38. **Angelique Aliperti and Jennifer Sutton** (Western University) Spatial knowledge of campus predicts feelings of belonging at university.

39. ~~**Madeline Bloomberg, Ardhra Miliakal and John Paul Minda** (Western University) Seeing the Forest or the Trees: The Impact of Attention on Category Learning.~~ ***Withdrawn***

40. **Melissa Pinto, Arya Karki and Chantal Lemieux** (Algoma University) Gender differences in motion sickness experiences.

41. **Natalia McCullough, Katherine Robinson and Alexandra Apesland** (University of Regina) Eye Love Arithmetic: An Inversion and Associativity Eye Tracking Study.

42. **Narae Ju, Valerie San Juan and Elizabeth Nilsen** (University of Calgary) That's not the one I wanted: Feedback improves 5-year-olds' communicative perspective-taking.

43. **Naima Mansuri, Esteban Hernandez-Rivera, Michelle Yang and Debra Titone** (McGill University) When "salt and pepper" diverges from "pepper and salt": How do L1 and L2 readers comprehend binomial expressions?

44. **Stephanie Deschamps, Jen-Kai Chen, Kevin Sitek, Casey Roark, Bharath Chandrasekaran, Shari Baum and Denise Klein** (McGill University) Effects of Early Language Exposure on Feedback Processing: Speech Category Learning in International Adoptees.

45. **Veronica Bodea and David Sidhu** (Carleton University) Lost in Translation? Maybe your body knows the answer.

46. **Tasha Ignatius, Randy Flanagan, Gerome Manson and Jeffrey Wammes** (Queen's University) Drawing quality and visual feature selection influence recognition memory.

47. **Yadurshana Sivashankar and Myra Fernandes** (University of Waterloo) Route and Landmark Memory: The Role of Decision-Making During Encoding in Older Adults.

48. **Jonathan Fawcett, Brady Roberts, Hanna Willoughby, Jenny Tiller, Kathleen Hourihan and Colin Macleod** (Memorial University of Newfoundland) The pupillometric production effect: Evidence for enhanced processing preceding, during, and following production.

49. **Siyue Hu, Cayley Thoms, Hannah Willoughby, Jedidiah Whitridge and Jonathan Fawcett** (Memorial University of Newfoundland) Preparation (without production) is enough to elicit a production effect: A behavioural and pupillometric investigation.

50. **Kesaan Kandasamy, Gabriel Crone, Katherine Imbat, Mary Wang, Buddhika Bellana and Lixia Yang** (Toronto Metropolitan University) The Memory Lingering Effect: Does it Extend to Older Adults?

51. **Sevda Hasanli and Patrick Davidson** (University of Ottawa) Can a Large Language Model (LLM) match humans in describing and rating complexity of videos?

52. **Veronica Bodea, Liza Kahwaki, Emily Schwartz, Rebecca Merkley and Guy Lacriox** (Carleton University) Is "Time" on Your Mind? How Prospective Judgment Primes Recognition.

53. **Severina Ferreira-Lopes and Aaron Johnson** (Concordia University) Eccentric Viewing Training for Balance in Older Adults with Visual Impairment.

54. **Corina Lacombe, Kassia Dubé and Charles Collin** (University of Ottawa) Investigating the Role of Mood Induction on Emotion Recognition in Social Anxiety.

55. **Diya Kamineni, Christen Potvin, Fraulein Retanal, Kessica Belisle, Hannah Young and Erin Maloney** (University of Ottawa) Relations Between Math Anxiety, Math-Related Intrusive Thoughts Management and Math Performance.

56. **Kieran Price and Jason Ivanoff** (Saint Mary's University) Is Response Speed or Poor Discriminability Necessary for the "Natural Tendency to Respond Toward the Source of Stimulation" in the Simon Task?

57. **Rafaela Platkin** (University of Western Ontario) Understanding Children's Engagement with Auditory Narratives: A Multimodal Approach.

58. **Julia Byron, Anna MacGillivray, Jack Lukeman, Laura Lambe and Ralph Redden** (St. Francis Xavier University) Standing up in the virtual world: Observing social-cognitive factors influencing peer defending behaviours using virtual reality.

59. **Maxine Montpetit, Manda Fischer, Ingrid Johnsrude and Shanna Kousaie** (University of Western Ontario, University of Ottawa) Lost in Translation? How Multitasking Effects Native and Non-Native Speech Processing.

The second poster session will be held on Wednesday 9th July between 7.15pm and 8.15pm in the Dalhousie Building Atrium with an accompanying wine reception.

1. **Matthew Villaquiran*, Andy Wills and Mila Mileva** (Sponsor: Mila Mileva) (University of Plymouth) First impressions of AI-generated faces and voices.

2. **Aimee Westbrook*, Nicholas Hedger and Etienne Roesch** (Sponsor: Katie Gray) (University of Reading) Influence of subliminal primes on perceptual judgements: Effects under masking and crowding.

3. **Vanessa Keller*, Scott Cairney and Gareth Gaskell** (Sponsor: Angela De Bruin) (University of York) Effects of processing lexically ambiguous words on subsequent recognition memory.

4. **Chloe Lanceley*, Victoria Lovett, David Playfoot and Jeremy Tree** (Sponsor: David Playfoot) (Swansea University) Over-imitation in older adults.

5. **Eva Kimel, Alice O'Hagan, Yekete Akal, Tali Bitan and Gareth Gaskell** (University of York, Tel-Hai Academic College, University of Haifa) Linking input non-uniformity with memory in a self-guided learning paradigm.

6. **Osarugue Victory Ulamen*, Eva Rubinova and Katja Zibrek** (Sponsor: Eva Rubinova) (University of Aberdeen, University of Rennes, France) Interviewing witnesses of interpersonal conflict: Improving report accuracy and consistency with the use of the timeline technique.

7. **Sophie Johnson* and Sam Berens** (Sponsor: Lizzie Bradford) (University of Sussex, Sussex Neuroscience) Learning map-like neural representations of abstract concepts.

8. **Elizabeth Renner*, Jason Rajsic and Ellie Wilson** (Sponsor: Ruth Filik) (Northumbria University) Effect of mode (2D vs 3D) and speed of play on memory performance in the game Concentration.

9. **Anita Twele* and Catherine Mondloch** (Sponsor: Clare Sutherland) (Brock University, Canada) Why doesn't the stereotype content model align with spontaneous impressions of young and older adult faces?

10. **Sophia Thierry* and Catherine Mondloch** (Sponsor: Clare Sutherland) (Brock University, Canada) An exploration of face and perceiver characteristics influencing adults' social impressions of child faces.

11. **Cordelia Meaker* and Brandi Lee Drisdelle** (Sponsor: Brandi Lee Drisdelle) (University of Bristol, University of Plymouth) Research Plan - Determining the impact of distractions on attentional control strategies.

12. **Mathilde Prenevost*, Lily FitzGibbon and Marina Bazhydai** (Sponsor: Lily FitzGibbon) (Lancaster University, University of Stirling) Research Plan - Curiosity Battery: A toolkit to measure children's curiosity.

13. **Eleanor Redfern*, Lisa Henderson, Silke Goebel, Scott Cairney and Emma Sullivan** (Sponsor: Rob Jenkins) (University of York) Investigating the relationships between sleep, maths anxiety and executive control.

14. **Artie Graham*, Robert McGregor, Anna Maher and Anthony McGregor** (Sponsor: Anthony McGregor) (Durham University) The effect of chemogenetic inactivation of the dorsolateral striatum on spatial learning in rats.

15. **Christopher Madan** (University of Nottingham) Lessons from academia and the world beyond: Post-PhD career paths and considerations.

16. **Christian Keitel*, Daniel Kluger and Joachim Gross** (Sponsor: Lynne Duncan) (University of Dundee, University of Muenster, Germany) A dynamic link between respiration and arousal.

17. **Antti Lattula*, Leonardo Weiss-Cohen and Christopher Madan** (Sponsor: Christopher Madan) (University of Nottingham) Numbers or Pictures? Comparing the description-experience gap with numeric and pictographic risk representations.

18. **Silke Wortha*, Korbinian Moeller and Kinga Morsanyi** (Sponsor: Camilla Gilmore) (Loughborough University) Research Plan - How activities of daily living relate to early mathematical development in healthy children.

19. **Zari Mousapour*, Phil Gee, Jaysan Charlesford and Pam Rae** (Sponsor: Mila Mileva) (University of Plymouth) The cognitive mechanism of Inter-Professional Education (IPE) in health and social care.

20. **Eleni Dubé-Zinatelli, Edwige Mayotte, Francesca Carraro and Nafissa Ismail** (University of Ottawa) Effects of Pubertal Antimicrobials and Lipopolysaccharide Treatments on the Brain, Ileum, and Liver: Implications for Neurodegeneration via the Gut-Liver-Brain Axis.

21. **Valêrie Lapointe, Brendan McAllister, Elisha Wong, Audrey Golsteyn, Jayden Hutchinson, Mackenzie Lavergne, Majid Mohajerani and Robert Sutherland** (University of Lethbridge) Age-dependent changes in neuropathology and behaviour in the P301S Tauopathy Mouse Model.

22. **Sophie Jacques, Alicia Jones and Catherine Reeve** (Dalhousie University) Executive Function in Dogs: Links with Receptive Language Abilities.

23. **Brandon Mayer and Dana Murphy** (Nipissing University) Emotional Speech and Distractibility: Age-Related Differences in Cognitive Task Performance.

24. **Diljan Sidhu, Yusuf Khan and Dana Murphy** (Nipissing University) Overcoming Inhibitory Deficits: Prioritization of Visual Information in Older Adults Elicits Priming Effects Similar to Younger Adults.

25. **Emily Mashaal and Mitchel LaPointe** (Mount Allison University) Using the attentional boost and word frequency effects to assess recognition memory performance among meditators and novices.

26. **Ben Sclodnick, Honglin Sun, Gabriel Xiao and Bruce Milliken** (McMaster University) Flexible, Trial-to-trial Preparation Effects in Singleton Search.

27. **Patrick Tsapoitis and Myra Fernandes** (University of Waterloo) Can Production During Encoding Protect Memories from Divided Attention?

28. **Nora Connolly, Ethan Kavanagh-Day, Anjali Pandey, Tracy Taylor and Jason Ivanoff** (Saint Mary's University) Does Tyrosine Affect Retrieval in a Directed Forgetting Task?

29. **Jaimy Hannah and Giovanni De Liberto** (University of Dublin) Neural Correlates of Trust in Speech Communication.

30. **Danica Robichaud, Heath Matheson and Benjamin Rich** (Memorial University of Newfoundland and Labrador) How Involved is the Motor System in Memory.

31. **Alexandra Morrison, Andrew Butler and Geneviève Desmarais** (Mount Allison University) The Impact of Visual and Haptic Sensory Degradation in Multisensory Integration and Object Perception Using Complex Objects.

32. **Andrew Butler, Alexandra Morrison and Geneviève Desmarais** (Mount Allison University) The Impact of Visual and Haptic Sensory Degradation in Multisensory Object Perception Using Simple Objects.

33. **Abigail Mitchell, Kai Côté and Geneviève Desmarais** (Mount Allison University) The Effect of Exercise and Degree of Congruence on the Colavita Effect.

34. **Rachel Simon, Maxwell Altman, Tyler MacDonald, Paul Andrews and David Shore** (McMaster University) Examining the Impact of Psychedelics on Cognition.

35. **Sarah Saperia and George Foussias** (University of Toronto) Examining the psychological pathways to motivation impairments in schizophrenia spectrum disorders: The role of neurocognition and social stress.

36. **Gabrielle Zeller, Rebecca Burbidge, Eva Lipton, Abby Morris, Zerevan Bindal and Sophie Jacques** (Dalhousie University) Hot-Cool Performance in Adults: Variations within and across six executive function tasks.

37. **Vivian Liu, Fraulein Retanal, Evan Risko, Jean-Francois Nureau, Helen Osana, Sheri-Lynn Skwarchuk and Erin Moloney** (University of Ottawa) Parent and child accuracy in estimating mathematics performance.

38. **Narissa Byers, Courtney Stacey and Veronica Whitford** (University of New Brunswick) Exploring the Relationship Between Cognitive Aging, Executive Functioning, and Schizotypal Traits.

39. **Courtney Stacey, Narissa Byers and Veronica Whitford** (University of New Brunswick) Cognitive Aging and Reading: An Exploratory Study of Perceptual Span.

40. **Greg Shaikevich, Jonathan Fugelsang and Katherine White** (University of Waterloo) The Crossmodal Illusion of Truth Effect.

41. **Marie Pier Grégoire-Gaul, Emily Karkin, Cristina Atance and Erin Maloney** (University of Ottawa) Comparing the types of spatial talk parents use during physical and virtual puzzle play with their child.

42. **Lindsay Heyland, Samantha Palatinus, Douglas Schiler and Daniel Lametti** (Acadia University) Motor Constraints on Second Language Speech Production.

43. **Angus Ball and Randy Jamieson** (University of Manitoba) Modelling lexical retrieval: An experimental and computational investigation using tip-of-the-tongue.

44. ~~**Felix Ayesu and Darcy Hallett** (Memorial University of Newfoundland and Labrador) Exploring Cross-Domain Associations Among Spatial Anxiety, Linear Number Line Knowledge, and Mathematical Performance in Adults.~~ ***Withdrawn***

45. **Maliha Dew and Kathleen Hourihan** (Memorial University of Newfoundland and Labrador) The Influence of Emotional Content on Metamemory Accuracy and Judgments of Learning (JOLs) within the Framework of Memory Monitoring in Emoji Recognition.

46. **Molly MacMillan, Blaire Dube and Kathleen Hourihan** (Memorial University of Newfoundland and Labrador) Stimulus Size Distorts the Perceived Temporal Structure of a Sequence.

47. **Madison LaSaga, Christopher Quinn-Nilas, Robyn Cumben, Marc Andersen, Mathias Clasen and Jonathan Fawcett** (Memorial University of Newfoundland and Labrador) Enter at Your Own Risk: Quantifying Intrusive Memories of Haunted House Experiences.

48. **Madison LaSaga, Jonathan Fawcett, Robyn Cumben, Marc Andersen, Mathias Clasen and Christopher Quinn-Nilas** (Memorial University of Newfoundland and Labrador) They're Heereeeee … in Your Head: Developing and Validating the Severity of Horror Media-induced Intrusive Memories Scale.

49. **Nathaniel Wells, Lauryn Eagles, Jedidiah Whitridge and Jonathan Fawcett (**Memorial University of Newfoundland and Labrador) Singing for Science: Exploring the Production Effect for Simple and Complex Singing.

50. **Olivia Ritchie, Mitchell LaPointe and Lucas Greville** (Mount Allison University) Language mnemonics enhance the learning of non-linguistic acoustic stimuli.

51. **Brendan Redmond and Kathllen Hourihan (**Memorial University of Newfoundland and Labrador) The Benefit and Cost of Source Judgment in the Directed Forgetting Paradigm.

52. **Katherine Churey, Ella Flaschner and Chris Fiacconi** (University of Guelph) Recalling reminded details protects against false recall.

53. **Leili Rouhi and Valerie Thompson** (University of Saskatchewan) The Impact of Working Memory Load on Metacognitive Monitoring.

54. **Adelaide Jensen, Alex Castro, Rui Hu and Patrick Davidson** (University of Ottawa) Multifactorial Memory Questionnaire: A comparison of young and older adults.

55. **Zuleika Gasimova and Valerie Thompson** (University of Saskatchewan) Belief-based Inferences in Logical Reasoning.

56. **Silia Losier Poirier, Audrey Caissie and Bradley Harding** (Université de Moncton) Replication of Ratcliff & Hacker's (1981) same-different task variant.

57. **Skylar Laursen, Michelle Dollois and Chris Fiacconi** (University of Guelph) Using memory to model metamemory: A novel application of MINERVA 2.

58. **Ryan Elson, Daniel Cocking, Adam Berrington, Katherine Dyke, Mohammad Zia Ul Haq Katshu and Claudia Danielmeier** (Sponsor: Emily Crowe) (University of Nottingham) Assessing glutamate changes in medial frontal cortex during encoding and recall phases of an associative visuospatial working memory task.

59. **Chantal Lemieux, Melissa Pinto, Arya Karki and Bamikole Adewale** (Algoma University) Gender differences in spatial cue utilization and metacognition during wayfinding: An eye-tracking Study.

CSBBCS Symposium: Current perspectives on reading.

Factors that Impact the Learning and Generalization of Newly Learned Pronunciations in Reading Aloud.

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Neural network models of English spelling-to-sound correspondences indicate that a graded "warping" mechanism enables the coding of both rules and exceptions. Words reflecting regularities (regulars, e.g., i in mint, hint, tint) require minimal representational warping and generalize broadly, exceptions that reflect atypical pronunciations (e.g., i in pint) require extensive warping and generalize rarely, and ambiguous words (e.g., i in drive/hive vs. give/live) fall somewhere in between. Thus, the warping mechanism predicts that the number of words with similar pronunciations determines how likely a pronunciation is to generalize. To evaluate whether human language representations align with neural network predictions, we manipulated context variability by teaching participants one, two, or three made-up words sharing the same regular, ambiguous, or exceptional rhyme body (e.g., -ive in bive vs. bive/tive vs. bive/tive/kive) in a multi-day word learning experiment with generalization tested on the last day. All items were learned to a high degree during training, but generalization varied as predicted by representational warping, indicating that context variability, more than rhyme-ending frequency (which was kept constant), drives generalization. Given that sleep is known to promote abstraction and generalization across exemplars, we also investigated whether the emergence of warped representations is specifically influenced by sleep-dependent consolidation. To test this, we conducted a condensed version of the same experiment wherein we trained and tested participants 12h apart, with or without an intervening period of sleep. If sleep enhances generalization by stabilizing and restructuring phonological-orthographic mappings, as predicted by memory consolidation theories, we excepted sleep to facilitate generalization, particularly for ambiguous and exceptional pronunciations that require greater warping. Preliminary results suggest limited evidence for an advantage of sleep. These results deepen our understanding of how a range of factors interact with neural representation mechanisms underlying phonological-orthographic mappings and may have implications for optimizing reading instruction.

Representational Similarity Analysis of the Neural Codes in Word Reading.

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Contemporary models of word recognition suggest that reading occurs within both a dorsal-route decoding pathway (orthography to phonology to semantics; O-P-S) and a ventral-route direct whole word pathway (orthography to semantics; O-S). The two pathways are further suggested to interact via a division of labour, with individual readers perhaps differing in their degree of reliance on one

or the other. Classical univariate neuroimaging studies are unable to capture graded representations and interdependence of representational units (such as orthography, phonology, semantics, and the intermediate processes). To address this, we investigated these neural codes using representational similarity analysis (RSA) and tested whether individual differences in the strength of representations within pathways predict reading ability. Fifty adult monolingual English readers silently read words during fMRI scanning. Using an RSA searchlight we identified regions sensitive to different reading sub-processes, as instantiated within a computational model of reading. Individual differences were then identified by correlating RSA results with scores on reading and cognitive tests completed outside of the scanner. We found that O-S processing follows a ventral sight recognition pathway, and semantic representations are distributed across the reading network. Additionally, stronger semantic and O-S representations in ventral stream brain regions were related to individuals' greater sensitivity to O-S information. The results support the theory that differences in reading skill ensue from the relative engagement of whole-word processes during visual word processing.

Can same-language subtitles help children become better readers?

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Influential campaigns in the UK and USA have argued that turning on same-language subtitles can improve children's reading. However, there is no convincing evidence to support these claims. Our first study investigated the extent to which primary school children engaged with subtitles. We tested 180 children in Years 1–6, using eye-tracking to measure where they looked while watching videos with and without subtitles. We found that children were able to engage with subtitles only after reaching a sufficient level of reading fluency, typically in Years 2-3. The second study tested the causal hypothesis that subtitles improve reading. 127 children in Years 2-3 were randomly assigned to an experimental or control group. The experimental group watched TV and streaming services with English subtitles at home for six weeks, while the control group watched TV without subtitles. Each group watched on average 11 hours of TV per week (SD = 5). Eye-tracking and behavioural measures were used to test whether the subtitles intervention increased children's attention to subtitles and improved their reading fluency. In the analysis of eye movements, we found that neither group changed their performance between the two testing sessions. In the behavioural measures of reading fluency, we found a main effect of session, indicating that all children improved in reading speed over six weeks. However, there was no impact of subtitles on reading fluency. These results indicate that watching TV with same-language subtitles for six weeks does not improve reading fluency or increase attention to subtitles. Overall, our findings suggest that same-language subtitles are unlikely to play a substantial role in children's reading acquisition. However, the primary school reading curriculum has a demonstrably positive impact on reading fluency in children that can be detected across relatively short time-scales.

Word-meaning priming during sentence reading for non-homographs.

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Recent evidence from the word-meaning priming paradigm suggests that even a single encounter with an ambiguous word can influence future interpretations. After just one exposure, participants are more likely to associate a homograph with its subordinate meaning. Similar effects have been observed for unambiguous words. However, it remains unclear whether word-meaning priming influences natural language processing beyond meta-linguistic tasks. While prior work shows experience aids homograph processing during sentence reading, we examined whether it similarly facilitates non-homographs. Participants read experimental sentences under three conditions: (1) unprimed, (2) probe-consistent primed (where primes biased the same meaning as the test sentence), and (3) probe-inconsistent primed (where primes biased a different meaning). Eye movement analyses revealed general priming effects, with shorter reading times on target words in the primed conditions compared to the unprimed condition. However, evidence for specific word-meaning priming was weaker: the difference between probe-consistent and probe-inconsistent conditions was small, and Bayes Factors were inconclusive for some measures. Overall, our current findings suggest that while word-meaning priming of non-homographs can facilitate lexical processing, its benefit during sentence reading appears limited.

CSBBCS-Symposium: The Intersection of language, cognition and the schizophrenia spectrum.

From Words to Diagnosis: The Potential Value of Speech Analysis in Schizophrenia.

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Schizophrenia is a severe mental health disorder that disrupts language and thought, leading to challenges in social interactions, employment, and relationships (Kalin et al., 2015). Language impairments, including disorganized speech and unusual linguistic patterns (DeLisi, 2001), are central to these difficulties and increasingly recognized as key clinical features of the disorder. Given the role of language disruptions in schizophrenia, speech analysis has emerged as a valuable tool for assessing and monitoring symptom severity (DeBoer et al., 2023; Arevian et al., 2020). Advances in natural language processing (NLP) have enabled automated speech analysis (Minor et al., 2023), enhancing the detection of psychosis risk (Bedi et al., 2015; Corcoran et al., 2018) and cognitive deficits (Girard et al., 2022; Minor et al., 2019). In this talk, we introduce the broader idea of using speech analysis to study schizophrenia, situating it within existing research. However, despite these advancements, the reliability of speech-based markers across different tasks, clinical settings, and illness stages is still underexplored (Minor et al., 2023). Without robust reliability, speech analysis cannot be meaningfully integrated into clinical practice. To address this gap, we present findings from our study evaluating the stability of speech markers over time in healthy individuals and individuals with schizophrenia. Using spontaneous speech data, we examine the consistency of linguistic markers related to content and organization across elicitation tasks with varying cognitive demands. Finally, there is a growing need for multilingual approaches to psychiatric assessment. Our

recent scoping review (Hodgins et al., 2024) underscores the importance of including bilingual and multilingual populations in schizophrenia research, highlighting the need for multilingual diagnostic tools. In future work, we aim to extend our speech-based analyses to multilingual populations, ensuring these markers are both reliable and applicable across diverse language contexts, contributing to more generalizable and equitable assessments.

Comparing Oculomotor Indicators of Local and Global Reading Difficulty in Schizophrenia and Developmental Dyslexia.

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Despite their different clinical manifestations and functional outcomes, growing evidence suggests that neuropsychiatric and neurodevelopmental disorders may share a common brain-based origin. For instance, studies have reported genetic and pathophysiological overlap between schizophrenia (a mental health condition characterized by positive and negative symptoms) and dyslexia (a language-based learning disorder characterized by word-reading difficulties). These shared factors may contribute to similar disturbances in perception (e.g., auditory processing, magnocellular functioning), cognition (e.g., attention, working memory), and language (e.g., phonological processing) observed in both conditions (reviewed in Vanova et al., 2021; Whitford et al., 2018). Although these processes play key roles in reading, surprisingly limited research has directly compared reading performance in schizophrenia and dyslexia (Whitford et al., 2024). To help address this gap in the literature, the current study employed eye movement measures of naturalistic paragraph reading (4 total; ~250 words each) to examine both local (word-level) and global (text-level) aspects of reading performance in adults with schizophrenia (n = 20) and psychiatrically healthy adults with dyslexia (n = 16). Matched control groups were also included for comparison purposes. Results from linear-mixed-effects regression models revealed two main findings. First, both the schizophrenia and dyslexia groups exhibited similar patterns of effortful local eye movement reading behaviour, evidenced by more/longer fixations, more regressions, longer word reading times, and larger effects of lexical properties, such as word frequency, that reflect ease of lexical accessibility from semantic memory. Second, these local reading difficulties scaled up to influence global eye movement reading behaviour, with both groups exhibiting more/longer fixations, more/shorter saccades, slower average reading rates, and longer total reading times. Taken together, our findings suggest that reading behaviour is similarly impaired in schizophrenia and dyslexia at both the local and global levels, lending further support for a potential common neurodevelopmental etiology.

Language Use and cognitive function in Schizophrenia Spectrum Disorders: Insights from Patients, First-Degree Relatives, and Healthy Controls.

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Language impairments are a core feature of schizophrenia spectrum disorders (SSD), reflecting underlying cognitive dysfunction. This study explores the intricate relationship between language use and cognitive domains, integrating findings from patients, first-degree relatives, and healthy controls. Drawing from (PAFIP) Programa de Atención a Fases Iniciales de Psicosis (2001-2018), PAFIP-FAMILIES (2018-2022) and PAFIP-DISCOURSE (2022–2025) projects, we examine linguistic disruptions in speech production alongside their associations with verbal memory, visual memory, working memory, executive function, motor dexterity, processing speed, attention and Theory of Mind. Preliminary findings suggest that SSD patients exhibit significant correlations between language disturbances and cognitive deficits, while first-degree relatives display linguistic and cognitive diversity, potentially serving as endophenotypic markers of psychosis risk. Our results provide novel insights into cognitive-linguistic interplay with implications for early identification and intervention, which will highlight the translational potential of language-based assessments in clinical and research settings.

Understanding the Emergence of Auditory Verbal Hallucinations: Linking Voice Perception to Speech Comprehension in Hallucination-Prone Individuals.

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Despite a focus on altered speech perception in the hallucination literature, auditory verbal hallucinations (AVH) can be more generally described as 'hearing voices.' Yet, surprisingly little work has been conducted on voice perception in AVHs. This study examined (a) the extent to which voice perception is altered along the continuum of hallucination proneness and (b) its potential link to impaired speech comprehension in hallucination-prone listeners. We assessed voice detection thresholds in ambiguous auditory stimuli, ranging from environmental (e.g., water stream) to vocal sounds (e.g., multi-talker babble). On each trial, listeners (N = 45) were asked to indicate whether they heard a vocal vs environmental sound and to rate their confidence in the decision. The stimuli were presented at four different positions along the azimuth of a spherical loudspeaker array to explore potential location-specific effects. In a subsequent cocktail-party experiment, listeners comprehended target speech while ignoring either an ambiguous voice masker or speech-shaped noise presented at the target position. Although we found no significant correlation between voice detection thresholds and hallucination proneness, a consistent positive trend emerged across different AVH measures: Individuals with higher AVH scores attained numerically higher voice detection thresholds. Notably, proneness to anomalous auditory perceptions showed a significant negative correlation with speech comprehension in the cocktail-party task. This finding suggests that individuals prone to auditory hallucinations experience difficulties in segregating auditory streams, potentially affecting their abilities to communicate in real-life listening environments.

CSBBCS-Symposium: Zooming out to dive in deeper: Recent findings in cognitive aging and their implications for past and current theories.

Aging alters brain criticality with implications for cognitive effort in older adults.

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The healthy adult brain operates near a critical point phase transition between distinct dynamical regimes. Proximity to criticality is determined by the balance of excitation to inhibition (E-I) in cortical tissue, and there is mounting evidence of a shift in the E-I balance with aging. As such, older adults' brains may deviate farther from criticality, relative to younger adults. Emergent properties of a brain operating at criticality are optimal for cognition including maximal susceptibility and responsiveness, maximal persistence of information, and maximal dynamic range. Hence diverse cognitive deficits in aging might reflect age-related deviation from criticality. Importantly, even in healthy younger adult brains, engaging in demanding tasks causes the brain to diverge from criticality, implying a loss of functionality. We hypothesize that the subjective cost of cognitive effort experienced when people engage in demanding tasks is an adaptive cue signalling the loss of emergent properties which support cognition. In this talk, we discuss our hypothesis and the speculation that older adults experience demanding tasks as more subjectively effortful than younger adults because their brains operate farther from criticality to begin with.

iTrain my Brain: Evaluating the effects of six weeks of multiple object tracking training on older adults' cognition, mobility and dual-task abilities.

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Everyday mobility often requires multitasking (i.e., dual-tasking) such as walking while processing visual scenes with multiple moving objects (e.g., pedestrians, cars). This poses a challenge for older adults due to age-related declines in attentional capacity and the need to compensate for sensory declines such as hearing loss. Training divided attention can enhance dual tasking, but programs rarely target the core visual function of multiple object tracking (MOT). MOT training has been shown to improve dynamic attention in older adults but its impact on mobility is unknown. It is still unclear whether training in a cognitive-motor format is even more effective at improving mobility than cognitive training alone. In a previous pilot study, we found that 4 weeks of MOT training in a seated and standing position improved older adults' single- and dual-task gait velocity and cadence. Our current study includes a longer training period and active control group to examine the effects of 6 weeks of single- versus dual-task training on older adults' cognitive-motor dual-task performance. We hypothesized that standing MOT training would be the most effective. Our study involved 72

older adults (Mean age = 70.04, SD = 5.98 yrs.), with normal hearing (n = 41) and hearing loss (n = 31). Participants were randomized to MOT training while seated (n = 27) or standing (n = 20), or to episodic memory training (active control: n = 25) for 6 weeks at home. Tests of cognition, mobility and dual-tasking were completed at pre and post. Blood oxygenation data were acquired during dual-task walking using functional near-infrared spectroscopy (fNIRS) for a subset of participants. We will discuss the effects of MOT training on older adults' working memory and dual-tasking while gait mat and treadmill walking and address pre-post changes in blood oxygenation in relation to changes in dual-tasking.

Getting the full picture: Examining successor representation learning in older adults.

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At the core of human intelligence is the capacity to learn which actions are most adaptive within ever-changing environments. This is particularly difficult for sequential decisions, as the effects of early choices only gradually become apparent with every subsequent choice. In the last two decades, decision-making research has focused on model-based (MB) and model-free (MF) strategies on opposite ends of a flexibility/efficiency spectrum. While younger adults flexibly engage in both strategies, older adults seem to rely primarily on MF. Recently, an intermediate strategy has been proposed; successor representation (SR) learning. SR offers reduced computational costs as compared to MB and enhanced flexibility in comparison to MF, allowing adaptation to certain environmental changes. While younger adults engage in SR, it remains unknown if older adults also adopt this strategy. Therefore, current aging research may have an incomplete picture of the age-related changes in decision-making. To investigate this possibility, we designed a gamified 3D navigation task where participants traversed a virtual labyrinth with the goal of maximizing reward. Once participants have learned this, they encountered changes in state transitions (available paths in the labyrinth), reward structure (reward locations) or optimal policy (optimal path). By examining each participants behavior during these types of changes, we aim to differentiate between different strategies given that MB adapts to all changes, SR accommodates only reward changes, and MF fails to adapt to any change and further elucidate context-dependent strategy changes during aging. In this talk, we present (1) computational modelling simulations showing predicted behavior of MF, SR and MB agents, and (2) pilot data revealing which strategies younger and older adults engage in based on their adaptation to different labyrinth changes. With these findings, we aim to shed light on the mechanisms which support decision-making during healthy aging by looking beyond the MB/MF dichotomy.

CSBBCS Symposium: Cognitive Listening.

A data-limit account of spatial and spectral release from masking during speech-on-speech listening.

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Speech-on-speech listening involves selectively attending to a target talker while ignoring a simultaneous competing talker. Spatially separating the talkers improves performance, a phenomenon known as spatial release from masking (spatial RM). The same is true of spectral separation, i.e., filtering the talkers into non-overlapping frequency bands (spectral RM). For both RM types, improved performance results from a decrease in energetic masking between the two talkers. It is unclear whether listeners' ability to exploit spatial and spectral cues correlates with individual differences in cognitive abilities. It has been suggested that cognitive abilities play a greater role when less of the target signal is available, implying that the cognition/performance relationship should be strongest when spatial/spectral RM is absent. However, an alternative claim, known as the data-limit account, suggests that cognitive resources cease to be useful when the target is severely degraded. In this study, participants (N = 240) completed a selective listening task in which they transcribed the speech of one of two simultaneously-presented talkers. The speech was filtered into overlapping or interleaved frequency bands (spectral RM vs. no spectral RM) and presented either at +/-90º azimuth or collocated (spatial RM vs. no spatial RM). We additionally administered a battery of cognitive tasks to assess key components of working memory and attention. Spectral RM provided at least as much benefit as spatial RM, with the best performance observed when both types of RM were present. Cognitive scores were positively correlated with performance in all conditions, but weakest in the no-RM condition. The results support the view that cognitive abilities contribute to speech-on-speech performance but only if degradation is moderate. When degradation is high, cognitive skills fail to compensate for the impoverished input, supporting the data-limit account.

Investigating motivation and reward in audiobook listening.

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Using a willingness-to-wait paradigm informed by the decision-science literature, Bains et al. (2023; Science of Learning 8, 17) measured fluctuations in readers' enjoyment of different book synopses. When readers reported greater enjoyment of a text synopsis, they were more likely to both understand its content and to take on a temporal cost (a 3-6 second wait) to read more of the book. In three experiments, we modified Bains et al.'s paradigm to investigate the role of enjoyment in audiobook listening. In Experiment 1, 86 adult speakers of UK English heard 20 short audiobook excerpts (each 30-40s long) produced by a naturalistic synthesised voice. After each excerpt,

participants rated their listening enjoyment on a 1-9 scale, answered a multiple-choice content comprehension question, and chose whether to hear more of the story (incurring a wait of 3-6 seconds) or skip to the next one. We replicated Bains et al.'s (2023) findings, providing evidence that the effects of moment-to-moment fluctuations in book enjoyment generalise to spoken input. Next, we investigated how the identity of the audiobook narrator might modulate the enjoyment and outcomes of audiobook listening. In Experiment 2, 80 participants heard the same 20 audiobook excerpts narrated by 2 different synthesised voices that significantly differed in perceived pleasantness. We replicated findings from Bains et al. (2023) and Experiment 1, and further demonstrated higher ratings of enjoyment for excerpts read by the more pleasant-sounding voice. In Experiment 3, with 90 participants (45 familiar, 45 unfamiliar), we harnessed personalised voice cloning to further show that enjoyment of audiobooks was greater when listening to personally-familiar narrators (self, friend) compared with unfamiliar narrators. We offer evidence for the enhancing role of voice identity perception in spoken language perception, and present interesting implications for how personalised voices could improve the enjoyment and comprehension of book language.

Individual differences in cognition and speech-in-noise intelligibility.

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One of the most venerable (Spearman, 1904) and robust findings in all of psychology is the "positive manifold" – performance across cognitive tests is positively correlated. Even if tests are sensitive to very different cognitive domains, they will share some variance in common. This general factor is also known as 'g'. Speech is often heard with interfering sounds (including other speech) in the background. Accurate perception of such masked and degraded speech probably depends on cognitive abilities somewhat different to those required for clear speech. Studies of the relation between speech-in-noise perception, and cognitive factors, typically have not taken g into account. This is a problem since any observed correlation between the ability to perceive noisy speech and performance on a test sensitive to a specific cognitive domain (working memory, for example) may be mistakenly attributed to that specific domain, when in fact the correlation may reflect more general cognitive ability, 'g'. In three online studies, we examine the relation between performance on a variety of tests sensitive to different domains of cognition, and the ability to report words from everyday sentences masked by multitalker babble. In all three studies, a matrix reasoning test accounted for significant variance in speech-in-noise performance (~10-15% variance in common). Matrix reasoning tasks are nonverbal, visual, problem-solving tasks that are known to correlate highly with 'g'. When matrix reasoning is taken into account, tests sensitive to working memory make non-significant contributions. The sole exception is that, when sentences contain multiple homophones (e.g., "The shell was fired towards the tank") a measure of working memory explained some additional variance, which was not the case for closely matched sentences without homophones (e.g., "Her secrets were written in her diary"). This result suggests that the cognitive demands of speech-in-noise perception vary depending on the nature of the utterance.

Leveraging large language models to advance assessments of naturalistic speech listening.

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Many older adults experience difficulties comprehending speech in the presence of background noise, such as in crowded restaurants. Standard speech tests do not capture such real-life comprehension difficulties well, in part because they assess verbatim word reports for short, disconnected sentences. Conversational speech follows a coherent narrative for which mental representations are not verbatim but reflect larger meaningful units of gist across many sentences. In this talk, I will show how large language models with behavioral and neuroimaging data can provide novel avenues to assess comprehension of spoken, narrative-like speech. The presentation will cover new advances of methodological approaches and applications to empirical data. Specifically, the results presented will show ways to assess real-time gist processing, automated scoring of narrative recall across languages, and neural sensitivity to meaningful events during spoken story listening. Overall, the research demonstrates news ways to assess speech comprehension for naturalistic, narrative-like speech.

CSBBCS-Symposium: Math Development across the lifespan.

One and Done? Testing the Need for Repetition in a Counting Task.

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What do kindergarten teachers need to know about their students' counting skills? Could the measures researchers use be helpful? In this study, we examine the dot counting task, a component of a digital math assessment used with four- to five-year-olds in Canadian kindergarten classrooms. Children (N=191) were asked to count sets of 3, 5, 6, 8, and 11 dots out loud. After they responded, the children were prompted with the question, "How many are there altogether?". This follow-up prompt is often used by researchers to assess young children's understanding of the cardinality principle – that is, the last number said when counting represents the total quantity. I will explore whether this second prompt helps educators clarify children's grasp of counting principles or introduces uncertainty. Children's responses may vary: some may count correctly, earning a point, whereas others miscount and miss a point. If a child repeats their counted number (whether correct or incorrect) when prompted with "how many", they earn a point for quantifying the set based on their final count: Accurately answering both questions requires both procedural fluency and conceptual understanding. However, children may wonder why their teacher is asking them the same question again and assume their first response was incorrect. Indeed, pilot testing suggested that some educators and students found this prompt confusing. In a busy classroom setting, it is important to determine whether one question is sufficient for assessing children's counting abilities or if the second prompt adds value for educators. I will investigate whether asking "how many" explains additional variance in children's counting abilities or if a single counting response is sufficient for

identifying children who require instructional support. The findings will help refine classroom-based math assessments, ensuring that teachers have an efficient and effective method to assess early numeracy skills in busy educational settings.

The Interplay Between the Preschool Environment and Child Characteristics in Supporting Mathematical Development in Three- to Four-Year-Olds.

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Preschool-aged children are capable of developing a range of mathematical skills, but there is considerable inter-child variation in the development of these skills (Duncan, 2007). In particular, children from disadvantaged backgrounds are at heightened risk of poorer mathematical skill development (James-Brabham, 2023). A high-quality early educational learning environment may serve to reduce the attainment gap by support disadvantaged children to 'catch up' with their more advantaged peers (Taggart et al., 2015), but many observational measures fail to take into account individual children's differential experiences of early education. This presentation explores the relationship between child skills at the start of the preschool year (T1), the individual child's experience of preschool and outcomes in mathematics at the end of the preschool year (T2). A battery of tasks including vocabulary, executive function and mathematics measures were administered to N=240 children across N=17 centres serving disadvantaged areas of the UK across two timepoints. Structured observations of mathematical practice (ECQRS-EC mathematics scale; Sylva et al., 2025) and the quality of adult-child interactions (SSTEW; Kingston et al., 2023) were carried out at each centre in addition to moment-by-moment observations of individual children's experiences using an adapted version of the Child Observation in Preschool (Farran et al., 2017). A series of multilevel models will be used to explore centre-level and child-level predictors of progress in mathematics across the preschool year, with a view to, firstly, characterising educator practices that are likely to support mathematical development and, secondly, characterising the profiles of children who make less progress in mathematics than would be expected. Implications for policy and intervention will be discussed.

Parent-Child Math Interactions: How Emotional Quality Relates to Math Attitudes and Performance.

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Parents play a crucial role in shaping children's math learning and attitudes. Research suggests that

parents' math attitudes, such as math self-efficacy and math anxiety, can be transmitted to their children. While previous studies have explored various mechanisms, including parental behaviors, the frequency of homework help, and home numeracy practices, little research has examined the emotional quality of math-related interactions and its relationship to parents' math attitudes. In this study, 108 parent-child dyads (children aged 7–10 years) participated in a video-recorded simulated math homework task. This study investigates the quality of parent-child interactions relate to parents' and children's math attitudes, and children's math performance after the interaction. Findings contribute to understanding how parents' math attitudes are transmitted to their children and provide insights for educational theory and policy on supporting positive math learning experiences at home.

The Development of Arithmetic Fluency: Investigating the Effects of Format and Task Order.

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Overexposure to standard arithmetic problems (e.g., 5 + 3 = __) promotes an operational view of the equal sign which in turn may lead to poor performance on nonstandard problems (e.g., 6 = 2 + __; 10 + 7 = __ - 2). To understand performance on these two tasks, we need to study the effects of task order and their co-development. In Study 1, we investigated the effect of arithmetic format (nonstandard vs standard) and task order (standard-nonstandard vs nonstandard-standard) on Primary 6 Northern Irish students' (N = 357, Mage = 10.2 years) arithmetic performance. We found that nonstandard arithmetic performance was influenced by task order, such that students had better performance when they completed the standard format first. In contrast, task order did not influence standard arithmetic performance. We speculate that starting the tasks with the standard format may have activated familiar retrieval strategies under timed conditions which in turn supported their later nonstandard problem solving. In Study 2, these same students completed the standard and nonstandard arithmetic tasks again in Primary 7, allowing us to examine the co-development of performance across these two formats. Cross-lagged panel analysis, controlling for nonverbal reasoning, found reciprocal relations between nonstandard and standard arithmetic fluency, with the influence of standard on nonstandard greater than the reverse. At both timepoints, students had better performance on the standard task. Replicating previous research, our findings suggest that standard arithmetic skills are the building blocks for nonstandard arithmetic development. However, the poorer performance on the nonstandard task and weaker relation may reflect the use of inefficient or incorrect strategies, possibly from overexposure to standard problems. We suggest that equal practice with both formats may help foster a more flexible view of the equal sign, leading to greater accuracy and efficiency in solving problems of various format.

End of Symposia

~~Examining various experience sampling techniques for repeated measures of attentional disengagement.~~

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~~Experience sampling is widely used in cognitive research examining states of attentional disengagement such as mind-wandering and boredom. This technique involves having participants perform a cognitive task and periodically interrupting them to report on their preceding experiences using various response scales. However, it remains unclear how the various characteristics of the experience sampling response scales influence the pattern of reports. Herein we examined how different types of experience sampling response scales impact patterns of reported mind-wandering and boredom, and the relations between these states and performance. A sample of 360 participants completing a metronome response task (MRT) in which they pressed a button in time with a steady metronome tone and intermittently responded to experience sampling probes that varied across six groups. Half of the groups reported on their mind-wandering and the other half reported on boredom. For each type of experience, three different response instruments were varied across subgroups: (1) a Likert-like scale with ordinal radio buttons, (2) a continuous slider allowing for responses along a horizontal line, or (3) a Bluetooth dial rotated to increase numbers displayed on the screen with no upper response limit. Performance on the MRT was evaluated by examining response variability with prior work having established that greater mind-wandering is associated with increased response variability. Analysis revealed that reports using the continuous slider had the strongest correlation with behavioural performance, suggesting that its greater response granularity and fixed-point framing enhance the accuracy of self-reported experiences. In contrast, the Likert scale produced ceiling effects, limiting its effectiveness in capturing progressive changes in mental states over time, while the Bluetooth dial introduced variability unrelated to task performance. These findings highlight the importance of selecting appropriate response instruments in experience sampling, with continuous sliders offering a more precise method for tracking dynamic mental states.~~
Withdrawn

Oral contraceptive use and cognition: A review of the current literature and future directions.

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Oral contraceptives (OCs) are composed of artificial estrogen (ethinyl-estradiol) and progesterone (progestin) and work by suppressing endogenous (or naturally occurring) estrogen and progesterone. Since endogenous estrogen and progesterone are neurosteroid hormones – which are synthesized and act on receptors in the brain to modulate neuronal excitability and the neural circuits underlying many cognitive functions – it follows that OC use could influence cognition. Prior reviews have investigated the literature on OC use and cognition by examining OC use and performance by cognition domain (see Warren et al., 2014; Beltz, 2022; Gurvich et al., 2023). However, these reviews are mixed, yielding no strong conclusions about OC use and cognitive performance, and do not thoroughly explore the reasons behind the various mixed findings. As a result, we largely still do not have a clear understanding of whether OC use is related to differences in cognitive performance in most domains. To move beyond these mixed results and thereby advance our understanding of OC

use and cognition, we review the state of the current literature and discuss possible factors and challenges that may contribute to the variability in findings (both within and between studies; factors such as sample size, inclusion criteria, conceptualization of measures, OC formulation, confounding variables, individual differences, lack of replication, and publication biases). Our resulting call to action provides a framework for future studies, highlighting the need for more control and consistency across investigations for addressing whether and how OC use is related to differences in various aspects of cognitive performance.

Assessing the Reliability of Dual-Task Processing Measures.

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The psychological refractory period (PRP) effect and the backward-compatibility effect (BCE) are measures of dual-task performance. These effects are consistently observed in experiments using the PRP paradigm, but their test-retest reliability and use as measures of individual differences in dual-task research is less well established. Reliable experimental effects often have low between-subject variability, resulting in low reliability for measuring individual differences (Hedge et al. 2018). Measures that are based on reaction time difference scores, like the BCE and PRP effect, also tend to have low reliability (Draheim et al., 2019). This study assessed the reliability of individual differences in the BCE and PRP effect across three sessions of a PRP paradigm. Both the BCE, measured in Task 1 performance of the PRP paradigm, and the PRP effect, measured in Task 2 performance, were reliable across sessions at the individual level, suggesting stable individual differences. Additionally, we show that the size of the BCE is positively associated with the size of the PRP effect, indicating that individuals who demonstrate the strongest parallel response activation also show the largest dual-task costs. Establishing the reliability of these measures of dual-task performance suggests they are useful for individual differences research and that they can be compared with other measures of attentional control and multiple-task performance.

Can computational sentiment analysis classify autobiographical memories? Comparing VADER and TextBlob.

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People's writings can provide insight into the mental and affective state of a person. However, current methods of analysis require extensive manual human work, limiting the sample size that can feasibly be analyzed. Alternatively, computational approaches using natural language processing can be employed to rapidly examine characteristics of narrative texts, such as autobiographical memories. Though used extensively in social media and customer reviews in industry, their classification accuracy relative to human self-classification remains unclear for psychological data. We compared the congruence of two popular lexicon-based sentiment analysis tools, VADER and TextBlob, with self-reported valence of 3,309 autobiographical memories from two datasets. Confusion matrices showed limited congruence in the first dataset. Both tools, but especially

TextBlob, displayed a bias to rating memories as neutral. Performance improved in the second, less skewed dataset, but both tools still displayed a neutral rating bias. VADER consistently produced more congruent scores than TextBlob. Accuracy improved significantly to moderate levels of congruence (MCC = .32) by limiting classifications to three, rather than five, valence types (negative, neutral or positive). Tool performance remained consistent regardless of dataset size. Sentiment analysis is a promising avenue for applications requiring broad classification of valence. VADER outperformed TextBlob as a useful means of rapidly determining the emotional valence of large volumes of text data that would be unfeasible for manual coding. Future work should evaluate alternative sentiment analysis tools that make use of different approaches, such as machine learning tools or LLMs.

Let me gamble your money: Agency overcomes earning in reward processing signals.

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Humans preferentially process information related to themselves compared to others. Interestingly, this self-reference effect is highly related to reward processing, evidenced by overlapping neural generators and self-related advantages in gambling tasks. However, what remains unclear is how agency over our actions, which is essential to our sense of self, impacts this self-related reward effect. Specifically, would reward processing remain preferential to self-related outcomes without control over the preceding decision? To test this, we had participants complete a modified form of Blackjack, where players made decisions to change their score to earn money, while electroencephalography (EEG) data were recorded. Participants were instructed that in some trials they would risk real money from their pot, but that other trials would risk the previous participant's money. Similarly, they were told that some trials would be simulated based on the prior participant's behaviour and that these trials would likewise risk their money or the prior participant's money. We found that the amplitude of the reward positivity, an event-related potential component of EEG data representing reward processing, was largest for trials that were self-played, regardless of whether participants earned money from their choice. Further, and more importantly, we found that this self-related reward advantage was reliant on control over the preceding decision – there was no difference in reward responses when participants did not make the decision. Preliminary results from a follow-up study with the same decision and reward manipulation in a learnable task (i.e. not true "gambling") replicate this agency bias. These findings indicate that while self-related biases are related to reward outcomes, they rely on the actions that lead to them, emphasizing the necessity of agency in self-related reward processing.

Putting the breaks on slot machine gambling: Reducing gambling engagement through strategic applications of friction.

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Slot-machine gambling is associated with problematic gambling behaviours often related to "dark

flow," an intense, effortless state of absorption leading to negative outcomes such as financial losses and neglect of time. Introducing friction—strategic pauses that disrupt habitual actions—has effectively reduced problematic behaviours in various other contexts but has not yet been examined specifically in slot-machine gambling. The present study investigated whether friction could reduce participant engagement with slot-machine play. Participants engaged in a structured 1 hr gambling session comprising 35 min of mandatory play followed by an optional "free play" period of up to 25 min, during which participants could continue playing or stop at any time. Participants (undergraduate students) were randomly assigned to either a 'friction' condition, which involved periodic 4 s lockout timers preventing immediate spins at regular intervals, or a 'control' condition, which did not involve friction. Since the transition between mandatory play and free play was seamless, participants were not notified when the mandatory period ended, but they could press a key to briefly display how much time elapsed at any point during the session. Participants then completed self-report assessments of general flow experiences (Deep Effortless Concentration–External scale; DEC-E), specific dark flow experiences (Modified Game Experience Questionnaire; M-GEQ), and the tendency to problem gamble (Problem Gambling Severity Index; PGSI). The PGSI indicated that participants were predominantly non-problem gamblers. Importantly, participants in the friction condition checked the time more frequently and stopped playing earlier in the free play period compared to participants in the control condition. Self-reported general flow and dark flow did not differ between conditions. These findings suggest that friction effectively reduces specific gambling behaviours even in populations with low baseline gambling tendencies, highlighting the potential for friction to function as a harm-reduction strategy in the slot-machine gambling context.

Psychophysiological and subjective measures of flow, depression & gaming addiction in role-playing games.

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Past studies (Larche et al, 2021, Tsang et al. 2025) have shown that flow and arousal can predict the level of enjoyment in video gaming. Gamers who played to escape and reported depressive symptoms in daily life reported higher levels of flow when they played immersive role-playing games RPG. This study examines expert video game players' psychophysiological response to different types of enemies in the souls-like role-playing game (RPG) Dark Souls III. Preliminary results show that players' expertise correlated with reduced physiological responses to non-boss enemy interactions and slightly elevated physiological responses during boss enemy interactions. Players' expertise was also correlated to depressive symptoms. We may be able to use these patterns of psychophysiological responses in RPG video gaming to predict potential depressive symptoms in expert video game players.

Event-related potentials reveal age-related differences in sensitivity to positive and negative feedback from social and non-social sources.

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Reacting to feedback, both positive and negative, is crucial for navigating social environments. In younger adults, behavioural and neural markers of feedback processing have been shown to be sensitive to feedback valence (positive vs. negative) and social content (social vs. non-social feedback). However, while theories of lifespan development might suggest differential sensitivity to feedback valence and social content in older adults, little is known about age-related differences in feedback sensitivity. The current study recorded electroencephalography (EEG) data while younger and older adults estimated the passing of one second, followed by positive or negative feedback from social or non-social sources. Response time data revealed greater performance adjustments following negative vs. positive feedback and overall better performance with social vs. non-social feedback for both age groups. Event-related potential (ERP) results, however, revealed age-related differences in the neural processing of feedback. Social feedback consistently elicited larger P2, FRN, and P300 amplitudes in both age groups, indicating increased attentional resource allocation. Compared to positive feedback, negative feedback elicited larger FRN, but smaller P2 and P300 amplitudes, suggesting increased error detection but decreased capture and context updating. Older adults showed larger P2 and P300 amplitudes at later latencies, suggesting enhanced early processing and resource allocation, but slower processing speeds and context updating. Moreover, age interacted with feedback valence differently on each component, indicating age-related differences in neural processing of feedback. These findings highlight age-related differences in the neural mechanisms of feedback processing, underscoring the interplay between social context and valence across the lifespan.

CSBBCS 2025 Vincent Di Lollo Early Career Award

Investigating how environmental context, goals, other people and individual traits shape attention.

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Intuitively, how we prioritize our attention likely varies based on numerous factors, including what we're paying attention to, where we are, and who we're with, along with individual participant differences. However, researchers don't always account for such variability in the design or analysis of their work. In this talk, I will present some of the work I've conducted, investigating the role that context, goals, the presence of other people, and individual traits play when we attend to the world around us. Much of this work employed a multi-method approach, with data collection occurring online and in person. Across the various studies we've measured a number of metrics, including response times, accuracy, observational measures, eye-tracking, motion-tracking and questionnaire scores. Taken together, this body of work highlights the role of the environment and the individual in shaping our attention, and opens up exciting new avenues of research.

CSBBCS 2025 Mid-Career Award

Duped by the pseudo-profound: Why we fall for BS, and how to protect against it.

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Over the past decade, there has been a growing body of research examining the influence of pseudo-profound bullshit (BS) on human thought. Pseudo-profound BS consists of seemingly impressive assertions that are constructed with a carefree indifference for conveying truth, and that are often used to impress, persuade, or otherwise mislead others. In this talk, I will present several lines of research that attempt to understand why we fall for BS, and how we can limit its influence. First, I will discuss work examining some of the main correlates of receptivity to BS, finding that receptivity is associated with a variety of conceptually relevant variables (e.g., intuitive cognitive style). Second, I will present evidence from several studies that demonstrate that susceptibility to BS may be the consequence of people's natural proclivity to search for patterns. Finally, I will present data from several experiments that demonstrate that receptivity to pseudo-profound BS can be reduced by having people engage in reflection.

Does video presence matter in associative and source memory during virtual socialization?

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Background: Virtual socialization became a trend since the pandemic. Past research showed significant benefits of virtual socialization in reducing social isolation and loneliness among older adults. Despite of its growing popularity, it is still unclear how certain features of the virtual platforms/environments affect memory of information shared during a virtual meeting. Objective: Two studies examined the effect of video presence (video-on vs. video-off) in a simulated virtual socialization on younger and older adults' memory for name-occupation pairs and the related source, manipulation-specific (video on/off, Study 1) or manipulation-independent (orange/blue frame, Study 2). Methods: Younger and older adults participated in two studies following a generic procedure. At encoding, participants joined a group zoom meeting where they watched a pre-recorded social simulation video clip in which speakers (with video on or off) took turn to self-introduce names and occupations, with the corresponding name-occupation pair displayed to each speaker's side. In Study 2, half speakers were presented with an orange and the other half with a blue frame, independent of the video manipulation. Following the encoding, they completed an on-line recognition task through a link shared in Zoom chat. At recognition, they recognized intact, rearranged, or new name-occupation pairs as OLD (intact) or NEW (other pairs) to assess associative memory. They further attributed each pair recognized as OLD to the corresponding source (source memory): video on/off (Study 1) or orange/blue frame (Study 2). Results: In Study 1, video presence benefited associative memory to an equal degree for younger and older adults, but benefits source memory of older but not younger adults. The data collection of Study 2 is ongoing. We predict to replicate Study 1. Conclusion: Taken together, video presence during virtual socializations is crucial for both associative and source memory. Older adults benefit most in their source memory.

Unspoken Confidence: On the effects of explicit judgments of metacognition in reasoning.

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When reasoning, individuals metacognitively monitor their intuitions and engage in more deliberative processing when this monitoring process indicates that their intuitions are unlikely to be correct. These monitoring and control processes, in turn, enable individuals to deploy deliberative processing optimally (i.e., when it is likely to be necessary). In a typical experimental paradigm, metacognitions (e.g., confidence) are measured explicitly by participant self-report. We argue this type of paradigm may make such experiments unlike real-world cognition, wherein individuals at least sometimes do not represent confidence explicitly. That is, even if everyday cognition requires the assessment of one's confidence, it rarely requires its report. We borrow and adapt a methodology from studies of nonhuman primate metacognition in order to compare a typical condition, where confidence is measured explicitly by self-report, to an alternative condition, where confidence is observed behaviourally. This allows us to examine the effect of explicit confidence reports on monitoring and control behaviour. We propose two candidate effects: i) That controlled behaviour is differentially linked to metacognitive monitoring processes when individuals are required to explicate the output of said monitoring processes, and ii) That monitoring processes themselves

change quantitatively given the requirement to self-report their outputs. We find experimental evidence for only the second of these potential effects: individuals' metacognitive monitoring processes differ when an explicit self-judgment is required. Specifically, the experience of ease or difficulty (i.e., fluency) predicts implicit confidence to a greater degree than it does explicit confidence. Controlled processes, however, are not driven by the explication of confidence. This work provides valuable insight into the nature of controlled thought in psychology and decision science. Potential effects of explicit monitoring of one's cognitions, the mechanisms by which these effects might exist, and implications thereof will be discussed.

What's your game? Investigating whether social context affects intention prediction when interacting online or in-person.

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Recent research has shown that two players in a simple online card game could better predict each other's intentions when cooperating than competing, with no significant differences in card scores between contexts (Ma et al., 2023). However, online interactions possess limitations in conveying social cues. Thus, we ran a follow-up study, exploring the influence of social contexts (i.e. cooperating vs. competing) on decision-making and intention prediction in the real world. Participant dyads (n=41) played a card game in two social contexts, either competing or cooperating (3 games each) while collecting cards with a certain goal feature (card score) and trying to guess what the other person's goal was (guess score). We tracked card and guess score performance alongside gaze and hand movement. Both online and in-person data revealed commonalities, such as: 1) Guess scores improve across turns as information is acquired, and 2) Social context impacts guess scores (cooperating improves guess performance). However, we found differences in movement-based measures across context, with participants moving faster and more directly when cooperating online, but moving slower and less directly when cooperating in person. Overall, the social context of cooperation appears to enhance the communication of intention during gameplay, but the mechanism by which communication occurs varies across context (online vs. in person).

Measuring intuitive moral trade-offs using the Moral Foundations Conflict Task.

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The scope of moral values has been debated in recent years, with disagreement about what should count as 'moral'. An influential and contested theory in this domain is Moral Foundations Theory (MFT: Haidt & Joseph, 2004), explaining moral diversity based on multiple innate and intuitive foundations. MFT has been criticised on multiple fronts, including that it has tended to rely on explicit self-report in the Moral Foundations Questionnaire (MFQ: Graham et al., 2011). In contrast,

we measure intuitive choices between foundations in a novel task - the Moral Foundations Conflict Task (MFCT: Ahluwalia-McMeddes et al., 2025). We present four studies showing that responses on this task reflect foundations measured by the MFQ (study 1), and did not find evidence that responding was altered under cognitive load or reduced cognitive control (studies 2a and 2b), nor when participants were instructed to deliberate (study 3). Furthermore, using responses and response times generated on the MFCT, we present a computationally explicit drift diffusion model of foundation-related intuitive judgments, and show that these patterns are consistent with theoretical claims of MFT. These findings show that the MFCT can contribute to understanding and furthering debate on the nature of moral values.

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Mentalizing Biases: More efficient perspective-taking for same-age versus other-age others.

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Despite possessing the ability to understand other people's perspectives from around 4-years old (and perhaps even younger), adults continue to make errors when considering other people's perspectives. This study considered factors that may influence successful mentalizing, with particular focus on the role of who the 'other' is in a mentalizing scenario. Using an adapted version of the 'Strange Stories' task, children (7-13 years), young adult (18-30 years), and older adult (60-80 years) participants took part in this study. Participants read stories in which a protagonist was described as either in the same-age category as the participant or a different-age category. They were then asked to explain why a character acted in a certain way, with some trials requiring understanding of mental states to explain actions ('mindreading' trials) and others not requiring mental state understanding (control trials). Results revealed a broad bias (improved accuracy and response speed) for same-age protagonist stories compared to other-age, although group categorization and prioritization differed across the age groups. We will discuss the role of age-related biases in shaping our ability to understand others, and how this changes across the lifespan.

Truth, Lies, and Social Risk: Neural responses during decision-making and feedback.

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To date very little is known about how differing social contexts may impact the mental representation of deceptive decisions. Under ecological circumstances, telling a lie often incurs a social consequence if detected. It follows that this may come at greater cognitive cost. 28 participants underwent a free-choice bluffing task during electroencephalography (EEG), in which their lies could either be exposed (detection risk) or not (no risk). Time series data from decision and feedback phases were subjected to mass univariate analyses to explore event-related potentials (ERPs). For decision making, lying was associated with greater cognitive load, reflected within both response time and ERP data. More specifically, deceptive responses demonstrated larger N200s and suppressed P300s, indicating that conflict monitoring and resolution processes are at play. For feedback-related activity, an interaction between condition and response was observed at a spatio-temporal cluster reflecting the fbP300. Deceptive responses under detection risk showed an enlarged effect, suggesting increased attentional allocation and affective evaluation. These results align with past findings of additional processing demands in spontaneous deception. We shed new light on how social detection modulates multiple neural representations associated with lying. Implications are discussed regarding neurocognitive and detection models of deception.

~~Extreme mental imagery in mental rotation.~~

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~~When determining whether two objects are identical in shape regardless of orientation, response times reliably increase with increasing angular disparity between the pair (Shepard & Metzler, 1971). This mental rotation effect suggests manipulation of a mental image analogous to physically rotating one object to match the orientation of the other. Thus, such mental rotation tasks have been used in assessing mental imagery ability. However, people with aphantasia - the inability to voluntarily conjure visual mental images - complete mental rotation tasks with the same pattern of responding, despite their lack of visual image. We compared performance across the imagery spectrum. Aphants, imagers, and hyperphants (exceptionally vivid visual imagery) completed a classic mental rotation task which elicited the typical increase in response times with each increasing angle of rotation, but neither accuracy nor response times differed between the groups. This is in contrast to recent work showing aphants to be slower but more accurate than imagers (Kay et al., 2024). In both cases, this suggests this task thought to require imagery can be completed without it, challenging the assumption that visual imagery is core to spatial reasoning. Implications for the functional-epiphenomenal and depictive-propositional imagery debates are discussed.~~ ***Withdrawn***

Advantage aphantasia! Multimodal mental comparisons in those with and without mental imagery.

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People self-report a vast range of mental imagery experiences, from vivid and realistic to none whatsoever (i.e., aphantasia). Identifying where people lie has relied on self-report mental imagery scales, in particular the Vividness of Visual Imagery Questionnaire (VVIQ). Attempting to reduce reliance on self-report, participants in the mental comparisons task (MCT) are asked to mentally compare stimuli, in the physical absence of those objects, based on visual, auditory, or tactile properties (Suggate, 2024, Behavior Research Methods). In the current online and pre-registered study, we test performance on the MCT for participants believed to have aphantasia (n=48) versus those without (n=95), recruited from the Exeter Eye's Mind Database and Prolific. In addition to the MCT, participants completed the VVIQ, Plymouth Sensory Imagery Questionnaire, and a series of questions as to how they solved the MCT task. Findings again indicated low and generally non-significant correlations between the MCT and self-report imagery scales. Aphantasics were no faster, but more accurate, on the MCT, with aphantasics showing superior accuracy for tactile stimuli. Aphantasics experienced less mental imagery during the MCT, answered based on 'gut feeling' less often, but were similar in using fact-knowledge. Overall, it appears that mental comparison performance is not impaired in aphantasia.

Visual imagery and the brain mechanisms underpinning aphantasia.

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Visual imagery refers to the ability to internally generate images in the absence of a direct external stimulus. There are large individual differences in the reported vividness of mental imagery, including individuals who report experiencing very poor to no voluntary mental imagery - referred to as aphantasia. We compared the brain responses during visual imagery of people and places between aphantasic participants (n=12) and controls with typical levels of mental imagery ability (n=12). All participants completed fMRI scans where they were asked to imagine personally familiar people and place stimuli. Participants then completed self-report measures assessing their imagined content. Results revealed reduced selectivity of responses in people and place preferring regions of medial parietal cortex (MPC) and ventral temporal cortex (VTC) in aphantasics compared to controls. Our data suggest that a weakening of the negative response to the non-preferred stimulus category drives this reduction in selectivity. This points to a possible neural correlate of aphantasia characterised by reduced differentiation between category-specific imagery signals.

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Do psychedelics enhance the mind's eye? Investigating their influence on visual mental imagery.

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We investigate the linkage between classical psychedelics (e.g., psilocybin, LSD, DMT) and mental imagery. Psychedelics are known to induce alterations of visual perception ranging from enhanced color perception to complex hallucinations; mental imagery classifies the ability to generate sensory-like experiences without external input. To assess the face validity of this relation we evaluate mental imagery ability (both subjective and objective) in those who have and have not taken a psychedelic in the past year. Our measures of interest include subjective report of vividness (i.e., clarity, brightness, or intensity), and objective accuracy at colour matching (i.e., between a perceived colour and an imagined one). We also evaluate the presence of Hallucinogen Persisting Perception Disorder (HPPD) and its relation with vividness or accuracy of mental imagery. We hypothesize that people who have taken psychedelics will report greater vividness and demonstrate enhanced accuracy in color matching. However, individuals with HPPD may exhibit exaggerated vividness yet impaired accuracy as a result of disruptions in visual processing. Participants complete the Vividness of Visual Imagery Questionnaire, record a history of psychedelic and polysubstance use, and any presence of HPPD symptoms. Participants complete a mental imagery task, in which they view a colored circle, visualize it, and then identify its color on a fine-grained color wheel requiring precise selection. Group differences in task performance and self-reported imagery scores are analyzed using independent samples t-tests or non-parametric equivalents. Potential covariates, such as polysubstance use, are explored. Findings may provide insights into the influence of psychedelics on perception and imagery, contributing to theories of visual perception and cognition. Additionally, understanding the link between psychedelics, imagery, and HPPD may offer insights into persistent perceptual changes following psychedelic use and inform future research on psychedelic-assisted therapy.

Picture superiority in memory is preserved in aphantasia.

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In long-standing accounts of memory recall, such as Paivio's dual-coding theory, it is presumed that pictures are easy to remember because one can reimagine them during the memory test. To assess whether this is the mechanism driving superior picture recall performance, we tested memory in a group of individuals that do not have the ability to visualize in their mind's eye. These individuals, referred to as aphantasics, report a total lack of mental imagery. In the current study, memory was tested for words, pictures, and symbols across both aphantasics and control participants. Results clearly show preserved picture superiority in the aphantasic group, suggesting that these individuals are able to remember pictures without conjuring them using mentally imagery. While picture recall in the aphantasia group was diminished relative to the control group, aphantasics showed equivalent recall for symbols. This study suggests that dual-coding theory may not be a viable account of picture superiority in memory. In addition, it indicates that symbols may be highly efficient visual forms that are more well-preserved than pictures in aphantasia.

White matter diffusion metrics are differentially sensitive to obesity and bipolar disorders: An ENIGMA bipolar disorders study in 2166 individuals.

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Bipolar disorders (BD) are associated with widespread brain white matter abnormalities, although specific risk factors for these alterations are unknown. One such risk factor may be obesity, as there is a high prevalence of obesity in BD. While gray matter correlates are well documented, we know much less about white matter abnormalities in obesity and BD. We obtained body mass index (BMI) and diffusion tensor imaging derived fractional anisotropy (FA), as well as mean, axial, and radial diffusivity (MD, AD, RD) values from 910 individuals with BD, and 1256 healthy controls from 16 research sites in the ENIGMA-BD working group. We used principal component analysis to detect patterns of covariance across white matter tracts, and region of interest (ROI) analysis using linear mixed modeling, to investigate the associations with clinical and demographic variables using mixed regression models. BMI was associated with the first principal component (PC1) FA and PC1 RD, while BD was associated with PC1 MD. ROI analyses reproduced this pattern, showing BMI was associated with lower FA in 11/22 white matter tracts, while BD was associated with higher MD in 14/22 white matter tracts. However, BD was also associated with lower FA in 13/22 white matter tracts. Specifically, PC1 and ROI patterns indicated lower FA and higher RD in older female participants with higher BMI, but higher MD only in older participants with BD. Researchers investigating white matter alterations in BD should be mindful that diffusion metrics can provide complementary information, where FA may reflect global network white matter alterations with higher BMI and local white matter abnormalities in BD, while MD may only reflect global network white matter alterations in BD.

Finding linguistic relativity in classifiers.

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Understanding the relationship between language and thought has long been a cornerstone of cognitive and linguistic research. This study addresses the fundamental question of whether the languages we speak can reshape our conceptual structures. By focusing on the unique Chinese classifier system, we conducted a comprehensive investigation. We compared Chinese and English speakers, using both behavioural experiments and in-depth analyses of semantic similarity from Chinese and English corpora. Our studies which included semantic judgment tasks, forced-choice tasks, and the drag-and-drop paradigm revealed that Chinese classifiers indeed shaped how Chinese speakers conceptually represent the world: Items grouped under the same classifier are seen as more alike by Chinese speakers, an effect that is either negligible or absent in English speakers, who do not use such a classifier system. These findings advance our knowledge of the language-thought interface.

Causality and coherence in discourse processing and recall.

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Discourse connectives (e.g., ‘because’ (causal), ‘but’ (contrastive), ‘then’ (temporal)) might serve as linguistic cues establishing discourse coherence, but connectives are not always explicitly realised in texts (e.g., ‘It was raining. I got wet.’). This project explored the role of causality in how humans establish a sense of coherence, i.e., connectedness between linguistic units, in language processing and recall. The main experiment manipulated degrees of causal relatedness (strong, moderate, incoherent) and connective presence (or absence) of the contrastive connective ‘but’ between clause pairs in a within-subjects online experiment, complementing a previous study which had focused on the causal connective ‘because’. English speakers (native or non-native speakers of English; final sample N = 114) completed self-paced reading and cued memory recall tasks of 108 clause pairs (72 target items). Causal relatedness facilitated processing and memory recall, and the presence of the connective ‘but’ sped up processing in overall reading times per character, though it only facilitated reading for incoherent clause pairs as measured in residual reading times. Moderately causal relations were processed more slowly and remembered less accurately than strongly related or incoherent relations. While discourse connectives can facilitate processing and memory, this suggests effects depend on the type of discourse relation.

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Electrophysiology reveals malleable predictions during language comprehension.

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Current models emphasize that language processing involves not only comprehension but also learning: unexpected input elicits prediction error signals that drive the updating of predictions, in order to reduce prediction error in the future. However, EEG studies have not measured the updating of predictive relationships between sentences and words. The current study presented forty EEG participants with sentences with expected or unexpected but plausible endings, which are known to elicit a frontal post-N400 positivity (‘He swept the floor with a broom/smile’). To evaluate prediction updating, sentence contexts were later repeated with either their expected or their unexpected ending, in a fully crossed design. If unexpected words lead to prediction updating, then on second presentation this should 1) reduce prediction violation responses to unexpected words, and 2) increase prediction violation responses to expected words. This was indeed the pattern observed on the frontal post-N400 positivity. A single previous encounter with a prediction violation (‘smile’) reduced the positivity in response to unexpected words, and increased the positivity in response to predictable words (‘broom’). This suggests that predictive relationships between sentences and words are highly malleable, with important implications for models of predictive language processing.

An emotional bouba/kiki effect: Congruence between sound and emotional arousal facilitates word processing and recall.

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Iconicity refers to a resemblance between form and meaning. In spoken language this occurs when the sound of a word is perceived as resembling its meaning, sometimes through analogy. An example is the word "teeny" which refers to something small and contains sounds that are associated with smallness. Here we explored emotional iconicity; in particular, words whose sounds resemble the emotional arousal of their meanings. We asked whether processing and recall would be facilitated for emotionally iconic words. In Experiment 1 we used a largescale rating study of over 5,000 nonwords to identify the sounds that are associated with excitement or calm. We found that, for example, nonwords containing voiceless stops (e.g., /p/, /t/, /k/) were judged as more exciting while those with nasal sonorants (e.g., /l/, /m/, /n/) were judged as more calming. We used these results, along with arousal ratings of word meanings in Warriner et al. (2013), to identify words whose sounds were congruent with their meanings (e.g., "shock"; an exciting sound and meaning) or incongruent with their meanings (e.g., "alarm"; a calming sound and exciting meaning). In Experiment 2 participants took part in a semantic decision task, categorizing words as exciting or calming, followed by a recall task. We found that congruent words were processed faster, more accurately, and were more likely to be recalled. We replicated the effects in reaction time and accuracy in Experiment 3. Finally, when analyzing over 1,500 items in a recall memory megastudy dataset (Khana et al., 2023) we again found that congruent words were more likely to be recalled. We consider various mechanisms by which emotional iconicity could affect processing and recall. Together these results suggest that iconicity has an effect on language processing.

An eye-tracking study of word predictability effects in L1 and L2 reading in children and adults.

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Readers capitalize on bottom-up visual cues (e.g., orthography) and top-down contextual cues (e.g., semantics) to predict upcoming words, aiding in word recognition. Indeed, eye-tracking studies have found that high-predictable words are processed more efficiently than low-predictable words, evidenced by shorter fixations and reading times (Staub, 2015). However, the extant eye-tracking literature has almost exclusively focused on first-language (L1) reading in monolingual young adults, leaving word predictability effects in other language groups (e.g., bilinguals) and age groups (e.g., children) little understood. Crucially, predictive processing may differ while reading in a weaker second-language (L2), as well as among those with developing reading skills. To address this gap in the literature, the current study employed eye movement measures of paragraph reading (4 x ~100-word stories) to examine word predictability effects (cloze probability values) in school-aged children (n = 67) and young adults (n = 60) from English monolingual and English-French bilingual backgrounds. We analyzed gaze durations (reflecting lexical access) and total reading times

(reflecting semantic integration) using linear mixed-effects regression models in R, with language group (monolingual vs. bilingual), age group (child vs. adult), paragraph language (L1 vs. L2), and word predictability (continuous) as fixed factors. For L1 reading, we observed main effects of word predictability that were comparable across language groups and age groups. For L2 reading, we observed a main effect of word predictability that was comparable across age groups. However, bilingual adults (with reduced current L2 exposure levels) exhibited significantly larger L2 vs. L1 word predictability effects, whereas bilingual children (with more balanced current L1/L2 exposure levels) exhibited comparable word predictability effects across their languages. Taken together, our findings suggest that readers similarly capitalize on contextual constraint during L1 reading, but are less effective at doing so during L2 reading, particularly when their current (in-the-moment) L2 experience is limited.

Visual and Auditory Processing in Sound Symbolism: The Impact of Modality on Ratings.

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Sound symbolism is the non-arbitrary association between words and meanings. A well-studied example is the correspondence between round- (sharp-) sounding words with round (sharp) shapes. Research has shown that two phoneme groups /k/, /p/, /t/ and /l/, /m/, /n/ elicit the most distinctive differences in associations with round and spiky shapes, respectively. Studies vary in terms of whether stimuli are presented visually or auditorily. We examined the effect of modality on sound-shape association ratings, with the goal of informing future best research practices. A total of 160 nonwords were selected from the Auditory English Lexicon Project. Participants either saw or heard a random set of 80 nonwords one at a time and rated each nonword on shape using a seven-point Likert scale (1 = Sharp, 7 = Round). Participants' subjective modes of internal representations were also measured using the Internal Representations Questionnaire (Roebuck & Lupyan, 2020).To examine the reliability of ratings in modality, we compared shape judgements between visual and auditory presentations as well as the influence of modality on phoneme-shape associations. Results revealed a positive correlation between visual and auditory ratings, indicating that nonwords were judged similarly in both modalities. We also found that shape rating variability, measured in standard deviation, was significantly lower in the visual modality than the auditory modality. Interestingly, phoneme-specific sound symbolic effects varied by modality. Specifically, nonwords containing the phonemes /k/, /p/, /t/ were judged sharper in the auditory modality, while nonwords containing /l/, /m/, /n/ showed no modality-based differences. Additionally, nonwords with voiceless consonants were judged sharper in the auditory condition, whereas no such effect was found for voiced consonants. These findings suggest that visual presentation provides more consistent ratings, whereas auditory presentation highlights phonetic cues associated with sharpness. The effects of individual differences in modes of processing will also be considered.

Flashbulb or Snapchat Memories? Age differences in the phenomenological experience for highly emotional public events.

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Flashbulb memories (FM) refer to autobiographical memories (AM) of the circumstances under which a person learns of a public event to which they exhibited an emotional response (Brown & Kulik, 1977). FMs are characterized by higher levels of vividness, details, and emotional intensity than typical AM. Many of the typical examples (e.g., 9-11, Princess Diana's death, etc.) occurred too long ago to be relevant FM in a younger population. The current study examines if there are specific events that younger individuals would report that meet the criteria of flashbulb memories. 456 participants (209 < 30 yrs; 247 > 40 yrs) were asked to report a highly emotional public event that stood out for them. The quality of the memory was assessed on the 10 dimensions of the Memory Experience Questionnaire (MEQ). Participants also completed a news consumption survey to determine if differences may be influenced by generational changes in how people receive their news. Results found that, whereas, older participants reported the classic FM events, the younger participants reported very few events that would meet the criteria of FM. Additionally, there was a significant difference in the length of time that had passed since the event had occurred in that younger participants tended to report events that had happened quite recently that were highly relevant to their own lives (e.g., closing of university due to COVID) rather than the more global events reported by the older participants. Results of the MEQ suggest that, although younger participants had overall higher scores, the older participants scored higher on almost every dimension indicating better alignment with the definition of FM. Discussion includes the influence of news consumption on source memory as well as the possible extinction of TV priority. The findings support the re-characterization of FB as Snap Chat memories.

Revisiting the retrieval state account of sequential dependencies in memory judgments.

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It is well established that extraneous information, unrelated to prior encounters, impacts recognition memory judgments. One source of irrelevant, but influential, information is the previous trial during a recognition test. Research has consistently found sequential dependencies at test, such that judgments (i.e., "old" or "new") tend to repeat across consecutive trials (Dollois et al., 2025). Additionally, there is some evidence to suggest that previous response also impacts associative memory judgments. Patil and Duncan (2018) found that on trials following an "old" judgment, participants were more accurately able to identify an adjective associated with the test item from study. They reasoned that the recent encounter with familiarity (the prior trial) prompted a retrieval state which enhanced pattern completion processes and facilitated the retrieval of associative information. The current work revisits this retrieval state explanation of sequential dependencies by presenting two experiments to address potential confounds in the original work. First, we ensure that source memory judgments are made regardless of confidence level. Second, we examine the possible influence of the test list composition. We suspect that alternating between stimulus categories at test (objects and scenes) may have produced a negative dependency between trials, which further limited

the source memory judgments following "old" responses to only those trials based on the strongest mnemonic information. By addressing these two concerns, we aim to more securely isolate the influence of previous response on associative memory retrieval. By reevaluating the retrieval state account of sequential dependencies in recognition memory, we can better understand the underlying mechanisms supporting memory decisions and how they relate to memory access and response accuracy.

Control over the timing of LTM reinstatement.

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Previous research suggests that when forming an attentional template based on an object represented in visual working memory (VWM), features previously associated with that object become reinstated. Through this long-term memory (LTM) reinstatement process, prior knowledge becomes integrated into the template and biases attentional capture, even when task irrelevant. Here we investigated two questions: After an object is stored in VWM, how long does LTM reinstatement take, and can it be delayed? Participants memorized coloured objects, then completed an object-search task where a grayscale memorized object appeared, and they then had to search for its shape in any colour. Replicating previous studies, targets were found faster when presented in their memorized colour, and slower when distractors were presented in that colour, indicating object colour was reinstated and biased attentional capture. We first varied memory display duration (30–800 ms) and the delay before the search task (0–800 ms) and found that reinstatement can occur with as little as a 100 ms memory display, and 50 ms delay. Next, to assess if reinstatement can be delayed, we added an additional-singleton search task between the memory display and object search task and manipulated the delay after the memory display (50, 100, or 500 ms). This additional task does not require the object in memory but allows us to separately measure capture by reinstated features. We hypothesized that if reinstatement is automatic, effects should appear in the additional-singleton search at early time intervals, but if can be delayed it would only show in the object search task. Our results showed delayed reinstatement, with no effects in the singleton search, but effects in the object search at 100 and 500 ms. Altogether, this work demonstrates that reinstatement can occur very quickly, yet objects can be held in VWM without features being immediately reinstated.

The impact of prior knowledge on memory for single and repeated events: A registered report.

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Individuals may experience events they do not fully comprehend because of insufficient prior knowledge. Prior knowledge facilitates comprehension, forming of expectations, and also memory retrieval. As part of a registered report, in Experiment 1, we developed and validated three sets of repeated event stimuli for the manipulation of prior knowledge (i.e., participants in the low prior

knowledge condition reported fewer accurate details about the repeated events). Experiment 2 followed up with a comparison of the impact of prior knowledge on recall of single and repeated events. When recall was compared between the single event and the final instance of the repeated event (the target comparison most frequently used in the literature), we found fewer accurate details reported for the low (compared to high) prior knowledge stimuli and for the repeated (compared to single) events. I will report exploratory comparisons of recall between Instances 1-3 and the single event, and analyses of comprehension.

Investigating memory control using the Think/No-Think task and its relationship with sleep and mental health.

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Sleep disturbances are linked to anxiety and depression, yet the neurocognitive mechanisms remain unclear. One hypothesis suggests sleep deprivation impairs executive control processes crucial for memory control, such as the suppression of intrusive thoughts, potentially leading to mood dysregulation (Harrington & Cairney, 2021). It is plausible this relationship is pertinent during adolescence due to increased sleep deprivation and critical periods of executive function development. Thus, this study used the Think/No-Think task to assess memory control in seventy-two young adults and forty-eight adolescents (aged 13-15 years). Participants were assigned to either the direct suppression (DS) or thought substitution (TS) condition where they were instructed to either recall (Think) or suppress or substitute (No-Think) words from studied word pairs. A significant suppressed induced forgetting (SIF) effect was found in both DS and TS conditions for both groups, with no differences found in DS performance. However, adolescents exhibited a greater SIF effect in the TS condition, suggesting greater thought substitution abilities, which may be attributed towards critical executive function development during this age. No significant correlations were found between SIF and self-reported sleep difficulties or mood symptoms. These findings challenge the use of the TNT task when examining individual differences in memory control.

Effects of sleep on emotional memory suppression.

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Suppressing distressing memories reduces their accessibility and emotional intensity. Sleep may also play a role in regulating emotional arousal by weakening the affective charge of aversive past experiences. This study examined the interplay between memory suppression and sleep in modulating affective responses to emotionally negative memories. Healthy young adults completed a memory suppression task involving negative and neutral images and then took a nap or remained awake. Affective responses to the images were assessed via subjective ratings and skin conductance

responses (SCRs) at three time points: before suppression, after suppression, and after the nap or wake delay. We hypothesized that (1) suppression would reduce the intensity of emotional responses to the images, and (2) that sleep would enhance this effect. Preliminary results suggest suppression lowered self-reported emotional responses, but its effect on SCRs was not significant. However, an interaction between suppression and delay emerged for SCRs, indicating that psychophysiological reactivity to previously suppressed memories decreased further after wakefulness, but slightly increased after sleep. In sum, these results suggest that sleep-associated consolidation may stabilise rather than diminish the emotional tone of previously suppressed memories.

Retrieval Outcomes Predict Restudy Decision Efficacy.

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A key assumption of the metamemory literature is that learners play an active role in acquiring new information. This involves both monitoring what they know, and controlling what information receives invested study effort. Indeed, research has shown that when able to control how and what information we study, memory performance is typically better than when study decisions are made for us (Tullis & Benjamin, 2011). Despite this general observation, however, little is known about the efficacy of the specific study decisions made by learners. Moreover, given that previous literature is mixed as to whether learners adjust their study strategies to match the demands of the expected test format (Finley & Benjamin, 2012; Laursen et al., 2024) it is also unclear as to whether such decisions are equally efficacious for all tests. In the current series of experiments, we used an honour/dishonour paradigm (Kornell & Metcalfe, 2006) to assess the efficacy of learners' restudy decisions when preparing for different tests. Participants either restudied all items selected for restudy (Honour condition), all items that were not selected (Dishonour condition), or no items (Baseline condition). Our results demonstrate that honouring individuals' restudy decisions only benefited participants' memory performance when solicitation of such decisions allowed individuals to engage in practice retrieval for each item, and did so equally for both forced-choice recognition and cued-recall tests. Interestingly, participants reported relying heavily on their memory performance as a basis for making their restudy decisions. Further supporting this idea, performance during restudy selection (as modeled by baseline memory performance) predicted which items were selected. These findings add to previous literature demonstrating that expected test format does not qualitatively alter learners' restudy decisions (Laursen et al., 2024), and critically, highlights the importance of retrieval success as a diagnostic cue when making metacognitive control decisions.

Perceptual difficulty, encoding of meaning, and recognition memory.

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A key finding in learning and recognition memory is that difficult-to-process items are often remembered better than easily processed items. Although such effects have been documented with many methods, they are not always easy to replicate, and the specific mechanisms that produce them

are not well understood. We have examined this issue using a recognition memory method and items that vary in selective attention demands. Across a range of experiments, participants in a study phase have been asked to name a target letter string presented on its own, interleaved with a congruent distractor word, interleaved with an incongruent distractor word, or interleaved with an incongruent nonword distractor. Generally speaking, subsequent recognition memory for formerly incongruent targets are superior than for formerly congruent targets (or targets formerly presented alone), with no influence of lexicality (word/nonword) of the distractor. In contrast, the role of lexicality (word/nonword) of the target appears to be critical to this effect. When participants name word targets in the study phase, recognition in a following test phase is exactly as described above, with better recognition for incongruent target items than for target items presented alone at study. When participants name nonword targets in the study phase, recognition in a following test phase is insensitive to study phase incongruency. These results suggest that processing difficulty at study produces enhanced recognition at test only when that processing difficulty prompts enhanced processing of meaning.

Remindings facilitate confident and correct rejection of false memories.

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Similarities between everyday experiences often elicit spontaneous remembering, such that the current experience may serve as a reminder of previous, similar experiences. Previous literature suggests that these remindings benefit later memory performance insofar as they promote later recollection of reminded information (Tullis et al., 2014). However, the consequences of remindings on the ability to accurately identify novel information, or avoid false recognition, remains unclear. Importantly, both remindings and instances of false memory can be driven by the similarity between experiences. This suggests that the mnemonic benefit of recollecting reminded details may also enhance the ability to discriminate between previous experiences and similar novel information, thereby reducing false memory. Indeed, across Experiments 1 and 2, we found that semantic similarity between study and test items increased overall instances of false memory, but the probability of misidentifying similar, novel information depended on remindings and later recollection of the reminded details at test. That is, exhaustive recollection of reminded studied items reduced false memory for similar, but novel test items compared to reminding alone. According to previous literature, this process of using recollected details to correctly identify novel items (i.e., recalling-to-reject) is typically associated with high confidence correct rejections (Ghetti, 2003). We, too, found higher confidence in the correct identification of similar, but novel items at test when at least some of the reminded items were recollected. Additionally, to better understand the contributions of similarity-driven familiarity and recollection to these false memories, we introduced a short response deadline during test in Experiment 3. We expect that the requirement to respond quickly will eliminate the benefits of reminding by reducing the contribution of recollection during test, which may increase similarity-driven false memories following reminding. This research highlights the mnemonic consequences of reminding as a function of the interplay between familiarity and recollection.

Metacognition of working memory for emotional faces.

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This study examined whether metacognitive monitoring relies on working memory performance and whether facial emotion classification moderates this relationship. A total of 128 participants performed a recognition task in which they memorised and recalled the identities of faces with low- and high-intensity emotional expressions (happy, angry, and sad). In each trial, participants rated their confidence level in remembering the face. Subsequently, they performed an emotion classification task using the same facial stimuli. Linear mixed-effects modelling revealed that recognition performance significantly predicted confidence judgments, indicating efficient metacognition. Sad faces were better recognised across both intensity levels. Happy faces were more easily recognised than angry ones at low intensity, whereas the opposite pattern was observed at high intensity. In the classification task, positive expressions were identified most accurately at both intensities. Angry expressions were more accurately classified than sad ones, only at high intensity. Importantly, emotion classification accuracy did not moderate the relationship between recognition and metacognition. These findings suggest that metacognitive confidence judgments are strongly tied to actual performance in working memory tasks and remain stable regardless of the participant's ability to classify emotional expressions.

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The impairing effects of positive and negative faces on memory for spatial details.

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Emotional content influences memory for contextual details, but its effects are not fully understood. Previous research has focused on the impact of negative faces, while less is known about the presence of positive faces. This study investigated how emotional faces (happy, neutral, sad) affect memory for spatial details in neutral backgrounds. Eighty participants viewed encoded scenes, each containing a face superimposed onto a background. During retrieval, participants made old/new judgments on the faces and then selected the background scene previously presented with that face. Selection was made from three images of the same scene taken from the left, right and front perspective; one of these had been paired with the face at encoding. We examined discrimination performance and eye movement behaviour both at encoding and during participants' attempt to recollect the background. Results revealed that both positive and negative faces impaired memory for backgrounds, with the impact of positive faces being more long-lasting. Eye-tracking data showed that fixations during encoding predicted fixations during retrieval for correct trials on both days, confirming the role of eye movements in encoding and retrieval processes. These findings support previous evidence of emotional faces impairing concurrently presented neutral backgrounds, extending this to positive faces.

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Eyewitness Line-up Identity (ELI) database: Crime videos and mugshots for eyewitness identification research.

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There is a long history of experimental research on eyewitness identification, and this typically involves staging a crime for participants to witness and then testing their memory of the 'culprit' by administering a lineup of mugshots. We created an Eyewitness Lineup Identity (ELI) database, which includes crime videos and mugshot images of 231 identities. We arranged the mugshots into 6-, 9-, and 12-member lineups, and then we tested the stimuli in an eyewitness experiment. Participants (N = 1584) completed six trials of viewing a crime video and completing a lineup identification task. In lineups that included the culprit, the average probability of correction identification was 59.0%, 95% CI [55.9, 62.0]. In lineups that did not include the culprit, the average probability of false alarm was 29.9% [27.8, 32.0]. These outcomes indicate that the ELI database is suitable for eyewitness identification research, and the large number of crime videos would enable stimulus sampling. The database is suitable for other face perception or face recognition research, and is available for research approved by a research ethics board: to be requested at https://osf.io/vrj3u. I will also present examples of how the database has been used since.

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Pitch variation and task-irrelevant auditory distraction: Exploring the effects of irregularity and directional change.

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The Irrelevant Sound Effect (ISE) refers to the disruption of visually presented short-term memory tasks by background sound (Colle & Welsh, 1976). While research has shown that speech with high acoustic complexity and unpredictability produces substantial disruption (Hughes, 2014), the specific role of pitch variation remains underexplored. This study investigates how pitch irregularity and directional movement (rising vs falling) in background speech affect cognitive performance. Given that rising pitch is known to capture attention more effectively than falling pitch (Jeon & Heinrich, 2022; Lialiou et al., 2024), we hypothesised that irregular and rising pitch patterns would have additive disruptive effects. Participants completed serial recall and non-serial missing item tasks while exposed to resynthesised speech sequences composed of ma syllables, systematically manipulated to create four pitch conditions: (1) repeated flat pitch, (2) repeated dynamic pitch (rising or falling), (3) alternating flat-dynamic pitch (flat-rise vs flat-fall), and (4) pseudo-random pitch variation. Across both experiments, irregular pseudo-random pitch patterns produced significantly greater disruption than regular patterns. However, no differences emerged between rising and falling pitch conditions. These findings advance our understanding of the acoustic features of speech that contribute to disruption from task-irrelevant sound.

When whispering speaks louder: The impact of comprehensibility on short-term memory disruption by hushed speech.

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Irrelevant speech can impair short-term memory performance. According to the duplex account of auditory distraction, disruption arises via two distinct mechanisms: interference-by-process, which results from conflict between competing seriation processes, and attentional diversion, whereby attention is drawn away from the focal task. In three experiments, participants memorised sequences of visually presented digits while exposed to either voiced or whispered sentential speech. These studies equated the intensity of voiced and whispered speech to isolate the effects of phonation and intelligibility. Both types of speech impaired serial recall, and intelligible speech was more disruptive than unintelligible speech. Furthermore, an interaction emerged: whispered speech was more disruptive than voiced speech, but only when intelligible (Experiments 2 and 3). A fourth experiment used a missing-item task, which is not susceptible to interference-by-process but remains sensitive to attentional diversion. In this experiment, whispered speech was presented at a lower intensity (30 dB(A)) than voiced speech (60 dB(A))-yet still produced a comparable level of disruption to that observed in the earlier, intensity-matched experiments. These findings support the duplex account by showing that irrelevant speech produces interference regardless of meaning, while intelligible whispered speech disrupts performance through attentional diversion, even at low intensity.

Theta-burst stimulation shows angular gyrus preferences in semantic processing: Abstract over concrete, buffered over immediate.

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The angular gyrus (AG) has been implicated in semantic processing, but its precise functional role remains unclear. While some neuroimaging studies, particularly those using multivoxel pattern analyses, suggest that the AG contributes to abstract semantic processing, others report reduced univariate activity for abstract compared to concrete concepts, leading to conflicting interpretations. Moreover, its involvement in semantic versus episodic memory remains debated. In this study, we used theta-burst stimulation to examine the causal role of the AG during semantic decisions. Participants judged whether two words were semantically related, while we manipulated (1) semantic type (abstract vs. concrete), and (2) presentation format (simultaneous vs. sequential), with the latter requiring temporary memory maintenance of the first word. Brain stimulation applied to the AG significantly impaired semantic decision performance. Crucially, disruption was greater for

abstract than concrete words, and for sequential (buffered) compared to simultaneous (immediate) presentation. A subsequent episodic memory task revealed impaired memory for words presented following AG stimulation, suggesting an additional role in memory encoding. These findings provide causal evidence that the AG contributes more to abstract semantic processing than to concrete processing, and that it plays a critical role when semantic integration requires maintaining information in a temporary buffer.

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The production effect: A distinctive memory advantage.

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The production effect is the advantage in memory for information that has been studied aloud rather than silently. There is now a quite substantial literature on this phenomenon, showing it to be a robust effect for a range of materials and under a broad set of circumstances. In this presentation, I will provide a brief review of key published findings and will introduce a couple of new findings. I will then consider how best to explain this effect and how it might relate to other encoding techniques.

Finding the Beat: How sound-movement alignment boosts flow, performance, and enjoyment in gaming.

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We investigated the psychological and physiological effects of audio soundtracks whose beat synchronizes with player movements in the video game Geometry Dash. Using an ABBA design, we compared epochs of sound/movement synchrony (A epochs) to epochs where sounds were desynchronized with movements that had to be made (B epochs). We measured cohesion, flow, arousal and positive affect, using subjective reports, and physiological arousal using heart and breathing rate, and skin-conductance changes. For the 90 players tested, the sense of cohesion, flow, positive affect, heart rates, and breathing rates all increased significantly during synchronous epochs compared to asynchronous epochs. Subjective arousal, and skin conductance changes had more ambiguous effects. After an initial practice effect, performance also increased significantly in the synchronous condition. The cohesion of auditory and motor movements appears to not only elevate performance but may also deepen engagement and enjoyment.

Physical exertion as an in-the-moment index of listening effort.

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Measuring fluctuations in listening effort and motivation to hear is important for investigating the cognitive mechanisms of speech perception. We previously found that participants exert physical effort (repeated button-pressing) to secure easier listening conditions (less background noise) in a subsequent speech-identification task. However, whereas we previously measured physical exertion before each trial, here we ask whether physical exertion can also provide a real-time index of listening effort. Spoken-narrative stories were presented with gradually-increasing levels of background noise. Participants (N = 215) could reduce the noise, if desired, by pressing a spacebar. A progressive-ratio schedule, however, meant that an increasing number of key-presses were needed to obtain easier listening conditions during the six successive narrative clips. Different ranges of signal-to-noise ratios (SNR) also meant that listening conditions were more extreme for 'wide-range' participants than 'narrow-range' participants (hardest SNR: -10 dB vs. -4 dB; easiest SNR: +14 dB vs. +8 dB). The temporal order of the narratives was also manipulated, presenting the story in either an intact-coherent or scrambled-incoherent format. Following the end of each story, thought probes assessed subjective effort, boredom, attention, and engagement. Narrative comprehension was tested using multiple-choice tests. Participants' key-presses increased significantly as the progressive-ratio required more physical exertion to obtain easier listening conditions; an effect that was significantly larger for wide-range participants. However, there was no difference in key-presses between the scrambled and intact stories, although self-reports revealed the scrambled stories elicited greater subjective effort and boredom; less attention and engagement; and worse memory. Our findings provide converging support that the costs of understanding speech in noise are readily exchanged for increases in physical effort. Importantly, these results demonstrate that the use of physical-exertion provides a useful real-time index of listening effort. Nevertheless, future work should investigate this novel index alongside other physiological measures of listening effort.

Does anxiety induce egocentric mentalizing?

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Mentalizing does not occur in an emotional vacuum. We need to consider the thoughts and feelings of others even when experiencing the ups and downs of daily life. Surprisingly, almost all studies of mentalizing have been conducted in low valence, low arousal, neutral conditions. Anxiety is a negative valence, high arousal emotion experienced by the entire population as part of their daily lives, and by increasing numbers of people with anxiety disorders to a debilitating degree. We (Surtees, Briscoe & Todd, 2024) recently proposed a framework for understanding the impact of anxiety on mentalizing, that hypothesised that anxiety makes our mentalizing more egocentric as a means to reduce uncertainty. In this talk, I will present findings from studies with three different paradigms that test that framework. Across measures of belief-desire reasoning, cognitive empathy and complex emotion recognition, we found no impact of state anxiety on mentalizing. I will consider whether this provides evidence that anxiety may have a more inconsistent impact on mentalizing than suggested and whether currently available mentalizing tasks present too varied cognitive challenges to provide consistent evidence of a singular effect of state-level changes on mentalizing.

Developing the Birmingham Advanced Mindreading Stories (BAMS): A valid and reliable measure of mindreading for adults that advances our understanding of how mindreading continues to vary beyond childhood.

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Most existing measures of mindreading cannot reliably measure mindreading in older adolescents and adults (Yeung et al., 2024). We have therefore developed a task that measures advanced mindreading in young people aged 15-30. Our task materials were crowd-sourced through participatory research in which real social narratives were written by young people who then answered questions about their intentions within their story; this formed the ‘ground truth’ for correct answers in our final task. Pre-registered analyses of our main sample (N=2612) indicated that participant responses to 9 stories load onto a single latent factor; this is robust to the effects of response length and proportion of mental state terms written by participants. The BAMS showed convergent validity with an existing measure of mindreading, and variation in performance was robust even when controlling for age, gender, socio-economic background, and general cognitive ability. Multiple groups CFA indicated that the BAMS shows full measurement invariance by gender and ethnicity, partial invariance by age, and full longitudinal invariance for test-retest reliability (1-month follow-up). In sum, the BAMS is the first measure of mindreading in adults to meet rigorous psychometric standards and shows consistent variation in mindreading across a large demographically representative UK sample.

Yeung, E. K. L., Apperly, I. A., & Devine, R. T. (2024). Measures of individual differences in adult theory of mind: A systematic review. Neuroscience & Biobehavioral Reviews, 157, 105481.

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Testing fundamental theories of consciousness science using psychophysical models: The case of warm and cold.

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Why do sensations differ in quality? "Labelled line" theories suggest each sensory receptor class carries a distinct experience. Warmth and cold have been linked to distinct skin receptor classes, activated by restricted temperature ranges. However, no psychophysical study has shown that cold and warm responses derive from separate psychophysical channels. Further, many central 'polymodal' neurons respond to either warm or cold, suggesting sensory quality could result from mixed selectivity processing rather than sparse peripheral coding. We delivered small temperature increases, decreases, or catch trials, to the hand dorsum of 28 healthy participants, in random order. Participants first detected whether any thermal stimulus was present, and then identified whether it was an increase or a decrease. Measuring both detection and identification allowed us to compare various psychophysical models. First, models with separate sensory warm and cold channels fitted the data better than single-channel models, suggesting two sensory qualities were indeed present. Second, signal detection models, based on continuous channel activation, fitted better than "High Threshold" models including a sensory threshold function. Third, in the best-fitting models, the channels did not overlap. We conclude that warmth and cold are indeed labelled lines, and we discuss the implications for qualia and consciousness science.

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~~Generative modelling of face processing tasks reveals improved task reliability and ability measurement.~~

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~~Researchers studying face processing have access to a wide range of objective experimental tasks to measure individual differences in ability, as well as subjective questionnaires. However, the collective psychometric properties of these instruments is often poor, with correlations amongst tasks being relatively low. This calls into question not only the fundamental nature of what is being measured, but also the wide literature on diagnosing extreme performers in face processing using these tasks. It is unclear whether the instruments have significant measurement error or suffer a lack of construct validity. Here, I describe the application of hierarchical Bayesian generative models to study face processing tasks. These models estimate a task-specific latent ability score for each participant that incorporates trial-to-trial variability in responses, as well as latent correlations amongst tasks. Across a series of open datasets that consider a mix of objective and subjective tasks, generative models show substantial improvements in correlations amongst tasks, suggesting generally good construct validity. The consequences of using model-derived scores versus standard sum scores are also discussed for the classification of extreme performers. The flexibility and clarity of these models stands to make significant advances in face processing research.~~ ***Withdrawn***

Seeing and hearing age: Estimating child age from faces and voices.

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Faces and voices signal age with varying reliability. Accurate child age estimation helps ensure that adult behaviour is appropriate to the child's developmental stage. Few age estimation studies have focused exclusively on children. Further, little is known about how simultaneously perceived visual and auditory cues combine to inform judgements. Across two experiments, we measured signed and absolute error in age estimation of children (4-15 years) across auditory, visual, or audiovisual conditions. Adult participants responded to ambient stimuli capturing realistic variability. In Experiment 1 (N=300), absolute error did not differ meaningfully between conditions at the extremes of the age range, but was higher for auditory-only estimates at the mid-range. Signed error was consistent across conditions, with the youngest ages overestimated and oldest ages underestimated. In Experiment 2 (N=300), we reduced the fidelity of visual cues through pixelation. Absolute error increased in the visual-only condition, while audiovisual estimates remained similar to Experiment 1. This suggests increased reliance on auditory cues when visual information is degraded. Signed error increased at the extremes of the age range only in the impaired visual condition. These results highlight how the type, availability and quality of sensory cues influence child age estimation.

Cross-view facial motion reconstruction with a 2-step Multi-view Face Space (2sMVFS).

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To best capture idiosyncratic information of a familiar person's face, Burton and colleagues (2016) proposed that in addition to a more identity-general face space (Valentine, 1991), we may also have separate identity-specific spaces to represent familiar individuals, capturing within-identity variation. Here, we extend these within-identity spaces to incorporate multiple viewpoints. This 2-step Multi-view Face Space (2sMVFS) model assumes that the brain represents faces across views by learning to associate multiple 2D viewpoints, rather than building an explicit 3D representation. The first, view-dependent layer of the model learns within-identity variation - during speech in our case - within separate nodes for each viewpoint. The model then learns the associations between the PCA components between neighbouring views. By reconstructing facial motion across neighbouring pairs of views, the second, view-invariant layer develops a multi-view space, containing information about all viewpoints within a single high dimensional space, mimicking the progression from view-dependence to invariance in humans and macaques. If the model is provided with speech in one viewpoint, it is able to reconstruct the appearance of the facial deformations in other viewpoints well, across both layers of the model.

Burton, A. M., Kramer, R. S., Ritchie, K. L., & Jenkins, R. (2016). Identity from variation: Representations of faces derived from multiple instances. Cognitive Science, 40(1), 202-223.

Valentine, T. (1991). A unified account of the effects of distinctiveness, inversion, and race in face recognition. The Quarterly Journal of Experimental Psychology, 43(2), 161-204.

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Influence of perceptual grouping on multiple salient distractor inhibition during visual search.

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We are constantly managing distractions in our environment. Though research suggests that attentional capture of highly salient distractions can be avoided, studies have typically focused on how a single salient distractor is managed, i.e., a red object among green objects. Investigating a single salient item has limited our understanding of distractor management, as natural scenes generally contain multiple distractions. I will present findings that explore how multiple distractors are inhibited in real time using behavioural and electrophysiological measures. We previously showed that when searching for a target in displays with one or two salient distractors, individuals avoided the distractors regardless of their numerosity. Additionally, the Pd component, a neural marker of salient distractor suppression, provided evidence of inhibition for two simultaneously presented distractors (Drisdelle & Eimer, 2023). Here, we explored whether salient distractors can be perceptually grouped (spatially) by comparing displays with two salient distractors that were adjacent or separated by a non-salient search item. Although performance was unaffected by distractor placement, the Pd was reduced for adjacent compared to separated distractors. We propose that this is because adjacent distractors are perceptually grouped. Our results offer insights into how multiple distractors are inhibited and their influence on one another.

Drisdelle, B. L., & Eimer, M. (2023). Proactive suppression can be applied to multiple salient distractors in visual search. Journal of Experimental Psychology: General, 152(9), 2504-2519. https://doi.org/10.1037/xge0001398.

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A data-driven analysis of the perceptual and neural responses to natural objects reveals organising principles of visual cognition.

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A key challenge in understanding the functional organisation of visual cortex stems from the fact that only a small proportion of the objects experienced during natural viewing can be presented in a typical experiment. This constraint often leads to experimental designs that compare responses to objects from experimenter-defined stimulus conditions, potentially limiting the interpretation of the data. To overcome this issue, we used images from the THINGS initiative, which provides a systematic sampling of natural objects. A data-driven analysis was then applied to reveal the functional organisation of the visual brain, incorporating both perceptual and neural responses to these objects. Perceptual properties of the objects were taken from an analysis of similarity judgements, whereas neural properties were taken from through whole brain fMRI responses to the

same objects. Partial least squares regression (PLSR) was then used to predict neural responses across the brain from the perceptual properties while simultaneously applying dimensionality reduction. The PLSR model accurately predicted neural responses across visual cortex using only a small number of components. These components revealed smooth, graded topographies, which were similar in both hemispheres, and captured a variety of object properties including animacy, real-world size, and object category. However, they did not accord in any simple way with previous theoretical perspectives on object perception. Instead, our findings suggest that the visual cortex encodes information in a statistically efficient manner, reflecting natural variability among objects.

A Competitive Edge: How social cues and spatial congruence influence joint attention in addressed or witnessed interactions.

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Joint attention is crucial for the development of social cognition, but whether the type of relationship (i.e., cooperative or competitive) or interaction (e.g., addressed or witnessed) modulates joint attention is unclear. This study investigated these factors in 96 neurotypical adults using a video object-choice task. Here, participants chose between cups based on an actor's pointing cue, either while being addressed or witnessing an interaction between two actors. Participants were primed about the actor's cooperative or competitive intent. Experiment 1 found no significant interaction between these factors. However, Experiment 2, considering spatial attention (cue direction), revealed nuanced effects. In addressed interactions, more social cues led to faster responses, especially during spatially congruent cooperative trials. In witnessed interactions, responses were faster to spatially incongruent cues in cooperative trials and vice versa in competitive trials. These findings suggest that joint attention is not solely a passive response to social cues, but is actively shaped by the social context and spatial configuration, highlighting how individuals actively interpret and adapt to others' attentional cues.

Deficits of visuospatial attention and short-term memory progressive supranuclear palsy and parkinsons disease.

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Progressive Supranuclear Palsy (PSP) is a rare (~2-7 cases per 100,000 people) and incurable movement disorder. Patients present with many of the same symptoms as Parkinson's disease (PD), which makes diagnosis challenging. Here, we present the results of a trial funded by the Dunhill Medical Trust exploring the potential of tests of visuospatial attention and memory to differentiate between PSP and PD. Patients with PD, PSP and age matched controls (28 per group) completed feature and conjunction visual search, a complex cancellation task (the bells test), tests of visual and spatial short term memory (VSSTM) and test of emotional face recognition. PSP patients had a profound deficit of visual search compared to PD and controls, reflected in very slow response times

on feature and conjunction search and highly inefficient exploration in the cancellation task. VSSTM was impaired in both patient groups, with PSP worse than PD. PSP was uniquely associated with an elevated guessing, indicating a reduced STM capacity. ROC analysis indicated that the Quality of Search metric derived from the cancellation task could classify PD and PSP with 92% accuracy. We conclude that the bells test may be promising tool for the differential diagnosis of PSP and PD.

This work was supported by the Dunhill Medical Trust, RPGO190612.

The impact of age and spontaneous strategy use on real-world visual memory tasks.

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The strategies people use during working memory tasks can impact performance and vary with adult ageing. However, more research is needed to understand how individuals spontaneously use different strategies to aid memory, and how this changes with age, particularly using more 'real-world' tasks. In each of these pre-registered studies 50 young (18-35 yrs) and 50 older (65-85 yrs) adults performed a novel visual binding task in which they briefly viewed everyday objects within realistic, virtual scenes. Participants were asked to recall the object-colour (Study 1) or object-location (Study 2) bindings. Throughout the task, spontaneous strategy use was reported via free text and Likert-scale responses probing specific task-relevant strategies. Participants subsequently completed a 'surprise' long-term memory task testing incidental memory for the stimuli shown in the earlier task. Across both studies, we report participants' strategies and any effects of age group. We then assess the impact of age group and strategy use on memory performance, as well as the potential interaction between the two. Overall, the study provides new insights into which strategies may support memory performance in young and older age.

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Development of Visual Feature Binding: Comparing 4-year-olds and 8-year-olds.

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This research investigated feature binding in children, building on the unexpected findings of a previous study by Simmering and Wood (2017). While Simmering and Wood hypothesized that younger children would perform poorly in binding compared to adults, their empirical results indicated that 5-6-year-olds were actually superior in binding than single feature memory. This incongruity was the impetus for our research. We compared 4-5 year olds and 8-9 year olds (n=48 each group), who completed a change detection task across three experimental sessions, each testing

memory either bindings, or shapes, or colours. Results from a 2(Age) × 2(Locations) × 3(Type of test) ANOVA revealed that locations significantly affected memory for bindings but not for single features. Surprisingly, 4-year-olds outperformed 8-year-olds in memory for bindings, while the reverse was true for memory of shapes. No age difference was observed in memory for colours. The results challenge the notion by Simmering and Wood (2017) that development in memory for bindings is only due to improved location-based processing with age. We argue for the study of memory for bindings in the context of Piagetian stages of cognitive development emphasizing qualitatively different modes of interaction at each stage, influenced by various cognitive capacities and factors.

Bolding and the broader benefits of pretesting.

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Sana and Carpenter (2023) pretested participants and then asked them to study a text containing the answers to the pretest. They manipulated the location of the pretested information within the text. When pretested information appeared at the end, non-pretested material was remembered better than when the pretested information was at the beginning. This result suggests that pretesting opens an "attentional window", that is, participants pay closer attention to a passage until they have discovered the answers to pretested information, during which any non-pretested material is also better learned. We investigated the reproducibility of that result, and moreover, whether presenting pretested or non-pretested information in bolded text has an impact. We hypothesised that bolded text draws participants' attention immediately, removing the need to search for answers and closing any attentional window. An initial experiment (n=68) replicated Sana and Carpenter's results successfully. In a subsequent experiment (n=138), with bolded text, we found that the location of pretested information still impacted learning of non-pretested materials, and moreover, bolding boosted learning of pretested information. Overall, our results suggest that other factors, beyond the increased attention during answer search, can play a role in the broader benefits of pretesting for learning from text.

Sana, F., & Carpenter, S. K. (2023). Broader benefits of the pretesting effect: Placement matters. Psychonomic Bulletin & Review, 30(5), 1908-1916.

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Metamemory monitoring in real-world scenes: Integration of and competition between cues.

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Metamemory monitoring is partly inferential and relies on appropriate use of cues during learning. In Koriat's (1997) cue-utilisation framework, intrinsic cues are item characteristics inseparable from that item (e.g., clutter of a scene). Most previous research has utilised relatively simple stimuli (e.g., words), whereas real-world scenes offer an informationally rich stimulus to gauge intrinsic cues effects on monitoring. In Experiment 1, we examined how two intrinsic cues (aesthetic quality and spatial layout) affect metamemory monitoring in scenes. Participants encoded scenes varying orthogonally in aesthetic quality (high, low) and spatial layout (open, closed) and made item-by-item immediate Judgements-of-Learning (JOLs). At test, they completed an old-new recognition test including item-by-item remember-know and detailed-unfamiliar judgements. Findings revealed higher JOLs for high aesthetic and closed scenes, but better memory for low aesthetic and closed scenes. Moreover, a higher proportion of Remember judgements were assigned to hits for low aesthetic and closed scenes. In Experiments 2 and 3, we investigated whether intrinsic cues compete for influence over JOLs by reducing availability of one cue in the presence of the other. Overall, our findings provide further evidence of multiple cue integration in scenes and suggest a dissociation in the JOL-memory relationship between aesthetic quality and recognition.

Am I sigma, NPC or skibidi? Mnemonic self-enhancement biases rely on explicit self-evaluation, but we preferentially encode all self-referential stimuli.

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Self-related information is afforded memory superiority (i.e., self-reference effect: SRE). Participants who evaluate the self- or other-relevance of positive trait adjectives (e.g., "are you/Harry Potter agreeable?") typically show a SRE for self-evaluated words. However, it is unclear if the SRE is underpinned by organisation and elaboration of material with self-knowledge, emotional self-enhancement, or both. Cognitive elaboration accounts predict that SREs should arise irrespective of valence, whereas self-enhancement accounts predict SREs should be restricted to positive traits. To investigate this, in experiment 1, participants evaluated the self- and other-relevance of positive, neutral and negative traits. We found a SRE largest for positive traits, but significant across all valences. Do self-enhancement biases rely on self-evaluation, or are they 'incidental' in the sense that any positive stimuli associated with the self at encoding is given greater attention, resulting in mnemonic priority? To explore this, in experiment 2, participants incidentally encoded positive, neutral and negative words by judging whether they appeared above a self- or other-name-cue. We found a SRE of similar magnitude across positive, neutral and negative words. Together, these experiments show that although self-enhancement boosts the SRE when information is evaluated against self-knowledge, adults preferentially encode all self-referential stimuli regardless of valence.

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2025 EPS / BSA Undergraduate Project Prize Talk

Large language models surpass human experts in predicting neuroscience results.

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The rapid expansion of scientific literature challenges human scientists who strive to remain up to date with the most recent developments and to guide research efforts efficiently. Large language models (LLM) could supplement human scientific exploration and discovery, provided they demonstrate sufficient predictive abilities in extrapolating from known information. We compared the scientific prediction abilities of LLMs and human scientists with a future-looking neuroscience benchmark. Test takers had to choose between an original and an edited version of a new, unseen abstract with the results modified to change the study's outcome. Results showed that LLMs significantly outperformed neuroscientists in terms of accuracy. Further analyses indicated that neuroscientists and LLMs found different test items difficult, showcasing diverging abilities, and that decision confidence predicted accuracy for both LLMs and humans. I will discuss the implications of these findings and how they relate to the wider debate on LLMs' capabilities. I will further consider ways of utilising this technology as a tool for scientists to aid scientific discovery.

Hebb Distinguished Contribution Award Lecture

The Reluctant Thinker: Why We Hesitate to Reflect- and to Stop.

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All other things being equal, what makes us pause and reflect on some choices but not others? Once reflection has been engaged, how do we decide that we have given the current matter sufficient thought? In this talk, I will use a metacognitive lens to shed light on these issues. Like other models of metacognition (e.g., Nelson & Narens, 1991), the Meta-Reasoning framework (Ackerman & Thompson, 2017) proposes that reasoning, decision-making, and problem-solving behaviours can be understood at both the meta- and the object-level. Processes at the "meta" level are proposed to monitor the quality of our thinking and to trigger control processes as needed. The monitoring processes that I will discuss consist of noetic feelings of certainty or uncertainty, which are measured by asking participants how they feel about a decision they are about to make, are in the process of making, or have made. Monitoring processes inform control processes, which include continuing to think about a problem, changing one's answer, giving up, changing strategies, amongst other behaviours. Perhaps not surprisingly, the data show that it is difficult for people to engage in analytic processes; counter-intuitively, however, the data also show that they are often reluctant to give up when it is appropriate to do so.

From classroom to daily life: The impact of attentional stability on real-world learning performance.

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Fluctuations in attentional states are critical in dictating effective learning. However, in learning environments, the influence of attention has largely been explored using binary on- versus off-task judgments in short lectures (e.g. in one-hour weekly lectures). This approach downplays the likely influence of the remaining 167 hours of one's week (e.g. socializing in daily life), and that other nuanced thought features (e.g. valence, modality) covary to generate some forms of "off-task" thought that are not necessarily detrimental to learning; indeed, some forms, like elaborative thought, may even enhance learning. Our study, therefore, expands the scope of investigation to include these broader influences on student learning and success. We use multidimensional experience sampling (mDES) to densely sample the thought patterns of 200+ undergraduate students in both lectures and their daily lives throughout a semester. mDES prompts participants to provide subjective ratings about their thoughts along 16 unique dimensions, including valence, detail, intention and intrusiveness. The covariation between these dimensions, as quantified by principal components analysis, captures the prevailing patterns of thoughts people experience (e.g. 'Pleasant Intrusive', 'Detailed Deliberate'). With our dataset, including thousands of mDES reports across various activities, we established thought patterns that were common among students in the real-world, and probed for associations with academic performance both broadly and specifically. Students who frequently engage in 'Detailed Deliberate' thinking during lectures tend to perform better on interactive assignments. Critically however, cognitive stability – maintaining consistent thought patterns across different contexts - is a strong predictor of students' academic success. As an example, high-performing students are more likely to exhibit consistent thought patterns while doing homework and attending lectures. Our findings establish cognitive stability as a unique indicator of academic performance, and highlight the importance of considering nuanced thought features and students' daily life experience when investigating determinants of academic success.

The cognitive cost of convenience: Offloading generative tasks to ChatGPT impacts learning outcomes.

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The recent advancements and widespread adoption of Large Language Models (LLMs), have the potential to profoundly influence human behaviour and cognition. Psychologists have long recognized the ways in which technology enables cognitive offloading - the process of storing information externally to reduce the cognitive load required to accomplish a task (Risko & Gilbert, 2016). While offloading can be beneficial and improve productivity, it can also impair learning and memory performance (Sparrow et al., 2011). Famously, global positioning systems help us navigate efficiently, but they can also hinder spatial learning (Dey et al., 2018). Similarly, LLMs can dramatically improve productivity through their ability to rapidly generate tailored outputs for a wide range of tasks, such as generating study materials, or offloading aspects of writing that require more extensive cognitive engagement. However, self-generating content engages deeper cognitive processes that enhances memory (McFarland et al., 1980). Nonetheless, the ability of LLMs to

produce unique and contextually relevant outputs raises the question of the extent to which the generative aspects of human learning remain relevant. The present study explored how offloading generative tasks during study to an LLM (ChatGPT) influences learning by investigating how offloading the generation of mnemonics for randomly-generated acronyms to LLMs influences both recognition and cued-recall memory performance, compared to self-generation of mnemonics. Our findings revealed that when mnemonic generation was offloaded to ChatGPT, both recognition memory and cued-recall performance were significantly impaired in comparison to when mnemonics were self-generated. These results underscore the need to explore the possible trade-offs between efficiency gains from LLMs with the potential cognitive drawbacks of relying them for tasks that are crucial for learning and memory. Future studies should aim to explore memory detriments associated with LLM-use in more generalizable contexts, such as when studying content in preparation for an exam.

Exploring profiles of early math achievement in Canadian students.

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Early numeracy skills are foundational for students' later success in mathematics. Although some children demonstrate consistent strengths or weaknesses across all numeracy skills, others excel in some areas while struggling in others. However, few researchers have explored heterogeneity in early math skill development. To address this question of heterogeneity and subsequent development, we used a person-centered approach to analyze data from a longitudinal study conducted in Canada (N = 1075, 567 girls, Mage = 6.3 years). We used Latent Profile Analysis to identify math skill profiles of grade 1 students across three core domains: Symbolic Number Knowledge (verbal counting, number naming, number writing), Number Relations (number comparison, number line estimation) and Number Operations (addition/subtraction of whole numbers). We found evidence for four distinct math ability profiles. Profile-1 were consistently low performers (20%), Profile-2 had low number knowledge skills but average relations and below-average operations (38%), Profile-3 had high number knowledge skills, but average relations and operations (31%) and Profile-4 were high performers in all three areas (11%). These results show that heterogeneity is present in students' math skills as they start formal schooling. We evaluated the relations between these distinct profiles and later mathematics achievement in Grade 2 by analyzing mathematics scores in a one-way multivariate ANOVA. There was a significant effect of profile membership, $F(18, 1971) = 17.80$, $p < .001$, indicating that students in the four profiles showed distinct performance patterns across Grade 2 mathematics measures. Post-hoc Tukey-HSD comparisons indicated that students in higher-ability profiles (Profile-3, Profile-4) consistently outperformed those in lower-ability profiles (Profile-1, Profile-2) across all assessed math tasks, showing the persistent challenges faced by students in lower-ability profiles. These results show that early math ability profiles are predictive of later mathematics performance, indicating the need for individualized, targeted educational interventions to support students' numeracy development.

Are sex/gender differences in math anxiety mediated by spatial anxiety and performance in 8- to 11-year-olds?

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Sex/gender differences exist in math anxiety, spatial anxiety, and in specific spatial tasks, from childhood to adulthood. It is not yet fully understood whether sex/gender differences in cognitive (i.e., ability) and affective (i.e., anxiety) aspects of spatial and mathematical processing are interrelated from a developmental perspective. Previous adult studies showed that sex/gender differences in math anxiety were mediated by mental rotation ability and spatial anxiety. Additionally, mental rotation ability mediated the increase in sex/gender differences in math anxiety from adolescence to young adulthood. The current study investigated sex/gender differences in both spatial/math anxiety and spatial/math performance, as well as relations between them, in 8- to 11-year-old boys and girls, as this is a critical age during which sex/gender differences in these constructs are thought to emerge. We administered tasks of mental rotation, math proficiency, and abstract reasoning. Math and spatial anxiety were also measured. Sex/gender differences were found in math anxiety and performance, not in spatial anxiety or performance. In contrast with previous adult findings, neither spatial anxiety nor performance mediated sex/gender effects on math anxiety. These results improve our understanding of the inter-domain relationship between math and spatial processing during development, suggesting that it may become salient during adolescence.

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The emotional space of arithmetic: Exploring affective influences on verification.

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There is a widely documented link between numbers and space which extends into arithmetic, associating addition with right and subtraction with left space. Similar spatial associations exist for emotions, with right for positive and left for negative. Thus, emotion induction should prime arithmetic operations. The present work investigated whether emotional primes congruent with the spatial mapping of arithmetic operations facilitate mental calculation. 64 right-handed participants (mean age: 24.3y; 44 females) verified the correctness of two-digit addition and subtraction equations following affective auditory word primes (positive, negative, neutral; 1000 ms). We predicted that congruent prime-operation pairs (e.g., positive-addition, negative-subtraction) would speed reaction times (RTs) and improve accuracy. Results showed no general priming effect of emotion on RTs or accuracy; however, a specific interference emerged in the incongruent pairing positive-subtraction, eliciting longest RTs. We interpret these findings in light of the Valence-Magnitude account, Conceptual Metaphor Theory, and embodied cognition

Investigating the impact of Gen-AI source on HE students' perceptions of learning.

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Gen-AI tools have become widespread in many fields, including Higher Education. Unfortunately, research investigating potential negative impacts (e.g. plagiarism) mainly involved students self-evaluating how they would use Gen-AI, not how they actually use it. To address this gap, we investigated how students learn from Gen-AI vs a more traditional source. In an online study, 158 participants studied a passage on a novel topic from ChatGPT (n = 75) or a textbook (n = 83). In both conditions participants actually saw a human-generated text. After reading, participants completed a test, plus questionnaires on Gen-AI Literacy, evaluations of the material and of their confidence in their learning. Across both conditions, test scores were positively related to time spent reading the information and predicted test scores before and after the test. There was no effect of condition on test scores, predicted scores or perceptions of learning. However, participants in the ChatGPT condition viewed the text as less reliable, and tended to view themselves as more AI Literate than participants in the Textbook condition. They also stated a greater intent to use Gen-AI in the future. We discuss our findings in relation to ongoing debates as to the place of Gen-AI in HE.

Do social judgements made from facial photographs predict those made in-person?

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People form rapid, automatic judgments about others based on their faces, with research suggesting that these initial impressions can significantly impact social interactions. However, much of this research relies on judgments made from photographs, raising questions about their relevance to face-to-face encounters. This study examines whether social judgments made from photographs align with those formed during in-person interactions. A total of 689 participants (344 males, 345 females) took part in a 'speed-meeting' study where they had brief, three-minute interactions with each other before rating each other on several social traits. These included traits such as attractiveness, creativeness, intelligence, kindness, confidence, plus others. Participants also provided facial photographs, which were then rated on the same traits by a separate sample of 356 raters in an online study. Predictably, physical traits, such as attractiveness and athletic ability, showed a strong association between the two contexts. Interestingly, there was also an association between some non-physical traits, such as creativity and intelligence judgements for male targets, and confidence and extraversion for female targets. These findings provide insight into the social traits inferred from faces that may have lasting effects on interpersonal perceptions. They also have implications regarding the ecological validity of research based solely on facial photographs.

Individual differences in older and younger adults' face learning efficiency.

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Older adults make more errors than young adults in unfamiliar face matching but show comparable benefits after viewing either 6 images or a 3-minute video of a to-be-learned identity (Matthews & Mondloch, 2021). Among young adults, individual differences in unfamiliar face matching predict the slope of face learning (i.e., the efficiency with which a newly encountered face becomes familiar; Baker & Mondloch, 2023). Here, we examined whether individual and group (young versus older adults) differences in similarity ratings of matched versus mismatched face pairs predict unfamiliar face matching, and the ability of age group, matching ability, and similarity ratings to predict the slope of face learning. Older and younger adults (N=205) completed an unfamiliar face matching task, a similarity rating task and a face learning task in which learning was assessed after viewing 1, 3, 6, and 9 images of each to-be-learned identity. Older adults made more errors than young adults on face matching; their similarity ratings of matched versus mismatched pairs were less differentiated; their slope of learning was shallower. Mediation analyses reveal that these are largely independent effects. Our findings have implications for face learning models.

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Clothing cues to status moderate face recognition.

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The privileging of certain faces over others in memory has important implications for interpersonal interactions and eyewitness identification. Existing research finds that memory for faces is affected by their perceived status, with higher-status faces recognised better than lower-status faces - suggesting greater motivation to attend to the faces of high-status others. However, extant work has almost exclusively tested the effects of status on memory using men's faces. This limits the generalisability of findings, especially as other research shows that people hold distinct stereotypes associating status and gender (e.g., men are associated with higher status). The current study addressed this gap, using a stimulus sample of Black and White women's and men's faces, with perceived status manipulated by combining face images with images of upper bodies wearing uniforms of high and low status occupations (e.g., doctor, cleaner). Our results showed two distinct effects of perceived status on face recognition in an old/new task: half of participants showed better recognition for high-status faces, whereas half showed better recognition for low-status faces. Faces'

gender and ethnicity were not consistent moderators. We observed these patterns across both neurotypical and autistic samples. Future research will explore individual differences that may explain these two opposing patterns.

The importance of context in face recognition.

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Research suggests that exposure to variability in appearance from one encounter to the next improves learning of a new face. However, although the role of perceptual exposure is well-documented, the role of conceptual information in face learning is not well-understood. We used a 3 x 3 mixed design in which participants viewed five ambient pictures of each target identity naturally depicted in either a) a repeating context that did not provide information about the person (i.e., single-uninformative), b) a repeating context that provided information about the person's occupation or hobbies (i.e., single-informative, or c) varying contexts that did not provide information about the person (i.e., multiple-uninformative). While viewing the images participants were asked to pay attention only to the faces, only to the context, or to both. We then tested recognition of these identities in novel contexts. Regardless of where participants directed attention, face recognition performance was best for identities viewed in a single informative context. Performance in this condition was consistently superior to that of the multiple uninformative condition, despite less perceptual exposure to within-person variability. Recognition performance for identities learned in a single uninformative context was the worst across all experiments, suggesting that the recognition advantage observed in the single informative condition was not merely due to the repetition of context creating stronger context-face associations. These findings provide evidence for the perceptual benefits of high within-person variability, but only when the low-variability condition does not provide conceptual information about the person. Importantly, however, repeatedly viewing a person in an identity-informative context yields better face recognition performance than perceptual exposure to high within-person variability in uninformative contexts.

The confidence-accuracy relationship and own-age bias when recognizing unfamiliar faces.

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Research suggests that memory is better for faces within one's own age group (i.e., own-age faces) than for faces of other age groups (i.e., other-age faces). This own-age bias (OAB) may be due to social factors, which motivate individuals to process in-group faces at an individual rather than categorical level. The present study investigated whether a manipulation that naturally encourages individuation (i.e., exposure to within-person variability) would reduce OAB. We hypothesized that within-person variability would lead to the highest accuracy for both own- and other-age faces. Further, if within-person variability encourages individuation, we expected that OAB would be reduced (i.e., accuracy would be similar for both own- and other-age faces). Additionally, we hypothesized that this would be counterintuitive and individuals would have higher confidence in

conditions in which they performed the worst. We expected this because previous research suggests it is easier to extract a representation of a person's face from images depicting little variability from one view to the next, but this learning does not facilitate recognition of novel views of the person's face. Forty-nine subjects were presented with six photos of twenty (i.e., ten own- and ten other-age) targets differing in the degree of within-person variability (i.e., no, low or high) captured in their photos. Following training, subjects completed a seen/unseen task scored using d′. Subjects also provided confidence ratings of their recognition ability during training and test. Surprisingly, the results suggest that within-person variability may contribute to OAB when recognizing unfamiliar faces. However, confidence at test was lower for own- vs. other-age faces in all conditions, consistent with our prediction that individuals would be most confident in the conditions that lead to the worst performance.

Does experiencing a recognition test improve metamemory accuracy for emotional images?

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Participants often show higher judgements of learning (JOLs) for emotional (especially negative) pictures than for neutral pictures, but their recognition accuracy is often contradictory to these predictions, with better performance for neutral content. One possible explanation is that JOLs made during study reflect a misunderstanding of the demands of the future old/new recognition test. Therefore, participants may benefit from experience with test conditions to better calibrate JOLs to match recognition accuracy. In the present study, participants studied a list of positive, negative, and neutral images while providing JOLs, and then completed an old/new recognition test. They then completed a second block of the same procedure, but with new images. JOLs were highest for negative emotional images in the first block, but recognition accuracy was highest for neutral images. JOLs were even less accurate on the second block, again showing the highest JOLs but the lowest recognition accuracy for negative images; experience did not calibrate participants to provide more accurate JOLs. Experiment 2 added post-diction judgments to new items during test in an attempt to encourage focus on test conditions, but results replicated the poor calibration observed in Experiment 1. Interestingly, both experiments showed higher resolution of JOLs for negative images compared to neutral images. Theoretical implications regarding the impact of emotion on metamemory for images and future directions of research are discussed.

Examining prediction stages with accented speech using the visual-world paradigm.

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People typically experience difficulty comprehending foreign-accented speech (Floccia et al., 2009).

We also know that comprehension is facilitated when they predict upcoming speech (e.g., Altmann & Kamide, 1999). Such prediction is impaired when they listen to foreign-accented speech (Chinese-accented English; Porretta et al., 2020), but we do not know whether it is impaired by less familiar native accents. Research suggests that prediction involves automatic and non-automatic stages (Pickering & Gambi, 2018). After hearing a male speaker say, Tonight, it is likely I will wear…, listeners first automatically predict verb-related (wearable) objects (e.g., a tie and a dress). They then predict an object that is stereotypically compatible with the speaker (here, a tie), but such predictions are slower and effortful (Corps et al., 2022). In this preregistered visual-world study, 32 participants from England listened to sentences by female or male speakers with (familiar) England-English or (less familiar) Glasgow-English accents while viewing four objects on a screen. Divergence point analyses show that participants predicted both verb-related and speaker-compatible objects for both accents, but neither type of prediction was affected by accent. We conclude that people make both automatic and non-automatic predictions for utterances spoken in less familiar native accents.

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Awareness of large-scale spatial statistics: Exploring the role of awareness in the allocation of attentional resources.

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Efficient environmental search relies on sensitivity to the spatial statistics of the array. Whilst studies of visual search suggest that probability cueing operates below the level of awareness, large-scale search experiments have generated more equivocal accounts. Here we present a task designed to closely gauge the relationship between large-scale statistical learning and participant awareness. In a fully immersive virtual environment, participants were required to search for a target positioned on the ground within an 8m2 arena. Unbeknownst to participants, trials were divided into two stages - an initial biased stage, where targets appeared in the cued quadrant on 50% of trials, and a subsequent unbiased stage, where targets appeared equally across all quadrants. Awareness of the probability cue was assessed using intermittent probes, alongside a series of additional probes administered either at the end of the biased or unbiased phase. In the biased stage, participants adapted their search in response to the cue and also indicated awareness of the spatial statistics. Prioritisation of the cued quadrant continued into the unbiased stage, despite awareness of the change in target distribution. These findings suggest a more prominent role for awareness in large-scale statistical learning, although additional factors appear to contribute to search strategies.

Capacity Bottlenecks in visual search: Evidence from event-related potentials.

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Visual search is guided by (memory-based) target templates. In previous two-forced choice (2FC) search tasks, reaction times (RTs) were increased when multiple target templates were needed simultaneously (e.g., during two-colour search). To determine the location of this capacity bottleneck, we measured event-related potentials as neuronal markers of target selection (N2pc), target identification (SPCN), and response selection (sLRP) in low- and high-load conditions of three search task with increasing complexity: simple target detection (key press if the target is present), Go/Nogo (key press if the target has a specific identity), and 2FC (different key presses for different target identities). All tasks produced behavioural load costs (i.e., delayed RTs in two-colour versus one-colour search), which increased systematically with task complexity. However, load costs were small and comparable in all three tasks at the level of the N2pcs but then increased at the level of the SPCN in the Go/Nogo and 2FC task, and increased further at the level of the sLRP in the 2FC task only. These findings demonstrate that while multiple target templates can be activated in parallel, the behavioural load effects observed in previous 2FC tasks reflect cumulative capacity limitations across attentional and post-selective processing stages.

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Training to attend selectively: Task demands shape the learning of cognitive control.

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Prior experience shapes what we attend to—but do the conditions that optimize selective attention in the moment also help us learn to attend over time? We have studied this issue using an attentional blink method (AB). The AB refers to the well-documented finding that selective attention to a first target (T1) often leads to poor identification of a second target (T2) appearing shortly afterward. One factor known to influence selective attention to targets (e.g., T1 in an AB task) is how consistently it is engaged across trials. When attentional demands are stable, performance tends to improve—a sequential congruency effect. The present study explored whether these immediate performance benefits translate into lasting improvements in attentional control. To test this idea, we measured two-target costs in a context where T1 consistently required selective attention (blocked context) versus one in which the T1 task unpredictably required selective attention (mixed context). As expected, participants in the blocked condition showed a smaller two-target cost than those in the mixed condition, confirming that stable attentional demands enhance immediate performance. However, 48 hours later, the pattern reversed: participants who had trained in the mixed condition—despite initially performing worse—outperformed those from the blocked condition. These findings support the idea that selective attention can be trained, and importantly, that the conditions supporting long-term improvement may differ from those that produce strong short-term performance. This pattern aligns with a well-established principle in learning and memory research—desirable difficulties—which holds that training conditions that initially impair performance can enhance retention and transfer over time. To our knowledge, this is the first

observation of such a pattern within an attentional control paradigm. Introducing variability and challenge with mixed-context training may impair performance in the moment, but ultimately may enhance long-term learning and attentional control.

Are cuing effects really "negligible" when accuracy is emphasized and single masks eliminate uncertainty about target location?

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Participants often show higher judgements of learning (JOLs) for emotional (especially negative) pictures than for neutral pictures, but their recognition accuracy is often contradictory to these predictions, with better performance for neutral content. One possible explanation is that JOLs made during study reflect a misunderstanding of the demands of the future old/new recognition test. Therefore, participants may benefit from experience with test conditions to better calibrate JOLs to match recognition accuracy. In the present study, participants studied a list of positive, negative, and neutral images while providing JOLs, and then completed an old/new recognition test. They then completed a second block of the same procedure, but with new images. JOLs were highest for negative emotional images in the first block, but recognition accuracy was highest for neutral images. JOLs were even less accurate on the second block, again showing the highest JOLs but the lowest recognition accuracy for negative images; experience did not calibrate participants to provide more accurate JOLs. Experiment 2 added post-diction judgments to new items during test in an attempt to encourage focus on test conditions, but results replicated the poor calibration observed in Experiment 1. Interestingly, both experiments showed higher resolution of JOLs for negative images compared to neutral images. Theoretical implications regarding the impact of emotion on metamemory for images and future directions of research are discussed.

Searched but never found: Attentional control settings are pruned based on interactions with the external environment.

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When visually searching for a large set of real-world objects, only those objects capture our attention, indicating we have adopted attentional control settings (ACS) based on long-term memory representations of those objects. For example, when searching for a set of real-world objects in a spatial blink task, distractor objects from that set will cause a spatial blink indicating they have captured attention, but not non-studied objects. How are long-term memory ACSs updated over time? If some of the searched-for objects never appear as targets, will they continue to capture attention, or will they eventually be excluded from the ACS? Across two experiments, we had participants study and then search for 16-24 objects during a spatial blink task. Unbeknownst to participants, studied objects were divided into three subsets: some regularly appeared as targets throughout the spatial blink task, some never appeared as targets, and some did not appear as targets

until the second half of the spatial blink task. We found that all studied objects initially captured attention, but by the end of the first half of the spatial blink task, only objects regularly appearing as targets captured attention, suggesting the other studied objects were no longer included in the ACS. In the second half of the spatial blink task, objects that were reintroduced as targets, started to capture attention again. These results seem to demonstrate that while LTM ACS are initially formed based on our internal attentional goals, the ACSs are updated over time so that only regularly encountered objects are included in the ACS.

Boredom proneness, social media use and its implications on mental health.

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Boredom is an uncomfortable feeling of wanting but failing to engage with the world. Boredom proneness – the tendency to experience the state more frequently and intensely – is associated with a range of mental health concerns including increased depression and anxiety. Boredom has also been associated with feelings of loneliness and problematic smartphone use. Here, we explored these relations more broadly to determine how boredom is associated with social connectedness. A comprehensive survey was administered online to undergraduate students from the University of Waterloo (N=606). The survey included a range of psychological scales, including the Boredom Proneness Scale (BPS), Depression Anxiety and Stress Scales (DASS), Smartphone Usage Questionnaire (SUQ), Nomophobia Questionnaire (NMPQ), Satisfaction with Life Scale (SWLS), and UCLA Loneliness Scale (UCLA). Replicating prior work, we showed that boredom proneness was strongly correlated with both depression (r=0.56) and anxiety (r=0.44). Those high in boredom proneness also reported higher levels of absent-minded smartphone use (r=0.28), nomophobia (fear of being without their phones; r=0.23), and loneliness (r=0.27). Furthermore, boredom proneness was found to have negative associations with life satisfaction (r=-0.32) and a general sense of belongingness (r=-0.44). Boredom proneness was positively related to problematic internet use (r= 0.21). Notably, individuals with severe levels of stress and depression exhibited higher 24-hour internet and smartphone usage. These findings highlight the complex interdependencies between technology usage, boredom proneness, and mental health and contribute to the growing body of evidence regarding the effects of boredom proneness on psychological well-being.

Are there two distinct mechanisms of JOL reactivity?

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Making judgments of learning (JOLs) during study can affect later test performance, a phenomenon called JOL reactivity. For example, Soderstrom et al. (2015) found that JOLs improve cued recall for related (not unrelated) word pairs. According to their cue-strengthening hypothesis, this effect is dependent on cue-target association. Beyond this, the underlying mechanism of this effect remains unclear. Perhaps JOLs trigger effortful, covert retrieval practice (Kubik et al., 2022). Alternatively, reactivity could be the result of a passive spreading activation process (Maxwell & Huff, 2024). If

the latter is true, then JOLs could increase the incidence of false memories in tests relying on familiarity-based memory. Methods. In a series of two experiments, we asked participants to study word pairs with or without concurrent JOLs. Participants were given associative recognition and cued recall tests in varying orders. Results. When cued recall occurred before associative recognition, JOLs led to improved performance on both tests. This positive reactivity was dependent on cue-target association for cued recall, but not associative recognition. Contrastingly, we found that when associative recognition precedes cued recall, participants were prone to false recognition and, later, intrusions in the cued recall test. Discussion. Following cued recall, JOLs boosted associative recognition for both related and unrelated word pairs. In this case, covert retrieval likely boosted cued recall performance. Then, participants were likely using a recall-to-reject strategy in this recognition test. When associative recognition occurred before cued recall, JOLs increased the likelihood of false recognition and later intrusions in cued recall. This result is consistent with spreading activation models of memory. It is possible that JOLs trigger both spreading activation, which affects familiarity-based memory, and retrieval practice, boosting recollection-based memory.

How to study and how long to study: Effectiveness of self-regulated study decisions.

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A student's capacity to effectively self-regulate learning is an important aspect of academic success. One way that individuals self-regulate their learning is by making decisions about how to allocate study time across a set of study items. Previous research by Tullis & Benjamin (2011) demonstrated that self-paced study leads to better memory performance in comparison to a yoked condition where total study time was equated, but each item was presented at a fixed rate. They also demonstrated that this benefit was driven by those self-paced participants that allocated study time preferentially to more difficult items. The present study challenges this assumption by yoking study time on an item-by-item basis and assessing whether the self-pacing advantage remains. Insofar as the benefit of self-paced study is only driven by individuals that allocate more time to challenging items, we would expect to see that their yoked counterparts should also have similar performance. However, if there are other factors, such as differences in encoding strategy use, that are influencing a boost in memory performance when study time allocation is under one's control, we should still see a self-pacing advantage. Across two experiments, we found that self-pacing led to better recognition memory performance in comparison to both participants yoked at a fixed-rate and on an item-by-item basis. Additionally, we failed to find evidence that the self-pacing advantage was restricted to those participants who preferentially allocated study time to more difficult items. Rather, we find evidence that the self-pacing advantage is a result of more frequent use of effective encoding strategies during study. These findings provide novel insights into the effectiveness of self-regulated study decisions and the mechanisms that drive the benefits of metamnemonic control over encoding.

Defence Against the Dark Arts: Simple nudges can make listeners more vigilant towards identifying AI voices.

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While the rise of AI-assisted voice technology that can clone or augment a speaker's voice offers many positive applications, it also poses risks for cybersecurity, fraud, and manipulation as natural and AI-augmented speech become harder to distinguish. Kirk (2024) recently found that listeners showed a general bias toward classifying voices as human. However, this bias was particularly strong when the voices spoke the Dundonian Scots dialect, which likely stems from a prior belief that AI cannot convincingly replicate local or non-standard varieties. Consequently, listeners may be more inclined to believe that AI voices using these dialects are real human speakers, leaving some language communities disproportionately vulnerable to deception. The proposed talk reports two experiments (N = 300) using the same classification task preceded with brief informational nudges about AI. The first revealed that informing participants that AI could authentically produce regional Scottish varieties cut the bias for responding 'human' in half, compared to a control (no information) condition. A second experiment demonstrated no effect of a vigilance-based nudge (that warned about the real-world consequences of misidentifying AI voices) on reducing this 'human' response bias. These findings offer both theoretical insights and practical guidance for addressing biases in AI voice perception.

Kirk, N. W. (2024). 'Eh? Aye!': Categorisation bias for natural human vs AI-enhanced voices is influenced by dialect [Manuscript under revision at Computers in Human Behavior: Artificial Humans]. PsyArXiv. https://osf.io/preprints/psyarxiv/skcv2_v1

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~~Time passage broadens generalization of instrumental avoidance in humans.~~

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~~Although there is a wealth of data on the generalization of fear in rodents and humans, less is known about the generalization of avoidance behaviour. In addition, we wanted to understand the effect of trace procedures (i.e., inserting a temporal gap between CS and US) on generalization of avoidance, given evidence in animals that trace conditioning results in broader generalization gradients. Finally, we wanted to explore if anxiety levels relate to generalization in delay and trace conditions. In this series of experiments, we developed an avoidance generalization test in which we could compare delay and trace procedures and investigate the generalisation of avoidance behaviour and anxiety. Experiments 1a and 1b provided preliminary evidence of generalization with delay and trace procedures, respectively. Experiment 2 was an online between subjects' experiment comparing delay and trace procedures and Experiment 3 was a within-subjects laboratory experiment. We consistently observed generalisation gradients were broader in the trace conditions compared to delay. Overall, this study indicates that avoidance behaviour generalises more broadly with trace procedures, in agreement with previous data in non-human animals.~~ ***Withdrawn***

Multisensory benefits measured with distinct motor actions: Introducing a novel paradigm with redundant signals.

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Responses to bimodal signals are typically faster than responses to unimodal signals, a phenomenon known as the redundant signal effect (RSE). Traditionally, the RSE is studied using tasks that require participants to perform the same motor action when detecting targets in either modality. The RSE can be explained either by pooling models, where sensory evidence is integrated to cross a shared response threshold, or by race models, where parallel processes race to cross one of two separate thresholds. Distinguishing between these accounts has proven challenging under a behavioural paradigm that fails to differentiate the two accounts. To address this, we modified the task, requiring participants to press distinct buttons corresponding to the modality they first detected under a signal onset asynchrony (SOA) manipulation. In bimodal trials, the proportion of button presses corresponding to a specific modality was predictably modulated as a function of SOA, confirming adherence to task instructions. Notably, the two-button task yielded RSE patterns consistent with predictions from the race account. Even though modalities were mapped to separate responses, responses violated Miller's bound, a finding often interpreted as evidence for pooling. Our results suggest that introducing a two-button instruction can clarify the mechanisms underlying the RSE.

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Learning through stories: Exploring the neurocognitive correlates of narrative processing in school-aged children.

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What does it mean for a student to be engaged in the classroom? Successful engagement relies upon the integration of several cognitive skills like attention, memory, and executive functions. For typically developing children, engaging in the classroom can at times be a highly demanding task. Many children with learning disabilities face these challenges daily, leading them to disengage from the typical classroom environment. Narratives, like movies and books, can offer powerful insights into how children process cognitively demanding, multisensory environments. For example, examining which brain regions are active while individuals engage with a complex narrative, and to what extent that activity correlates across individuals provides a window into the networks that support narrative comprehension. Indeed, brain activity during movies has been shown to synchronize between adults when they have a similar understanding of the plot. Yet little is known about neural synchrony during movie-watching in children or the potential sources of individual differences. Here, we used the Healthy Brain Network—a large-scale clinical neuroimaging database—to investigate the relationship between narrative processing skills and cognitive abilities in 526 children. Taking a multimodal approach, we analyzed standardized tests, spontaneous storytelling samples, and functional MRI scans acquired during movie-watching. We used clustering,

machine learning, and natural language processing tools to extract and model the relationships among measures. Our results suggest that cognitive abilities are uniquely predictive of narrative processing skills across different brain networks. That is, cognitive test scores can help differentiate between children who might have an easier versus harder time understanding stories. Our data-driven method provides critical insights into how cognitive abilities impact learning. Research of this nature could inform the development and delivery of materials to improve engagement and accessibility in the classroom, ensuring more equitable access to education and its benefits for individuals with a range of abilities.

Crime, Punishment, and Utility: How we weigh justice and economics.

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Do laws function to maximize societal well-being (an economic view) or to implement justice (a moral view)? We investigate which view better aligns with lay beliefs. According to economic theories of law, crimes with lower probabilities of detection should receive harsher punishments to maintain a negative expected value and deter the crime. Two sets of studies tested whether people intuitively apply this logic when assigning punishments. Experiments 1a and 1b examined crimes where harm was primarily economic (e.g. littering and vandalism). In Experiment 1a, the level of harm (e.g., $100 vs. $400 clean-up cost) and apprehension probability (20%, 50%, 80%) were manipulated. Experiment 1b simplified this to two levels of apprehension probability with verbal descriptors ("very low" or "very high"). In both experiments, participants' behaviours followed the economic theory's predictions: Higher punishments were given to criminals causing greater harm ($p < .001$), and those less likely to be apprehended ($p < .001$). However, relative to normative economic benchmarks, participants were less sensitive to apprehension probability despite being appropriately sensitive to victim harm. Experiment 2 extended this to bodily harm scenarios. Participants read vignettes with two varying levels of victim harm (e.g., a broken leg vs. loss of a leg) and apprehension probability (as in Experiment 1b), then assigned jail time punishments (days, months, and years). While victim harm strongly influenced punishment ($p < .001$), apprehension probability had no significant effect ($p = .090$), diverging from economic theory. Overall, people behaved more like economists than expected in economic scenarios—but not bodily harm scenarios. By integrating the cognitive science of decision-making to legal studies and economic analysis, our research further informs how legal policies align with moral intuitions. These findings have implications for legal policy, as the alignment between laws and moral intuitions influences the perceived legitimacy of the justice system.

Media multitasking during online lectures: Varying volition and the interactivity of distracting media.

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Media Multitasking (MMT) is a common everyday behaviour, wherein people either actively or

passively engage with secondary media while completing a primary task. In the context of education MMT is frequently associated with lower academic performance. In a series of studies, we investigated how the opportunity to voluntarily engage with a distracting video game during a 22-minute video lecture (i.e., MMT), impacted attention, MMT behaviour, and performance on a memory test. While viewing the lecture participants could press a button to simultaneously display a window containing a simple video game (snake) beside the lecture video. The video game could be toggled on and off at will, with the amount the amount of MMT being indicated by the amount of time the game was toggled on (i.e., visible). In Study 1, we varied the interactive qualities of the distracting game so that participants could engage with it either actively (i.e., by playing the game) or passively (i.e., by watching a recording of someone else play it). In Study 2, we used the same paradigm but added intermittent thought probes asking people whether their attention was on task, on the video game, or on task-unrelated thoughts. Across these studies, participants engaged in significantly more MMT and reported attending to the distractor more frequently when the distractor allowed for active rather than passive interaction. However, despite these differences in inattention across active and passive conditions, there was no difference in quiz performance across conditions in either study. Taken together the results suggest that participants may have engaged in MMT strategically, such that increased MMT was done during moments of low learning demand, mitigating potentially negative effects on performance. In addition, we present results from an ongoing study that further investigates how required vs. volitional MMT impacts performance and participant experiences.

The double empathy problem in ambiguous communication: How perceived neurotype shapes interpretation of paralinguistic communication.

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The double empathy problem suggests that communication breakdowns between neurodivergent and neurotypical individuals arise from mutual misunderstandings rather than a deficiency in neurodivergent communication. This study investigated whether the framing of conversational exchanges as within- or between-neurotype affects interpretation of ambiguous text with supportive use of emoji. Eight-hundred and eighteen participants provided 3 keywords each for 18 ambiguous texts, each paired with a single emoji. The texts were accompanied by information about the writer's neurotype (neurodivergent or neurotypical). Sentiment analysis revealed a significant effect of perceived writer neurotype among neurodivergent participants, who rated messages from perceived neurodivergent writers more favourably than those from perceived neurotypical writers. This effect was particularly pronounced for texts supported by highly ambiguous emojis. However, no difference in sentiment was found for neurotypical participants based on the perceived writer neurotype. These findings suggest that the double empathy problem extends to paralinguistic communication, as emoji interpretations are shaped by assumptions about the sender's neurotype.

Young children's updating of mental representations of story characters and events based on verbal and pictorial information.

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The ability to create mental models of story events is essential for narrative comprehension, yet little is known about the mechanisms supporting children's ability to update an integrated mental representation of a story (a 'situation model') as it unfolds. This study investigated young children's ability to update their situation model of a simple story from verbal and pictorial information about a physical event, manipulating explicitness of verbal information and the informativeness (Study 1) and presence (Study 2) of pictorial information. Two- and 3-year-olds updated their mental representation of the physical state of the story protagonist at a rate above chance, regardless of the informativeness of an accompanying picture (Study 1) and the explicitness of verbal information provided (Study 2). However, children's age in months significantly predicted 2-year-olds' performance across studies, and in the absence of a picture, 3-year-olds performed less robustly when receiving implicit than when receiving explicit verbal information. Findings suggest that 2- and 3-year-olds can integrate implicit information into their situation model of a story, even when the accompanying pictorial information is not maximally informative, but that implicit verbal information embedded in a narrative presents challenges for young children's updating when provided without pictorial support.

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Social mindfulness and prioritisation effects.

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An extensive literature has suggested that self-relevance automatically enhances stimulus processing, with this benefit emerging with familiar and arbitrary information related to the self (i.e., the self-prioritisation effect). Specifically, for arbitrary information, during shape-label matching tasks, geometric shapes associated with the self are identified quicker and more accurately than comparable stimuli paired with other targets (e.g., friend, stranger). While much research has expanded upon the conditions under which the effect emerges, little research has explored the influence of traits upon the emergence - or absence - of this self-bias. To explore the possible influence of traits, the current experiment focused upon social mindfulness (i.e., being mindful of others). In the experiment, participants completed the classic shape-label matching task whereby they associated geometric shapes with the self and a friend. Participants also completed the SoMi Paradigm, which explores the proportion of socially mindful choices individuals make in a dyadic setting. The results demonstrated those higher in social mindfulness generated a greater friend-bias than those low in social mindfulness. These findings suggest there are trait differences that can impact upon the emergence of the self-bias and that these differences could lead to an alternative bias emerging.

Indexing mental imagery using a colour identification paradigm.

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Visual Mental Imagery (VMI) is the ability to generate and maintain images in the mind's eye. Individuals vary from extremely vivid imagery (hyperphantasia) to none at all (aphantasia). However, most indices of VMI rely on subjective self-report measures (e.g., Vividness of Visual Imagery Questionnaire; Marks, 1973, B.J.Psych.). These measures are widely criticized for their subjective nature and often fail to predict performance on putatively imagery-based tasks such as mental rotation and spatial transformation. We developed an objective index of vividness to better understand individual differences and eventually explore the neural correlates of VMI. In our present study, participants completed a battery of internal representations questionnaires (IRQs) including the VVIQ, Spontaneous Use of Imagery Scale (Reisberg, Pearson, & Kosslyn, 2003, App.Cog.Psych.), and the Internal Representations Questionnaire (Roebuck & Lupyan, 2020, Beh.Res.Meth.). Participants then completed three blocks of trials identifying the colour of a displayed patch on a colour wheel. In the first block, the wheel was presented immediately after the participant indicated they had the colour in memory, while the second and third blocks had delays of 3 and 6 seconds, respectively. We then examined whether accuracy in colour identification (ACI) correlated with IRQ ratings. We expect individuals with higher vividness to demonstrate greater ACI, and for it to decline with increasing delays. Our critical assessment ultimately focuses on whether ACI correlates with subjective vividness ratings.

Lion–tiger–stripes: A test of the mediated association effect on working memory.

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Working memory performance is better for lists of semantically associated words than for those of non-associated words. The association effect is typically explained based on the spreading activation theory. For example, encoding "lion" would activate "tiger" via the associative link between them. Although previous studies have shown the effect of direct association (e.g., "lion" -> "tiger") in line with the spreading activation theory, the theory can offer a novel prediction: Mediated or two-step association (e.g., "lion" -> "tiger" -> "stripes") should facilitate working memory performance. Such a mediated association effect has been observed in lexical decision experiments. In those experiments, "lion" primed "stripes". Here, we examined the possible effect of mediated association in working memory. Experiment 1 presented the first and third words of triples (e.g., "lion, stripes") without the second mediating words (e.g., "tiger") in an immediate serial recall task. If mediated association plays a role, this manipulation would lead to a beneficial effect. Contrary to our prediction, performance for the lists of mediated association did not differ from that for the control lists of non-associated words (e.g., "hand, stripes"). We validated our materials by replicating the direct association effect: Experiments 2 and 3 presented the second and third words of triplets (e.g., "tiger, stripes"). The results clearly demonstrated the direct association effect. A post-hoc analysis

(using data of Experiments 2 and 3) was also conducted as an attempt to find the mediated association effect. It, again, provided evidence against the mediated effect. The presence of the direct association effect and absence of the mediated association effect would aid delimiting the scope of association's influence on working memory.

~~Exploring the attentional cycling model of mind wandering through the lens of time perception.~~

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~~Spontaneous shifts in attention toward internal thoughts (mind wandering) are common experiences, yet the mechanisms triggering these attentional transitions remain poorly understood. While research has established that attention influences subjective time perception, with time-related thoughts making time feel longer, the relationship between spontaneous mind wandering and time perception has received limited investigation. We hypothesized that internal clock mechanisms could play a causal role in both subjective time perception and spontaneous shifts in attention. Using a novel time perception task, we manipulated participants' time perception and measured their off-task thoughts, task-related interference, and thoughts about time. We found that both off-task thoughts and task-related interference peaked when time perception was neither completely fast nor completely slow, while time-related thoughts increased with faster time perception. These findings suggest that the internal mechanisms regulating our sense of time may actively influence when our attention spontaneously shifts inward, with moderate temporal processing creating conditions most conducive to mind wandering.~~ ***Withdrawn***

N2pc as an index of attention shifting for emotional faces: The role of task type.

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The event-related potential component N2pc (N2-posterior-contralateral) is an index of attentional shifting. However, previous studies show mixed evidence regarding whether the N2pc appears in different types of task involving irrelevant emotional facial expressions. In the current study, we investigate this issue using a within-participant design. On each trial, two faces with overlaid lines, one displaying a neutral and one a fearful expression, were presented simultaneously with the fixation point, which changed luminance on 25% of trials. Twenty-eight participants performed both a line direction task and a luminance change task in a counterbalanced order. We extracted a 30 ms window around the peak amplitude of the second negative deflection and conducted a 2(fixation type: change, no-change) Ã— 2(laterality of fearful face: contralateral, ipsilateral) repeated-measures ANOVA on ERP amplitude for each task. The main effect of laterality indicated a significant N2pc in the line direction task, but not in the luminance change task. Our results indicate that the presence of the N2pc varies across different types of irrelevant emotional tasks, indicating that it is sensitive to factors such as task difficulty.

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Shifting into High-Level Vision: Tracking visual object foraging across development.

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What visual and semantic information drives object recognition across development, and how well do computational models capture these processes? We examined object processing in a large cohort of children aged 4-8 (N = 263) and separate sample of adults (N = 70) using an engaging visual object foraging task. Targets varied in their visual and semantic similarity to distractors, allowing us to assess which object properties best predicted performance. We quantified these properties from human judgments (e.g., shape and feature dissimilarity) and computational measures from different layers of the CORnet-S neural network, which models the primate visual hierarchy. We found that with age, children's performance improved and increasingly reflected a reliance on high-level visual and semantic information. In addition, age-related changes were modulated by the type of categorization: subordinate-level distinctions benefited from fine-grained features, whereas basic-level distinctions were guided by shape. These results suggest both a developmental tuning to diagnostic cues and a notable alignment with high-level visual representations, indicating a developmental shift toward more high-level visual processing.

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Zooming out: Extending the boundaries of children's and adults' visual memories.

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When we view a photograph, we often falsely remember a zoomed-out view, remembering seeing more of the scene as originally seen, termed boundary extension (Intraub, 2012). Recent debate suggests boundary extension underlies scene extrapolation and source monitoring errors (Intraub, 2020) or is simply a stimulus driven effect where viewers are drawn to an average scene view ('normalization'; Bainbridge & Baker, 2020); closer objects are remembered as more distant, more distant objects remembered as closer. We investigated boundary extension in 5-, 7-year-olds and adults (N = 472) for natural scenes and single objects where the latter provides greater chances of 'normalization'. For scene images boundary extension occurred in 5-year-olds and 7-year-olds but not in adults who were equally likely to falsely remember zoomed-in and zoomed-out views. For single objects the reverse pattern emerged. Unlike adults, children showed no boundary extension. The difference in scenes and single objects in children poses explanation difficulties for the claim of 'normalization' as it would have been expected across both types of stimuli and particularly for single objects. Rather, findings support boundary extension as a source-monitoring error. Young children may not mentally extrapolate a scene for single objects per se.

Is world knowledge activation exhaustive or selective during language comprehension? Evidence from bidirectional self-paced reading.

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World knowledge (WK) can be readily activated and influence real-time language comprehension [1]. However, few studies have recognised that individuals may have knowledge from multiple cultures simultaneously, and it remains unclear whether WK activation is exhaustive [2] or selective [3] under such circumstances. We investigated this issue using two bidirectional self-paced reading experiments with late and proficient Mandarin-English bilinguals who had lived in both China and the UK. Both experiments manipulated the written language (Mandarin vs. English) and WK (consistent vs. inconsistent with the culturally specific WK for each language, e.g., English-consistent conditions were consistent with UK WK but not China WK and vice versa) in a 2 × 2 design. In Experiment 1, the stimuli did not specify which country was being discussed (e.g., "The number 13(consistent)/4(inconsistent with UK WK) is often associated with bad luck), and no effect of WK consistency was found. The stimuli in Experiment 2 specified the relevant country (e.g., "In the UK…"). In contrast to Experiment 1, a WK consistency effect was found in the critical, spillover1, spillover2, and spillover5 regions. Our results suggest that when cultural context is not specified, WK activation is exhaustive — all knowledge is activated irrespective of situational relevance.

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Interplay between animacy and thematic role in structure building.

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Theories of human sentence production often distinguish between syntactic and semantic processes. We tested this assumption by examining the interaction between animacy and thematic roles in active-passive structural priming. Study 1 found that the structure of a preceding sentence (prime)-active or passive-influenced structural choice in a subsequent sentence (target). This priming effect was stronger when the agent and patient roles shared the same animacy pattern across the prime and target (inanimate agent and animate patient). Studies 2 and 3 further explored this interaction, showing that repeated animacy features in thematic roles increased the likelihood of preserving both the thematic role order (e.g., maintaining the agent-first order in It was the thief that chased the lorry) and the argument structure (e.g., assigning the agent as subject) in English cleft constructions. In Japanese declarative sentences, where particles indicate the sentence topic, repeated animacy features strengthened argument structure persistence but not thematic role order persistence. These findings suggest that animacy repetition in thematic roles enhances structural priming by reinforcing thematic emphasis, as structure building and topic selection occur simultaneously, both influenced by animacy and thematic roles.

The head boost effect in structural priming: The position of the head does not matter.

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The structural priming method, the finding that language users repeat syntactic structures across utterances, is a commonly used method to investigate how people mentally represent syntax (Pickering & Ferreira, 2008). One important finding has been that priming is stronger when the word that is the syntactic head of the primed structure is repeated in the target (the lexical boost effect), whereas the repetition of non-head words does not enhance structural priming (e.g., Carminati et al., 2019), suggesting that structures are mentally represented with their syntactic head only. However, the different effects of head and non-head words might have been due to their different position. For example, the head verb (handed) immediately preceded the primed structure in ditransitive sentences (The lawyer handed the celebrity the present/the present to the celebrity), whereas the non-head subject noun (lawyer) did not. The current study investigated structural priming in Dutch ditransitive sentences and used prime and targets where the order of the head (verb) and non-head (subject) was reversed compared to previous studies. Despite this, repetition of the head verb resulted in a lexical boost (Experiment 1), but repetition of the non-head subject did not (Experiment 2). This supports head-centred structural priming models.

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Discovering affixes in visual word processing: The role of explicit instruction in statistical learning.

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Lelonkiewicz et al. (2020) showed that statistical learning enables readers to extract position-specific affix-like chunks from an artificial orthography. In a conceptual replication, we tested this effect in a single experiment that included both prefixes and suffixes, unlike the original study where they were tested separately. During the learning phase, participants were exposed to pseudoletter strings in which consistent three-letter chunks appeared either at the beginning (prefixes) or end (suffixes) of random sequences. In the testing phase, they were asked to judge whether novel strings belonged to the familiarization lexicon. Using materials closely modelled on the original study, we replicated the effect: participants preferred novel strings with affix-like chunks in familiar positions (position-congruent) over controls. In a second experiment, we used strictly balanced materials that controlled letter distribution across items. Under these conditions, the position-congruent advantage

disappeared, suggesting that statistical learning alone may be insufficient when the input structure is more complex. In a third experiment, we manipulated explicit instruction using the same balanced materials. Only the instruction group showed a preference for position-congruent items-and this effect was limited to prefixes. These findings suggest that explicit instruction selectively supports the extraction of positional regularities when statistical learning is constrained.

Lelonkiewicz, J. R., Ktori, M., & Crepaldi, D. (2020). Morphemes as letter chunks: Discovering affixes through visual regularities. Journal of Memory and Language, 115, 104152. https://doi.org/10.1016/j.jml.2020.104152.

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Does education matter? Spelling among adults with and without dyslexia.

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Spelling proficiency predicts professional, academic, and even social success (e.g. Martin-Lacroux & Lacroux et al., 2017). However, spelling difficulties are one of the most persistent symptoms in adults with dyslexia (Reis et al., 2020). Moreover, the literature is focused on university-level adults with dyslexia, likely due to easier recruitment, despite this group being a minority within the dyslexic population. This is why we chose to focus on the spelling skills of adults with and without dyslexia, both university-educated and non-university-educated (30 French-speaking participants per group). Sentence dictation scores (grammatical, lexical and phonological errors) show group differences. Adults with dyslexia produce significantly more errors than non-dyslexic adults. Non-university adults with dyslexia produce significantly more errors overall than university-educated adults. This difference is not observed when only lexical word spelling is assessed. The two typical adult groups do not differ from the university dyslexics in terms of grammatical errors. Finally, phonological errors are significantly more frequent only among the non-university-educated dyslexics compared to both typical groups. Thus, the strengths and weaknesses of university and non-university level adults with dyslexia appear to differ in spelling, highlighting the importance of distinguishing these populations.

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Reis, A., Araújo, S., Morais, I.S., & Faísca, L. (2020). Reading and reading-related skills in adults with dyslexia from different orthographic systems: a review and meta-analysis. Annals of Dyslexia, 70(3), 339-368. https://doi: 10.1007/s11881-020-00205-x

Style and quality of undergraduate writing in the AI era: A cross-sectional and longitudinal analysis.

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The emergence of AI-powered chatbots such as ChatGPT has prompted widespread debate regarding their impact on student learning and academic integrity. To examine how these tools may be reshaping academic practices, we analysed 4,200 authentic reports submitted by 1,784 psychology undergraduates at the University of Warwick between 2016 and 2024. Our investigation focused on both cross-sectional and longitudinal trends, assessing changes in (a) the prevalence of stylistic markers, (b) linguistic style, (c) sentiment, and (d) perceived quality following the release of ChatGPT in November 2022. Although we observed clear shifts across these dimensions, no students reported the use of AI in their work. These findings highlight the pressing need for universities to revisit existing academic integrity frameworks and develop transparent, pedagogically grounded strategies for responding to the growing presence of generative AI in higher education.

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Bartlett Prize Lecture Symposium.
People in mind.
Organised by Rob Jenkins.

Noisy variability in face learning: A role for context and augmentation?

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Variability is a core concept in face learning and recognition. Within-person variability in appearance makes familiar face recognition remarkable; we recognize friends and family with ease, despite changes in expression, viewpoint, and age. Exposure to within-person variability is also key to face learning, defined here as the ability to recognize novel images of studied identities. Current models argue that within-person variability benefits learning because it is informative (e.g., covers the problem space, moving perceivers from extrapolation to interpolation). The current studies explore an additional potential role—creating noise. Noisy variability benefits learning across multiple domains, leading to the prediction that contextual variability and augmentation (artificial modification) will improve face learning, despite not providing information about a person's appearance. In Experiments 1 and 2, participants studied six low-variability images in a passive viewing paradigm, then completed an immediate recognition test in which novel images of the learned identities were presented. Neither contextual variability nor augmentation increased performance. Follow-up studies are examining whether noisy variability improves learning when the study phase involves retrieval practice and the recognition test is delayed, and when less expert perceivers (children, older adults) are tested. Collectively, these studies will further refine models of face learning and recognition.

Gender stereotypicality in multimodal first impressions.

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We cannot help but form a first impression when we meet someone new. These judgements are often driven by cues to gender, as a salient social category, as well as by gender stereotypicality. It has been generally accepted that defying gender stereotypes results in a backlash, where counter-stereotypical identities are perceived more negatively than those who fit within gender stereotypes. More recent work on facial first impressions, however, shows such a backlash against female, but not male, identities. Here, in a series of unimodal and multimodal rating studies, we identify the role of gender and gender stereotypicality in three identity cues – naturally-varying faces and voices and given names. In unimodal studies, regardless of the cue presented, counter-stereotypical (masculine) female identities were perceived more negatively. No such pattern was observed for male faces and names and male voices that defied gender stereotypes were actually perceived more positively than those that conformed to them. Multimodal studies replicated these results with counter-stereotypical (masculine) female identities perceived more negatively, whereas counter-stereotypical (feminine) male identities were perceived significantly more positively. Altogether, these findings imply a more prominent role of judgements of masculinity and femininity in social person evaluation rather than the adherence to gender stereotypes.

Are individual differences in face recognition ability linked to social attention in natural settings?

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Individual differences in face recognition ability are associated with patterns of social attention, and both traits are highly heritable. Impairments in these domains often co-occur in neurodevelopmental and mental health conditions, suggesting a shared basis. However, social attention is typically studied in artificial lab settings, using static images of isolated faces or social scenes. In two studies, we investigated the link between face recognition ability and social attention in more dynamic and naturalistic contexts. In Study 1, Australian participants viewed an episode of Eastenders on a screen-based eye tracker. In Study 2, wearable eye trackers measured gaze during campus navigation and face-to-face interactions. The association between visual attention to faces and face recognition ability varied across contexts, with the strongest link observed during face-to-face interactions. These findings highlight gaps between lab-based and naturalistic studies of face perception, raising important differences in the quantity and quality of exposure to faces that individuals experience in their daily lives.

Role of naturalistic stimuli to investigate the neural mechanisms for face perception and recognition.

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For decades the face perception system has been investigated with well-controlled stimuli that are still images of strangers' faces limiting the potentiality of characterizing such system in all its complexity. My talk will focus on two major points: the use of naturalistic stimuli to investigate the neural system for face perception and the use of familiar faces to better depict the individual components of this system. I will present fMRI data collected during movie viewing that were used to estimate multiple category-selective topographies including the face selective topography preserving the idiosyncrasies of each individual functional brain architecture. I will highlight also how, using naturalistic stimuli, we have shown that, so far, the human face perception system cannot be fully modelled by the state-of-the-art DCNNs.
Recognition of familiar faces is remarkably effortless and robust. Automatic activation of knowledge about familiar individuals and the emotional responses play crucial roles in familiar face recognition. I will present data that show how familiarity affects the earliest stages of face processing to facilitate rapid, even preconscious detection of these highly socially salient stimuli, and present data that support the hypothesis that representation of personally familiar faces develops in a hierarchical fashion through the engagement of multiple levels in the distributed neural system from early visual processes to higher level of social cognition and emotion.

Cyranoids reveal attribution of consciousness to artificial minds.

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We routinely divide the world into things that seem conscious and things that do not. However, the cues we use to make this distinction are poorly understood. Here we consider the role of appearance in shaping perception of artificial minds. We adapted Milgram's Cyranoid technique to allow live dyadic interactions in which the *contributions* of a conversational partner (human or artificial) and the *appearance* of that conversational partner (human or artificial) could be manipulated independently. Human appearance greatly elevated participants' attributions of consciousness to artificial interlocutors. More importantly, it also increased participants' behavioural efforts to avoid harming them. It is appearance, not processing power, that prevents artificial minds from seeming conscious and attracting ethical consideration.

Abstraction of mind and the medusa effect.

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Throughout history, humans have favoured depicting things with minds. A series of studies are presented indicating that abstraction in pictures diminishes the perceived mind, a phenomenon called the Medusa effect. Specifically, people appear more real and higher in Agency (the ability to do) and Experience (the ability to feel) when presented directly as pictures rather than as pictures of pictures. As mind perception underpins moral judgement, depicted persons may receive greater or lesser ethical consideration, depending on the level of abstraction, with viewers being less generous towards more abstracted individuals. Methods to control the Medusa effect, as well as the role of individual differences are examined, revealing multiple avenues for future investigation.

End of Symposium

EPS Bartlett Prize Lecture

Face Recognition: Familiarity, idiosyncrasy and representation.

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Despite many years of research on face perception, the problem of identification remains unresolved – how do we recognise the people we know? I will discuss the difficulty of this problem, with reference to three sources of idiosyncrasy: individual differences in perceivers' abilities; individual differences in perceivers' experience; and the unique ways in which individual faces vary. I will argue that familiar face representations are best described as statistical entities, rather than idealised descriptions of each face we know. I will review our work based on this approach, emphasising the usefulness of within-person variability.

Distortions in perceived depth from conflicting ordinal and metric depth cues.

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In the natural environment, we rely on multiple cues including binocular disparity, occlusion, retinal size, and proprioception to construct a stable and coherent percept of three-dimensional space. These cues are typically consistent, supporting accurate depth perception. However, when these cues conflict—such as in augmented reality (AR) where virtual objects may not align with real-world occlusions—systematic distortions in perceived depth can arise. Here, we evaluated the combined effects of occlusion and binocular disparity using a depth matching paradigm in AR. The virtual stimulus was a green letter 'A' presented using a Microsoft HoloLens 2. It was optically superimposed on a physical surface with variable transparency at a fixed distance. The target letter was placed at a range of distances, including the surface location. Observers were asked to indicate the remembered location of the letter. We found that errors are particularly pronounced when a virtual object is positioned beyond a real-world occluder, introducing conflicts between occlusion and binocular disparity. Our results show consistent underestimation of perceived depth that increases along with the disparity of the virtual target. The magnitude of this error is modulated by the opacity of the occluding surface, but is present even when additional depth information is provided through retinal size cues and proprioceptive input. These findings underscore the importance of ordinal depth cues. Even in the presence of a metric depth cue as strong as binocular disparity, incorrect occlusion consistently biases perceived depth magnitude across different viewing conditions. Our results provide insight into how the brain integrates these different sources of depth information and speak to the importance of accurate rendering of occlusion arrangements in AR environments.

Don't look, don't like: Stimulus devaluation by oculomotor inhibition.

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Cognitive-control mechanisms, such as attention- and response-related inhibition, help us to ignore or withhold motor responses from items in the environment that are task-irrelevant or otherwise problematic. These inhibitory mechanisms appear to also elicit negative affect and thereby impact the perceived value of associated visual stimuli. Here we use head-stabilized screen-based eye-tracking to search for similar effects in the oculomotor domain by combining tasks involving inhibitory control over eye-movements with affective evaluations of stimuli. Following a centrally presented art-like images in an oculomotor Go/No-go task, a central cue prompted participants to either Go (look at an abrupt-onset stimulus appearing to the left or right of the image) or No-go (avoid making any eye-movements and instead maintain fixation on the image). Liking ratings obtained after each Go/No-go trial revealed that No-go-trial images were evaluated more negatively than Go-trial images, despite any fluency-related enhancement from longer foveal processing. Oculomotor inhibition was found to have lingering impacts on the stimulus coding as previously unseen novel images were also disliked if rated shortly after a No-go trial than after a Go trial. Results from other selective-attention and motor-response control domains suggest the mechanisms underlying 'distractor devaluation' and 'No-go devaluation' effects may be similar to those

influencing stimulus value in the oculomotor domain. Ongoing analysis of eye-movement data from target-distractor visual search tasks will further reveal whether the trial-by-trial fluctuations in distractor suppression reflected in deviations in saccade trajectory can predict the magnitude of oculomotor-distractor devaluation. This research underscores the potential significance of the link between inhibition and aversive response as a manifestation of the interplay between cognitive-control and affect in prioritizing our thoughts and actions to focus on and approach what is helpful and disengage from and avoid what is harmful.

Developing measures of hidden binocularity: Evaluating test–retest reliability.

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Amblyopia affects almost 100 million people around the world and this number is expected to double by 2030 (Fu et al., 2020, BJO). As a neurodevelopmental condition, amblyopia produces lifelong difficulties in living. Individuals with amblyopia struggle with everyday tasks such as driving, walking up a flight of stairs, and reading. Characterized by poor vision, primarily in one eye, this condition arises when an individual does not receive concordant visual input early in life due to strabismus (misalignment of the eyes), cataracts, or high differential refractive error between the two eyes. Even after corrective surgery, deficits often persist throughout life. Remarkably, in a recent paper by Maehara et al. (2019, Opt vis sci), a subset of amblyopia patients, who failed all clinical tests of binocular vision, demonstrated a Pulfrich illusion, which implies residual hidden binocularity. The Pulfrich illusion occurs when horizontally moving objects are presented to both eyes with a neutral density filter over one eye. The reduced contrast to one eye delays visual processing, which the perceptual system perceives as spatial disparity, inducing depth perception. To explore hidden binocularity in these patients further, we developed a battery of motion-based binocular vision tests, which we plan to use to help rehabilitate the condition. The present project evaluates the test–retest reliability of four tasks– Letter Dominance, Pulfrich, Plaid Motion, and Motion Parallax. 23 participants with typically developed vision completed these four tasks one week apart. We observed a strong positive correlation between performance on week one and week two for the Letter Dominance, Pulfrich, and Plaid Motion tasks. This represents a significant step forward in the rehabilitation of binocular vision in these patients.

Assessing the integration of visual and audio cues used for heading perception.

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A novel paradigm originating in vision science, continuous psychophysics, promises to revolutionize experimental design by coupling a continuously changing stimulus with a continuous response. Here, we show how this paradigm can be used to study multisensory integration by replicating the known result that visual and audio information is integrated for direction perception. We used a simple tracking task in which stationary participants tracked a drone in Virtual Reality by continuously pointing a controller at it. The drone changed direction from left to right and right to left relative to the observer's straight ahead on a random walk. Visibility was manipulated using a visual fog which could be absent, light or heavy, and the drone emitted a humming sound on some trials to provide auditory cues. Sensory precision was higher when sound was added to the visual stimulation, except for the NO FOG condition, where a ceiling effect may have prevented us from detecting benefits of multisensory integration. Replicating this known effect of auditory cues enhancing heading perception confirms that Continuous Psychophysics can be used in this context and opens up a wealth of directions for future investigation into precision, accuracy and the time course of multisensory integration.

Hemispheric asymmetries in auditory distraction by acoustic and semantic deviations.

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Irregularities in the auditory background disrupt cognitive functioning: the unexpected insertion of a deviation, whether acoustic or semantic, into a sequence of to-be-ignored sound hinders the recall of concurrently presented visual material. Despite apparent similarities between the acoustic and the semantic deviation effects, recent evidence suggests that these two phenomena may not be functionally equivalent. To better understand the mechanism underlying these two forms of auditory distraction, this study aims to determine the role of cerebral hemispheres in the manifestation of the two deviation effects. The first two experiments were designed to assess how the ear of presentation of the irrelevant sound modulates the semantic deviation effect in a context minimizing the potential recourse to semantic processing. Participants performed a visuospatial serial-recall task while ignoring auditory sequences composed of exemplars drawn from the same semantic category. In rare trials, one spoken item was replaced by an exemplar from another category (e.g., a tool among animals). The presence of such a semantic deviant disrupted recall performance, but only when the sound was presented through the right ear. Experiment 3 provided a direct comparison of the impact of the ear of presentation of the irrelevant sound on the manifestation of the two deviation effects. Participants performed this time a verbal serial-recall task while ignoring a sequence of lateralized spoken letters. Occasionally, one of the letters was either presented in a different voice (acoustic deviant) or replaced by a digit (semantic deviant). The results replicated the right-ear disadvantage for the semantic deviation effect while revealing a left-ear disadvantage for its acoustic counterpart. This dissociation highlights a functional divergence: the right hemisphere, accessed via the left ear, is more sensitive to acoustic change, whereas the left hemisphere, accessed via the right ear, excels in detecting semantic deviance.

How involved is the motor system in memory.

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Music listening activates motor regions of the brain, even when not moving. In musicians, motor areas of the brain are activated when imagining playing a familiar piece. This suggests that musical memory may be reliant on the motor system. One issue with this research is that it is correlational; that is, most studies involved observing correlations between brain areas and behaviour. The goal of the current study is to establish a causal link between the motor system and memory for music. One way to investigate a causal connection between a neural region and a behaviour is with transcranial direct current stimulation (tDCS). By delivering a small current to a motor region we can modify its functioning and observe how it affects a musician's memory for a known musical piece. A sample of advanced pianists will be recruited for this study. Over three sessions, participants will be presented with an audio version of a piece they know well. Each piece will contain 32 errors, and these errors will be different each time the participants hear the piece. In one session the participant will receive inhibitory tDCS over their left motor cortex, in a second session inhibitory tDCS will be applied to the right motor cortex, and in a third session, a sham tDCS stimulation will be applied. It is expected that the inhibitory tDCS will decrease error detection compared to sham stimulation only for errors that would be performed by the right hand, after stimulation to the left motor cortex, and vice versa for the right motor cortex and left hand. This project will determine if there is a causal link between the motor system in a musician's memory for music, and will help us better understand how the brain supports musical memory.

~~Touch activated capillary phlebotomy as an alternative to venepuncture for collecting blood samples from autistic adults.~~

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~~Needle phobia affects ~10% of the global population, resulting in non-compliance and avoidance of medical treatment (Meindl et al., 2019). Individuals with sensory hypersensitivity, such as autistic individuals, are at a heightened risk of this phobia, resulting in reduced medical care. Current blood diagnostic approaches rely heavily on standard venepuncture phlebotomy (SVP) as this is the most practiced method of drawing sufficient blood needed for a diagnostic test. However, the high pain scores associated with SVP make them undesirable research methods for working with clinical populations who experience greater levels of sensory hypersensitivity than the general population (such as those diagnosed with a neurodevelopmental condition). The present study compared pain scores from SVP with Touch Activated Phlebotomy (TAP) capillary blood drawing devices in non-autistic and in autistic individuals. Findings demonstrated that the TAP technique was far less painful than SVP in the non-autistic participants and virtually painless in the autistic participants (M = 0.5/10 pain score in both groups). This study provides strong evidence to recommend use of TAP devices in research with needle-phobic participants or those with sensory hypersensitivity. Furthermore, in general population studies, using TAP devices will increase the proportion of the population who can volunteer.~~ ***Withdrawn***

Twisting bodies and turning minds: Children's engagement in aesthetic physical activity and their spatial cognition performance.

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Physical activity (PA) is known to benefit health and academic achievement in children and adults, supporting PA inclusion in school curricula; yet, which types of PA contribute most to cognitive and socio-emotional development remains unclear (e.g., Twisk, 2001; Fedewa & Ahn, 2011). Existing literature suggests that aesthetic activities (e.g., dance, gymnastics, martial arts) are linked to spatial cognition (Voyer & Jansen, 2017). In a quasi-experimental design, we therefore examined whether children's (8-14 years, N=53) spatial thinking and socio-emotional skills depend on their engagement in different types of PA, categorised as aesthetic, team-based or individual sports. PA was assessed through a questionnaire; children also completed the emotion-recognition task (RMET-C, Baron-Cohen et al., 2001), and a mental-rotation task (Frick & Pichelmann, 2023). Hierarchical multiple regressions revealed that aesthetic PA and gender were the strongest predictors of spatial cognition, while team-based and individual sports showed no significant contribution. Duration of PA further improved model predictability. These findings highlight the importance of aesthetic activities in physical education for cognitive development, and emphasise the relevance of engagement duration. Future research should evaluate effects of aesthetic PA interventions and their potential to reduce gender differences in spatial cognition (Voyer, Voyer & Bryden, 1995) and increase equality.

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Does size matter? Clock contours in ageing.

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Graphic production tasks assess diverse cognitive functions such as memory, attention, motor planning, and visuospatial ability. The Clock Drawing Task (CDT) is particularly sensitive to these domains and is relatively unaffected by confounds, reliably detecting cognitive decline in older adults due to its executive demands. Circle size-or contour-may reflect visual perception, spatial representation, and fine motor control. However, age-related differences in contour scaling remain underexplored. The study examined contour size in CDT performance across younger and older adults under constrained and unconstrained drawing conditions. A 2x2 between-subjects design (N = 252), with Montreal Cognitive Assessment (MoCA) subtests (e.g. memory, attention, executive function) serving as covariates to explore broader cognitive influences, revealed that older adults drew significantly larger contours than younger adults in the unconstrained condition, suggesting age-related differences in spatial scaling. No significant differences appeared in the constrained condition, indicating that environmental structure may mitigate spatial distortions. Executive function emerged as a significant covariate, supporting theories that spatial planning and organisational control underpin successful CDT performance. These findings suggest that simple variations in drawing behaviour may offer meaningful insights into cognitive ageing, with implications for clinical screening and early intervention strategies.

When one race is not enough: Introducing the relay model to explain multisensory response times.

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Responses to bimodal signals are typically faster than to unimodal ones, a phenomenon known as the redundant signals effect (RSE). Raab's (1962) race model explains this by positing two parallel decision processes, with responses being triggered by the faster of the two. Despite its simplicity, the model largely predicts the speed-up of responses when stimulus timing or signal strength are manipulated. However, Miller (1982) showed that observed RSEs often exceed race model predictions, resulting in systematic violations of the race model inequality (RMI). These violations have traditionally been interpreted as evidence against race models, casting doubt on their ability to capture multisensory decision-making. We introduce the relay model, a novel extension of Raab's framework that reconciles these findings. Here, two race units operate sequentially: the first provides a start signal for the second. This small modification retains the race model's predictive power while naturally accounting for RMI violations. Constrained only by unimodal response time distributions, the relay model captures all critical aspects of the RSE, with RMI violations emerging as an intrinsic feature of relay-based processing. This framework offers a refined view of multisensory decision-making and highlights a simple, biologically plausible mechanism that may underlie apparent violations of classical models.

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Many hands make for light work: Student-led projects are unaffected by sampling population and testing platform.

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There is a long standing and arguably fierce debate within research regarding the robustness of data collected from student populations and by student researchers. The issues raised are twofold; first the common view leans towards student population data being biased demographically and second, that data collected through undergraduate student researchers is unreliable due to variability and inexperience. Whilst social psychological variables should be affected by WEIRD criteria, as low-level cognitive tasks are generally considered not heavily reliant on demographics (e.g., age, gender) they should theoretically be robust to student samples and sampling. To investigate this, we utilised a Stimulus Response Compatibility task across two cohorts (11 experimenters) over two testing sites; King's College London, University of Nottingham and the Prolific online testing platform. In this task, participants view an action whilst performing a congruent or incongruent action. In congruent trials, response facilitation produces faster responses, whilst response inhibition in incongruent trials slows response. Our results show that reaction time differences between levels of prompt-stimulus congruency are in line with published work and replicate across platform, site and experimenter. We conclude that data reliability remains unaffected by student populations sampled by student researchers, methodological implications of which will be discussed.

The effects of previewed instructor enthusiasm on attentional forecasting.

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Research has shown that when making predictions about one's future cognitive or affective states, people are reasonably accurate in some cases, but show biases and inaccuracies in others. Previously, we investigated people's ability to forecast their future attentional states by providing participants with a preview of a future lecture and asking them to predict how engaged they would be throughout it. The results showed that individuals were able to accurately predict a progressive decline in their attentional engagement. This raises questions about whether the preview was important in guiding participants' attentional predictions. Here, we examined the role of the preview in participants' predictions, and specifically, whether participants used certain aspects of the preview to inform their metacognitive judgements. Specifically, we explored how variations in instructor enthusiasm influenced individuals' predicted and reported attentional engagement. To address this, participants were presented with a 15-second preview of a future video lecture and asked to predict how engaged they would be at eight time points of the video lecture. Participants then watched the lecture, which was either presented by a low- or high-enthusiasm instructor. At several points throughout, participants reported on their momentary engagement with the lecture. Results indicated that: (i) participants predicted and reported experiencing a decline in their attentional engagement; (ii)

participants were pessimistic in their predictions; (iii) predictions influenced participants' later reports of attentional engagement; and (iv) in some cases, enthusiasm impacted participants' predicted and reported attentional engagement, with low instructor enthusiasm leading to decreased engagement. Taken together, these findings highlight how individuals' metacognitive judgements are shaped by their general schemas, which can then be refined by additional information about the specific future task.

Real-time triggering identifies thought patterns using dynamic behavioral variability.

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Behavioral variability has a long history as a useful marker of inattention, and is highly predictive of ongoing performance (e.g., reduced memory, decreased learning). For example, task-based response time profiles like increased speed or variability, or secondary measures like increased movement (i.e., fidgeting) have been used as markers of inattention. A relatively common approach to measuring inattention has been to deliver thought probes at random intervals during a task, however this runs the risk of missing meaningful moments that occur between probes, while also disrupting task performance. A key advantage of monitoring behavioral availability is that it avoids these two constraints; however, using variability in this way requires first validating that these behavioral signatures directly signal variable attentional states. To test this directly, we use real-time triggering to detect and verify attentional states as they happen. Here, we used the Rhythmic Visual Response Task (RVRT), a derivative of the metronome response task. In the RVRT, participants are tasked with synchronizing their responses with the onsets of trial-unique visual stimuli, providing a continuous trialwise response time (RT) signature. We developed an algorithm to monitor and process participant-specific RT behavior dynamically, using extreme scores on these measures to trigger presentation of thought probes, where participants rated their thoughts along several dimensions (e.g., absorption, valence). Probes triggered by high RT variance (i.e., a poor attentional state) revealed distinct thought patterns that were more negative, intrusive, distracting, and absorbing, than when triggered by low RT variance. This pattern was absent when triggering was based on speed instead of variability, reinforcing prior work where speed predicts errors, and variance predicts attentional states. By monitoring behavior in real-time, we effectively leveraged behavioural measures to identify and characterize changes in attention states as they occurred, highlighting the potential for adaptive task designs based on real-time cognitive states.

Reading with intent: Phonological processing is not always automatic.

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This project tests how sound and spelling information is processed during skilled reading in adults using event-related potentials in EEG. We focus on whether goal-driven attention exerts a top-down

influence on automatic word recognition and minimizes interference from sound-spelling conflict. We recorded EEG data in English-speaking adult readers as they made quick judgements of visually presented word-pairs. Tasks directed attention to different aspects of word information by asking participants to judge word-pairs on rhyme, spelling, or text colour. Orthographic and phonological conflict was manipulated by presenting word-pairs that shared both (cool/pool) or neither (boat/fair), versus conflict trials which were mismatched in orthography (cane/rain) or phonology (most/cost). Participants had slower reaction times to conflict trials when making rhyme and spelling judgments but not colour judgements. EEG analysis found enhanced N400 negativity when comparing conflict trials to their non-conflict counterparts, suggesting both orthographic and phonological differences between word-pairs were recognized when participants made rhyme or spelling judgements. However, participants making rhyme judgements had a significant latency difference in N400 peak when responding to conflict trials, while participants making spelling judgements did not. The effect of sound-spelling conflict on the N400 was attenuated in the colour judgement task as N400 differences were only found in trials with orthographic mismatch. Results show that directing participant attention to phonological information via rhyme task, or orthographic information via spelling task evokes measurable differences in N400 activity and participant response to conflict trials. Likewise, sound-spelling conflict did not occur when participant attention was directed to non-word information in the colour task. Together, these results highlight the role attention plays in directing automatic processes during reading.

How accurate are retrospective reports of attention following a 24 hr delay?

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When allocating time to studying, it would be helpful if students were able to accurately judge how attentive they had been during specific moments in a previous lecture. In prior work, we established that individuals can accurately report on moment-to-moment fluctuations in attention immediately following video-lecture viewing both generally (i.e., states of engagement) and specifically (i.e., mind wandering). However, it is unclear how accurate these retrospective judgments might be following a longer delay, or what sources of information are used to inform these metacognitive judgments. Here, we investigated this while considering two contrasting hypotheses: that retrospective judgments rely on (1) memory for specific attentional experiences (memory hypothesis) or (2) inferences made from memory for the content presented in the cues (inference hypothesis). Participants watched an online video lecture and intermittently provided their in-the-moment levels of attention (engagement or mind wandering). Then, either directly following the video lecture (0 hr) or at the same time the following day (24 hr), participants were presented with short excerpts as cues, and they reported their level of attention from when they initially watched those excerpts. Finally, participants completed a multiple-choice quiz assessing memory for the lecture content. Preliminary results indicated that for both engagement and mind wandering, the temporal overlap between in-the-moment and retrospective ratings of attention declined following a 24 hr delay compared to 0 hr after initial video-viewing. However, memory for lecture content and overall levels of attention were consistent across 0 hr and 24 hr groups. This implies that, in line with the memory hypothesis, momentary experiences of attention are encoded into episodic memory but decay quickly, while memory for content is relatively stable and therefore not driving these judgments.

The immediate benefits of an enhanced music program on the psychosocial and cognitive functions of older adults.

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The current study explores the effectiveness of a unique music program in eliciting benefits to psychosocial and cognitive functioning in older adults as compared to a standard music program and control condition. The researchers predict that: 1) both the standard music group (SM) and enhanced music group (EM) will show significant improvements in psychosocial and cognitive functioning from pretest to posttest relative to the control group (CG); 2) the benefits of the EM group will be larger than the SM group. The current study utilizes a three-arm randomized controlled trial aiming to recruit 60 healthy older adults aged 65 and above, with participants randomly assigned into the SM, EM, and CG. The SM involves personalized playlists of preferred music, while the EM incorporates preferred music that has been enhanced with pure tones associated with positive emotions into personalized playlists. The CG experiences an audiobook. The four-week intervention includes four, 30-minute online sessions weekly (16 sessions altogether), utilizing tablets and speakers. Assessments occur at pretest and posttest. The intervention benefits will be assessed using a 3 (group) by 2 (time, pretest versus posttest) repeated measures analysis of variance (ANOVA) to compare the pretest to posttest scores. The researchers will also assess the benefits of the EM and SM compared to the CG, and understand whether there are added benefits of the EM as compared to the SM.The potential health implications include improving cognitive functions of older adults, and contributes to the development of personalized and technological interventions for older adults using common technological equipment (i.e., tablet, Bluetooth speaker).

The Second Database of emotional videos from Ottawa (DEVO-2): Over 1300 brief video clips rated on valence, arousal, impact, and familiarity.

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We introduce an updated set of 1380 brief video clips portraying real-world situations, for research on emotion and its relations with perception, cognition, and behaviour. Undergraduate students rated the clips on emotional valence, arousal, impact, and familiarity. As expected, valence and arousal ratings were related in a U-shaped manner, and arousal and impact were positively linearly associated with one another. Ratings of familiarity were near zero on average, verifying that the clips came from obscure sources. k-means cluster analysis revealed that the clips could be grouped by valence, arousal, and impact for the selection of subsets for future studies. Additionally, we used MATLAB algorithms to explore several visual characteristics of each clip, including motion, luminance, contrast, and visual complexity. The most notable relation was between arousal and motion, revealing that clips with more motion were rated as significantly more arousing. These clips can be used in similar ways to static images but with the advantage of being dynamic and thus more ecologically valid.

How modifiers in language production and comprehension affect younger and older adults' memory.

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In everyday conversations, people often use modifiers to refer to objects in the immediate environment. Research to date has shown that the use of modifiers in language production and comprehension can enhance younger adults' memory for past referents. There is also evidence that older adults produce more modifiers than younger adults, even when it is unnecessary. Less explored is whether the type of modifier used in both language production and comprehension tasks differentially affect memory. In two studies, we explored the effect of modifier type, namely colour (e.g., the red door) versus state (e.g., the open door) on younger and older adults' recognition memory. In study 1 (production), 67 younger and 60 older adult participants were asked to describe a target object presented with another same-category object of a different colour or state, or presented with an unrelated object. Next, participants completed a surprise recognition memory task. Consistent with previous findings, older adults produced more modifiers than younger adults. Importantly the results revealed that the production of modifiers improved later recognition memory across both age groups, irrespective of the type of modifier produced. In study 2 (comprehension), 63 younger and 70 older adult participants were asked to select an image based on a pre-recorded spoken description referring to the displayed image. The descriptions included a colour or state modifier, or a bare noun. As in study 1, participants were then asked to complete a surprise memory task. The results showed that relative to the bare noun condition, only state modifiers (and not colour) enhanced later recognition memory across both age groups. Together, the results reveal that the effect of modifier on memory is similar across both age groups with memory benefits varying depending on the task and/or the type of modifier.

An episodic model of semantic memory.

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We present an episodic model of semantic memory. According to the model, people encode instances of language experience in episodic memory, one trace per instance. When a word is presented, it activates all memory traces, and the activation-weighted sum of all traces decodes for the word's meaning. We present a computational expression of the model that substantially improves its computability. With that improvement, we demonstrate that the model tracks several phenomena from the domain of semantic cognition including taxonomic organization, semantic priming, and contextual disambiguation of polysemous words. We use those demonstrations to reveal how the model accomplishes semantic cognition, without the requirement of a separate and dedicated semantic memory system. Taken together, the model presents a computational framework embedded within established memory theory to think about semantic cognition as active and constructive process from cue-based and contextualized parallel retrieval of episodic experience.

Exploring comprehension and production symmetry in idiom processing: Effects of familiarity and color coding on L1 and L2 typing production.

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Idioms, such as break the ice, are figurative, semantically non-compositional expressions whose meanings transcend the literal interpretation of their components. They highlight the psycholinguistic tension between direct retrieval vs compositional semantic analysis. Past research suggests that L1 readers rely more on direct retrieval (i.e., influenced by familiarity), whereas L2 readers depend more on compositional processing (i.e., semantic decomposability). Supporting this, studies showed that disrupting an idiom's canonical form impacts L1 readers more than L2 readers; L2 readers are less affected by idioms with code-switched final words (e.g., break the glace), reflecting their compositional processing tendencies. This study explored the reverse effect in comprehension and production by strengthening an idiom's canonical form through font color differentiation. L1 (Experiment 1) and L2 (Experiment 2) English bilinguals read English sentences containing idiomatic or literal phrases, presented in either colored or standard font, and judged whether the phrases made sense. Afterward, participants completed a copy task, typing back the target idiomatic or literal expressions. This paradigm allowed us to explore the comprehension-production symmetry for dominant and non-dominant language. Preliminary results revealed a general idiom superiority effect in L1-English bilinguals—better performance for idioms than for literal phrases—driven by familiarity and enhanced by color coding. This effect was present in comprehension and extended to typing production. However, in L2-English bilinguals, comprehension and production exhibited an asymmetrical pattern: idiom superiority was observed only in comprehension, not in typing production, and was driven by familiarity and semantic decomposability but depended on color coding. Findings suggest that dominant language primarily rely on direct retrieval for idiom comprehension, which extends to production, whereas non-dominant language utilize both direct retrieval and compositional processing during comprehension, but this effect does not extend to typing. Color coding facilitates idiomatic processing for both groups, playing a crucial role in non-dominant language comprehension.

Using an error detection paradigm to examine individual differences in reading comprehension performance.

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Reading comprehension performance is associated with academic and vocational success (Silva & Cain, 2015). It relies on abilities such as comprehension monitoring, working memory and attentional control. The current study examined comprehension monitoring and its relationship to text recall and reading comprehension performance in adult readers with different backgrounds (e.g., individuals with ADHD). 75 adults (females = 66; mean age = 20.6 years) completed a self-paced reading task where an error detection paradigm was implemented. Half of the expository texts were inconsistent and contained contradictory information. The other half maintained consistency and contained no semantic discrepancies. Following each text, participants performed a text recall. At the end of the task, they completed a true-false test. Working memory, word reading fluency, verbal and

non-verbal reasoning were also assessed to determine whether these variables interacted with performance on the text reading measures. Although overall, participants spent more time reading the critical sentence when contradictory information had been presented relative to when the information was consistent, this difference was only significant for individuals with ADHD. In contrast, for the text recalls, only the participants without ADHD exhibited a consistency effect where they recalled more information from the consistent texts than the inconsistent texts. Lastly, the magnitude of the consistency effect was only associated with working memory and none of the other individual differences measures. The study's results provide further evidence for the association between reading comprehension performance and comprehension monitoring and suggests that it is impacted by individual differences such as attentional control and working memory.

Neuroimaging in 5 minutes or less.

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Neuroimaging used to be something that was done in a laboratory in the basement of the Psychology or Neuroscience Department. In particular, electroencephalography (EEG) was associated with a long setup time involving a cap, electrodes, and gel. Mobile EEG technology has changed that. Here, we continue to demonstrate that you can get reliable steady-state and event-related potential data from a headband and a mobile phone in under five minutes. We present two specific results here. One, we demonstrate that sleep is potentially the single biggest predictor of brain health and performance, as evidenced by correlations between P300 amplitude and latency and hours slept the previous night. Participants performed an oddball task on an Apple iPhone while EEG data was recorded via a Muse headband. Sleep data was obtained via a question-and-answer session prior to recording the EEG data. Two, in an older population we demonstrate that analysis of steady-state EEG data via a machine learning classifier can predict mild cognitive impairment. Participants were recruited via an open advertisement in the local newspaper, and we asked them to complete a MOCA and an RBANS assessment. EEG data collection occurred subsequent to this, and we were able to reliably predict both MOCA and RBANS scores from our five-minute capture of EEG data. In sum, our results demonstrate that mobile EEG technology affords an ability to capture data that not long ago was thought to be impossible.

Using sentiment analysis to characterize narrative memory for emotional videos: The role of language proficiency.

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Introduction: Previous research suggests that lower language proficiency reduces emotional expressivity. We examined participants' narrative descriptions of positive, negative and neutral videos, and whether independent measures of language proficiency were related to output. We also examined whether memory for perceptual details within videos was similarly influenced by proficiency. Methods: Data were collected from 72 young adults (23 males, 47 females; Mage = 22.1), using Qualtrics. Participants watched 18 silent 7-second video clips that were positive, neutral, or negative valence, presented in random order one at a time. Clips were selected based on normed arousal and valence ratings (Ack Baraly et al., 2020). Following each video, participants recounted the events aloud for 30 seconds. They then answered three multiple-choice questions assessing memory for perceptual details. Finally, participants completed the LexTALE to assess English proficiency. Results: The number of words used to recount videos was equivalent across valences (M = 32.05). There was a significant positive relationship between word count and proficiency (r = 0.11). Narratives were analyzed using a sentiment analysis software tool: Valence Aware Dictionary and sEntiment Reasoner (VADER; Hutto & Gilbert, 2014). VADER uses a dictionary method of pre-defined valence scores to determine overall emotional valence, ranging from -1 (negative) to +1 (positive). As expected, classification by VADER showed higher valence ratings for positive than for neutral or negative summaries. However, low proficiency participants produced more neutral sentiment overall than high proficiency participants. Memory for perceptual details within the videos was highest for neutral (84.49%) and lowest for negative videos (64.35%). Conclusions: Using a computational approach, we showed that emotional sentiment within narrative descriptions were congruent with video valence, and that language proficiency influenced emotional expressivity but not memory for perceptual details. Replication and extension to those with lower English proficiency (second-language learners) is in progress.

Multimodal components and evolving brain-states underlie learning during drawing tasks.

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Our ability to successfully encode information into long-term memory is crucial for guiding later behaviour. Recently, drawing has emerged as an effective encoding tool that improves memory robustly compared to other strategies. Theoretical accounts suggest drawing enhances memory by integrating three multisensory components – elaborative, motoric, and pictorial information – which together form a distinctive memory trace significantly stronger than any subset of components alone. Here, we tested the relative contribution of each of these cognitive features underlying drawing using both behavioural measures and functional MRI. Across three behavioural experiments, participants completed a set of encoding tasks (Drawing, No-Ink Drawing, Tracing, Visualizing), designed to differentially engage one or more of the components underlying drawings' impact on memory. They later completed a combined test assessing both item and source recognition, where participants were asked to remember the specific task context they encoded each item in. Behavioural results

demonstrated that the best item and source memory resulted from engaging all three components during Drawing. However, while removing the visual component in No-Ink Drawing resulted in comparable item memory to Drawing, it catastrophically impaired source recognition, leading to the worst performance across all conditions. This punctuates the importance of integrating multimodal components in promoting memory specificity. Building on this behavioural design, our current fMRI work investigates the neural mechanisms that support encoding and later memory, and how they vary across encoding tasks. We used recent advances in dimension reduction techniques to map patterns of whole-brain functional connectivity onto a low-dimensional manifold space, to track how brain regions differentially coordinate their activity across encoding tasks to support later memory, while also probing for univariate differences across these tasks. Together, our results extend our understanding of the cognitive and neural processes underlying successful encoding and provide insights into how different encoding approaches contribute to memory.

Investigating sequential letter reversals in adults with dyslexia using the oddball paradigm.

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Dyslexia is a lifelong neurobiological disorder marked by slow and labored reading, difficulties with accurate and/or fluent word recognition and decoding abilities. As a result, individuals with dyslexia report problems with word and letter reversals, have difficulty memorizing information, struggle with learning languages and struggle with letter-sound correspondence. A hallmark symptom of dyslexia is sequential reversals, changing the sequence of letters within a word, such as weird and wried. Here, we hypothesized that adults with dyslexia viewing sequentially manipulated words and non-words would have increased reaction times and showed a decrease in accuracy compared to a control group of typical readers. To test this hypothesis, three conditions were created using the oddball paradigm. The three conditions consist of five-letter arrays of non-words and words: 1) word-word, 2) word-nonword, and 3) random letter conditions. A signal detection analysis was conducted for accuracy of responses, across conditions and groups. Differences were found in the strategies used by the two groups. To investigate possible reaction time differences between groups, two-tailed permutation t-tests were conducted accompanied by plotted bootstrapped shift functions. No differences were found for reaction time between our sample of individuals with dyslexia and our control sample. Visual crowding effects and the impact of context-based cues are considered when interpreting these results. The investigation of letter reversals at the psychophysiological level can serve to better shed light on the deficits experienced by individuals with dyslexia.

Investigating the cognitive underpinnings of distracter complexity effects.

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Spoken sentences are known to significantly disrupt serial recall performance, yet the mechanisms underlying this disruption remain unclear. In this study, we report two experiments designed to investigate these mechanisms. Experiment 1 examined the disruptive impact of spoken sentences and identified the features responsible. English sentences produced greater disruption than reversed sentences and other auditory distractors, such as changing-state word sequences or auditory deviants. Although providing participants with foreknowledge of the distractors reduced the disruption, it did not eliminate it. Experiment 2 extended these findings by testing the influence of language familiarity and meaning. Sentences in a language understood by participants produced more disruption than those in an unfamiliar language. Moreover, foreknowledge reduced disruption only when the sentences conveyed meaningful content. Taken together, the findings suggest that the syntactic and semantic familiarity of meaningful sentences accentuates their attention-capturing effects relative to meaningless speech. These results are discussed within the framework of the Duplex Mechanism account of auditory distraction.

Research Plan - Investigating how we represent mirrors of alphanumeric characters using OPM - MEG.

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When 5 - 6 year old children learn how to write, they often mirror-write letters and numbers. This behaviour disappears with increasing reading and writing expertise. One theory suggests that an area in the visual ventral stream has to suppress its property of viewpoint independent object encoding for letters (and digits) to allow proficient reading, as it is important to differentiate between certain letters (e.g. b and d). We plan to investigate how expertise with normal and mirrored alphanumeric characters is reflected cortically. Participants will view alphanumeric characters, their false font and mirrored equivalents in an OPM-MEG paradigm, whilst completing a visual dot detection task. We plan to use temporal decoding, temporal generalisation and source localisation analyses to understand the underlying neural processing of these stimuli. We expect that letters and numbers can be dissociated temporally within the first 200 ms post stimulus onset in temporo-parietal areas. Alphanumeric characters and their mirrored equivalents may be perceived similarly at first, but reliable dissociation may emerge later in the neural time course, around 400 ms. These stimuli may be dissociated in the visual word form area in the ventral visual stream, the ventral occipitotemporal cortex and the intraparietal sulcus.

Impressions are in the mind of the beholder: Idiosyncratic associations unite domains of naturalistic whole-person perception.

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Impressions about one's character are quick, largely inaccurate, yet highly consequential. Recently, impressions from faces have been argued to result not only from visual cues (e.g., smiling looks attractive) but also individuals' unique conceptual associations (e.g., believing attractive-looking people are creative). These associations have been proposed as a mechanism uniting distinct domains of social perception (Stolier et al., 2020). However, this framework has only been tested with face-based perception, questioning its role in inferences based on bodies or whole persons. First, bodies and faces signal distinct impressions (Hu & O'Toole, 2023), possibly due to different visual cues and/or conceptual associations. Second, considering their visual richness, conceptual associations may be unnecessary for whole-person impressions. We address these concerns in two studies (N=768): between (Study 1) and within perceivers (Study 2). First, we find strong correspondence between conceptual associations, face, body, and whole-person impressions, showing these associations predict judgements across different perceptual domains. Second, conceptual associations uniquely contribute to whole-person impressions beyond face and body impressions, revealing non-perceptual contributions to impressions of visually rich stimuli. Together, we show that conceptual associations unite domains of whole-person impressions, such that how individuals think about traits is reflected in complex social perception.

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Women are perceived as competent, but only in 'pink' locations: How gender stereotyped locations affect face impressions.

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Impressions shape how we feel, behave, and interact with someone who we encounter for the first time. Factors including facial appearance as well as perceived face gender shape impressions. While the influence of perceived face gender is understood, how this effect may interact with the wider context is not. For example, are women perceived as more competent when seen in a clothing store compared to men? In our research, we show faces in social media style profiles with different

surrounding locations to establish if the gender-stereotyped locations interact with face gender to influence how trustworthy, dominant, competent, and warm the person appears. Across three studies and two different face and scene sets, we find consistent evidence for the effect of face gender on impressions as well as an interaction with the gender-stereotyped locations. While warmth, dominance, and trustworthiness are mainly influenced by face gender, competence is shaped by the interaction between face and location gender; women seem more competent in female-stereotyped locations, and men in male-stereotyped locations. In summary, gender stereotypes, in conjunction with contextual information, can shape impressions. Real-life implications arise, prompting, for example, considerations of how interview locations could affect competence impressions during job interviews.

No size-order preference for low mass objects during multiple object handling.

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Humans can cumulatively grasp multiple objects and then transport them using a single hand (e.g., when clearing up tableware). This skill, which we call ‘multiple object handling’, helps minimise the number of actions required to transport objects. Our previous work using pairs of objects suggests multiple object handling often involves grasping using a typical finger-thumb opposition grip. Conversely, atypical grips (e.g., finger-palm opposition) are frequently used to secure previously selected objects. We also observed preferences for grasping objects with a lower mass or surface area first, likely to facilitate this strategy. However, in this stimulus set mass and surface area were correlated, meaning that object selection preferences could not be uniquely attributed to differences in either parameter. We therefore examined selection preferences during multiple object handling when participants were presented with object pairs (spheres) that were both low mass (â‰¤3 g) but varied in surface area (i.e., size). Participants did not consistently select smaller spheres first. Instead, they often grasped the nearest sphere first regardless of its size, frequently using an atypical grip to do so. Results suggest that when objects are low mass people can flexibly shape the hand to sequentially grasp and transport different sized objects efficiently.

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Pupil dilation and eye movements track emotion content in natural speech.

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Speech varies in rhythmic structure, evident in the speech envelope’s slow amplitude fluctuations that convey temporal cues. Neural activity aligns with these modulations, a process known as speech tracking, which aids temporal prediction and supports continuous comprehension. Although widely studied at neural and behavioural levels, emerging evidence indicates that ocular responses may mirror this tracking. In this study, we investigated (1) whether eye movements and pupil dilation track the speech envelope, and (2) whether tracking strength varies with perceived emotional

content. Forty-one participants listened to TED Talks while we recorded eye-tracking data and electrooculography (EOG). Participants intermittently rated speech segments on valence (negative-positive) and arousal (low-high). Speech tracking was quantified using a mutual information (MI) framework. Results showed significant envelope tracking across pupil dilation, vertical EOG, and horizontal EOG. All measures showed the strongest tracking below ~4 Hz, while horizontal EOG additionally tracked higher frequencies (~4-8 Hz). Linear mixed-effects models revealed enhanced ocular tracking during lower-valence (i.e., more negative) speech. Furthermore, arousal enhanced speech tracking, but only for pupil dilation and horizontal EOG. These findings suggest that ocular activity dynamically follows speech rhythm and is sensitive to emotional content, supporting its potential as a physiological marker.

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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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Around the clock: Physiological markers of lapses in attention during sustained task performance.

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Too often still, people lose their lives in tragic accidents that are the result of lapses in attention. With today's technology, it should be possible to develop assistance systems which use changes in physiological signals to indicate an imminent lapse. Our study aims at identifying physiological

markers that are maximally diagnostic and reliable, first in the lab and then in a more ecologically valid setting. In the lab, we monitor arousal and attentional fluctuations by recording changes in pupil diameter and electroencephalographic (EEG) activity as participants complete modified versions of two sustained attention paradigms, the Mackworth Clock Task (Mackworth, 1948) and Sustained Attention to Response Task (Robertson et al., 1997). Both require participants to remain focussed for a long period and respond appropriately to infrequent target events. Preliminary results indicate that changes in pupil diameter significantly predict errors and reaction times, thus far supporting our preregistered hypotheses. In contrast, similarly pre-registered tests did not substantiate effects in EEG alpha power. Exploratory spectral analysis however shows performance-depended theta- and beta power effects that dissociated the two task types. Ultimately, this implies that it is possible to predict behavioural performance using neurophysiological measures, but findings may depend on the task being used.

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The relationships between empathy and problem solving in social advice task amongst older adults.

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Everyday problem-solving tasks have been used to measure cognitive function in older adults. Some researchers have examined this task in conjunction with depressive symptoms, quality of life and age differences. To the best of our knowledge, we do not know whether individuals' empathic traits are related to how they solve these problems. In this study, we recruited 148 older adults (Mage = 68.97, SD = 6.10, range = 60 – 89, 79 females) from Prolific and they completed the 16-item brief Interpersonal Reactivity Index and answered six problems. The problems were about retirement (Q1), grandchildren's (mis)behaviour (Q2), financial strain with adult son (Q3), daughter's engagement (Q4), grandchildren's birthday (Q5), and moody friend (Q6). We coded the responses into affective and cognitive. For affective, results showed that empathic concern was positively correlated with Q1, Q5 and Q6 (all ps .052). Our findings indicate that older adults' solutions may have masked their empathic responses.

The role of stimuli trustworthiness, dominance, and attractiveness on overall impressions of online dating profiles.

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The valence-dominance model proposes that two dimensions (i.e., trustworthiness and dominance) underpin impression formation, and has been applied to a range of stimuli, including, faces, bodies, and voices. Dating profiles tend to be comprised of at least one photo and a short bio; however, it is unclear how people integrate this information to form impressions. Previous literature on multimodal impression formation is mixed with some finding that photos have the largest impact, whereas others report text to contribute the most.
In the current study, participants were randomly allocated to rate faces, bios, or profiles (randomly comprised of faces, bios, and pre-rated names) on either attractiveness, dominance, or trustworthiness. Stimuli gender matched participants self-reported preferred gender while dating (men or women). To analyse data, separate mixed effects models were conducted for attractiveness, dominance, and trustworthiness judgements. Preliminary results suggest that facial image and bio, but not name, influenced overall impressions for all three traits. Facial image had the largest impact on overall impressions of attractiveness, whereas bio had the strongest effect on overall impressions of dominance and trustworthiness. Overall, these results suggest that individuals primarily use the most valid or relevant cues when making judgements of attractiveness, dominance, or trustworthiness.

Exploring representations of familiar faces using weighted averages.

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The present research aimed to explore whether representations of faces stored in memory are weighted towards recent encounters with a person. We examined this using face averages (created by morphing multiple images of the same person together) of characters from the soap opera Coronation Street, who had been on the show continuously for at least 20 years. For each character, three face averages were created (past-weighted, non-weighted, recent-weighted). In Experiment 1, participants who had watched Coronation Street continuously for 20 years completed a speeded name verification task and a likeness task. Recent weighted averages were recognised faster and rated as a better likeness than past-weighted averages. In Experiment 2, non-UK participants, unfamiliar with Coronation Street were familiarised with characters by viewing a series of video clips depicting each character across the last 20 years. Familiarisation took place over six days with half of the participants viewing the clips in chronological order and half viewing them in reverse chronological order. Participants then completed both a speeded name verification and likeness task. Recent weighted averages were once again recognised faster and rated as a better likeness. These findings suggest mental representations are weighted towards older appearance, rather than recent encounters.

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The effect of preference, enjoyment and familiarity on neural music processing.

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Listening to our preferred music has been associated with different rhythmic neural activity in several frequency bands, compared with non-preferred music. Enjoyment also influences how well neural activity aligns to music ("neural tracking"). However, our favourite music is characterised by enjoyment as well as familiarity, and these are often difficult to disentangle. In the current EEG study, we measured continuous brain activity of N = 32 participants while listening to preferred and unpreferred music. We manipulated the familiarity and enjoyment of songs by selecting four songs per participant: their 'all-time favourite' (high in enjoyment and familiarity), their 'current favourite' (high in enjoyment but potentially less familiar) and two songs from their disliked genres, matched in tempo to the all-time favourite and current favourite songs. Participants were asked to rate each song on enjoyment and familiarity. Our results show that delta and beta power distinguish between more and less familiar songs, with no difference in neural tracking between conditions. These results suggest differential effects of familiarity and enjoyment on the processing of music.

The influence of endogenous brain rhythms on speech comprehension.

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Individuals vary widely in their ability to understand speech in challenging conditions, such as with background noise, rapid, or interrupted speech. We investigated whether these differences relate to intrinsic brain rhythms, measured via resting-state EEG. In our diverse population study (N=400; addressing the overreliance on WEIRD populations in experimental psychology research), we assessed peak frequencies and amplitudes of neural oscillations and their association with speech comprehension. Participants repeated sentences from three parametrically manipulated conditions: with background noise, time-compressed speech, and interrupted speech. Initial results from 144 participants show expected large variance between individuals across the three comprehension tasks. Analyses of intrinsic brain rhythms show that individuals show distinct topographical patterns in all frequency bands. Individual differences in the theta (4-8 Hz) and alpha (8-13 Hz) bands in auditory electrodes predict speech comprehension, particularly when listening is difficult. These relationships are somewhat specific to each task. Crucially, these relationships persist after accounting for peripheral hearing abilities. Our findings indicate that individual differences in understanding speech are at least partially associated with differences in the rhythmic make-up of the brain.

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Exploring the effect of inertial perception on auditory attention allocation using mobile EEG: Does neuroimaging work in the real world?

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EEG studies are increasingly used to measure cognition during real-world behaviour, but the consequences of taking neuroimaging out of the laboratory remain largely unknown. Existing evidence suggests a widely-used neural measure of auditory attention (the P300 oddball effect) is reduced during motion, reflecting the competing cross-modal demands of visual and inertial processing on auditory attention. Here, we investigated whether auditory attention is differentially affected by the increases in inertial processing associated with movement at different speeds. We measured auditory attention by calculating the differences in P300 effect induced by rare and frequent tones using an eye-closed counting task. EEG was recorded from 21 participants performing the oddball procedure while sat stationary, and while pushed in a wheelchair at either slow or fast pace (40 or 80 steps-per-minute) with condition order counterbalanced across participants. Analysis revealed centro-parietal maximum P300 oddball effects when participants were stationary, with significant reductions in attention during motion (across peak and average amplitudes), but no modulation according to the speed of movement. Our findings highlight the sensitivity of neural measures of auditory attention to inertial cross-modal processing demands that occur when cognition is examined during naturalistic behaviour, but provide no evidence that specific speed of motion matters.

The role of social factors on motivation in prospective memory amongst older adults.

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Prospective memory (PM) is the ability to form a specific intention and remember to carry it out at an appropriate future time, and it has been found to decline significantly with age. Further, motivation plays a vital role in PM and previous research indicated that older adults display higher motivation in socially relevant PM tasks, suggesting that social factors might have an impact on motivation for PM. Therefore, the current study investigated the role of motivation in health-related PM scenarios (e.g. remembering to take medications). In an online study, 120 older participants (M_age = 70.78,) were presented with 16 different health-related scenarios with either a social (remind your partner to take medications) or non-social (remember to take your own medications) aspect and asked to rate their motivation following each scenario. The main hypothesis was that we expected higher motivation for social compared to non-social health-related PM scenarios. Results of a linear mixed model suggested higher motivation for social (M=5.63, SD=1.02) compared to non-social (M=5.19, SD=1.1) scenarios (p=.027), specifically when participants believed the task to have an impact on others. The findings have implications for enhancing PM ability which can aid independent living and quality of life for older adults.

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How morphological structure modulates the optimal viewing position: Eye-tracking evidence from Arabic.

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The position at which the eyes first fixate a word influences how efficiently it is recognized, typically forming a U-shaped curve known as the Optimal Viewing Position (OVP), where central fixations yield the best performance. While this pattern has been replicated in Arabic (Jordan et al., 2011), the influence of morphological variation within the language remains unexplored. In Arabic, core lexical meaning is carried by a root morpheme, which may appear at the beginning, middle, or end of a word. This raises the question of whether fixation efficiency depends not only on visual position but also on the location of key morphological information. We conducted a fixation-controlled eye-tracking study in which native Arabic speakers read isolated words while initial fixation was manipulated across six-character positions, and root position was varied. Using Bayesian mixed-effects models, we analysed error rates, fixation counts, fixation durations, and reaction times. Performance was highest for central fixations (positions 3 and 4), consistent with the typical OVP pattern. However, this effect was reduced when the root appeared at the end. Fixating the root did not consistently enhance recognition. These findings show that while the OVP is robust, it can be reshaped by morphological structure, particularly root position.
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The Relationship between reading ability and neural synchronisation to speech and music.

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Musical experience and training have long been associated with improved cognitive development, particularly in children. Among various cognitive domains, language development and reading have frequently been linked to musical ability. However, recent research challenges this connection, suggesting that music experience and reading operate independently with little direct influence on one another. In the current study, we tested whether neural synchronisation to speech and music predicted reading ability in adults. Neural synchronisation has been shown to vary based on language and music skills. N = 32 native English speakers (ages 19-28) completed an online session in which they performed a word recognition task to assess their reading skills, followed by an EEG session during which their brain activity was recorded while listening to speech and music. Using a mutual information framework, we showed that neural activity synchronised to both speech and music in a wide range of frequencies. Furthermore, the synchronisation to speech at slow frequencies predicted word recognition speed, with stronger speech synchronisation being associated with faster reaction times. These findings indicate that the connection between music abilities and reading may be weaker than previously thought, but point to a connection between speech listening skills and reading.

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Facilitating early diagnosis of neurodegenerative diseases through normative modelling of healthy brain states.

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Parkinson's Disease (PD) is the fastest growing neurodegenerative disease, affecting 10 million people worldwide (Feigin et al., 2017). Diagnosis is often delayed, hindering effective early intervention. This project investigates encephalography (EEG)-based biomarkers that may indicate disease before visible symptoms, suggested by prior work (Gimenez-Aparisi et al., 2023). The study also aims to advance understanding of mechanisms underpinning the non-motor symptom of apathy through a decision-making paradigm. Using existing datasets from >1000 healthy controls, we will build normative models of EEG measures as a function of age, sex, and cognitive abilities. These models will be tested on data from 60 PD patients with absent or minimal motor symptoms to assess how well they are distinguished from controls. The richer information provided by EEG-based normative models will critically increase diagnostic sensitivity for detecting individual PD-related abnormalities relative to classic case-control studies. Additionally, the 60 PD patients are taking part in an EEG experiment testing their decision-making skills. PD-related deficits in decision-making have been shown to predict the symptom burden of apathy (Gilmour et al., 2024). Decision-related EEG signatures may offer novel biomarkers to track symptom progression. Preliminary results show significant differences between patients and healthy controls in resting-state EEG aperiodic signal slopes.

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An in-depth investigation of face processing in developmental prosopagnosia.

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Developmental prosopagnosia (DP) is characterised by severe difficulty recognising familiar faces, but little is known about the precisely where in the human face processing system difficulties occur. Adults with DP (n = 20) and age-matched controls (n = 60) completed ten tasks testing both identity and non-identity aspects of face perception and recognition of novel and familiar faces. The test battery was designed to systematically tap each stage of face processing. Individual and group level results showed support for two sub types of DP: An apperceptive subtype with widespread face perception and face memory impairments and a mnemonic subtype with fairly typical face perception yet a distinct face memory deficit. Exploratory Principal Components Analysis indicated

a two-factor solution explaining 58% of variance in overall sample scores. Component one, accounting for 30% of variance, mainly comprised face memory and face identity perception measures (i.e. the Cambridge Face Perception Test (CFPT)). Component two accounted for 28% of variance and comprised non-identity face perception measures. The CFPT is commonly used to test face perception in DP but may be more closely associated with face memory ability and thus cannot be interpreted as indicating broader face perception ability.

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Are task set preparation effects in singleton search context-specific?

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Preparation to respond selectively to a shape of a particular colour can carry-over to a following colour singleton search task. This carry-over effect may reflect a form of task set inertia—it may be difficult to shift from a task set that focuses on a particular colour, to a task set aimed at searching for a singleton regardless of its colour. It is well documented that task set switch costs are sensitive to learning that binds task sets to specific locations. We describe results from recent experiments aimed at determining whether the carry-over effect on singleton search described above is also subject to this form of location-specific associative learning.

Does Feature Instability Affect Multiple Object Tracking?

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Multiple-object tracking (MOT) is the ability to monitor positions of a number of identical target items as they move among identical distractors. This ability is considered integral to tasks such as driving or playing sports, but in the real-world items are rarely identical. Our goal was to determine if participants can use of differences in item colour and shape during item motion to improve target report after items stop moving and become identical. Displays consisted of 16 unique combinations of four colours and four shapes. We compared performance when all four targets had the same colour (Colour share condition), the same shape (Shape share), or neither (No Share condition: e.g., red circle, blue triangle, green square, yellow cross) to when items were identical (Standard MOT). Compared to performance with identical items, MOT improved whenever items were unique, both when the targets shared a feature (target-featural-similarity advantage) and even when they did not (item-uniqueness advantage). To investigate the relationship between the target-featural-similarity and item-uniqueness effects, we manipulated the stability of the features so that items could simultaneously change in one dimension (either colour or shape), both dimensions (colour and shape), or experience no change. The item-uniqueness advantage disappeared with any item change while the target-featural-similarity advantage remained regardless of the number of dimensions that

changed, as long as targets shared a common feature. This discrepancy in the effects of featural change suggest that different processes are involved in the target-featural-similarity and item-uniqueness effects.

Is an increase in space-averaged luminance necessary to elicit alerting?

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Performance in various visual tasks is known to be enhanced when the target display is preceded by a brief task-irrelevant stimulus. This effect is known as "alerting", and the inducing stimulus is known as "alerting stimulus". The alerting stimulus typically consists of a transient brightening of the entire screen resulting in a sudden increment in its space-averaged luminance (e.g., Jankovic et al., 2022). The present work asks whether alerting depends critically on a change in space-averaged luminance or whether luminance changes in local details that maintain a constant space-averaged luminance are sufficient. To this end, we employed a full-screen checkerboard that remained on view throughout the trial. The alerting stimulus consisted of a brief reversal of the luminance of the individual checks (light to dark and vice-versa) which did not cause a change in space-averaged luminance. After a stimulus-onset asynchrony (SOA) of 100, 150, or 200 ms, a search display containing four coloured diamonds was presented with observers indicating whether it contained a colour oddball. Two experiments revealed that alerting is indeed elicited by an alerting stimulus that does not trigger any change in space-averaged luminance. Notably, however, the SOA at which alerting occurred was longer when the alerting stimulus was a checkerboard reversal (200 ms) than when it was a uniform white-screen flash (150 ms). This difference is highly reliable and demands further study. For example, this pattern of results has clear implications for exploring the known relationship between alerting and the activation of the locus coeruleus as indexed by corresponding changes in pupil diameter.

Cognitive Decline or Strategic Choice? Measuring Attentional Control in Healthy Aging.

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The flanker task is widely used to measure executive function, yet its interpretation in aging research remains unclear. While healthy aging is often associated with executive decline, when both speed and accuracy are considered, age differences may reflect strategic adaptations rather than cognitive deterioration. We examined this question using the Combined Attention Systems Test (CAST), manipulating task strategy by instructing participants in one condition to focus on speed and in another condition on accuracy. Preliminary analyses of the data from 50 participants showed that when participants were aligned on strategy (whether emphasizing speed or accuracy), age-related differences effectively disappeared. This was demonstrated in two different types of analysis. First, a Brinley plot of response time data, comparing young and old participants in the same strategy conditions, revealed that the slopes of these functions did not exceed 1.0, consistent with the absence

of age differences. Second, attention network scores based on inverse efficiency scores (IES = RT/accuracy), revealed significant differences between the networks (alerting and executive function) and an interaction between network type × strategy, but no evidence of any disadvantage for older adults. These preliminary findings challenge traditional deficit models of cognitive aging, suggesting that what has been interpreted as "age-related decline" in attentional control may reflect strategic preferences rather than cognitive limitations. One exciting implication for cognitive aging models and real-world functioning is that interventions recognizing and leveraging strategy selection may help older adults optimize attentional performance.

Implicit memory for unattended background speech in monolingual/bilingual and aging adults.

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Previously, we demonstrated that bilingual younger adults ignore irrelevant auditory information more effectively than monolingual younger adults. Specifically, bilingual participants demonstrated little to no implicit memory for previously ignored sentences while monolinguals demonstrated significant implicit memory for such sentences. This enhanced selective attention ability among younger bilinguals is thought to result from the constant need to manage two languages (Bialystok et al., 2010). To confirm and extend these findings, the present study included a larger sample of younger adults and a sample of older adults to increase the reliability and generalizability of the results. The Inhibition Deficit Hypothesis (Hasher & Zacks, 1988) suggests that age-related cognitive declines affect tasks requiring selective attention. The current study examines whether older bilingual adults display a similar selective advantage observed in younger bilingual adults, particularly in inhibiting irrelevant auditory information. Participants completed two priming phases: in the ignored priming condition, they counted asterisks (*) on a computer screen while ignoring auditory sentences and numbers; in the attended priming condition, they identified the first letter of the target word in sentences. Priming effects were assessed by identifying the target word in degraded sentences, with some sentences previously presented as attended or ignored. Contrary to the Inhibition Deficit Hypothesis, younger monolingual participants and older adults demonstrated similar abilities to identify target words in degraded sentences which had been previously heard as ignored sentences, demonstrating similar inhibitory effectiveness. Interestingly, younger bilinguals exhibited the most effective inhibitory functioning. Differences between older monolinguals and bilinguals were less pronounced. These findings highlight the unique cognitive benefits of bilingualism, particularly in younger adults, and challenge age-related assumptions about the ability to ignore irrelevant auditory input. Implications of these findings related to the Inhibition Deficit Hypothesis will be discussed.

Effects of Temporal Delay in Auditory Integration in Younger and Older Adults.

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Previously, we demonstrated that younger and older adults could effectively integrate spectral information presented in different ears to disambiguate sentences filtered to remove low and high frequency portions of the spectrum. We presented a low frequency portion in one ear and a high frequency portion in the other and found similar abilities to correctly identify target information if younger and older participants who had good hearing. In additional studies, we have assessed the flexibility of the integration window by introducing a delay between the presentation of the signal in one ear compared to the start time of the information in the other ear. In this previous research, we found that both younger and older adults were able to effectively put the disparate signals back together even with a delay of as much as 16 ms. A delay of 64 ms resulted is significantly poorer performance with the decline most noticeable in older adults. In the current study, we attempted to further specify the size of this integration window by including delays between 16 and 64 ms and determined if age differences exist in this ability. In this study participants listened to filtered sentences presenting narrow one-octave bands of spectral information with a low frequency bandwidth (centred at 500 Hz) and a high frequency bandwidth (centred at 4000 Hz) presented in opposite ears. Older and younger adults listened to the sentences and repeated the final/target word of each sentence. Five delays (20ms, 25ms, 32ms, 40ms and 55ms) between the two ears were included and differences were calculated between delay conditions and a no delay condition. Both younger and older participants demonstrated a large temporal integration window with both groups demonstrating no decline in accuracy until 40 ms. Implications of this large and flexible integration mechanism will be discussed.

The Effects of Mood on the Lateralization of Visuospatial Attention: Testing the Valence Hypothesis.

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Visuospatial processing is our natural tendency to attend to stimuli in specific areas of our visual field, which may be biased by lateral asymmetries (Ickx et al., 2017). This occurs when one hemisphere of the brain becomes more activated, resulting in differences with how one attends to the left or right visual field (Alves et al., 2008). Spatial biases may be influenced by many aspects of human behaviour such as mood states. Understanding if emotional valence plays a role in spatial biases may reveal the extent to which emotional and visuospatial systems interact. The present study uses a mood-induction protocol based off Butler' et al., (2018) experiment with the aim to determine if emotional valence (positive vs. negative) impacts spatial lateral biases. As Butler's use of one drawing task found support for the Valence Hypothesis, we extended the method to include four additional visuospatial tasks (line bisection, landmark, greyscales, and bells tasks) which may support or challenge the findings of Butlers study. Participants were assigned to play a game of Connect Four against another participant or to a control group where they stacked Connect Four tokens. This resulted in winner, loser, and control participants. Because of the positive experience of winning the game, we predicted that more left hemisphere activation would lead to stronger

rightward spatial biases among winning participants. For participants who lost, we predicted that more right hemisphere activation would lead to stronger leftward spatial biases. For control participants, we predicted normal patterns of pseudoneglect (leftward biases) because of no significant mood change. Findings from this research will aid in determining if emotion/mood states impact processes like spatial attention which have been shown to be laterally biased. Implications for real-world scenarios where individuals may experience various emotions/moods and where spatial attention is important, such as driving, are discussed.

Hidden Binocularity: Searching for Measures in Controls and Individuals with Amblyopia.

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Amblyopia represents a lifelong neurodevelopmental disruption of binocular vision, and thus depth perception. Lack of depth perception has implications for day to day living: reading, driving, and even walking down a flight of stairs can all be affected. Although individuals with amblyopia typically fail standard clinical tests of binocular vision, a subset of these individuals demonstrated an intact Pulfrich illusion, which indicates some hidden binocularity (Maehara et al., 2019). The illusion manifests when a neutral density filter covers one eye while stimuli move horizontally across a display. The neutral density filter creates a delay in processing for the affected eye. This delayed processing introduces a spatial disparity between the two eyes, which creates the illusion of depth. To explore this idea of hidden binocularity, our team developed a novel battery of binocular vision tests, designed to be a more precise measure of binocularity than current standard clinical tests. We assessed performance on four of these tasks in individuals with amblyopia and controls. Despite poor performance on standard clinical tests, the individuals with amblyopia performed similarly to controls on some tasks in the battery. Future research in this program will characterize the similarity and differences across these tasks with the ultimate goal of developing motor and visual motion based rehabilitation strategies for individuals with amblyopia.

Examining Neural Responses to Social Rejection: Developmental and Individual Differences in Anxiety.

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Adolescence marks an important stage of development as individuals attempt to achieve independence and establish their self-concept while navigating social, cognitive, and biological challenges. Social rejection is one possible outcome of social challenges that can negatively impact mental and physical well-being. Previous research has highlighted the importance of peer relationships during adolescent development; however, there is less research on how maladaptive behaviours are associated with social feedback processing at the neurophysiological level. Thus, the current study examined the neural responses to social rejection feedback using the social judgement paradigm as they relate to developmental and individual differences in anxiety. The social judgement

paradigm required participants to submit a self-portrait and were then told that a panel of peers would rate them indicating whether they liked or disliked them. Results showed that contrary to our expectations, Medial Frontal Theta (MFT), a neural marker of feedback processing, to unexpected social rejection was not positively associated with age and self-reported anxiety symptoms. MFT was largest when an individual is expected to be liked. In addition, participants were quicker to make decisions when expecting to be disliked and had greater expectations of being disliked. In other words, these results suggest a negative expectancy bias such that adolescents do not think that they are going to be liked and quickly make this decision; however, the MFT findings indicate that, despite this behavioural bias, individuals are particularly invested in feedback when they do not expect to be liked. Taken together, these findings suggest that there is this violation of expectancy, where when they think they are going to be liked they are actually very interested in knowing the feedback of their peers.

CASTRO (Culturally Adaptive & Sensitive Test for Recognizing Others) Memory Task.

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Introduction. Despite growing recognition of diversity in human cognition, most face recognition memory tests (including the popular Warrington Recognition Memory Test) lack age, gender, and racial diversity in their stimuli - limiting generalizability. Many tests feature only younger faces, imbalanced gender ratios, and minimal racial/ethnic diversity, despite evidence of own-age, own-gender, and own-race biases in memory processing. Objectives. We introduce the CASTRO Memory Task, a novel face recognition memory test that uses (1) high-resolution images with diverse age, gender, and racial/ethnic representation and (2) both quantitative and qualitative measures of face similarity in a young-adult sample. Methods. Face photographs were selected from the US-Adult-Faces Database using a 12-step extraction process to ensure image diversity and quality (neutral expressions, non-famous faces, clear lighting). Face similarity scores were calculated for all face pairings, using subjective ratings from the Bainbridge database and objective ratings from the Azure Face Recognition software (range=0-1, mean=0.37, SD=0.09). Eighty-one face trios were created, with 30 trios per parallel set (Set 1 and Set 2). Preliminary Findings. 155 participants completed both Sets, in counterbalanced order. The CASTRO Memory Task showed accuracy rates comparable to Warrington (~88 vs. 84.8-88.6%). A strong positive correlation existed between Set performance ($r(153)=0.622$, $p<0.001$), suggesting consistent performance across sets. A two-way ANOVA revealed no significant main effect of gender $F(1, 151)=0.11$, $p=0.740$; $F(1, 151)=0.05$, $p=0.817$ or monitor size ($p>0.05$), although there was a significant cost of wearing glasses, $F(1, 151)=9.41$, $p=0.003$; $F(1, 151)=5.23$, $p=0.024$. The interaction effect was not significant ($p>0.05$). Implications. CASTRO Memory Task is the first face memory test to incorporate both subjective (human-rated) and objective (AI-rated) face similarity scores in its development, all while maintaining diverse stimulus representation. CASTRO Memory Task addresses limitations in neuropsychological tests, promoting equity, diversity, and inclusion (EDI) in memory research.

Bilingual Language Experience Predicts Larger Hippocampal Subfield Volume in Older Adults.

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Bilingualism has been associated with neuroprotective effects in aging, particularly in mitigating hippocampal and subfield volume loss (Coulter et al., 2024). This study aimed to replicate and extend these findings on bilingualism and brain maintenance by examining brain structures in relation to continuous measures of bilingualism, such as L2 age of acquisition, in addition to dichotomous classification (i.e., monolingual vs. bilingual). A sample of monolingual or French/English bilingual participants (n = 16; data collection is ongoing) aged 65-81 years old participated in this magnetic resonance imaging (MRI) study. We performed volumetric segmentation of the hippocampus using the FreeSurfer pipeline (version 6.0) based on a whole-brain T1-weighed scan and a high resolution T2-weighed image of the hippocampus. We tested whether bilingualism status (monolingual, bilingual), L2 age of second language acquisition, and age predicted hippocampal volume, while controlling for cognitive status (Montreal Cognitive Assessment scores) and estimated total intracranial volume. Preliminary results show significantly lower hippocampal volume in monolinguals compared to bilinguals, and this also applied to the CA1 and subiculum subfields specifically. Additionally, an older L2 age of acquisition was associated with lower subiculum volume. Despite the small sample size, these findings align with Coulter et al. (2024) and further support the hypothesis that bilingualism contributes to brain maintenance, with pronounced effects in the hippocampus, a key region in the development of age-related cognitive disorders. Future analyses with a larger sample will consider the complex interplay between language experience (e.g., proficiency and language usage) and individual characteristics and extend to additional brain structures. Keywords: bilingualism, hippocampus, CA1, subiculum, aging, neuroplasticity, language experience

A test of arousal-biased competition theory in the context of risky choice.

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According to arousal-biased competition theory (ABC; Mather & Sutherland, 2011), arousal increases cognitive selectivity by strengthening processing of high-priority (e.g., visually salient) stimuli while reducing processing of lower-priority stimuli. ABC theory has received empirical support in the domains of attention, memory, and perceptual learning, but has not been tested in the domain of decision making. In two experiments (total N = 85), we examined whether arousal would boost the impact of visually salient, high-priority stimuli pre-decisional information search and choice outcomes. Participants made a series of binary decisions between risky financial prospects differing in risk and expected value. Arousal and salience varied unpredictably from trial to trial. Arousal was manipulated via presentation of sound clips (high-arousal, low-arousal) prior to each choice trial. Visual salience was manipulated dimension-wise (amount salient, probability salient, or neither). Pupillometry and eye movement data indicated that the arousal manipulation was successful, but showed no impact of visual salience on pre-decisional information search. Risk taking and decision quality showed no systematic effects of arousal or salience. Overall, the experiments failed to support the predictions of ABC theory in the context of value-based decision making, shedding light on potential boundary conditions for the theory's scope.

The Social Cost of Impartiality: Moral perceptions of helping are influenced by relationship obligations.

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Moral psychology has traditionally focused on explaining peoples' moral judgments of strangers acting within impersonal hypothetical dilemmas. This approach paints an incomplete picture of morality, ignoring moral expectations within repeated long-term interactions. It may be that a certain degree of partiality is expected in close relationships, with people possessing strong moral norms against violating social obligations. Study 1 (N = 1017) examined participants' moral judgments of actors choosing to help either a close other (relative, friend, or community member) or stranger when both were simultaneously in need of help. Impartial actors who helped a stranger instead of a close other were judged as less moral than partial actors who prioritized a close other. Impartial actors were also viewed as less predictable and judged as fulfilling less of their social obligations, suggesting that participants held a moral norm for partiality. These effects were sensitive to relationship strength, as agents helping a stranger instead of a relative or friend were judged particularly harshly. Study 2 (N = 528) assessed participants' own preferences for helping close versus distant others in a hypothetical donation task. Mirroring moral judgments in Study 1, a large majority of participants elected to help a close other (relative, friend, or community member) over a stranger who was equally in need. Participants were more impartial when the stranger was described as being in greater need, although a majority still chose to donate to a close other. In sum, we find evidence that people possess a strong moral preference for partial compared to impartial actors, with the strength of this preference depending on relationship strength. By demonstrating how moral perceptions shift across relational contexts, our findings underscore the importance of studying moral judgment beyond impersonal dilemmas involving strangers and within the close and varied relationships that define social life.

~~Examining Brain Function and Behaviour in Infants During Prehension and Play: A fNIRS Study.~~

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~~Early childhood is a critical period for sensorimotor development, as infants transition from spontaneous movements to goal-directed actions like reaching, grasping, and object manipulation. These motor refinements are correlated with neural changes; yet the underlying mechanisms remain largely unexplored due to challenges in infant neuroimaging. This study addresses this gap by investigating the relationship between brain activity with behaviour in infants 6 to 11 months old (mo). We used wireless functional near-infrared spectroscopy (fNIRS, Brite, Artinis) across 21 channels over bilateral fronto-parietal regions whilst infants engaged in prehension and free play conditions. Behavioural events were extracted from video recordings using Boris software and integrated into the fNIRS data. Infant participants were divided into young (YI, 6-7 mo), middle (MI, 8-9 mo), and older infant (OI, 10-11 mo) groups. Event-related brain activity across conditions and age groups was analyzed using the Brain AnalyZIR toolbox. A general linear model (GLM) with~~

~~autoregressive iteratively reweighted least squares (AR-IRLS), incorporating prewhitening to reduce noise, was used for subject-level analysis. Group analysis and t-test contrasts identified distinct patterns of brain activity between age groups. Findings suggest an increased lateralization and greater right-hemisphere activity in older infants during prehension compared to MI and YI ($p < .05$). These patterns may indicate a developmental shift in neural recruitment as motor skills become more refined and stable. This research contributes to understanding the neural mechanisms underlying early motor development by exploring potential brain-behavior relationships in infancy. Additionally, findings may offer insights into typical developmental trajectories of motor function.~~
Withdrawn

Quantitative and Linguistic Pathways to Early Numeracy: The Importance of Parental Attitudes, Home Experiences, and Early Skills.

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Children's numeracy and literacy development, beginning in a child's home environment, predict mathematical ability. Although numeracy and literacy development are frequently assessed by parental attitudes, home activities, and early skills, these measures are rarely combined within or across numeracy and literacy domains. The goal of the current study was to examine three predictors (parental attitudes, home activities, and early skills) of mathematical understanding within quantitative and linguistic pathways to determine how they predict concurrent mathematical ability. Data were collected from 166 senior kindergarten students (M age = 5.9 years) and their parents within an Ontario, Canada school board. Parents completed a questionnaire regarding their own attitudes and their home environments. To assess numeracy skills, children were tested on symbolic and non-symbolic number comparison. To assess literacy skills, children were tested on phonological awareness and receptive vocabulary. The KeyMath - Numeration subtest was used to measure the outcome variable of mathematical ability. Considering the Pathways to Mathematics model (LeFevre et al., 2010), it was hypothesized that quantitative and linguistic pathways would independently predict mathematical ability. Structural equation modelling (SEM) was used to test this hypothesis. Findings indicate that expanded pathways do not independently predict mathematical ability. Based on the poor fit of the hypothesized model, a more parsimonious model was sought. The final model of early skills and parental attitudes, excluding home activities, showed a better model fit. Findings support the Pathways to Mathematics model, in that early numeracy and literacy skills uniquely predict mathematical ability. The current study works to refine the Pathways to Mathematics model, expand cross-domain research, and demonstrates that parents' attitudes towards math and reading may be more important for their child's math development than previously thought.

Puzzle Play and Amount of Parental Spatial Talk in a Digital Age.

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Spatial language refers to language used to describe object location, object features, and relations between objects. It has been widely demonstrated that parental spatial talk relates to the development of children's spatial reasoning skills. For example, exposure to parental spatial talk is positively correlated to the use of spatial words in their children's vocabulary. Recent research suggests that parents' use of spatial language may vary between digital and physical puzzle play. However, the parental spatial talk elicited across different puzzle modalities requires further investigation. In the present study, we examined puzzle duration and parental spatial talk in 162 parent and child (ages 3 and 4) dyads across three puzzle conditions: physical, virtual with rotatable pieces, and virtual without rotatable pieces. ANCOVA analyses (controlling for child age) revealed significant differences in puzzle duration, frequency, and proportion of parental spatial words between the conditions. Moreover, dyads in the virtual puzzle with rotation had longer puzzle durations compared to the other two conditions. Additionally, parents in the virtual puzzle with rotation condition had higher frequency (but not proportion) of spatial words than the other two conditions. Parents in the virtual puzzle without rotation condition had a higher proportion of spatial words (but not frequency) compared to the parents in the physical puzzle condition. Findings have educational implications for parents, particularly in an era where touchscreen apps create new sociocultural contexts for spatial learning and development. This research allows us to better understand how puzzle design may influence both the amount of parental spatial language used and task complexity when using duration as an indicator. In all, encouraging parents to engage their children in complex puzzle tasks may help enhance their spatial development through spatial play.

Age-based Prediction in Language Processing.

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Language processing is incremental – we make real-time predictions about what will be said next based on both lexical cues (e.g., "drink" leads one to expect a drinkable object) and speech cues (e.g., "uhh" leads one to expect something difficult). Currently, there is little work examining whether our real-time predictions are influenced by social information. This study examines whether children make lexically-based (verb) and socially-based (age) language predictions. Twenty-nine pre-schoolers (3.5-to-5.5-years) participated in a looking-while-listening task. In each trial (32 total), they saw an image of a speaker (child or adult) and heard a sentence spoken by that speaker (e.g., "I am going to ride the nice bike"). There were 2 trial types: in Age trials, participants saw one child-related (e.g., a tricycle) and one adult-related (e.g., a motorcycle) object; the target was the object related to the speaker's age. In Verb trials, participants saw one verb-related object (e.g., a tricycle) and one object unrelated to the verb (e.g., a hot dog); the target was related to the verb. Participants' gaze patterns were coded offline in 33-msec increments. The proportion-of-looks-to-the-target was measured during an age window (speaker-voice-onset to target-onset) and a verb window (verb-onset to target-onset). Pre-schoolers looked at the target at above chance levels in both windows:

64% during the verb window (p<.0001) and 54% during the age window (p=.037). This study demonstrates for the first time that pre-schoolers use age as a predictive language cue, when given both voice and visual cues to age. However, verbs seem to be stronger predictive cues than age for pre-schoolers, suggesting either that children need more time to develop age-based knowledge or that age-based predictions are weaker than lexically-based predictions in general. Two follow-ups examining age-based predictions using audio information only in pre-schoolers and adults are in progress and will be reported.

Gender Difference in Spatial Cue Utilization and Local Metacognition.

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There are well-established gender differences in spatial navigation ability and global metacognition in spatial navigation tasks (i.e., one's overall confidence in one's navigation ability; e.g., Lawton & Kallai, 2002). However, very few studies have examined whether there are gender differences in local metacognitive accuracy, a form of trial-by-trial self-assessment, during spatial navigation tasks. One such study found evidence of gender differences in the cues used to make local metacognition judgments during wayfinding (Lemieux et al., 2019). In the current study, we assessed trial-by-trial metacognitive performance, based on the Nelson and Narens' (1990) metamemory framework, in a sample of men and women engaging in a first-person virtual maze navigation task with two conditions; one with only distal cues present and one with both distal and proximal cues present. In particular, Judgements of Learning (JOL) and Retrospective Confidence Judgements (RCJ) were used as prospective and retrospective trial-by-trial self-assessments, respectively. Does local metacognition for wayfinding change according to the type of visual cue present and how is this difference seen across gender? Preliminary findings show a gender difference in performance for both conditions, but this difference was greatest for the distal-only condition. Women were less accurate at making RCJs compared to men in the distal-only condition, no difference was seen in the combined cue condition. These results suggest that women's performance and local metacognition rely more on proximal landmark-based visual cues on wayfinding tasks.

Spatial knowledge of campus predicts feelings of belonging at university.

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A sense of belonging at school has been linked to university students' academic success, retention, and motivation (Pedler et al., 2022; Strayhorn, 2019). Slaten et al. (2014) proposed that this sense of belonging is comprised of psychosocial as well as environmental factors. Given recent evidence that some forms of spatial knowledge of a university campus are related to students' emotional bond to their university (Pullano et al., 2024), the current study investigated whether university students with a stronger knowledge of the landmarks and spatial layout of their campus would also report a higher sense of belonging. In an online survey, participants at Western University (N = 120, 80 women) provided their year of study, whether they lived on or off campus, and their involvement in

extracurricular activities. To assess belongingness, they completed the University Belonging Questionnaire (UBQ; Slaten et al., 2018) and the Place Attachment Scale (Williams & Vaske, 2003) used by Pullano et al. Spatial skills were measured with the Santa Barbara Sense of Direction Scale (Hegarty et al., 2002) and three spatial tasks assessing recognition of campus landmarks, routes through campus, and survey knowledge of campus. Higher scores on the UBQ were associated with living on campus, greater place attachment to the campus, and better survey knowledge of the campus. In a hierarchical regression model, non-spatial variables hypothesized to increase belonging were entered into the first step and showed that year of study and living on campus significantly predicted scores on the UBQ. Scores on the survey task were entered in the second step and significantly improved the model and predicted UBQ scores. Knowledge of the spatial layout of campus explained unique variance in university students' sense of belonging at their school, highlighting how cognitive and affective variables can interact.

~~Seeing the Forest or the Trees: The Impact of Attention on Category Learning.~~

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~~Attention to features is the first step in the formation of mental representations and differences in attentional focus may impact how concepts are learned. We investigated the influence of attentional processing styles (global or local) on the formation of category representations during a classification task. We primed participants with global and local attention in a Navon task (Gerlach & Poirel, 2018; Navon, 1977). Participants then learned to classify a set of cartoon fish based on a "5-4" categorization task adapted from Medin & Schaffer (1978). We predicted that individuals primed globally would be more likely to abstract and rely on prototypes and that attention would be more distributed across stimulus features. We also predicted that individuals primed with local processing would be more likely to store and rely on specific exemplars and attention would be less distributed across stimulus features. We found a relationship between priming condition, category learning, and categorization models, suggesting that attentional processing styles may influence how new categories are learned and represented. Additionally, our paradigm demonstrates differences in the deployment of attention to stimulus features in our classification task across priming conditions. This research contributes to the ongoing investigation of individual differences in category learning and provides insights on global and local processing influences on category representations.~~ ***Withdrawn***

Gender Differences in Motion Sickness Experiences.

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There is a gender difference in virtual reality (VR) sickness, a type of motion sickness, with symptoms experienced predominantly by women (e.g., Howard & VanZandt, 2021). Women may be susceptible to VR sickness as they have a naturally larger field-of-view (FOV) compared to men, which is associated with more symptoms (Kennedy & Frank, 1985). While the mechanisms for this gender difference are not clearly known, further investigation into differences in the visual systems

of the genders might help to elucidate the underlying mechanism. The current study collected the gaze behaviour of men and women performing a VR wayfinding task with different spatial cues present to help with performance across 20 virtual mazes. There was significant attrition due to virtual reality sickness where 47% of women and 10% of men could not complete the task due to feeling ill, thus causing a sample bias related to gender. Incomplete data from these individuals was kept and used in the current analysis. Preliminary results found significant differences in gaze behaviour between those who experienced symptoms of VR sickness and those that did not. Those experiencing VR sickness tended to make fewer fixations in general and spent less time on specific spatial cues and more time on the walls and floor, regardless of gender. Indeed, participants self-reported more VR sickness symptoms when they would move their fixation or their head (a chinrest was not used), indicating a mechanism related to eye-movements, perhaps the vestibulo-ocular reflex. VR sickness correlated with wayfinding strategy; a discussion on gender differences in strategy, visual streams, and motion sickness is provided.

Eye Love Arithmetic: An Inversion and Associativity Eye Tracking Study.

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Arithmetic is important for developing the cognitive and problem-solving skills that are fundamental for higher levels of math. Individuals' understanding of arithmetic concepts such as inversion and associativity are evident in how they solve three-term arithmetic problems. If an adult solves an inversion problem, like 27 + 46 – 46, by cancelling the 46s, it suggests they understand inversion and have used an inversion shortcut. Similarly, when adults solve an associativity problem, like 3 × 26 ÷ 13, by first computing 26 ÷ 13, they have used an associativity shortcut. To understand why some adults are better at using shortcuts, the current study used an eye tracker to compare the visual attention of shortcut users to shortcut non-users. Participants (N = 60) solved 32 three-term arithmetic problems while their eye movements were tracked. Half of the problems were inversion, and the other half were associativity. Problems differed by operators (additive or multiplicative) and their format (conducive or non-conducive). Results support previous findings that adults are more accurate and use more shortcuts on inversion, additive, and conducive problems than associativity, multiplicative, and non-conducive problems. When comparing the eye movements of shortcut users to shortcut non-users, the heat maps indicate that participants focused on different areas. Further visual and statistical analyses were also used to compare the eye movements of shortcut users to shortcut non-users. Continuing to study adults' visual attention during arithmetic will give researchers a better understanding of how people problem-solve. Keywords: arithmetic, inversion, associativity, shortcuts, attention, eye tracking

That's not the one I wanted: Feedback improves 5-year-olds' communicative perspective-taking.

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Effective communication requires participants to recognize what knowledge is shared between them and what remains unique to each person. Although research has examined the developmental emergence of this communicative skill, it is unclear how children's attention to shared knowledge is impacted by feedback. This study addresses this gap by examining whether corrective feedback affects the time course and outcome of Canadian 5-year-olds' use of shared knowledge to guide interpretation of a speaker's referential intent. Children who received feedback on the accuracy of their interpretations pointed to target objects more than those who did not receive feedback. Children in the feedback group showed preferential looking towards the target (relative to a competitor), with this effect emerging at later stages of sentence processing. Children's working memory capacity was positively associated with greater fixation on the target object during trials that required perspective-taking, only if they had received feedback on their previous choices. We discuss these results in terms of children's attention to their own perspective vs that of others.

When "salt and pepper" diverges from "pepper and salt": How do L1 and L2 readers comprehend binomial expressions?

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Binomials are multiword expressions (MWEs) that often have a canonical word order ("salt and pepper" but not "pepper and salt"). Like other MWEs (e.g., idioms), canonical binomials should be easier to process than reversed binomials for first language (L1) readers, due to their strong lexicalization. In contrast, second language (L2) readers do not have the same incremental experiences with binomials (Siyanova-Chanturia & Janssen, 2018; Conklin & Schmitt, 2012), Thus, they should process canonical binomials less efficiently than L1 readers and show lower processing costs for reversed binomials. Relevant here, past findings are mixed on these points, likely due to unexplored item-level differences (e.g., familiarity and inherent reversibility). To address this, we investigated which item-level factors modulated L1 and L2 binomial processing. We selected 280 binomials from Muraki et al. (2023) as stimuli for a speeded comprehensibility task with 35 L1 English and 17 L1 French bilingual adults (data collection is ongoing). Preliminary results suggest that binomials presented canonically were more likely to be judged as high vs. moderately comprehensible and were responded to more quickly than reversed binomials. These effects were modulated by item-averaged off-line ratings of familiarity and reversibility. Importantly, L1 English readers processed canonical binomials faster, and judged them as more comprehensible than reversed binomials, especially for binomials rated off-line as inherently non-reversable). In contrast, L2 English readers showed faster processing only for high familiar canonical binomials, and they were less impacted by reversed presentations low familiar binomials. Taken together, L1 vs. L2 readers show evidence of a more entrenched binomial form representation, like prior findings for idioms (Senaldi et al., 2022). Thus, processing models developed for idioms may also be applicable to binomial MWEs (e.g., Libben & Titone, 2008).

Effects of Early Language Exposure on Feedback Processing: Speech Category Learning in International Adoptees.

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Speech category acquisition in adulthood is a difficult task requiring supervised learning with feedback to support error monitoring. Prior studies show that a broad network involving the fronto-parietal attentional network, striatum, and anterior cingulate cortex (ACC) are involved in feedback processing during speech category learning (Yi et al., 2016). International adoptees (IA) often experience early but discontinued exposure to their original birth language during the first years of life, prior to being adopted and acquiring the language of their new family. Previous research has shown this early exposure can result in maintained phonological traces in the brain over time (Pierce et al., 2014). We build on this work by examining how these phonological traces of IAs' birth language influences the (re-)learning of discontinued speech categories in adulthood. We also examine whether these traces modulate feedback processing mechanisms during such learning.To address these questions, 2 groups of adult participants were recruited: 1) IA from China, who were exposed to Mandarin lexical tones during infancy before being adopted into French-speaking families, and 2) French speakers without prior exposure to Mandarin tones. Both groups of participants performed a Mandarin lexical tone learning task while in an MRI scanner, during which participants were presented with monosyllables produced using the 4 Mandarin lexical tones. They were asked to categorize the stimuli while receiving trial-by-trial feedback. Although the French and IA groups performed similarly throughout the task, brain activation patterns during positive feedback presentation revealed group differences in networks underlying performance. Towards the end of the task, the French participants displayed greater engagement of corticostriatal networks including the dorsolateral prefrontal cortex, ACC, and putamen, whereas the IA group showed a reduced pattern, only recruiting the right putamen. The results are discussed in the context of theories of feedback-based learning, the sensitive period hypothesis, and neuroplasticity.

Lost in Translation? Maybe Your Body Knows the Answer.

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Can we "feel" the meaning of an idiom even if we don't understand the language? Figurative language often describes abstract ideas, but many idioms contain embodied elements such as the Spanish idiom "to have one's heart in a fist" (meaning "to feel anxious or worried"), where the physical imagery conveys a sense of tension and unease. This study investigates whether sensorimotor grounding in unfamiliar idioms can help individuals infer their meaning. To examine this, we developed a novel database of 300 idioms from 10 languages—Arabic, Bulgarian, Mandarin, French, German, Indonesian, Romanian, Russian, Spanish, and Vietnamese. Each idiom was elicited from native speakers of a given language, who were asked to provide commonly used idioms. Each entry included a literal translation into English, along with its figurative meaning. To ensure accuracy, one native speakers per language reviewed all translations, refining them to preserve both linguistic precision and cultural authenticity. We are collecting two sets of ratings for

each idiom. The first are intuitiveness ratings, in which participants judge how naturally the literal translation relates to its figurative meaning. The second are embodiment ratings, in which participants assess how much the idiom evokes a bodily experience. Ratings will be provided on a 7-point Likert scale, with each participant providing rating for a random 50 idioms on one rating scale. To ensure objectivity, all participants are monolingual English speakers with no fluency in the source languages. If it is true that embodiment plays a role in idiom comprehension, we would expect embodiment ratings to correlate with intuitiveness ratings. This would support theories of grounded cognition in language processing. Our findings will provide insight into whether the human mind relies on bodily experience to bridge linguistic gaps, offering insights into how cognition, culture, and language interact in shaping meaning construction.

Drawing quality and visual feature selection influence recognition memory.

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Creating drawings of to-be-learned information improves memory, and it has been proposed that this is because elaborative, pictorial and motoric information are integrated to facilitate retrieval. However, the role of the specific features of drawings remains unexplored. In a project designed to investigate the motor system's role, we performed an additional in-depth analysis to determine whether there were identifiable features of drawings that most benefit memory performance. Across two experiments, participants used a robotic manipulandum to draw studied items. After 10 mins (E1) or 24-48 hours (E2), they completed a recognition test while being guided through predetermined paths by the manipulandum. If the path involved implicit motor reinstatement, there was consistent evidence for increased efficiency in memory access across both experiments, but our focus here was on the nature of the drawings themselves. We performed a feature extraction on participants' drawings using a convolutional neural network (CNN), VGG-16, that was pretrained on millions of drawings from the 'Quick, Draw!' dataset. In E1, drawings that were more recognizable by the CNN (i.e. more accurate) were better remembered regardless of condition. Interestingly, this effect was only temporary, disappearing after E2's delay. We were also interested in whether features of drawings orthogonal to its accuracy would drive successful remembering. We used a principal components analysis to reduce thousands of complex CNN features into a lower-dimensional space. Two components describing features in the second fully connected layer of the CNN (sensitive to higher-order visual features) interacted to predict memory across both experiments, indicating that specific feature combinations reliably predict drawing memorability. Ongoing work will determine whether changes in motor engagement and the quality of drawings modulate memory effects. Altogether, these studies reveal that drawing quality has a short-term benefit to memory, but this fades quickly, in favor of specific features driving performance.

Route and Landmark Memory: The Role of Decision-Making During Encoding in Older Adults.

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Introduction: Navigation devices such as Google Maps reduce the need for independent decision-making. We examined whether providing visual navigation guidance cues during initial exploration of roads, within virtual reality (VR), hindered subsequent memory for the route travelled. We compared route and landmark memory in younger (n = 54) and older adults (n = 20). We also examined whether self-generated motoric engagement during encoding enhanced retention in both age groups, as suggested by previous work. Methods: At encoding, participants explored 12 VR environments based on real-world cities, for 40s each, aiming to find a star. Navigation strategy was manipulated within-subjects, randomly, and required either actively self-initiating decision-making about the route of travel (active exploration) or following a visually-guided route (guided exploration), both with volitional control of movements using VR paddles. In a third condition (passive exploration), participants simply viewed a pre-selected route of travel within an environment. Following encoding, participants re-entered each environment and were asked to "re-trace" the exact route they had traveled. Results: In younger adults, both active and guided exploration at encoding improved subsequent route and landmark memory compared to passive exploration. In older adults only active exploration, which required decision-making, enhanced memory. Importantly, older adults were able to achieve equivalent route and landmark memory performance to the younger group following active exploration. We also found that individual differences in curiosity traits related to thrill-seeking and VR immersion predicted enhanced route memory performance following active exploration in both groups. Conclusion: Active navigation requiring self-generated motor engagement, coupled with decision-making, mitigates age-related declines in memory. Encoding new environments through motor engagement and decision-making is more effective in individuals with higher trait curiosity than in those with lower curiosity. Nonetheless, active exploration of new environments enhances route and landmark memory, regardless of age.

The pupillometric production effect: Evidence for enhanced processing preceding, during, and following production.

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The production effect refers to superior memory performance for words read aloud compared to those read silently. This finding has often been attributed to the incorporation of distinctive sensorimotor information into the memory record of items read aloud, facilitating their successful retrieval during the memory test. Whereas this distinctiveness account has historically focused on the act of verbal production and its sensorimotor components, less research has explored other cognitive or motivational differences between the aloud and silent conditions. Within the context of a modified production task, we used pupillometry to explore variation in the time course of attention allocated during aloud, silent, and control (say "check") study trials. Across experiments, instructions on whether to read a word aloud or silently were presented either concurrently with the word or preceding the word. We also explored the case where the response had to be withheld until a "Go" signal appeared to permit evaluation of preparatory processing independent of a response.

In addition to a typical behavioural production effect in memory performance, each experiment also revealed the presence of a pupillometric production effect (greater pupil dilation for aloud than for silent words) separable from the act of production itself. We interpret our findings with respect to attention, strength, and distinctiveness.

Preparation (without production) is enough to elicit a production effect: A behavioural and pupillometric investigation.

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The production effect refers to the finding that words read aloud are better remembered than words read silently. This phenomenon has historically been explained with reference to distinctive features encoded at study (e.g., audition) being used to discriminate between studied and unstudied items at test, with emphasis placed on the productive act itself. Across two experiments we demonstrate that even anticipating you may be asked to read a word aloud is sufficient to improve memory over silent items. Using a recent variant of a production paradigm, participants received study words alongside instructions to read those words aloud or silently; however, they were instructed to withhold their response until a "Go" signal appeared. On one-third of all trials this signal never came ("catch" trials). Despite having not produced the words on catch trials, participants nonetheless demonstrated a credible behavioural production effect (aloud > silent) in recognition performance (E1, E2) and a credible pupillary production effect (aloud > silent pupil size; E2), although either were of lesser magnitude than trials containing actual production. These results support recent claims that motivational or attentional factors play a role in the emergence of the production effect.

The Memory Lingering Effect: Does it Extend to Older Adults?

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Background: The persistence of semantic content in subsequent thoughts (i.e., memory lingering) has been recently studied, but the underlying mechanisms for this phenomenon remain unknown. Inhibitory control (responsible for suppressing task-irrelevant information) may play a role in constraining spontaneous thoughts in memory lingering. The memory lingering effect has not been examined in older adult populations, a group with well-established, age-normative inhibitory declines. This study aims to investigate whether the memory lingering effect extends to older adults. It was expected that older adults, given their inhibitory declines, would show greater memory lingering than younger adults. Methods: A final sample of 154 participants was recruited online via Prolific, including 82young adults (M age = 25.1 years) and 72 older adults (M age = 68.7 years). Participants completed a verbal free association task before and after reading a short story. Memory lingering was quantified as an increase in theme similarity in free association responses following story reading. This was calculated using GloVe word embeddings, a machine learning algorithm for

generating vector representations of words. The vectors were compared to assess thematic similarity before and after story reading. Self-reported rating of memory lingering was also assessed to capture a subjective appraisal of lingering. Results: Mixed ANOVAs revealed significantly higher theme similarity values at post-story than pre-story time point across both age groups (ps < .001), suggesting an age-comparable memory lingering effect. Self-reported lingering effect showed the same pattern. Conclusion: These findings are the first to indicate that memory lingering is intact in older adults relative to younger adults. Both objective and subjective measures suggest that the persistence of narrative content is largely comparable between young and older adults, highlighting that the underlying mechanisms of memory persistence operate similarly regardless of age. Further research is necessary to elucidate the role of inhibition in memory lingering.

Can a Large Language Model (LLM) match humans in describing and rating complexity of videos?

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Many fields are incorporating computational tools to improve research efficiency. Large Language Models (LLMs) can now process video clips quickly and consistently, helping researchers handle exponentially more data. We explored whether LLMs can accurately describe and rate the complexity of video stimuli and match traditional human ratings of complexity. We compared the performance of three LLMs—LLaMA 3-8B, LLaVA 34B, and GPT-4o—in automatically describing 62 videos from the Database of Emotional Videos from Ottawa (DEVO-2). First, we ran Python scripts with structured prompts that fed each DEVO-2 video into the three LLMs. These scripts extracted frames from the videos and asked the models to identify objects, actions, and any critical details. We then manually checked each LLM description against actual video content. After this informal analysis, we chose the strongest model to continue processing the additional video clips. To our eyes, GPT-4o outperformed LLaMA and LLaVA, consistently generating the most detailed and contextually relevant descriptions of videos. Next, we prompted the LLMs to assess the visual complexity of each video. To validate the LLMs' assessment, we selected a previously published dataset with ratings of video complexity by 24 undergraduate participants which gave us a benchmark to compare LLM-generated complexity ratings. First, however, we examined the reliability/consistency of the LLM ratings. We ran GPT-4o twice on the same video and compared the results. GPT-4o consistently reported similar complexity ratings from both runs (Spearman r=0.96, p=2.1e-11). Next, we compared LLM ratings with human judgments. The results show that GPT 4's scoring method aligns well with how people perceive complexity. (Spearman r=0.74, p=0.0002). This study provides strong evidence that LLMs, particularly GPT-4o, can describe and rate the complexity of video stimuli. As LLMs continue to advance, their role in psychological research will expand, offering new opportunities for innovation in the study of human cognition.

Is "Time" on Your Mind? How Prospective Judgment Primes Recognition.

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Prospective time judgment instructions require participants to keep track of time. Although it is assumed that participants comply with these experimental demands, it is unclear to what extent that they actively do so or for how long. Thus, the goal of this experiment will be to investigate this question using a lexical decision task (LDT). The participants will judge 49 words and 49 matched non-words under prospective or retrospective time judgment conditions (i.e., they will be told that they will need to report the task's duration when it ends or not). Critically, the word "time" will be presented after 30 seconds, 2 minutes, or 4 minutes. If the participants in the prospective group do actively monitor time, they should identify "time" as a word more quickly than participants in the retrospective condition. Moreover, if they fail to maintain their attention to time at some point during the LDT, then the response times for "time" presented at 2 or 4 minutes should be slower than at 30 seconds. In sum, this experiment will attempt to reveal to what extent participants who are asked to give prospective time judgments actively monitor the passage of time as opposed as to relying on memory.

Eccentric Viewing Training for Balance in Older Adults with Visual Impairment.

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Age-related macular degeneration, the second leading cause of vision loss in Canada, affects central vision, impairing reading, mobility, and engaging in daily activities. This increases depression risk and psychological distress, highlighting the need for effective rehabilitation. Current low vision rehabilitation interventions primarily target reading, such as eccentric viewing training (EVT), which helps clients locate and use their preferred retinal locus to improve reading. Previously, we found a correlation between fixation stability and perceived and objective measures of balance. However, the current study examined whether an EVT intervention that improves fixation stability can improve balance. Sixteen participants (Mage = 87, SD = 7) underwent an EVT program at the Lethbridge-Layton-Mackay Rehabilitation Centre in Montreal, all with visual acuity of at least 6/10 in their better eye. Pre- and post-testing included measures on reading performance (Pepper Visual Skills Reading Test), global balance (Timed Up-and-Go), gait (Dynamic Gait Index), fixation stability (measured via scanning laser ophthalmoscopy), perceived balance confidence (Activities-specific Balance Confidence Scale), and postural stability (Nintendo Wii Balance Board). Preliminary results show EVT improves fixation stability ($g = -1.4$, 95% CI [-2.09, -0.925], $p < .001$) and reading accuracy ($g = 0.657$, 95% CI [0.33, 1.02], $p < .001$), though not reading time ($g = -0.102$, 95% CI [-0.414, 0.399], $p = .624$). Effect size estimates show a medium effect on global balance ($g = -0.428$, 95% CI [-0.817, -0.088], $p < .013$), but no effect on postural stability ($g = -0.035$, 95% CI -0.474, 0.278, $p = .849$). Further testing is needed to achieve planned statistical power, but preliminary findings suggest EVT may have transferable benefits beyond reading, increasing the incentive for its inclusion in standard rehabilitation programs. Enhancing mobility through EVT could potentially reduce falls and fear of falling in older adults, fostering greater independence and ultimately improving quality of life.

Investigating the Role of Mood Induction on Emotion Recognition in Social Anxiety.

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Individuals with high-trait social anxiety (SA) experience multiple challenges when interacting with others. Social cognition abilities like accurate emotional facial expression recognition are particularly impaired in this population. Neutral facial expressions are most often miscategorized and met with uncertainty. Part of this categorization difficulty may be attributable to increased state anxiety when approaching ambiguous social situations. However, little is known about the influencing role of state anxiety on emotional expression recognition (EER) among those with social anxiety. The present study aimed to evaluate the impact of experimentally induced state anxiety on EER. Fifty-two undergraduate students with high-trait SA participated in a pre-post facial expression recognition task. Participants were presented with happy, neutral, and angry facial expressions and asked to categorize the expressed emotion among six basic emotion categories. In between emotion recognition tasks, participants engaged in an affect induction procedure (i.e., mock discussion with a confederate) designed to increase state anxiety. The results suggest that individuals with high-trait SA were significantly worse at recognizing happy facial expressions post-affect induction ($F(1, 50) = 4.367$, $p = .048$, $\eta p2 = .080$). Furthermore, individuals with high-trait SA showed significant difficulty in accurately recognizing neutral facial expressions across pre- and post-conditions ($F(1.512, 155.685) = 409.794$, $p < .001$, $\eta p2 = .799$). An error rate analysis revealed that neutral and happy facial expressions were most often miscategorized as either surprise, angry, sad, or disgust. This study highlights that positively-valenced expressions are met with increased uncertainty, particularly when experiencing elevations in state anxiety. Future research should investigate why individuals with high-trait SA have difficulties correctly identifying expressions that are not overtly negative.

Relations Between Math Anxiety, Math-Related Intrusive Thoughts Management and Math Performance.

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Individuals higher in math anxiety perform worse on working-memory-demanding math tasks than do lower math-anxious individuals, likely because intrusive thoughts consume working memory resources required to complete the math tasks. Research has shown that in higher working-memory-demanding tasks, the extent to which participants feel that intrusive thoughts interfere with calculations mediates the relation between math anxiety and math performance. The current research expanded upon these findings by investigating whether, among participants experiencing intrusive thoughts, different management strategies significantly predicted math performance beyond what is explained by math anxiety. We examined the impact of four different intrusive thought management strategies: reasoning about the thoughts, replacing the thoughts, self-distraction from the thoughts, and focusing more on the question. Participants (N=118) completed measures of math anxiety, general anxiety, math performance, and intrusive thoughts. A hierarchical regression controlling for general anxiety was conducted, with the initial model including math anxiety and the full model

incorporating intrusive thought management strategies. We found that adding these strategies significantly improved model fit (F Change = 5.16, $p < .001$). While the initial model explained 11.5% of the variance in math performance, including intrusive thought management strategies accounted for an additional 13.9% of unique variance. In the full model, math anxiety (β=-.278, p=.004) and reasoning about the intrusive thoughts (β=-.236, p=.009) negatively related to math performance, whereas focusing more on the question positively related to math performance (β=.246, p=.004). However, self-distraction strategies (β=-.157, p=.080) and replacing the intrusive thoughts (β=-.052, p=.593) did not relate to math performance. Consequently, while directing attention from intrusive thoughts back to the math questions can positively impact math performance, trying to reason through the thoughts can be detrimental. This is likely because reasoning about intrusive thoughts consumes working memory resources necessary for performing the math task.

Is Response Speed or Poor Discriminability Necessary for the "Natural Tendency to Respond Toward the Source of Stimulation" in the Simon Task?

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The Simon effect (SE) refers to the performance advantage for responses that are spatially congruent with stimuli, even when responses are based on a stimulus feature other than location. The SE typically decreases with slower response times. The SE also generally decreases when the discriminability of the task-relevant stimulus feature is low. It is thought to arise from fast, yet transient, stimulus-response (S-R) spatial activation. It remains unclear, however, which contextual factor—response speed or reduced discriminability of the task-relevant feature—is necessary for S-R spatial activation. We explored this issue in a speed-accuracy trade-off (SAT) Simon task in which stimuli were presented to the left or right of fixation and responses were made to the orientation of the stimulus with the left and right index fingers. The perceptual discriminability of the task-relevant feature was reduced by including trials with a mask that followed the brief presentation of the stimulus. We found that masking reliably reduced the susceptibility of responses to the task-relevant feature of the stimulus. The effect of masking on S-R spatial processing was considerably weaker. Notably, there was more individual variability in the impact of masking on S-R spatial processing than on the processing of the task-relevant stimulus feature. These findings suggest that the "natural tendency to respond toward the source of stimulation" primarily occurs during fast responses, long before task-relevant S-R information can be fully processed. This tendency weakens over time, even when the perceptual representation of the task-relevant feature of the stimulus is degraded.

Understanding Children's Engagement with Auditory Narratives: A Multimodal Approach.

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In complex listening environments, such as classrooms, successful auditory perception is related to listening effort—the dynamic relationship between the processing demands of auditory stimuli and

an individual's cognitive resources (Johnsrude & Rodd, 2016). Previous research explored factors influencing listening effort, however, much of this work has focused on isolated stimuli (Herrmann & Johnsrude, 2020). As a result, less is known about how listening effort is deployed to perceive naturalistic stimuli that represent real-world listening. This study examines how children engage with context-rich auditory stimuli, providing a deeper understanding of how they process and respond within complex listening environments. Children aged 9-12 listened to a series of stories while EEG and eye-tracking data were recorded. After each story, the children completed an absorption scale that measured how engaged they were by the story. In addition, measures of sustained attention and working memory were administered to assess the contributions of domain-general cognitive abilities. EEG power spectral density analysis was used to assess changes in alpha-theta frequencies linked to attention and cognitive load during story listening, while gaze dispersion was used to capture visual attention patterns. Our findings support the hypothesis that highly engaging stories elicit greater listening effort, as reflected by changes in the distribution of EEG power and gaze dispersion. Engagement varied story, with the degree to which children enjoyed listening being the primary driver of this effect. Moreover, engagement was also shown to be associated with higher theta band power and lower alpha band power, suggesting increased listening effort for engaging materials. These findings provide evidence that child-oriented narratives can be used to quantify listening effort under naturalistic listening conditions. This work has implications for classroom education, where an improved understanding of the mechanisms associated with engagement and listening effort can inform strategies to enhance learning outcomes.

Standing up in the virtual world: Observing social-cognitive factors influencing peer defending behaviours using virtual reality.

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Bullying victimization is a serious threat to Canadian youth. Bullying most often occurs in the presence of peer bystanders, who can intervene to defend their victimized peers. Although rare, peer defending is an effective way to combat bullying, ending the bullying episode rapidly when a bystander intervenes. Past research has used passive viewing methods (e.g. vignettes) to study factors associated with peer defending, limiting our understanding of how social attention contributes to peer defending in real-time. The present study used a virtual reality (VR) paradigm to examine how social attention is related to peer defending in a bullying scenario. Multi-method data were collected during the VR task, including eye tracking data, state affect, and various defending behaviours in response to a social exclusion scenario. Results indicate that there is a correlation between gaze allocation and some types of peer defending, as well as a correlation between specific peer defending behaviours and negative affect during social exclusion. Results from this study are among the first to demonstrate the social cognitive processes underlying peer defending behaviour as it unfolds in real-time, showing that gaze allocation in dynamic social situations can be sensitive to witnessing peer victimization. Moreover, state affect and attentional allocation during and after an episode of social exclusion are predictors of subsequent defending behaviours.

Lost in Translation? How Multitasking Effects Native and Non-Native Speech Processing.

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With increasing global accessibility, more people are now working or studying in a second-language (L2) environment daily, creating challenges for speech comprehension. While some non-native listeners can perform at a native-like level in quiet conditions, research indicates that challenging listening environments – such as those with background noise, phone transmission quality issues, or hearing loss – significantly hinders speech intelligibility compared to native listeners, especially when target speech is in a low-proficiency L2 (Borghini and Hazan, 2018; Bsharat-Maalouf and Karawani, 2022; Francis et al., 2018; Grant et al., 2022; Rogers, et al., 2006; Rosenhouse et al., 2006). If this deficit occurs because listening to L1 speech makes fewer cognitive demands, then a concurrent task should disrupt perception of speech less than if the speech is in L2. This experiment examines how attentional focus affects intelligibility of native and non-native speech. Participants heard a spoken sentence (English or French) and needed to report the words they heard as accurately as possible. Simultaneously, participants tracked the location of moving dots (1, 3, or 5) on a screen (multiple object tracking, MOT; TRACK Task) or focus solely on the speech (LISTEN Task). Preliminary results suggest that word report is best when participants attend fully to the speech, with minimal differences between languages. While MOT task does not seem to affect L1 intelligibility during the TRACK task, L2 intelligibility declined even with the lowest load (1 dot). This would suggest that non-native speech perception is more cognitively demanding and vulnerable to distraction, reinforcing the idea that L2 comprehension requires greater cognitive control.

First impressions of AI-generated faces and voices.

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Artificial Intelligence (AI) has become a more invasive presence in people's lives over the last few years, with recent research showing difficulties in distinguishing between human- and AI-generated materials. With this in mind, it is important to understand not only the effect that AI content has on people's general impressions, and how it differs from their impressions of similar human-generated content, but also whether their awareness of the stimuli origin can affect the resulting impressions. Here, we collect spontaneous descriptors attributed to either AI- or human-generated faces and voices. While some participants received no specific instructions, others were informed they would encounter AI-generated materials. Data included 13,000 face descriptors and 13,263 voice descriptors. Higher competence-related traits were observed when participants thought they were seeing AI-generated faces. When participants thought they were hearing human voices, they referred to more fallible human traits such as tired, nervous and stressed. Therefore, these data help us understand the common traits people attribute to realistic AI-generated faces and voices and how they differ from the impressions people form of the faces and voices of real people.

Influence of subliminal primes on perceptual judgements: Effects under masking and crowding.

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How does the emotion-laden information we face but don't see influence our perceptions and decisions? Subliminal affective priming is typically studied using backward masking, but spatial crowding provides an alternative means of limiting visual awareness. In the present study, participants were exposed to emotional face primes (happy and angry) presented at graded visibility levels using either backward masking (brief presentation followed by a mask) or spatial crowding (primes embedded among flankers). A subsequent emotion categorization task assessed priming effects on response accuracy. By employing both masking and crowding, we investigated how residual coarse emotional information-disrupted temporally or spatially-can influence decision-making in the absence of full visual awareness. To further examine the relationship between awareness and affective processing, both objective (two-alternative forced choice) and subjective (Perceptual Awareness Scale) measures of awareness were collected. Modulated by level of awareness, distinct patterns of priming effects emerged between the two methods: under crowding, greater awareness was associated with negative priming effects (i.e. the reported valence of the target was biased away from the prime valence), whereas under masking, positive priming effects emerged with awareness. This offers key insights into the encoding of affective information across the continuum of conscious visual perception.

Effects of processing lexically ambiguous words on subsequent recognition memory.

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Decades of psycholinguistic research have shown that the processing of lexically ambiguous words involves the transient activation of all the meanings known to the comprehender. However, it is unclear how the activation of multiple meanings affects subsequent memory for the encountered word form. To address this question, we investigated how sentential processing of high ambiguity (multiple meanings), low ambiguity (one primary meaning) and incongruent (semantically anomalous) words affected subsequent recognition of those words. Preliminary analyses (n = 40) using mixed-effects modelling show that both low ambiguity and incongruent words were remembered better than high ambiguity words after they were read in sentence contexts, suggesting that the activation of multiple meanings during sentential processing negatively affected memory for the encountered word form. For new test items, low ambiguity foils (e.g., the test word 'garden' if the exposure phase included the high-ambiguity sentence 'There were weeds growing in the bed.') were more difficult to reject compared to high ambiguity and incongruent foils, suggesting that the activated meanings (e.g., 'garden') may have lingered in participants' memory. Overall, our findings suggest that the activation of multiple meanings during sentential processing of ambiguous words affects subsequent memory for the encountered word forms, contributing to the growing psycholinguistic literature implicating memory processes in language comprehension.

Over-imitation in older adults.

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Over-imitation is a social learning phenomenon; whereby human observers copy all actions in a goal-directed action sequence even when unnecessary to goal achievement (1). Previous literature has shown middle-aged adults display higher levels of fidelity to irrelevant actions than children (2), suggesting over-imitation may be progressive. However, this phenomenon has never been investigated in older adults (3), leading to uncertainty whether over-imitation continues into later life and if so, what function it serves. The current study aimed to address this gap in literature by expanding over-imitation research into older adults, an understudied population. Participants viewed video demonstrations of an individual performing an action sequence including causally relevant and irrelevant actions to gain a reward from inside a transparent puzzle box. Participants were then given the opportunity to 'have a go themselves', performing three trials. Finally, participants completed a short cognitive assessment to screen for signs of mild cognitive impairment. Results showed older adults had significantly higher levels of fidelity to irrelevant actions than younger adults, and, in line with previous research, younger adults continued to be faithful imitators. These findings suggest over-imitation continues to be a robust learning strategy used not only by the young but utilised throughout the full human lifespan.

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Linking input non-uniformity with memory in a self-guided learning paradigm.

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Language learning has been extensively studied in laboratory settings, with the number of exposures and the order of presentation being pre-set by the experimenter. However, in everyday ecological settings, humans are active learners influencing their own input, which in turn impacts the effectiveness of learning1. Recent research suggests that non-uniform distributions of input benefit learning more than the uniform distribution2,3. Thus, if learners can efficiently guide their learning, they might not sample the input randomly but rather in a non-uniform manner. We examined object-label learning with a self-guided learning paradigm, asking: 2) Do young adults sample the available input randomly? 2) At the level of individual differences, is less uniform sampling associated with better learning? The experiment included training, where participants chose the learning sequence of object-label pairs, and testing, where each label was presented, and participants were asked to click its corresponding object. Preliminary results suggest that participants' choosing patterns were significantly different from random (all p-values of comparisons to simulated samples were significant, mean $p<.0089$). Less-uniform sampling was found to be associated with better memory ($p<.041$). These findings suggest that learners who shape their input to be less uniform end up with better retention of that material.

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Interviewing witnesses of interpersonal conflict: Improving report accuracy and consistency with the use of the timeline technique.

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Despite tackling domestic abuse being a priority in many jurisdictions, statistics indicate a striking discrepancy between the number of reported and charged cases (>50% in the UK). The most likely reason is insufficient evidence, indicating a need to use effective interviewing techniques to improve memory reporting. In this preregistered study, we examined the potential of the timeline technique developed by Hope et al. (2013) to facilitate witness reporting at interviews in domestic abuse scenarios. We hypothesised that participants in the timeline technique would report more accurate information and that consistency between written reports and interviews would be higher for the timeline technique. Fifty-four participants in the role of friends experienced interpersonal interactions between a heterosexual couple in Virtual Reality. The interactions involved behaviours consistent with the early stages of domestic abuse. The following day, participants were told they were cited as witnesses to a reported incident of domestic abuse and asked to provide a written statement. One week later, participants were interviewed using the timeline technique or a free-recall interview. Preliminary results from 20 participants show memory results are inconclusive. What we see are a small number of differences that may change upon completion of data analysis.

Hope, L., Mullis, R., & Gabbert, F. (2013). Who? What? When? Using a timeline technique to facilitate recall of a complex event. Journal of Applied Research in Memory and Cognition, 2(1), 20-24. https://doi.org/10.1016/j.jarmac.2013.01.002

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Learning map-like neural representations of abstract concepts.

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Recent theoretical models suggest that conceptual learning is grounded in our experience with space. Just as the mammalian hippocampal system learns maps of spatial environments, it may also learn ‘conceptual maps’ representing abstract relations between stimuli. Here, we test novel hypotheses about conceptual learning that stem from these theoretical models. Across ~6 weeks, participants used trial-and-error to learn abstract relationships between visual stimuli (addition problems over a modular ring of integers). After this, they underwent fMRI scanning while rehearsing what they had learnt. Although the task did not explicitly involve any spatial transformations, we predict the stimuli will be represented in an abstract task space with a modular (circular) structure. Consistent with this, participants made more ‘near-miss’ errors than is expected without knowledge of the modular structure (i.e., they were more likely to select stimuli conceptually ‘close’ to the target). Mirroring what is seen in artificial neural networks, we also found that participants could generalise what they had learnt to solve unseen problems, but only long after memorising explicitly trained relationships.

Using representational similarity analyses of the fMRI data, we test whether the hippocampal system learns map-like representations of the task stimuli encoding conceptual 'distances' between them.

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Effect of mode (2D vs 3D) and speed of play on memory performance in the game Concentration.

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Does interacting with a screen affect cognitive performance in a memory game? The goal of Concentration is to locate pairs of cards from an array. In two studies, we examine whether (i) memory performance differs in 2D (computerised) and 3D contexts, and building on this, (ii) whether the responsivity of a computerised game affects performance. For the first study, we examined 2D-3D differences in a 30-card solo game within participants (n=15), with order counterbalanced. There were no significant differences between modes in number of turns to solution ($p = 0.87$), but 3D games took longer to complete (153 vs 68 seconds). The second study tested the effect of overall game duration on performance, to determine whether faster game responsivity would confer a performance advantage (result in less decay). A computer-based 32-card version of the game responded either quickly (0.25s) or slowly (1s) to participant card selections. Participants (n=73) played the game on their internet-connected device, once with each responsivity level (counterbalanced). While the 1s delay lengthened solution time (238 vs 153 seconds), the number of turns to solution did not differ between conditions ($p = 0.63$). Concentration performance is robust to mode and timing of play.

Why doesn't the stereotype content model align with spontaneous impressions of young and older adult faces?

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According to the Stereotype Content Model, older adults are viewed as higher in warmth and lower in competence than young adults (Fiske et al., 2007). This model is based on ratings of abstract social groups. We recently collected spontaneous impressions of real faces and discovered minimal effects of facial age, even when age was made salient by intermixing young and older faces (under review). Here we examine two potential sources of this discrepancy: perceptions of social groups versus individuals, and ratings versus spontaneous impressions. Study 1 was a re-analysis of data on the Open Science Framework (Nicolas et al., 2022) that comprised spontaneous responses to social group labels. We analyzed responses to two labels: elderly and adults. Contrary to spontaneous impressions of real faces, competence responses were more prevalent than warmth responses overall. Contrary to the Stereotype Content Model, there were more positive references to competence and warmth for adults vs. elderly. Ongoing studies contrast warmth and competence ratings of social groups (young adults; seniors; elderly) versus real faces (Study 2), and spontaneous impressions of

social group labels versus real faces (Study 3). Our findings have significant implications for the integration of stereotypes and facial impressions in person perception.

Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. Trends in Cognitive Sciences, 11(2), 77-83. https://doi.org/10.1016.j.tics.2006.11.005

Nicolas, G., Bai, X., & Fiske, S. T. (2022). A spontaneous stereotype content model: Taxonomy, properties, and prediction. Journal of Personality and Social Psychology, 123(6), 1243-1263. https://doi.org/10.1037/pspa0000312

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An exploration of face and perceiver characteristics influencing adults' social impressions of child faces.

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Adult face databases are expansive and include highly variable images. Conversely, few children's face databases exist, and most feature standardized images of White children. To address this limitation, we created a set of 500 AI-generated child faces. We then examined first impressions of child faces among children and adults in the UK (n = 180) and US (n = 369), comparing our AI faces to a homogeneous database of real child faces. Impressions were similar across both databases, highlighting the potential of AI images to enhance diversity in child face research. We then recruited US participants (N = 200) to assess the images' perceived realism. 380/500 faces were perceived as real above chance levels, and ratings were independent of the child's ethnicity or emotion. We are currently recruiting a diverse sample of adult participants from five countries (US, Germany, Brazil, Kenya, and India) to rate the child faces on four key attributes: nice, shy, smart, and cute. This project is the first to investigate adults' perceptions of children using a globally diverse participant sample. The findings will inform future work exploring low-level perceptual features and high-level attitudes contributing to facial stereotyping.

Research Plan - Determining the impact of distractions on attentional control strategies.

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Our goal is to determine if distractions impact an individual's attentional control strategy during visual search. Though research has shown substantial variation in the strategies used to direct attention, with some less effective than others (Irons & Leber, 2016), whether distractions impact these strategies is unknown. We predict that distractions will disrupt how individuals choose to

search and reduce the likelihood of choosing an efficient strategy. This will be tested by modifying the Adaptive Choice Visual Search task (Irons & Leber, 2016), where participants (N = 40) will choose which of two targets to report. One target will be considered easier to locate because it will be embedded in a smaller subset of items. Critically, a salient distractor will be included on a subset of trials (20%). Strategy related data will be collected via a post-experimental questionnaire. To understand distractor and target processing in real time, neural activity (EEG) will be recorded. The N2pc, a neural marker of attention, and the Pd, a marker of distractor suppression, will be used to determine whether distractors are attended (eliciting an N2pc) or suppressed (eliciting an Pd) and if this relates to individual strategies. A repeated-measures univariate approach (ANOVAs) will be used to test our predictions.

Irons, J. L., & Leber, A. B. (2016). Choosing attentional control settings in a dynamically changing environment. Attention, Perception, & Psychophysics, 78, 2031-2048.

Research Plan - Curiosity Battery: A toolkit to measure children's curiosity.

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Curiosity is a key driver of information seeking and learning, beginning in early childhood. Yet, research on children's curiosity remains fragmented (Grossnickle, 2016), and there is a lack of standardized, validated tools that reflect its multifaceted nature (Jirout et al., 2024). Our study aims to develop a comprehensive toolkit to assess individual differences in curiosity among children aged 7-11 years. We will target theoretically derived curiosity facets (e.g., epistemic, perceptual, interpersonal, breadth, depth), capturing both the curiosity-driven processes and children's explicit valuation of curiosity through behavioural tasks and self-report measures. Measure selection will be guided by a scoping review of existing measures (Prenevost et al., 2024). Validation of the Curiosity Battery will proceed in two phases to evaluate psychometric properties (Phase 1) and predictive validity (Phase 2). In Phase 1, we will recruit 600 children to assess reliability and construct validity, and a separate sample of 200 to examine test-retest reliability. Phase 2 will be a longitudinal study of 1,200 children to determine whether the curiosity battery predicts academic achievement and well-being. Altogether, the study will lay the groundwork for advancing curiosity as a measurable and impactful educational target.

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Investigating the relationships between sleep, maths anxiety and executive control.

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Poor sleep is thought to have a negative impact on both mental health and academic attainment, but there is relatively little focus on how these impacts may interact. Harrington and Cairney (2021) proposed that the relationship between sleep and mental health is mediated by the impact of poor sleep on executive control mechanisms which normally suppress intrusive thoughts and anxiety. We are investigating the extension of this hypothesis to maths anxiety to understand the mechanisms by which sleep might impact both mental health (measured as general anxiety) and attitudes towards maths (measured as maths anxiety). In a study of 87 adults aged 18-30, using standardised questionnaires of sleep quality, general anxiety and maths anxiety, we found a correlation between maths anxiety and sleep quality ($r=.364$, $p<.001$) which became non-significant when general anxiety was controlled for ($r=0.183$, $p=0.091$). This suggests that the relationship between sleep quality and general anxiety can have an impact on anxiety within academic contexts, perhaps impacting academic attainment, engagement and motivation. We will also present data from a further individual differences study which looks to validate these results and investigate if this relationship is mediated by executive control measures of inhibition and working memory.

The effect of chemogenetic inactivation of the dorsolateral striatum on spatial learning in rats.

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Spatial navigation learning involves processing multiple cues in the environment: egocentric cues (individual left and right turns), and allocentric cues (constellations of surrounding landmarks). Traditionally, tasks focused on the former recruit the dorsolateral striatum (DLS), and the latter the hippocampus. However, it may not be the cue category driving this differential activity, but the model-based or model-free approach to spatial learning, as being flexible and building relations between cues and ourselves requires maintaining a model of the environment, recruiting the hippocampus, whereas processing individual stimulus-response associations does not, relying on the DLS instead. To investigate this, a two-turn maze task with no allocentric cues was designed for rats, where the second turn remains the same for a ‘fixed’ group, or alternates in a ‘variable’ group. Repeating individual turns in the fixed group may be habitual and DLS-dependent, however, the spatial alternation in the variable group represents a minimal model of time and sequence knowledge to identify when and how to alternate, and may be hippocampal-dependent. When inhibiting use of the DLS via chemogenetic DREADDs technique, we expect the fixed group to be inhibited and the variable group be unaffected. However, both groups showed improved performance. Future studies will investigate this.

Lessons from academia and the world beyond: Post-PhD career paths and considerations.

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A common question posed to PhD students from friends and family is: 'What will you do after?' But many students are too focused on the PhD itself and have not yet had a chance to sufficiently think about post-PhD life. Across a two-volume book series, Academia and the World Beyond (Madan, 2022, 2024a), 53 interviews described a range of post-PhD individual career journeys, both in and outside of academia. Here I share insights gained from these interviews through qualitative analyses, particularly career paths and considerations. These findings help summarise the interviews, directing readers to the resources most relevant to them (Madan, 2024b). Many non-academic career paths were found to still be academic adjacent, such as working at government or funding agencies, sales or technical roles in companies develop research-oriented products (e.g., eye-trackers, brain imaging, and experiment software), or develop training resources for academics. Other careers could be more related to skill transfer, such as data science or project management. These analyses have led to a set of general doctoral skills-including programming, data visualisation, critical thinking, and science communication-along with further developed guidance.

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A dynamic link between respiration and arousal.

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Viewing brain function through the lens of other physiological processes has critically added to our understanding of human cognition. Further advances though may need a closer look at the interactions between these physiological processes themselves. Here we characterize the interplay of the highly periodic, and metabolically vital respiratory process and fluctuations in arousal neuromodulation, a process classically seen as non-periodic. In the data from three experiments (N = 56 / 27 / 25 women and men), we tested for covariations in respiratory and pupil size (arousal) dynamics. After substantiating a robust coupling in the largest dataset, we further show that coupling strength decreases during task performance compared with rest and that it mirrors a decreased respiratory rate when participants take deeper breaths. Taken together, these findings suggest a stronger link between respiratory and arousal processes than previously thought. Moreover, these links imply a stronger coupling during periods of rest, and the effect of respiratory rate on the

coupling suggests a driving role. As a consequence, studying the role of neuromodulatory arousal on cortical function may also need to consider respiratory influences.

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Numbers or Pictures? Comparing the description-experience gap with numeric and pictographic risk representations.

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Depending on how information is conveyed, people show different risk preferences. Odds and outcomes could be described (e.g., A [90%:£20, 10%:£8] and B [certain £18]), where people often overweight rare outcomes [10%:£8]. However, if odds and outcomes are learned through experience (sampling), people underweight rare outcomes; known as the DE-Gap. Previous studies demonstrating these effects have relied on numerical risk representations. Risk communication could be visual, using pictographs, possibly resulting in different preferences due to numeracy and pattern-recognition processes. Across pre-registered experiments, we examined the DE-Gap across numerical and visual risk representations. Participants made risky choices under four within-subjects conditions: (1) Numeric Description—full numeric summary of each lottery; (2) Pictograph Description—lotteries portrayed with arranged icon arrays; (3) Numeric Sampling—numeric outcomes sampled sequentially; and (4) Pictograph Sampling—outcomes sampled sequentially from icon arrays. We found reduced DE-Gap with visual formats—driven by the Pictograph Description. In Experiment 2, we tested how variations in these conditions, related to attenuating memory reliance (via history table of samples) and sampling effort (via automated sampling), accounted for the between-condition differences. Our results persisted despite these changes—providing new insights into how distinct cognitive processes relate to this risk preference behaviour.

Research Plan - How activities of daily living relate to early mathematical development in healthy children.

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Introduction: Activities of daily living (ADLs) are routine tasks essential for independence and well-being, commonly used to assess cognitive and functional abilities, particularly in older adults. ADLs include personal tasks (PADLs, e.g., dressing and hygiene) and instrumental tasks (IADLs, e.g., time management and mobility). In children, most ADL research focuses on those with physical, cognitive, or neurodevelopmental conditions, showing delays in ADL development. However, typical ADL development and its associations with cognitive skills like mathematics remain

understudied. Evidence suggests ADLs involving time or spatial processing are associated with mathematical skills, but broader links are unclear. This project will explore how ADLs relate to early mathematical skills in children aged 3-6 years, a key stage for developing independence and foundational mathematical skills. Methods: In this cross-sectional study, 100 children aged 3-6 years will complete standardized assessments of early mathematical skills (e.g., counting, magnitude understanding, patterning), executive functions (e.g., working memory, inhibition), language, and motor abilities. Additionally, parents will report on their children's ADL development.
Approach for statistical analysis: Multiple regression analyses will be conducted to evaluate associations between ADLs and mathematical skills, controlling for executive functions, language, motor skills, and age. Interaction effects will test whether associations differ across age groups.

The cognitive mechanism of Inter-Professional Education (IPE) in health and social care.

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This study explored cognitive processes in interprofessional education (IPE) by integrating predictive coding (De-Wit et al., 2010), a theory suggesting the brain continuously updates its world model, with the Contact Hypothesis (Allport, 1954), which sets out how to reduce prejudice through positive interaction. Although the Contact Hypothesis underpins much IPE research on role identification and teamwork, the present research is among the first to explore whether predictive coding may explain when contact has the desired effect. The study investigated how prior knowledge of groups affects attention, attitudes, and memory in IPE. Psychology undergraduates participated in an IPE simulation on dementia care, with priming conditions giving information (positive, negative, neutral) about another profession. Attention was measured via eye-tracking, attitudes through questionnaires, and memory through free recall tests. Results showed a significant positive priming effect on attitudes ($F(2, 168) = 6.73$, $p < .01$, $\eta^2p = .07$), but no significant changes in attention or memory. This small but notable attitude suggests that attitudes are more sensitive to context than cognitive processes like attention or memory (Dovidio et al., 2001). These findings emphasise the affective aspects of cognitive processes in collaborative learning and suggest that understanding how prior information shapes attitudes may improve IPE design and inter-professional collaboration.

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Effects of Pubertal Antimicrobials and Lipopolysaccharide Treatments on the Brain, Ileum, and Liver: Implications for Neurodegeneration via the Gut-Liver-Brain Axis.

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The gut-liver-brain axis, a multidirectional communication network linking the gastrointestinal tract, liver, and nervous systems, has emerged as a vital framework for understanding disease comorbidity and the systemic interactions that influence overall health. While the effects of pubertal antimicrobial (AMNS) and lipopolysaccharide (LPS) treatments on the gut and brain have been examined previously, their impact on the gut-liver-brain axis remains unclear. Thus, this study investigated the effect of pubertal exposure to AMNS and LPS treatments on the neurodegenerative biomarker apolipoprotein E (APOE) in the brain and liver and on heat shock protein 70 (HSP70), a protein associated with cellular stress responses, in the gut and liver. At five weeks of age, male and female CD-1 mice received 200 µL of either a mixed broad-spectrum antimicrobial solution or water via oral gavage twice daily for seven days. At six weeks of age, mice were administered an intraperitoneal injection of either LPS or sterile saline. Twenty-four hours later, the mice were euthanized, and their intestines, livers, and brains were collected for Western blot analysis. Results indicated that pubertal AMNS and LPS treatments increased HSP70 expression in the ileum, with females displaying significantly higher levels than males. This reduction was accompanied by decreased expression of the neuroprotective APOE dimer in the hippocampus and caudate putamen of female mice. These findings suggest that pubertal exposure to AMNS and LPS may compromise neuroprotection, especially in females, and provide insight into the gut-liver-brain axis as a mechanism through which microbiome disruptions during puberty may contribute to sex-dependent neurodegeneration later in life. Keywords: Gut Dysbiosis; Sex Differences; Inflammation; Puberty; Apolipoprotein E; Heat Shock Protein

Age-dependent changes in neuropathology and behaviour in the P301S Tauopathy Mouse Model.

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Tauopathies are a group of neurodegenerative diseases, including Alzheimer's disease and frontotemporal dementia, characterized by the abnormal aggregation of tau protein in the brain. In these conditions, the pathological transformation of tau into phosphorylated tau (p-tau) and its aggregation disrupts normal cellular functions, ultimately leading to neurodegeneration, cognitive decline, and motor impairment. The progression of tauopathies is closely linked to inflammatory processes, with immune activation hypothesized to be a key factor in their pathogenesis. While p-tau pathology has been associated with behavioral dysfunction and brain atrophy, the mechanisms and timeline underlying these interactions remain poorly understood. This study aimed to investigate the progression of tau pathology, its interaction with microglia (the primary immune cells of the brain), and its impact on hippocampal (HPC) volume and cognitive functions. To achieve this aim, p-tau pathology, microglial activation, and HPC volume were quantified in P301S (+/-) mice and their littermates (-/-) at four different ages (3, 6, 9, and 12 months of age) using histological techniques. Cognitive functions were assessed in a separate group of mice at 9 months of age using behavioural

tests. Results indicated that pathological p-tau was absent in littermates (-/-) but increased from 3 to 12 months of age in P301S (+/-) mice, with corresponding microglial activation and HPC volume loss, likely indicating neuroinflammation and HPC atrophy. P-tau labeling was first detected in the ventral HPC CA3 region, appearing progressively in other areas in a stereotypical pattern and increasing in intensity. Behavioural assessments suggested that object recognition memory and anxiety-like behaviour may be affected in P301S (+/-) mice, but no impairment was found in spatial learning and memory. The abundant p-tau pathology observed in P301S mice makes them a valuable model for investigating the role of p-tau in tauopathies and related neurodegenerative conditions.

Executive Function in Dogs: Links with Receptive Language Abilities.

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Language predicts executive function (EF) in humans (Shokrkon & Nicoladis, 2022). For example, Slot and Suchodoletz (2018) measured EF and language in pre-schoolers twice in one year and found that language more strongly predicted later EF, despite bidirectional relations. Cross-species comparisons are important for determining the universality of such relations. Dogs are ideally suited given that they possess rudimentary EF skills, measured using either owner questionnaires (Foraita et al., 2022) or behavioural tests (Tiira et al., 2020). Dogs also learn to respond systematically to words, particularly commands (Ramos & Mills, 2019), demonstrating receptive abilities (although not necessarily semantic abilities). Moreover, owners direct and adapt their speech to dogs like parents do for infant-directed speech (Hirsh-Pasek & Treiman, 1982; Mitchell, 2001). Recently, Reeve and Jacques (2022) developed an owner-reported vocabulary checklist, modelled after the MacArthur-Bates CDI (Fenson et al., 2007)—a widely used measure of receptive/expressive language abilities in (preverbal) infants—and found that dogs vary in reported receptive abilities, predicted by breed group and dogs' professional work status. We examined whether receptive abilities correlated with EF abilities in 664 dogs (320 females; Mage=5.57yrs; SD=3.63; 477 purebreds). Using an expanded version of Reeve and Jacques' (2022) vocabulary checklist with 615 words/phrases organized into 16 categories (e.g., food / people / toys / commands / specialized commands [for service dogs]), owners selected words to which their dog responded regularly with a specific behavior. EF abilities were assessed using a 44-item owner questionnaire (5-point Likert-scale) assessing dog-relevant behaviors. Items loaded onto 3 factors (EFA, Oblimin rotation), accounting for 37% of variance: Factor 1 (Attentional/Cognitive Control; 20.9%), Factor 2 (Behavioural Control; 10.4%), and Factor 3 (Emotion Control; 5.5%). Number of words/phrases reported (M=99.55; SD=55.85) correlated with attentional/cognitive and emotion control, but not behavioural control, even after controlling for other variables. Inter-species similarities and differences in related abilities can help limit possible theoretical explanations.

Emotional Speech and Distractibility: Age-Related Differences in Cognitive Task Performance.

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Emotional prosody has been shown to involuntarily capture attention, potentially disrupting working memory and task efficiency. This study investigates the extent to which emotional speech distracts individuals during a visual cognitive task, with a focus on age-related differences in susceptibility to distraction. Participants completed 80 trials of a Star Counting task under four blocked conditions: happiness, fearful, anger, and silence. During the experiment, participants are instructed to ignore both spoken numbers and irrelevant emotional speech distractors presented over headphones. All irrelevant speech conditions were completed in blocks of 20 trials, with sentences spoken in happy, angry, or fearful prosody serving as distractors. Response times for the emotional conditions were measured and compared to response times in the silent condition to assess the impact of emotional prosody on task performance. These results indicate that emotional prosody disrupts task efficiency, with the degree of distraction varying by emotion. Specifically, fearful speech significantly interfered with performance, as indicated by increased response times relative to silence. However, when analyzing by age group, happiness was the most distracting emotion for both younger and older adults. Among older adults, anger was nearly as distracting as happiness, while younger adults were less affected by angry speech. These findings suggest that different emotional prosody may capture attention more strongly at different life stages, particularly younger and older adults may be more attuned to positive social cues, while older adults exhibit greater sensitivity to negative or threatening emotional content.

Overcoming Inhibitory Deficits: Prioritization of Visual Information in Older Adults Elicits Priming Effects Similar to Younger Adults.

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To further investigate the inhibition deficit hypothesis, we conducted additional analyses on the results from our study of implicit memory for previously presented pictures and words using binocular suppression and word fragment completion. Our binocular suppression results indicated that younger and older adults demonstrated similar levels of inhibitory functioning and showed similar processing of ignored words. However, our fragment completion results indicated that only the older adults demonstrated inhibitory deficits and completed more fragments using previously ignored words than did the younger adults. In our additional analysis of these data, we divided our older sample into high and low performers based on completion rates for fragments using the previously attended pictures from the earlier priming task. We hypothesized that older adults who saw a greater benefit from previously attended pictures in the fragment completion task than younger adults would show similar priming effects as younger adults in the binocular suppression task. When we assessed the performance of these high performing older adults in the binocular suppression task, we found that these high-performing older adults had reaction times and benefits for attended pictures between those of younger adults and low-performing older adults and reduced benefits from ignored words relative to poorer performing older adults. However, in the fragment completion task, high-performing older adults exhibited a significantly greater benefit than either the low-performing

older adults or younger adults from the attended pictures. Furthermore, they demonstrated a lower benefit for the ignored words in this task compared to low-performing older adults. High-performing older adults appear to have allocated cognitive resources differently compared to low-performing older adults, effectively focusing on the visual stimuli in the binocular suppression task, allowing them to overcome much of their inhibitory deficits with priming effects like younger adults in the fragment completion task.

Using the attentional boost and word frequency effects to assess recognition memory performance among meditators and novices.

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Deficits in attentional processing are widely studied among cognitive psychologists. The Overinvestment Hypothesis suggests that these deficits occur because paying too much attention to a task can result in capacity-limited stores taking in too much task-unrelated information. A growing body of research supports this view—suggesting these deficits can be overcome with manipulations that lead to a diffuse mental state. Inducing a diffuse mental state has been associated with improving cognitive flexibility through various means including dividing attention across a primary and secondary task (e.g., attentional boost effect), and meditation. Meditation is the intentional practice of regulating attentional resources and blocking out distractors, thus modifying cognitive flexibility and creating a diffuse mental state. In the present study, meditators and novices completed an attentional boost task, wherein they either memorized words and detected target signals (i.e., divided attention) or memorized words while ignoring the detection signals (i.e., full attention). Previous studies have reported that memory for items associated with detecting a target signal in the divided attention condition is as good or better than memory for items in the full attention condition (i.e., attentional boost effect). This boost in memory when completing a secondary detection task has been shown to be additive with other memory effects, like word frequency. Here, we asked whether meditators would produce an attentional boost effect above that of the novices. Moreover, we introduced a word frequency manipulation to determine whether meditation, dividing attention across two tasks, and word frequency would result in an additive benefit in memory. We did not uncover a larger attentional boost effect in meditators over novices. However, we did find a larger word frequency effect for meditators than novices in the full attention condition, but the reverse pattern in the divided attention condition. These results are considered using the Overinvestment Hypothesis.

Flexible, Trial-to-trial Preparation Effects in Singleton Search.

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Understanding the role of experience in visual selective attention is a central topic of current research. Much past work has been done to isolate effects of experience—often referred to as selection history effects—from the effects of conscious, goal directed control and bottom-up

saliency. As the name suggests, selection history effects typically refer to the effects of repeating acts of selection, such as repetitions of a target feature across trials. In contrast, our research focuses on the unique contribution of experience to acts of preparation, independent from selection events themselves. To do this, we developed a singleton search method that allows preparation to be manipulated independently from stimulus feature repetitions. Search displays either had a blue target with orange distractors or vice versa, and when the search displays appeared, participants always responded to the singleton target. Critically, each search trial was preceded by a go/no-go task, which induced preparation for a particular colour feature. That is, on some trials we instructed participants to respond to the go/no-go item if it was blue, and to ignore it otherwise—encouraging participants to prepare to selectively respond to blue. This method allows us to answer a number of questions: How does preparation impact singleton search? Can a lone go/no-go item produce priming of pop-out? (Only if a selective response is prepared.) Does preparation impact singleton search when preparation is implemented flexibly from trial-to-trial, or does it depend on cumulative repeated experiences, like might be observed in the task-set literature? (Yes, flexibly.) Are there unique contributions of preparing to selectively attend versus preparing to selectively ignore? (Yes!) Do these effects truly reflect "preparation", or do they depend on the experience of making a go-response to a go/no-go item that shares a feature with the search target? (Yes, they depend on preparation).

Can Production During Encoding Protect Memories from Divided Attention?

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Introduction: The negative effects of multi-tasking during learning (encoding) on memory have been well-documented. The current study examined whether established techniques to enhance memory could offset the negative effects of divided attention (DA). Research has shown that saying to-be-remembered words out loud (production) during encoding, relative to silently reading them, enhances their retention. Given this, production may protect memory for words encoded under DA. Methods: Data were collected in a sample of healthy adults using Qualtrics and the Prolific platform for online remote data collection. Participants were asked to either read visually-presented words aloud or silently, in randomized order. Following encoding, and a short 30-second filled delay, they were asked to freely recall as many studied words as they could remember. Each participant encoded two separate 20-item neutral word lists, one under full attention (FA) and another under DA conditions in which they had to perform a mental arithmetic task simultaneously during encoding. Results. Data were analyzed in a 2 (Encoding type: read silently, read aloud) x 2 (Attention condition: FA, DA) repeated measures ANOVA. There was a main effect of encoding type such that words read aloud were better remembered than words read silently. There was also a main effect of attention such that memory performance decreased under DA compared to FA. There was also an Encoding type X Attention condition interaction such that there was a significant effect of attention on memory on words read silently at encoding, but this effect size was smaller for words read aloud during encoding. Discussion and Conclusions: Production likely offers protection to memory from the negative effects of DA at encoding. We propose that it does so by creating additional motor-based representations, enhancing the accessibility of produced relative to silently read words.

Does Tyrosine Affect Retrieval in a Directed Forgetting Task?

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Tyrosine is a precursor to the catecholamines—dopamine, norepinephrine, and epinephrine. It is often marketed as a nutraceutical supplement that improves cognitive function (e.g., multitasking, response inhibition, and working memory), typically under stressful conditions. Here we examine whether tyrosine supplementation improves performance on a directed forgetting task. In a double-blind, placebo-controlled design, participants were randomly assigned to take either L-tyrosine or microcrystalline cellulose (placebo) capsules immediately before studying two types of words presented sequentially. Words were either designated as to-be-remembered (TBR) or to-be-forgotten (TBF) by a post-cue. Following the encoding phase, participants completed a distractor reaction time (RT) task until one hour had passed since ingesting the capsules. During the recognition test phase, participants were shown TBR, TBF, and new words and were instructed to indicate whether they had seen each word previously by moving the computer mouse to a target. Although a robust directed forgetting effect was observed (i.e., TBR words were recognized more often than TBF words), there was no evidence that tyrosine supplementation influenced recognition performance. However, tyrosine influenced the chronometry of computer mouse movements. The placebo group moved to their choice faster and reached peak velocity earlier for TBR words than they did for TBF words. In contrast, there was no evidence that the type of word influenced either measure for the tyrosine group. Peak velocity toward the response choice was faster for TBF words than TBR words in the tyrosine group, but not in the placebo group. These findings suggest that although tyrosine supplementation did not directly affect the recognition of TBR and TBF items, it seems to influence response dynamics during retrieval by potentially reducing the hesitancy towards TBF words.

Neural Correlates of Trust in Speech Communication.

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Speech perception is affected by several factors such as familiarity or emotional tone. These factors have an impact on cognitive resource recruitment and cortical tracking of speech. In the present study, we were interested in how trust – or lack thereof – with a communication partner impacts the way speech is perceived. We used electroencephalography (EEG) to measure neural activity while participants listened to stories spoken by different "gnomes" (different voices represented by coloured gnome icons) after familiarizing themselves with each voice in a trust building phase. During the trust building phase, participants played 20 trials of a trust-based investment game with eight different gnomes. On each trial, participants heard a rule (e.g., "I'll double your coins!"), chose how many coins to invest, and received a certain number of coins in return. Trustworthiness was manipulated by creating different lie distributions based on how often and how severely each gnome lied. For example, one gnome may tell lies 80% of the time that result in net losses of coins, whereas another gnome may tell lies only 20% of the time that result in net gains of coins, albeit less than promised. After building trust with each gnome, participants rated their perceived trustworthiness. Participants then listened to monologues wherein each gnome was accused of doing something

wrong such as cheating on a test or stealing someone's idea at work. Participants rated how confident they were that the gnome was innocent.EEG data was analysed using a multivariate temporal response function (mTRF) approach to map speech features to the neural response. We used mTRFs to test whether cortical tracking of speech increased with decreasing trustworthiness due to the increased cognitive demands associated with listening to an untrustworthy communication partner. These results provide insight as to how external speaker cues impact speech perception.

How Involved is the Motor System in Memory.

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Music listening activates motor regions of the brain, even when not moving. In musicians, motor areas of the brain are activated when imagining playing a familiar piece. This suggests that musical memory may be reliant on the motor system. One issue with this research is that it is correlational; that is, most studies involved observing correlations between brain areas and behaviour. The goal of the current study is to establish a causal link between the motor system and memory for music. One way to investigate a causal connection between a neural region and a behaviour is with transcranial direct current stimulation (tDCS). By delivering a small current to a motor region we can modify its functioning and observe how it affects a musician's memory for a known musical piece. A sample of advanced pianists will be recruited for this study. Over three sessions, participants will be presented with an audio version of a piece they know well. Each piece will contain 32 errors, and these errors will be different each time the participants hear the piece. In one session the participant will receive inhibitory tDCS over their left motor cortex, in a second session inhibitory tDCS will be applied to the right motor cortex, and in a third session, a sham tDCS stimulation will be applied. It is expected that the inhibitory tDCS will decrease error detection compared to sham stimulation only for errors that would be performed by the right hand, after stimulation to the left motor cortex, and vice versa for the right motor cortex and left hand. This project will determine if there is a causal link between the motor system in a musician's memory for music, and will help us better understand how the brain supports musical memory.

The Impact of Visual and Haptic Sensory Degradation in Multisensory Integration and Object Perception Using Complex Objects.

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Vision and touch both rely on shape information and may even share a representation in memory for objects. Indeed, pas research looking at multisensory object identification showed that incongruent inputs interfere with object identification. Typically, the visual component dominates over the haptic component, and indeed incongruent visual information interfered more with performance than incongruent haptic information. Recently, we also showed that degrading an input interfered with multisensory integration, but this was done with simple objects that differed in global shape. We investigated how sensory degradation impacts multisensory object recognition using complex objects

that vary on individual features. Participants first learned to recognize objects by sight and by touch, then completed a multisensory identification task where they were presented with two objects: one they could see and one they could touch. Participants were asked to identify EITHER the visually-presented object or the haptically presented object and ignore the irrelevant object. On half of the trials, the two objects were identical (congruent trials) and on the other half they were different (incongruent trials). Crucially, participants performed the task twice: once as is (control) and once with either haptic degradation or visual degradation. When haptic perception was degraded, the degradation slowed down haptic identification and reduced the impact of incongruent stimuli on both haptic and visual identification. When vision was degraded, there was less interference from the incongruent visual stimuli during haptic identification but more interference from incongruent haptic stimuli during visual identification. These results differ from those obtained using simple objects, suggesting that the re-weighting observed when inputs are degrading might depend on the type of features that determine object identify.

The Impact of Visual and Haptic Sensory Degradation in Multisensory Object Perception Using Simple Objects.

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Object representations are accessible from both vision and touch, but vision tends to dominate object perception. Visual object identification is faster than haptic identification and when there are incongruent visual and haptic inputs, the interference from an incongruent visual input is greater than interference from an incongruent haptic input. This may occur because a more reliable input (like vision) will be prioritized over a less reliable one (like touch). If so, degrading an input should change the amount of interference observed from incongruent sensory information. Participants first learned to recognize novel objects by sight and by touch before completing a multisensory identification task. During each trial, they were presented with one object they could see and one they could touch. 50% of the trials presented different objects (incongruent trials). Participants identified one of the objects and ignored the other. Crucially, this occurred once as is and once with degraded input (either degraded vision or degraded touch). We observed different effects depending on the type of sensory degradation. When the haptic input was degraded, performance was overall slower and less accurate. Also, performance was faster/more accurate during congruent trials for haptic identification but not for visual identification. When the visual input was degraded, degradation only impacted error rates. Nonetheless, performance was faster/more accurate during congruent trials for visual identification but not for haptic identification. Despite 'visual dominance' participants were able to partially ignore an incongruent input during haptic identification when the visual input was degraded and therefore unreliable. Our results confirm the idea that sensory inputs are weighted based on their reliability and suggest that these weights are flexible to adapt to changing conditions.

The Effect of Exercise and Degree of Congruence on the Colavita Effect.

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The Colavita effect occurs when participants fail to report the auditory component of bimodal stimuli. Participants are more likely to incorrectly respond "visual only" than "auditory only". This reflects a visual dominance and may partly be because participants tend to respond faster to visual stimuli than auditory stimuli. We also recently showed that the effect is larger with congruent stimuli (the picture and sound of a cat) compared to incongruent stimuli (the picture of a cat with the sound of a dog). This may occur because the visual and auditory components of these stimuli refer to the same object, creating unity and facilitating multisensory integration. We evaluated whether different degrees of correspondence impacted the Colavita effect by presenting participants with visual, auditory, and bimodal stimuli and asking them to report the modality of the stimuli. Crucially, we varied the correspondence of audiovisual stimuli. They were either congruent (the sound/sight of a cat), incongruent but within category (the sight of a cat with "woof"), or incongruent and between category (the sight of a cat with a guitar sound). We also compared the performance of athletes, who often respond faster to various tasks, and non-athletes. We replicated previous findings: athletes responded to stimuli faster than non-athletes, and all participants responded faster to visual stimuli than to other stimuli. All participants produced more errors for bimodal trials – but this effect was larger for athletes. Importantly, the proportion of visual-only and auditory-only responses was modulated by the degree of correspondence between the visual and auditory component of stimuli. Showing that the Colavita effect can be modulated by the semantic correspondence of the stimuli. Results will be discussed in the context of the unity assumption.

Examining the Impact of Psychedelics on Cognition.

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Psychedelics may influence core cognitive processes such as rumination—a repetitive, analytical thought pattern commonly associated with mood and anxiety disorders. While it is widely believed to be maladaptive, we hypothesize that rumination may serve a functional role in problem-solving when directed toward understanding the causes of distress. According to the Analytical Rumination Hypothesis, this mental state may support recovery by promoting insight into personal problems. Psychedelic-assisted psychotherapy (PAP) may facilitate this process by disrupting rigid thought patterns, and shifting beliefs about the nature of reality, self and consciousness. We hypothesize that changes in these metaphysical beliefs may mediate the transformation of rumination into a more adaptive process. These belief changes are often linked to the intensity of ones' mystical experience—an altered state of consciousness elicited by psychedelics. This study uses a longitudinal, survey-based design to investigate the cognitive mechanisms underlying these effects. Clinical participants complete validated self-report measures before and after a psychedelic experience, with a six-month follow-up. Measures include the Analytical Rumination Questionnaire (Barbic, Durisko & Andrews, 2014), Psychological Insight Scale (Peill et al., 2022), Metaphysical Beliefs Questionnaire (Timmerman et al., 2021), Mystical Experience Questionnaire (Pahnke, 1963),

and Patient Health Questionnaire (Spitzer et al., 1999). Data are currently being collected from clinical populations across North America undergoing PAP. Here, we present data from non-clinical participants recruited at McMaster University, who retrospectively reported on their psychedelic experience. This research contributes to the understanding of how psychedelic-induced cognition processes may elicit therapeutic effects.

Examining the psychological pathways to motivation impairments in schizophrenia spectrum disorders: the role of neurocognition and social stress.

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The development and maintenance of motivation deficits (i.e., negative symptoms) in schizophrenia are hypothesized to be related to dysfunctional belief systems that emerge in the face of recurrent failures and life setbacks. While the model highlights the role of neurocognitive impairments in fostering said beliefs, the impact of more social determinants has yet to be explored. The current study therefore aimed to examine different etiological pathways to negative symptoms, through dysfunctional beliefs, in schizophrenia. In a sample consisting of 103 patients with schizophrenia, a battery of assessments were administered to assess for negative symptoms, neurocognition, experiences of discrimination, as well as dysfunctional beliefs such as defeatist performance beliefs and low expectancies for success. For each dysfunctional belief, two hypothesized models were tested with path analysis. The first model tested the hypothesized paths from neurocognition to dysfunctional beliefs to negative symptoms, while the second model replaced neurocognition with social stress. The second model fit the data better for both defeatist performance beliefs ($\chi2 = 0.2$, $p = 0.68$, RMSEA = 0.00, 90% CI [0, 0.21], TLI = 1.2, AIC = 979.6, BIC = 989.7) and expectancies for success ($\chi2 = 0.4$, $p = 0.52$, RMSEA = 0.00, 90% CI [0, 0.24], TLI = 1.1, AIC = 926.1, BIC = 936.6). All paths in these models were significant, with discrimination directly predicting defeatist performance beliefs ($\beta = -0.1$, $p < 0.001$) and expectancies for success ($\beta = 0.5$, $p = 0.002$), with indirect effects on negative symptoms, as well. The current study suggests that social stressors, specifically experiences of discrimination, rather than neurocognition, may play a central role in engendering dysfunctional beliefs in schizophrenia. Identifying the socio-environmental factors that render individuals vulnerable to developing dysfunctional beliefs may be critical for effective and timely interventions for negative symptoms.

Hot-Cool Performance in Adults: Variations within and across six executive function tasks.

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Executive functions (EFs) are cognitive processes responsible for controlling behavior, including three separate but related components: working memory (holding information in mind and manipulating it), cognitive flexibility (taking different perspectives), and inhibitory control (inhibiting habits and impulses; Miyake et al., 2000). EFs are also distinguished as hot (processing

emotionally/motivationally relevant stimuli) versus cool (processing neutral stimuli; Zelazo et al., 2024). Cool EFs develop before hot EFs, differing notably during adolescence (Casey & Caudle, 2013), but hot and cool EFs are often assessed using different tasks (Fernández-Garcia et al., 2021; Mehsen et al., 2022), complicating interpretations. However, some researchers have used affective and neutral stimuli within the same task. For example, Casey and Caudle (2013) used a go-no-go task including negative, positive, and neutral faces. The current study assessed 254 adults (M=20.16yr) on six EF tasks, two for each EF component:1). Working memory: Backward Word Span and N-Back task (Ladouceur et al., 2009).2). Cognitive flexibility: Verbal Fluency (Sass et al., 2013) and Flexible Item Selection Task (Jacques & Zelazo, 2001).3). Inhibitory control: Stroop (1935) and Flanker (Erikson & Erikson, 1974). Each task included neutral, negative, and positive stimuli (words or faces depicting different emotions) to determine (1) whether participants consistently do better on cool/neutral versions of tasks compared to hot versions, (2) whether valence (positive/negative) matters, (3) whether stimuli type (words/faces) matters, and (4) whether processing hot/cool stimuli differentially affects different core components of EF. Given previous research (Lagattuta et al, 2011; Casey & Caudle, 2013), performance on cool EF versions was expected to exceed performance on hot versions. Consistent with predictions, findings indicate that cool EFs consistently surpassed hot EFs when facial stimuli were used, but not always when words were used as stimuli. With words, relative performance on hot/cool versions varied across tasks and EF components.

Parent and child accuracy in estimating mathematics performance.

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Background: The home environment has been shown to mitigate children's academic development. Parents can help promote children's academic skills by providing resources for children's learning as well as feedback on children's performance. Accurate judgement of children's competence enables parents to match the support they provide to the children's level of knowledge during home activities and homework interactions. A correct understanding of one's strengths and limitations empowers children to seek further support when they need it. In the current study, we assessed how accurately parents and children estimate their own performance, as well as each other's performance, on a math assessment. We also explored what factors might influence these estimates. Method: Parent-child dyads (83 in total; 60 mothers; 46 daughters) completed a series of equivalence math problems in separate rooms and were asked to estimate how well they did on the worksheet as well as how well their counterpart did. Participants also completed assessments of generalized anxiety and math attitudes. Results: In general, parents tended to underestimate their own performance, ($t(82) = -2.995$, $p = .004$, but overestimate their children's performance, $t(82) = 2.187$, $p = .035$. One's math anxiety was not related to the accuracy of the estimate of their own mathematics performance, nor of their counterpart's math performance. Children's math anxiety was related to how parents estimated their child's performance, such that the higher the child's math anxiety, the lower the parent's estimation ($\beta = -.301$, $p = .002$). Furthermore, the younger the child, the more likely their parent overestimated the child's performance ($\beta = -.227$, $p = .043$), and the more likely the child overestimated their own ($\beta = -.252$, $p = .027$).

Exploring the Relationship Between Cognitive Aging, Executive Functioning, and Schizotypal Traits.

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Schizotypal traits are milder perceptual, cognitive, and behavioural/interpersonal abnormalities (e.g., magical thinking, difficulty forming close relationships) characteristic of the schizophrenia-spectrum disorders. Research has found that greater schizotypal traits among healthy populations are associated with reduced executive functioning, including poorer attention, inhibition, and working memory (Sarajehlou et al., 2023). However, this research has almost exclusively focused on young adults. Research involving older adults has been limited, with some studies suggesting that schizotypal traits may decrease with age (Bora & Baysan Arabaci, 2009). The current study aims to further explore the relationship between executive functioning and schizotypal traits in older adults, with a particular focus on two cognitive aging profiles: healthy vs. probable mild cognitive impairment (MCI). A total of 33 English monolingual older adults (Mage = 68.7 years; 22 cognitively healthy vs. 11 with probable MCI based on Montreal Cognitive Assessment/MoCA scores; Nasreddine et al., 2005) completed a backwards digit span (BDS) task to assess working memory and the Schizotypal Personality Questionnaire Brief (SPQ-B; Raine & Benishay, 1995) to assess cognitive-perceptual, disorganized, and interpersonal schizotypal factors. Results from linear regression models revealed a significant interaction between cognitive aging profile and BDS (both span and total score) for the interpersonal SPQ-B factor. Higher schizotypal traits were associated with reduced working memory in healthy older adults, whereas the opposite pattern was found for those with probable MCI. Although preliminary in nature, our findings for the healthy aging group align with those previously reported for healthy younger adults: a negative relationship between executive functioning and schizotypal traits. In contrast, our findings for the probable MCI group suggest that those with better executive functioning may be more aware of their cognitive decline, potentially leading to social withdrawal due to concerns about cognitive struggles in social settings.

Cognitive Aging and Reading: An Exploratory Study of Perceptual Span.

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Aging can impact a wide range of perceptual and neurocognitive abilities that are crucial to older adults' daily functioning and independence, such as reading. Indeed, several studies employing eye movement recordings have reported reduced reading fluency, reduced parafoveal processing, and smaller perceptual spans during reading in older adults. However, these studies have almost exclusively focused on cognitively healthy older adults, leaving reading and reading-related processes in those experiencing accelerated cognitive decline, such as mild cognitive impairment (MCI), little explored. Here, we investigated both reading fluency and perceptual span in healthy older adults (n =10) and those with probable MCI (n = 8) based on Montreal Cognitive Assessment (MoCA) scores (Nasreddine et al., 2005). Participants silently read 75 short, syntactically simple sentences while their eye movements were recorded. The sentences were presented using a gaze-contingent moving window paradigm, which manipulated the amount of parafoveal information available rightward of fixation: four "window" conditions (2, 6, 10, and 14 characters) and one

"no window" condition (full text). Linear mixed-effects regression models examining global aspects of reading (e.g., average reading rates, average fixation durations) revealed no impact of cognitive aging profile on reading fluency. Models examining parafoveal processing/perceptual span revealed reduced reading rates for the restrictive window conditions (relative to the no window condition) for both cognitive aging profiles. However, those with probable MCI were less effective at engaging in parafoveal processing, evidenced by significantly slower reading rates across the restrictive window conditions. Although exploratory, our findings suggest that reading fluency may be similarly affected in healthy cognitive aging and MCI. In contrast, the breadth of parafoveal processing appears to be more strongly influenced by greater cognitive decline. Continued data collection will help further clarify these patterns and enhance our understanding of how healthy vs. accelerated cognitive decline impact reading and reading-related processes.

The Crossmodal Illusion of Truth Effect.

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The ease with which we process a piece of information (i.e., its processing fluency) is positively related to its perceived truthfulness, a phenomenon known as the Illusion of Truth Effect (IOT). Fluency may be increased in several ways, such as through repetition of information. To date, most research on the IOT has focused on the visual domain by presenting written statements. However, in the real world, much of our exposure to information comes through the auditory modality. Therefore, it is critical to understand how processing fluency in the auditory domain influences perceived truthfulness. To this end, we exposed participants to a series of statements (e.g., "Ants don't sleep"), half of which they had been exposed to in a previous phase of the experiment and half of which were novel to them. Participants either read or listened to these statements in each phase of the experiment, leading to statements being presented either in the same or different modalities across phases (between-participants). Furthermore, half of the statements were true while the other half were false. The findings will be discussed in terms of the degree to which the input and truth rating modality influence the IOT effect. This work will expand our understanding of what influences our perceptions of the truthfulness of the information we hear and whether the IOT persists when repeated information is presented in different sensory modalities.

Comparing the types of spatial talk parents use during physical and virtual puzzle play with their child.

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Parents use spatial talk during puzzle play with their children, which has been linked to children's understanding of spatial concepts. Previous research has found that the number of spatial words used from different spatial categories differs depending on the puzzle medium (virtual vs physical). In the current study, we examined the proportion of spatial words from eight categories used by parents across three puzzle mediums (physical, virtual with rotation, and virtual without rotation) in 162

parent-child dyads, controlling for the child's age, which ranged from three to four years old. A mixed design analysis of covariance revealed a statistically significant difference in the proportion of spatial talk within the eight spatial categories between the three puzzle conditions. Specifically, during the virtual puzzle without rotation, parents used more words from the Spatial Features and Properties, and Location and Direction categories when compared to the other puzzle mediums. During the virtual puzzle with rotation, parents used more words from the Orientation and Transformation category compared to the other puzzle mediums. Lastly, during the physical puzzle, parents used more words from the Continuous Amount category compared to the virtual puzzle with rotation. Proportions for the Spatial Dimension, Shapes, Deictics, and Pattern categories did not show any significant differences across the three puzzle mediums. These results suggest the variance in proportion of spatial words from different spatial categories is related to the puzzle medium being used. Future research may consider investigating how different spatial language types relate to children's development of their own spatial language or of their understanding of spatial concepts.

Motor Constraints on Second Language Speech Production.

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Persistent difficulties in second-language (L2) speech production, such as a foreign accent, are attributed to perceptual limitations—the inability to distinguish some L2 speech sounds from similar sounds in the first language (L1). Another possibility is that L2 speech is constrained by motor processes, with L2 speech motor plans being less flexible—specifically, more tied to the context in which they're learned—than those acquired in L1. We used adaptation to real-time speech feedback alterations to test this in English (L1) - French (L2) bilinguals. In real-world speech, we examined if newly acquired L2 motor plans generalize to new linguistic contexts as readily as L1 motor plans. Participants (n=50) produced whole sentences into a microphone while hearing their own speech in real time. After a period of unaltered speech, vowel formants were shifted in opposite directions depending on the language of production: in L1, the first formant was decreased and the second formant was increased, with the reverse alteration for L2. Adaptation was observed in both languages, with speech production changes countering the feedback manipulation. The effect of adaptation was that, for the same vowels, formant production differed markedly depending on whether participants were producing English or French. We then tested the transfer of these language-specific adaptations to three distinct production contexts with the same phonetic content but different syntactic structure: part sentences, reversed part sentences, and isolated words. L1 adaptations transferred fully across conditions, while L2 adaptations did not, with transfer being significantly greater in L1 compared to L2. These findings demonstrate that L2 speech motor plans are highly context-dependent and less flexible than L1, suggesting a motoric constraint on second-language speech production which may contribute to persistent L2 phonetic learning challenges. Future analyses will examine whether bilingual proficiency influences transfer by quantifying participant language background and assessing correlations with adaptation outcomes.

Modelling lexical retrieval: An experimental and computational investigation using tip-of-the-tongue.

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Tip-of-the-tongue (TOT) states come with a strong and often frustrating feeling that you must know the exact word that you are seeking and yet cannot express it, providing a unique view of the memorial and meta-cognitive processes involved in lexical retrieval. Whereas researchers have traditionally examined TOT as incomplete recall of words from long-term semantic memory, we applied a paired-associate learning task method to examine TOT for studied target words in short-term episodic memory. When participants could not recall a target, they were invited to indicate any sense of recollection on a scale from complete forgetting to TOT, before attempting to identify a close associate of that target on a 4AFC task. Across a series of experiments, we measured participants' ability to choose words related to unrecalled targets by meaning, sound, or spelling and found that TOTs emerge alongside retrieval of target information that supports improved guesses and ongoing retrieval efforts. We present a modelling framework that coordinates computational accounts of episodic and semantic memory to account for the memorial and meta-cognitive components of TOTs during simulations of lexical retrieval. The model retrieves meaning, sound, and spelling information from episodic memory, which contributes to accumulating activation. The blurry information retrieved is used to search semantic memory for the target, and the contents retrieved from memory along with the level of activation determine whether recall, forgetting, or a TOT occur. By applying this model to TOTs, we aim to gain insight into not only when our memory succeeds or fails, but also when it is seemingly caught between the two.

~~Exploring Cross-Domain Associations Among Spatial Anxiety, Linear Number Line Knowledge, and Mathematical Performance in Adults.~~

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~~Research has consistently demonstrated a strong relationship between spatial skills and mathematical achievement. However, less is known about the role of spatial anxiety, a distinct emotional barrier that may disrupt numerical processing. The spatial representation theory suggests that the linear number line serves as a key cognitive bridge between spatial and mathematical abilities. This study investigated whether spatial anxiety predicts mathematical performance and whether linear number line representation mediates this relationship. A total of 191 undergraduate students completed assessments of spatial anxiety (navigation, manipulation, imagery), math anxiety, general anxiety, spatial skills (mental rotation, visualization), and math proficiency (arithmetic, fractions, algebra, percentages). Linear number line was measured using bounded (BNL) and unbounded (UNL) number line estimation tasks. Structural equation modelling demonstrated that higher spatial anxiety, particularly manipulation anxiety, was associated with lower mathematical performance, with UNL accuracy mediating this relationship. Additionally, spatial skills positively predicted math outcomes, with UNL partially mediating effects for percentages, fractions, and algebra, but not arithmetic. These findings highlight that while spatial anxiety is related to math performance, it seems that this relation is explained by the relation between spatial anxiety and the unbounded number line.~~

~~Furthermore, the absence of BNL mediation underscores UNL's superior sensitivity in capturing numerical processing efficiency in adults. Further research is needed to understand the relation between spatial anxiety and number line representation and its role in math learning.~~ ***Withdrawn***

The Influence of Emotional Content on Metamemory Accuracy and Judgments of Learning (JOLs) within the Framework of Memory Monitoring in Emoji Recognition.

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This research investigates the influence of emotional content on memory predictions and recognition performance, utilizing emojis as symbolic emotional stimuli. A pre-rating study was conducted where participants rated 100 emojis across four dimensions: valence, arousal, familiarity, and frequency of use. Based on these ratings, 90 emojis were categorized into positive, neutral, and negative groups for the subsequent metamemory experiment. During the metamemory task, participants provided Judgments of Learning (JOLs) predicting their likelihood of recognizing emojis, followed by a recognition test to assess actual memory performance. Results suggested that although participants anticipated higher recognition accuracy for positive and negative emojis compared to neutral ones, no significant differences were found in actual recognition performance across emotional categories due to ceiling effects. Numeric trends suggest that emoji may show the same metamemory biases as emotional images, with higher JOLs but lower recognition accuracy for emotional than neutral stimuli. Results are discussed in terms of the cues used to make JOLs for emotional information.

Stimulus Size Distorts the Perceived Temporal Structure of a Sequence.

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Past research has shown that the visual features of a stimulus influence its perceived duration. Participants tend to assign longer duration judgments to larger than smaller visual stimuli. Whether this time dilation effect persists when participants are asked to make temporal judgements about a sequence of stimuli is unknown. In the present study, participants were shown sequences of four (Exp 1) or three (Exp 2) coloured circles. They made judgements about the circles' durations by placing markers along a timeline representing the trial's temporal extent. The circles within each list varied in size (small vs. large) and veridical duration (ranging between 500 and 1000 ms). Experiment 1 showed that participants perceived larger circles as lasting longer than smaller circles, and that this impacted temporal judgments for other items in the sequence. Participants reported a later onset for the second circle if the first circle in the sequence was large than if it was small. Similarly, participants reported a later onset for the fourth circle if it was preceded by two large and one small circle than the converse. In Experiment 2, participants were cued to report the temporal onset of either the second or third circle on each trial. Again, the size of the circles influenced the temporal judgments that participants made. Participants estimated a later onset time for the second and third circles in sequences that began with two large circles than in sequence that began with two

small circles. Overall, the results suggest that the size of stimuli within a sequence distorts participants' judgments about the temporal structure of the entire sequence. The implications of these results will be discussed in the context of the temporal memory literature.

Enter at Your Own Risk: Quantifying Intrusive Memories of Haunted House Experiences.

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Haunted house attractions are carefully crafted to evoke fear and thrill, but the psychological impact of horror engagement can linger long after the experience has ended, manifesting as nightmares, anxious thoughts, and intrusive memories of horror content. Given this common experience, haunted house attractions offer a unique opportunity to investigate how intrusive memories of frightening experiences form and persist. This study investigates the frequency of intrusive memories following a haunted house experience, using a daily self-report measure. Each day for one week following the experience, participants were prompted via an automated online survey to report the number of intrusive memories pertaining to the haunted house that they experienced that day. The frequency of intrusions was then modelled using Bayesian Poisson regression. Credible predictors included days since the experience (with intrusions dropping precipitously each day), how afraid participants reported feeling immediately after the experience (with greater fear predicting greater intrusion frequency), and total scores from the Severity of Horror Media-induced Intrusive Memories (SHMIM) scale, reflecting each participant's experience of intrusive thoughts following typical exposure to horror media content (e.g., horror movies), including subscales of cognitive distress, physiological reactions, vividness, intentionality and perceived control. Here, participants reporting greater scores on the SHMIM, representing more intense intrusive memories following horror movies, tended to exhibit more frequent intrusions following the haunted house experience. This study contributes to our understanding of the psychological impact of frightening experiences and offers insights into the cognitive mechanisms underlying intrusive memory formation and persistence.

They're Heereeeee … in Your Head: Developing and Validating the Severity of Horror Media-induced Intrusive Memories Scale.

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While many enjoy the horror genre, some report particularly frightening scenes intruding into their mind for days, weeks, or even years following exposure to horror media. However, until now, no measure has existed to quantify the severity of these experiences. This study introduces the Severity of Horror Media-induced Intrusive Memories (SHMIM) scale, a novel instrument designed to assess the multifaceted nature of intrusive memories following horror media exposure. A multinational, multidisciplinary team with expertise in recreational fear, cognitive psychology, and scale

development conceptualized the premise, and created the initial 36-item pool by looking to existing instruments measuring cognitive distress and unwanted repetitive thought, theory, review of the literature, and items were voted on for wording on conceptual value. Initial factorial validity data was assessed using a dataset of 318 participants. Exploratory Factor Analysis and Exploratory Graph Analysis supported a five-factor structure: Cognitive Distress, Physiological Reactions, Vividness, Perceived Control, and Intentionality. The final model comprises 15 items (three per factor) with strong reliability coefficients. In terms of face-and-known groups validity, SHMIM subscale scores positively correlated with self-reported frequency and duration of intrusive memories. Non-fans scored significantly higher than horror fans on the SHMIM overall and all subscales except Intentionality. Another sample was collected to further test the structural validity of the scale. The scale was translated into Danish using forward and backward translations, with feedback solicited from the research team and bilingual speakers to ensure semantic equivalence. A Confirmatory Factor Analysis (CFA) was conducted on a new sample of 240 participants. The 5-factor model fit extremely well according to all conventional indices with high factor loadings for each factor. The SHMIM scale provides a tool for studying the psychological impact of horror media consumption and offers a valuable instrument for broadly studying intrusive memories, including mechanisms underlying their formation and persistence.

Singing for Science: Exploring the Production Effect for Simple and Complex Singing.

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The production effect is defined as a memory advantage for words read aloud compared to words read silently. This finding is often attributed to production encouraging distinctive encoding. Specifically, produced words are thought to incorporate additional distinctive elements absent for non-produced words. These additional features make the words stand out against the “backdrop” of the non-produced words, making them easier to retrieve at test. Past research has found an even greater production effect for words that are sung compared to words that are read aloud, a pattern known as the singing superiority effect. However, this has not always replicated. The present study investigated the singing superiority effect using two singing styles: The first mimicked instructions used by past research in this area (i.e., simple singing) and the second instead encouraged more varied melodies (i.e., complex singing). Participants completed a production task in which words were read aloud, read silently or sung either simply or complexly. Complexity was manipulated in a blocked fashion. Further, half of our participants received test items colour coded according to their study phase condition (with colours randomly assigned to foils) and the other half received test items in a neutral colour (yellow). Preliminary findings support the singing superiority effect, especially when sung complexly. These findings are consistent with the role of distinctiveness, demonstrating that more elaborate forms of production can produce greater memory benefits.

Language mnemonics enhance the learning of non-linguistic acoustic stimuli.

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Mnemonics are common learning tools (e.g. chunking, acronyms, etc.) that enhance memory encoding and retrieval. Additionally, past studies have demonstrated that the practice of reading information aloud – as opposed to mentally reading in a silent state – can improve memory retention (known as the Production Effect). Typically, researchers study these effects using numeric and linguistic stimuli. In the current study, we extend the use of mnemonics and the Production Effect to acoustic non-language stimuli using bird vocalizations as they are naturally melodic, rhythmic, and species specific. We hypothesized that the association of a language mnemonic and audibly reading species names aloud would enhance the future recognition of bird vocalizations. Participants were sequentially presented with an image and name of 8 North American bird species followed by an audio recording of the species vocalization. Half of the species were presented alongside an English-language mnemonic designed to follow the rhythmic pattern of the vocalization (e.g. Yellow Warbler - "Sweet, sweet, sweet sugary treat"). Participants either read species names – and associated mnemonic if present – aloud or silently. Following a 10-minute arithmetic assessment, participants listened to vocalizations and were tasked with identifying the species by image and name using a four-alternative forced-choice selection. In support of our hypothesis, the pairing of a language mnemonic with vocalizations led to higher accuracy of species identification. We observed a speech production effect opposite to our hypothesis: participants that read silently during learning outperformed those that read aloud at time of testing. There was no interaction effect and we did not observe any difference in reaction times between groups. Our results highlight the robust application of language mnemonics including their extension to non-linguistic acoustic stimuli. Although the Production Effect improves recall of linguistic stimuli, we suggest that these benefits do not extend to non-linguistic stimuli.

The Benefit and Cost of Source Judgment in the Directed Forgetting Paradigm.

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In the directed forgetting paradigm, study words are followed by either a remember or forget cue, typically resulting in better memory for remember-cued words. Previous research has postulated that directed forgetting may be due to selective rehearsal or active inhibition. Recently, Hourihan (2021; 2022) examined source reliability in directed forgetting, with words being provided from either a mostly-remember-cued (more remember- than forget-cued items) or ¬mostly-forget-cued (more forget- than remember-cued) source. This resulted in higher recognition accuracy for words provided by the mostly-remember-cued source and source judgments that reflected heuristic attributions. The goal of the present study was to expand on Hourihan's research, hypothesizing that enhanced selective rehearsal of mostly-remember-cued source items would benefit word recognition compared to a control source, and/or the inhibition of items from the mostly-forget-cued source would reduce word recognition when compared to a control. Participants studied words in two blocks, with each block including two sources: a control source that provided equal remember and forget cues, and either a mostly-remember source or a mostly-forget source. We found a directed forgetting effect in

item recognition, with interactions suggesting differences based on study block order. Participants whose first study block included a mostly-forget source showed evidence of differential rehearsal based on source in both item and source judgments, whereas participants whose first study block included a mostly-remember source showed evidence of general selective rehearsal regardless of source, and heuristic source attributions.

Recalling reminded details protects against false recall.

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It is well-established that similarities between previously studied items and novel test items elicit false memories. Indeed, in a typical Deese-Roediger-McDermott (DRM) paradigm, studying several semantically related items leads to greater false recognition and false recall of the category prototype (i.e., critical lure; Roediger & McDermott, 1995). These false memories are driven by similarity between study and test items, thus increasing the probability of mistaking the critical lure as being studied. In light of the consequences of similarity-driven familiarity, it has not yet been considered how similarity may also be used to protect against false memories. Here, we propose that remindings – also elicited by similarity – are crucial in this process. More specifically, when similarities between studied items elicit reminding, subsequent memory for reminded items is enhanced (Tullis et al., 2014). Since reminding enhances memory for studied items, exhaustive recollection of reminded details could be used to disqualify novel related items through a recall-to-reject process (Ghetti, 2003). Critically, previous work in our lab has demonstrated this predicted pattern of results with recognition memory, where exhaustive recollection of reminded studied items reduced false recognition compared to reminding alone. The current study aimed to determine whether these findings generalize to false recall as well. Consistent with our previous findings, in Experiment 1, we found that the probability of falsely recalling critical non-presented items was lower when reminded details were exhaustively recollected, compared to when no related studied items were recalled. In Experiment 2 we sought to tease apart whether recall output is, indeed, being 'edited' through a recall-to-reject process, or if the critical non-presented items are simply not brought to mind following reminding at study. We predict the former to be the case. Overall, this research highlights the potential benefits of reminding in mitigating false recall of related, but non-studied information.

The Impact of Working Memory Load on Metacognitive Monitoring.

Leili Rouhi and Valerie Thompson
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Does metacognitive monitoring suffer from working memory load? People monitor the quality of their thought processes, based on signals or cues to certainty, and these monitoring judgements in turn guide control behaviors such as thinking time allocation (Ackerman & Thompson, 2017). For example, in a logical reasoning task, people's confidence judgements are sensitive to cues such that when there is a conflict between the logical validity and the believability of the conclusion, people are less confident in their solutions than for non-conflict problems. Some studies have suggested that

monitoring and working memory (WM) use the same cognitive resource (Bryce et al., 2023) leading us to examine the effect of WM load on cue sensitivity in a logical reasoning task. Across four experiments (N = 800) which used the two-response paradigm (Thompson et al., 2011), participants provided a rapid initial response and then a revised response with unlimited time in a logical reasoning task. We measured confidence judgements for both intuitive and revised answers. The control group performed the task under the standard instructions, while the deadline group-imposed time pressure on initial response time. The WM load group introduced a concurrent working memory task during the initial response time, and the combined group integrated both time pressure and WM load. Contrary to our hypothesis, results showed a non-significant interaction between load condition and sensitivity to conflict, suggesting that metacognitive monitoring of conflict items remains stable regardless of WM demands, suggesting that the conflict effect in logical reasoning is robust against external cognitive constraints. However, further investigation of the effect of WM load on resolution—the ability to differentiate between correct and incorrect judgments—as well as control sensitivity—the degree to which confidence is linked to control behaviors— can shed light to the interplay between WM and metacognition.

Multifactorial Memory Questionnaire: A comparison of young and older adults.

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The Multifactorial Memory Questionnaire (MMQ; Troyer & Rich, 2002) is a widely used measure of subjective memory consisting of three scales: Satisfaction, Ability, and Strategies. Although subjective memory complaints are prevalent across different age groups, the factor structure and psychometric properties of the MMQ have yet to be examined in young adults. Here, we independently replicated the original MMQ factor structure in N = 408 young adults (YA) recruited from undergraduate courses and N = 327 older adults (OA) and, for the first time, assessed the age-invariance of the scale using measurement invariance testing. YAs made significantly higher ratings than OAs on MMQ-Satisfaction and MMQ-Strategies, indicating greater satisfaction with their memory and greater use of strategies, but the groups were similar on MMQ-Ability. The original MMQ factor structure was replicated in OAs but not in YAs, and age invariance was not supported. Future studies seeking to compare young and older adults could therefore consider either requesting modification of the MMQ for use with young adults or using a different scale.

Belief-based Inferences in Logical Reasoning.

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What makes us think that some reasoning problems are more difficult than others? It is well-documented that thought processes are often accompanied by subjective experiences of ease or difficulty, which can serve as a signal or a cue for the quality of reasoning processes. For example, in problem-solving tasks, solutions that are familiar or come to mind quickly elicit subjective feelings of ease and certainty (Thompson et al. 2011). However, people might also have lay beliefs about what may make the reasoning process easy or more difficult. For example, a reasoner might have a lay belief that reasoning is easier in a familiar domain and, therefore, might have (misleadingly) high certainty in their performance. There's limited research about whether people have lay beliefs about difficulty in the reasoning domain and how people may rely on such beliefs when monitoring their progress and making effort allocation decisions. In Study 1 (N = 80), we presented participants with two otherwise equivalent logic problems featuring either familiar or nonword terms side by side. When asked to indicate which problem would be easier to solve, participants chose those with familiar terms over those with nonwords. Qualitative responses showed that participants may hold lay beliefs about familiarity and fluency. Study 2 (N = 178) examined whether people's beliefs were predictive of actual performance on the logic problems. Familiarity affected participants' monitoring judgements such that problems with familiar terms were judged to be less difficult and elicited higher certainty in a solution compared to nonwords, despite there being no difference in actual performance. More importantly, participants gave up on solving logic problems with nonwords more frequently. Thus, we have demonstrated that people misleadingly believe that certain task features (e.g. familiarity) affect reasoning and rely on these lay beliefs when making monitoring judgements and control decisions.

Replication of Ratcliff & Hacker's (1981) same-different task variant.

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The Same-Different task, a paradigm in which participants must decide as quickly and as accurately as possible whether two stimuli are identical or not (Bamber, 1969), can be considered the simplest possible cognitive task involving a choice (Sternberg, 1998). While this task is easy for participants, offers intuitive results, and is often used nowadays as a tuning task to assess higher-level cognitive processes, modelling the fundamental task had been at a stalemate for 50 years. This modelling hurdle comes from the fact that "Same" decisions are much quicker than "Different" decisions, opposing the predictions of most cognitive models, a robust-to-replication effect since coined the fast-"Same" phenomenon (Bamber, 1972). Nevertheless, recent work (Cousineau, et al., 2023; Harding & Cousineau, 2021) has been able to make significant headway and show that identity priming seems to be the best predictor of the elusive phenomenon. While this priming model explains many of the results, "Same" responses remain faster even when priming is completely abolished indicating an incomplete prediction of why "Same" responses are so rapid. In this research project, we address potential response biases at play within the higher levels of cognition involved when making comparison-based decisions. We thus directly replicated experiment 1a and 1b (albeit with six times the number of participants to satisfy a priori power requirements) from Ratcliff & Hacker's (1981) paper whereby response preferences are encouraged by having participants make

cautious "same" or "different" responses. Analyses on response time distributions show no significant difference between cautious-"same" and cautious-"different" conditions and modelling efforts indicate little to no difference between the parameter estimations of both tasks using the EZ diffusion model (Wagenmakers, Van Der Maas, & Grasman, 2007). We can therefore conclude that response biases, if present at all, are unlikely to be a factor in activating the fast-same phenomenon.

Using memory to model metamemory: A novel application of MINERVA 2.

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Judgments of learning (JOLs) are predictions of future memory performance made based on individuals' subjective assessments of learning. Critically, recent research has shown that individuals' assessments of learning, for new information, may be colored by information learned in the past, such that similar information learned previously may also influence their JOLs unknowingly (Laursen & Fiacconi, 2024; 2025). A potential mechanism as to why our previous learning may impact how we evaluate our learning of new information may involve the use of a memory-based matching model. Specifically, we propose that during previous learning a memory trace is created for all learned information. During a future learning period individuals may implicitly compare the new to-be-learned information to all stored memory traces. The outcome of this global matching comparison may then inform assessments of learning. To the extent that the similarity signal returned from this matching process is high, participants may experience a correspondingly high degree of familiarity, leading them to provide a relatively high assessment of learning. Conversely, a low similarity signal would yield a weaker familiarity signal leading to a relatively low assessment of learning. This simple similarity-based matching mechanism has been instantiated in many computational models of human memory and can help explain a wide range of memory phenomena (Jamieson et al., 2022). Here we use the MINERVA 2 computational model to test whether this similarity-based mechanism may also inform metacognitive evaluations of learning.

Assessing glutamate changes in medial frontal cortex during encoding and recall phases of an associative visuospatial working memory task.

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Medial frontal cortex (mFC) is recruited for many aspects of working memory (WM) and executive function, including maintenance of stimuli, responding to changes in task phase (Kamiński et al 2017), resolving response conflict, and post-error readjustments. Prior research using magnetic resonance spectroscopy (MRS) has shown that glutamate levels increase in mFC (Jelen et al., 2019) with increased working memory demands. However, changes in glutamate levels in mFC during specific phases of encoding and retrieval in a working memory task are yet to be explored. Here, we conducted a mixed-design functional (f)MRS study to assess changes in medial frontal glutamate levels while participants (n=21) engaged in an associative visuospatial WM task. In the task,

memory trials required participants to learn the shapes, colours and locations of abstract items, and then recall an item's colour based on its shape or location. In no-memory trials, participants simply responded to the colour of a presented shape. Initial results show that glutamate levels are significantly increased during the retrieval phase compared to baseline, but not during either control (no-memory) trials or the encoding phase of memory trials. This suggests that glutamate responses in mFC are particularly engaged in recall, and possibly maintenance, compared to encoding.

Kamiński, J., Sullivan, S., Chung, J. M., Ross, I. B., Mamelak, A. N., & Rutishauser, U. (2017). Persistently active neurons in human medial frontal and medial temporal lobe support working memory. Nature neuroscience, 20(4), 590-601.

Jelen, L. A., King, S., Horne, C. M., Lythgoe, D. J., Young, A. H., & Stone, J. M. (2019). Functional magnetic resonance spectroscopy in patients with schizophrenia and bipolar affective disorder: Glutamate dynamics in the anterior cingulate cortex during a working memory task. European Neuropsychopharmacology, 29(2), 222-234.

Gender differences in spatial cue utilization and metacognition during wayfinding: An eye-tracking Study.

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Findings have shown that men and women use different navigational strategies and relatedly use different visual spatial cues when navigating (e.g., Coluccia and Louse, 2004), with women depending on proximal landmark-based cues and men capable of using both proximal landmark-based cues (e.g., left at McDonalds) as well as distal orientation-based cues (North Star). However, there is little research confirming this difference using eye-tracking. There is also some preliminary evidence to suggest men and women have different trial-by-trial local metacognition during wayfinding (Lemieux et al., 2019). The current study compared the performance, metacognition, and gaze behaviour of women and men on a series of 20 3D virtual reality mazes using a wayfinding task with a learning and performance phase on a desktop computer. This task has two conditions, one where both a distal orientation-based cue (Moon in the sky) and proximal landmark-based cues (3D object at two decision points) are presented and one where only a distal orientation-based cue is presented. Participants were also asked to make metacognitive judgments after the learning phase and performance phase of each maze. Preliminary results indicate that there was a gender difference in performance where women had significantly higher error counts and maze run times compared to men regardless of condition, but this effect was strongest in the distal cue only condition. Women had greater fixation counts and total durations on proximal landmark-based cues in the combined cue condition compared to men. Men's gaze behaviour did not change between conditions with more time spent fixating on the walls and floor of the maze, regardless of condition, compared to women. Men had more accurate metacognitive judgments after performance, than did women.

EPS
Experimental Psychology Society

53rd EPS Bartlett Lecture

will be delivered by

Mike Burton
University of York

Face Recognition: Familiarity, idiosyncrasy and representation.

5.30pm, Thursday 10th July 2025

Lecture Theatre 3, Dalhousie Building

No registration is required to attend in person.

EPS
Experimental Psychology Society

2025 EPS/BSA Undergraduate Project Prize Talk

will be delivered by

Akilles Rechardt
Royal Holloway University of London

Large language models surpass human experts in predicting neuroscience results.

5.15pm, Wednesday 9th July 2025

Lecture Theatre 3, Dalhousie Building

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 and returning to the EPS Administrator as a PDF file to expsychsoc@kent.ac.uk.

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.

EPS
Experimental
Psychology
Society

CRITERIA AND PROCEDURES TO JOIN

Soon after the closing date of the relevant deadline, 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 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 they 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

We recommend booking accommodation as early as possible.

The University of Dundee is located in the city centre, walkable from the train station, and well connected by buses across the city.

The Dundee City Region Convention Bureau have set up an accommodation portal for the EPS / CSBBCS meeting, which can be found here: Joint EPS/CSBBCS July 2025 Meeting – Dundee Bzon.

This accommodation portal has a variety of room rates and terms, although please note that rooms may be found at better rates through other sources so please do double check – these are rooms held specifically for the conference at a set rate.

There are a number of hotel options in Dundee (and surrounding areas), below are some suggestions, with walking times to the Dalhousie Building:

Hampton by Hilton Dundee City Centre – 5 min walk

Best Western Queens Hotel – 8 min walk

Four Points Flex by Sheraton – 14 mins walk

Apex City Quay Hotel & Spa – 20 min walk

Holiday Inn Express – 18 min walk

Hotel Indigo Dundee – 24 min walk

Staybridge Suites – 24 min walk

Malmaison Dundee – 14 min walk

Travel

Alongside the information below, a 'Travelling Made Easy Guide' has been made available by the Dundee City Region Convention Bureau.

By Air

Dundee Airport has daily flights to and from London Heathrow. Flights from elsewhere in the UK, or international airports, will land at one of four Scottish airports, with Glasgow and Edinburgh being closest. These are all well connected, and it is easy to get to Dundee from each of these airports. View guides for public transport links from each airport to Dundee below:

- Edinburgh International Airport
- Glasgow International Airport
- Aberdeen International Airport
- Prestwick International Airport

By Rail

Dundee Railway Station is in the city centre, a few minutes walk to City Campus. ScotRail journeys from other major cities in Scotland (Aberdeen, Edinburgh, Glasgow Queen Street) take approximately 75 minutes.

Dundee is on the main East Coast line with direct LNER and Cross Country services from: London, Newcastle, York, Birmingham, Oxford, Bristol, Reading, Southampton, Bournemouth, and Plymouth.

Overnight sleeper services by Caledonian Sleeper run from London, the south coast, and the west country.

By Car

Edinburgh is a 90-minute drive away, Manchester is a 5-hour drive away and London is an 8-hour drive away from Dundee. Please note, parking on the city campus is for permit holders only.

By Bus

Dundee Bus Station is to the east of the city centre. It is a 15-20 minute walk to the City Campus. The two bus stops nearest the conference location (Dalhousie Building) are
Hawkhill opposite Hunter Street and Hawkhill near Hunter Street.

Dundee's two major bus operators are Xplore Dundee and Stagecoach Strathtay. Their sites include details of routes, ticket prices, and offers including flexi-cards.

Many buses come regularly (10 to 20 minutes) during daytime. Last buses leave the city centre about 23:15 on most routes.

There are also options for travelling by bus between Scottish cities:

- Megabus services from Glasgow to Dundee
- Megabus services from Edinburgh to Dundee
- Ember services from Glasgow and Edinburgh to Dundee

University of Dundee - Campus Map

Conference Dinner

The conference dinner will be at The Apex Quay Hotel, 1 West Victoria Dock Road, Dundee, DD1 3JP on Thursday 10th July, with arrivals from 7.00pm and the dinner starting at 7.30pm.

Bookings for the conference dinner are now closed.

Attendees will need to choose one starter, main and dessert from the below options.

Starters

Curried Sweet Potato Soup
Served with Lime Crème Fraiche and a Vegetable Samosa
(Vegetarian / Vegan without crème fraiche / Gluten free suitable**)**

Smoked Arran Cheddar Arancini
Served with Spicy Tomato Sauce and Red Pesto
(Vegetarian suitable)

Mains

Lentil & Squash Wellington
Served with Steamed Broccoli, Roasted Carrots and Parsley Oil
(Vegan and Vegetarian suitable)

Slow Cooked Beef Roulade and Mini Steak Pie
Served with Roast Garlic Mash Potatoes, Steamed Broccoli and Truffle Jus
(Gluten free suitable without the mini steak pie)

Desserts

Trio of Chocolate
Chocolate Mousse, Chocolate Brownie and Chocolate Sauce
(Gluten free suitable, with a slightly different brownie)

Lemon Cheesecake
Served with Berry Compote and Vanilla Cream
(Can make a Vegan alternative)

If there are any special dietary requirements these can be accommodated.

Eating and Drinking

Dundee is a walkable city, with access to a number of options for food and drink. A few suggestions below, and more can be found via Dive into our delicious food scene | Dundee.com.

Cafés/Lunch

Parlour – very near Dalhousie, for brunch/lunch (take out or sit in, although very small so limited tables!); salads, sandwiches, cakes, and coffee.

Fisher & Donaldson – take out or a small traditional café tearoom. A local Fife bakery, we very much recommend the fudge doughnuts and the coffee towers! (savoury choices also available).

Eastfield – sit in, small bites.

Gallery 48 – also very near Dalhousie, tapas and wines.

Stenecki Coffee – brunch/lunch, and good coffee.

Waterstones Café – café in a book shop. Sandwiches, coffee, snacks.

Tatha – café inside the V&A Dundee. Soups, salads, sandwiches.

Dinner

Jute Café Bar (DCA) – range of food/drink on offer, with outdoor and indoor seating.

Rama Thai – nice Thai food, reservation recommended.

St Andrews Brewing Co. Caird Hall – burgers and beer (and other drink options!).

Don Michele – Italian.

Black Mamba – tapas and cocktails.

The Barrelman – good pub food.

The Giddy Goose – pizzas and burgers.

Tahini – Lebanese, with good vegetarian/vegan options.

Korean BBQ Dundee – Korean selections.

Babujee Tawa & Balti Restaurant – Indian.

Duke's Corner – pub food, good drink selection.

Rishi's Indian Aroma – Indian food.

Gidi Grill – Caribbean food.

Things to do in Dundee

A historic city and compact in size, Dundee is a great place to wander and explore. It is also well connected to many other Scottish sites of interest, making it easy to find things to do whilst here!

A map, along with suggested walking guides, can be found via this link: Our walkable city | Dundee.com

Within Dundee, you can find some suggestions of activities via this link: Things To See & Do & Top Attractions in Dundee | VisitScotland

There are also a number of lovely places to visit around Dundee, including Forfar (Glamis Castle), Broughty Ferry, and St Andrews (6 Cool Day Trips From Dundee | VisitScotland).

You can find a list of **exclusive offers**, including discount codes for selected activities and restaurants in Dundee and surrounding areas, here: 2025 | Exclusive Offers

EPS Business Meeting

A Business Meeting will be held on Thursday 10th July 2025 at 12:30pm in Lecture Theatre 4 at the University of Dundee, Dalhousie Building, Old Hawkhill, Dundee, DD1 5EN.

AGENDA

25/23 Minutes of the Business Meeting, held at Lancaster University on Thursday 3rd April 2025

See Attachment 1.

25/24 Matters Arising

25/25 Secretary's Report

25/25.1 Hon. Secretary's Report

25/26 Treasurer's Report

25/26.1 Treasurer's Report

25/27 QJEP Editor's Report

25/27.1 Editor's Report

25/28 Arrangements for Future Meetings

25/29 Any Other Business

25/30 Date, Time and Place of Next Meeting

Attachment 1.

EPS Business Meeting

A Business Meeting was held on Thursday 3rd April 2025 between 12:00pm and 1:00pm in the Biology Lecture Theatre at Lancaster University, Furness College, Lancaster, LA1 4YW.

MINUTES

~40 members in attendance

25/15 Minutes of the Annual General Meeting, held at University College London on Thursday 9th January 2025

Approved without any changes.

25/16 Matters Arising

There were no matters arising.

25/17 Secretary's Report

25/17.1 Hon. Secretary's Report

The Secretary gave a verbal report outlining funding schemes which are currently open and encouraged applications.

25/18 Treasurer's Report

25/18.1 Treasurer's Report

The Treasurer gave a verbal report on finances, reminded members to check that their standing order for the membership fee is for the correct amount, and encouraged members to pay the voluntary registration fee for meetings if they have current grant funding for their research.

25/19 QJEP Editor's Report

25/19.1 Editor's Report

The QJEP Editor gave a verbal report on the journal and highlighted the upcoming call for a new Editor in Chief.

25/20 Arrangements for Future Meetings

The Conference Secretary gave a verbal report on upcoming meetings and encouraged members to submit their abstracts for the upcoming Dundee meeting.

25/21 Any Other Business

There was no AoB.

25/22 Date, Time and Place of Next Meeting

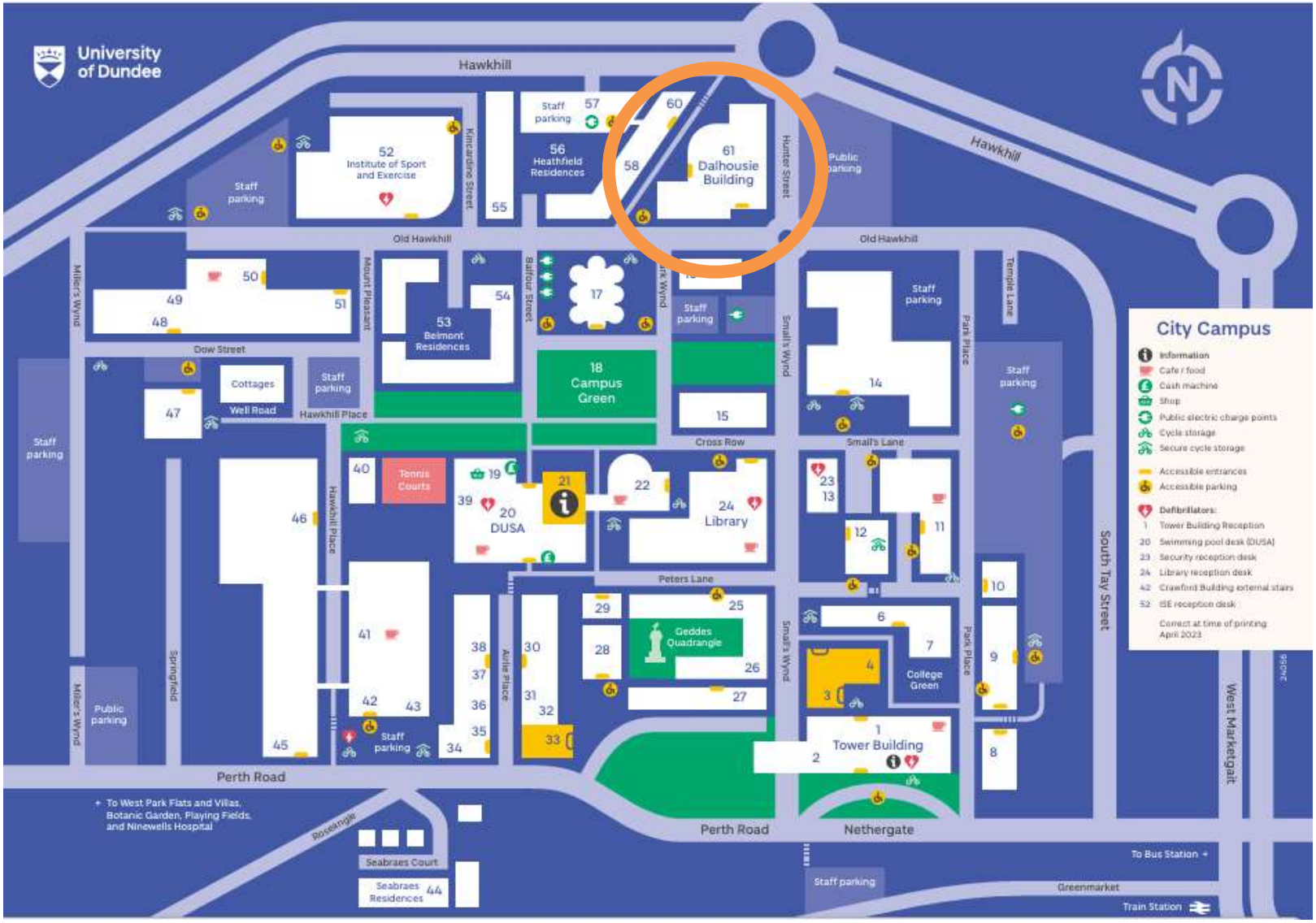
The next business meeting will be at the University of Dundee in July 2025.

Next Meeting: University College London. Dates to be confirmed, January 2026.

This meeting will include the EPS President's Address by Rob Honey.

The portals for this meeting will open in September 2025.

Local Organiser: Adam Parker


University of Dundee
Hawkhill
Old Hawkhill
Hunter Street
Kinnaird Street
Mount Pleasant
Balfour Street
Park Wynd
Small's Wynd
Park Place
Temple Lane
South Tay Street
West Marketgait
Miller's Wynd
Springfield
Dow Street
Well Road
Hawkhill Place
Cross Row
Small's Lane
Peters Lane
Airlie Place
Perth Road
Nethergate
Rosemyln
Seabraes Court
Greenmarket
Train Station
To Bus Station
52 Institute of Sport and Exercise
56 Heathfield Residences
61 Dalhousie Building
53 Belmont Residences
18 Campus Green
20 DUSA
24 Library
Geddes Quadrangle
College Green
1 Tower Building
Tennis Courts
Cottages
Staff parking
Public parking
To West Park Flats and Villas, Botanic Garden, Playing Fields, and Ninewells Hospital
City Campus
Information
Cafe / food
Cash machine
Shop
Public electric charge points
Cycle storage
Secure cycle storage
Accessible entrances
Accessible parking
Defibrillators:
1 Tower Building Reception
20 Swimming pool desk (DUSA)
23 Security reception desk
24 Library reception desk
42 Crawford Building external stairs
52 ISE reception desk
Correct at time of printing April 2023