YORK MEETING

3-5 July 2024
Open exchange of new ideas is central to EPS meetings. To foster up-to-date discussion, presenters are mandated to report work that is not yet published. We ask that attendees respect this mandate. Please do not record or publish presented material (e.g., via X or Facebook) without the presenter's permission. To remove any ambiguity regarding permission, this programme now includes a symbol next to every abstract (the hashtag shown on this page), where the presenter has agreed permission for their work to be shared on social media. Where no symbol is shown for a given presentation, there should be absolutely no filming, pictures, or social media of any kind. For explicit guidance on reporting at EPS meetings, please refer to the EPS handbook.
A scientific meeting will be held in the Ron Cooke Hub, University of York, East Campus, 133 Deramore Lane, York YO10 5GE, between 3rd – 5th July 2024.

The local organiser is Aidan Horner.

52nd EPS Bartlett Prize Lecture
Thursday 4th July, 5.45pm

The development, hemispheric organization, and plasticity of high-level vision.
Marlene Behrmann, University of Pittsburgh, USA

52nd EPS Bartlett Prize Lecture Symposium
Vision and Vision: The Scientific Career of Marlene Behrmann
Thursday 4th July, 2.00pm – 5.30pm
Organised by Karalyn Patterson.

Networking & Pub Quiz

Covering everything from Baddeley & Hitch to Lilo & Stitch, we warmly welcome you to join us for some pub quiz fun and an opportunity to meet new colleagues. Early career researchers are particularly encouraged to attend.

Speed Mentoring Event

Mentees will be paired with 2-3 mentors for short discussions, depending on availability. The event will take place over lunch on Thursday 4th, with lunch provided for attendees.

Poster Session

There will be two poster sessions, poster session one is to be held on Wednesday 3rd July between 6pm and 7pm in the Atrium with an accompanying wine reception. Poster session two is to be held on Friday 5th July between 9am and 10am in the Atrium with accompanying pastries and tea / coffee.

All posters will also be available virtually on the EPS website from Monday 1st July 2024 at 9am.

Online Posters and Talk Through Videos

Conference Dinner

The conference dinner for EPS York 2024 will be held on Thursday 4th July from 7.30pm at Impossible York, 3 St. Helen’s Square, York, YO1 8QN.

For more details on how to book a place at the conference dinner, please see page 111.
START OF PARALLEL SESSIONS

Session A – Lecture Theatre RCH/037

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<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
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<tr>
<td>12:00</td>
<td>No effects of predictability on word-meaning priming and incidental memory.</td>
<td>Vanessa Keller*, Matthew Mak, Scott Cairney and Gareth Gaskell (University of York, University of Warwick) (Sponsor: Gareth Gaskell)</td>
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<tr>
<td>12:15</td>
<td>The semantic control network preferentially activates for the control of meaningful stimuli, yet task process and stimulus format matter.</td>
<td>Rebecca Jackson, Victoria Hodgson, Matthew Lambon Ralph, Elizabeth Jefferies and Katya Krieger-Redwood* (University of York, University of Cambridge)</td>
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<tr>
<td>12:30</td>
<td>Can the use of semantic elaboration explain working memory development in childhood?</td>
<td>Luísa Superbia-Guimarães* and Nelson Cowan (University of Leeds, University of Missouri, USA) (Sponsor: Dominic Guitard)</td>
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<tr>
<td>12:45</td>
<td>Spatial listening in a bilingual dual-language context.</td>
<td>Emily Rice*, Sarah Knight, Angela de Bruin and Sven Mattys (University of York, University of Newcastle) (Sponsor: Sven Mattys)</td>
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<table>
<thead>
<tr>
<th>Time</th>
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<td>13:00</td>
<td>Break</td>
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START OF PARALLEL SESSIONS

Session B – Lakehouse Lecture Theatre

12:00  Nick Barraclough, Laura Vinton*, Alessia Vlasceanu* and Stephan de la Rosa* (University of York, University of Applied Sciences, Germany) Representation of actions within a conceptual space.

12:15  Amélie Gourdon-Kanhukamwe*, Yu Yang Chou*, Aiden Woolford* and Amber Inman* (King's College London, Financial Conduct Authority) (Sponsor: Charlotte Russell) Testing boundary conditions to the lower acceptability of non-informational nudges.

12:30  Emine Bilgen*, Hanna Zagefka* and Thora Bjornsdottir (Royal Holloway, University of London, University of Stirling) (Sponsor: Thora Bjornsdottir) Making oneness cognitively salient and examining its effect on helping Syrian and Ukrainian refugees.

12:45  Sarah Knight, Jonathan Flavell* and Sven Mattys (University of York) Sounds easy, looks nice: The crossmodal transfer of auditory processing fluency to visual object preference.

13:00  Break
START OF PARALLEL SESSIONS

Session A - Lecture Theatre RCH/037

13:30  Vesko Varbanov*, Paul Overton and Tom Stafford (University of Sheffield) (Sponsor: Tom Stafford) Unravelling the Anxious Nexus- or what role does anxiety play in the interaction between ADHD, Autism and sensory processing traits in a sub-clinical sample.

14:00  Daniel Poole, James Grange and Elizabeth Milne (University of Sheffield, Keele University) Distractor suppression in autistic and neurotypical adults.


15:00  Amy Atkinson, Beatriz Pinheiro Sanchez*, Matthew Warburton, Heather Allmark* and Richard Allen (Lancaster University, University of Leeds) Is the ability to direct attention in working memory impaired in individuals with ADHD?

15:30  Tea / Coffee

16:00  2024 EPS / BSA Undergraduate Prize Talk by Didem Yurdakul

16:45  Break

17:00  13th Frith Prize Lecture - Lecture Theatre RCH/037
      Sara De Felice, University of Cambridge
      The social dynamics of learning with others.

18:00  Poster Session with accompanying wine reception.

      EPS Poster Session - Online Posters and Talk Through Videos
START OF PARALLEL SESSIONS

Session B - Lakehouse Lecture Theatre

13:30  Stefan Schweinberger, Jurgen Kaufmann*, Andrea Kowallik*, Katharina Limbach*, Verena Skuk* and Celina von Eiff* (Department for General Psychology and Cognitive Neuroscience, Friedrich Schiller University, Germany, Voice Research Unit, Friedrich Schiller University, Germany, Visual Communication (ViCom), Germany, German Center for Mental Health (DZPG), Germany, University of Technology, Germany) Vocal and facial communication: Tools for basic science, assessment and intervention.

14:00  Sumeyye Ozkaya* and Isabelle Mareschal* (Queen Mary University of London) (Sponsor: Nadine Lavan) Emotion recognition and stress reactivity to solitude in subclinical anxiety and depression.

14:30  Leora Sevi*, Caroline Catmur and Geoffrey Bird (University of Oxford, King’s College London, University of Birmingham) (Sponsor: Geoffrey Bird) Personality information shapes judgment of emotion from expressions according to idiosyncratic priors and their precision.

15:00  Douglas Martin, Ewan Bottomley*, Jacqui Hutchison*, Agnieszka Konopka, Carolyn Dallimore*, Gillian Slessor and Rachel Swainson (University of Aberdeen, Open University) Social category modulation of emotion categorisation.

15:30  Tea / Coffee

16:00  2024 EPS / BSA Undergraduate Prize Talk by Didem Yurdakul

16:45  Break

17:00  13th Frith Prize Lecture - Lecture Theatre RCH/037
Sara De Felice, University of Cambridge
The social dynamics of learning with others.

18:00  Poster Session with accompanying wine reception.

EPS Poster Session - Online Posters and Talk Through Videos
Session A - Lecture Theatre RCH/037

09:15  Ed Donnellan*, Kate Messenger and Chiara Gambi (University of Warwick, Lancaster University, Cardiff University) (Sponsor: Emma James) Stronger incorrect (and then revised) predictions improve 4-year-olds' sentence structure comprehension: Evidence from eye-tracking.

09:30  Nicola Dawson*, Mothen Zhang and Kate Nation (University of Oxford) (Sponsor: Kate Nation) The influence of individual and item-level characteristics on morphological processing in child and adolescent readers.

09:45  Shi Hui Wu*, Kayleigh Warrington*, Erik Reichle*, Kevin Paterson and Sarah White (University of Edinburgh, University of Leicester, Macquarie University, Australia) (Sponsor: Sarah White) Parafoveal preview of short words during reading and skimming.

10:00  Dominic Guitard, Nelson Cowan and Jean Saint-Aubin (Cardiff University, University of Missouri, USA, Universite de Moncton, Canada) Bilingual transfer of learning: The influence of multiple lexicons on learning.

10:15  Emily Williams, Matthew Warburton, Faisal Mushtaq and Ryan Morehead (University of Leeds) The Typability Index: A tool for measuring and controlling for typing difficulty.

10:30  Tea / Coffee

11:00  Trisevgeni Papakonstantinou*, Ivan Leong* and David Lagnado (University College London) (Sponsor: David Lagnado) Humans generate auxiliary hypotheses in response to information conflicts.

11:15  Kalvin Roberts*, Ines Jentzsch and Thomas Otto* (St Andrews University) (Sponsor: Ines Jentzsch) Modality switching (and the absence thereof) modulates the redundant signal effect.

11:30  Rachel Hagan*, Ralph Pawling, Francis McGlone and Susannah Walker (Liverpool John Moores University, Aalto University, Finland) (Sponsor: Susannah Walker) No evidence for goal priming or sensory specific satiety effects following exposure to ambient food odours.

11:45  Alexis Garsmeur* and André Knops* (Universite Paris Cite, France) (Sponsor: Silke Goebel) Does a joint numerical magnitude code underpin the processing of symbolic and non-symbolic quantities?

12:00  EPS Business Meeting for Ordinary and Postgraduate Members
Lecture Theatre RCH/037

12:30  EPS Speed Mentoring
Thursday 4th July, am

Session B - Lakehouse Lecture Theatre


09:30  Rochelle Williams* and Lucia Garrido (City, University of London) (Sponsor: Lucia Garrido) Investigating the relationship between dyadic person similarity and face judgement similarity.

09:45  Siew Kei Kho* and Alejandro Estudillo (Bournemouth University) (Sponsor: Alejandro Estudillo) Own- and other-race face learning in high and low variability.

10:00  Kristen Baker*, Niall Brenock* and Markus Bindemann (University of Kent) (Sponsor: Mike Burton) Individual differences in choice blindness predict unfamiliar face matching.

10:15  Amelia Turner Kohl*, James Sauer* and Matthew Palmer* (University of Birmingham, University of Tasmania, Australia) (Sponsor: Heather Flowe) The theoretical basis of recognition-ratings: An inferential approach vs a psychophysical approach to confidence.

10:30  Tea / Coffee

11:00  Anna Crossland* and Catherine Preston (University of York) (Sponsor: Catherine Preston) Recognising, identifying, interpreting and reacting to internal bodily signals during pregnancy: A scale development study.

11:15  Elisabeth Bradford, Katharine Chadbourn* and Nina Fisher* (University of Dundee, Aston University, Edinburgh Napier University) Positive perceptions of Autism in job applications by Autistic and allistic raters.


11:45  Eva Rubinova and Pia Pennekamp* (University of Aberdeen, University of Arkansas, USA) Credibility of eyewitness identification decisions depends on the format of confidence expression.

12:00  EPS Business Meeting for Ordinary and Postgraduate Members
Lecture Theatre RCH/037

12:30  EPS Speed Mentoring
Thursday 4\textsuperscript{th} July, pm

\textit{Session A - Lecture Theatre RCH/037}

\textbf{EPS Bartlett Prize Lecture Symposium}
Organised by Karalyn Patterson.

\begin{itemize}
\item[14:00] \textbf{James McClelland} (Stanford University, Google DeepMind) Attending to hemispatial neglect: Insights and challenges from the research of Marlene Behrmann.
\item[14:30] \textbf{David Plaut, Nicholas Blauch and Marlene Behrmann} (Carnegie Mellon University) Cortical organization as optimization: Topography and lateralization in high-level vision.
\item[15:00] \textbf{Alex Leff} (University College London) The curses of relearning specificity.
\item[15:30] \textbf{Tea / Coffee}
\item[16:00] \textbf{Matthew Lambon Ralph} (University of Cambridge) When “double vision” is good for you: Looking beyond the occipitotemporal cortex to the anterior temporal lobes, bilaterally, brings resilient meanings to life.
\item[16:30] \textbf{Randi Starrfelt} (University of Copenhagen, Denmark) The neuropsychology of face, word and object recognition.
\item[17:00] \textbf{Karalyn Patterson} (University of Cambridge) Abnormal word length effects in reading: Two stones with one bird.
\item[17:30] \textbf{Break}
\item[17:45] \textbf{52\textsuperscript{nd} EPS Bartlett Prize Lecture - Lecture Theatre RCH/037}
\textbf{Marlene Behrmann, University of Pittsburgh, USA}
The development, hemispheric organization, and plasticity of high-level vision.
\item[19:30] \textbf{Conference Dinner}
\end{itemize}
**Session B - Lakehouse Lecture Theatre**

14:00  Mahmoud Elsherif, Sara Middleton*, Jenny Mai Phan*, Flavio Azevedo*, Bethan Iley*, Magdalena Grose-Hodge*, Samantha Tyler*, Steven Kapp*, Amelie Gourdon-Kanhukamwe*, Desiree Grafton-Clarke*, Siu Kit Yeung*, John Shaw*, Helena Hartmann* and Marie Dokovova* (University of Leicester, University of Oxford, Children’s National Hospital, USA, University of Cambridge, Queen’s University Belfast, University of Birmingham, University of Portsmouth, King’s College London, Institute for Globally Distributed Open Research and Education, Chinese University of Hong Kong, China, Edge Hill University, University Hospital Essen, Germany, University of Strathclyde) Bridging neurodiversity and open scholarship: How shared values can guide best practices for research integrity, social justice, and principled education.

14:30  Prerna Aneja*, Samuel Forbes*, Eleanor Johns* and John Spencer* (University of East Anglia, Durham University) (Sponsor: Louise Ewing) Examining the relationship between caregiver and infants' visual cognition in rural India.

15:00  Sophie Meekings*, Lotte Eijk* and Stefany Stankova* (University of York) (Sponsor: Sarah Knight) Testing motor timing theory of stuttering: conflicting evidence for neurotypical and stuttering talkers in a choral speech task.

15:30  Tea / Coffee

16:00  Robert Ward*, Gemma Chatten*, Kanza Jamil*, James Hardy* and Paul Rauwolf* (Bangor University) (Sponsor: Paloma Mari-Beffa) Surprising efficiency of small teams and the constraints of collective knowledge on group decision-making.

16:30  Rui Pereira*, Martina De Lilo, Andrew Bagshaw*, Clare Anderson and Andrew Surtees (University of Birmingham) (Sponsor: Andrew Surtees) The impact of sleep deprivation on social cognition.

17:00  Tom Peney* and Paul Skarratt (University of Hull) (Sponsor: Paul Skarratt) Evaluating virtual reality as a tool for cognition research.

17:30  Break

17:45  52nd EPS Bartlett Prize Lecture - Lecture Theatre RCH/037
Marlene Behrmann, University of Pittsburgh, USA
The development, hemispheric organization, and plasticity of high-level vision.

19:30  Conference Dinner
START OF PARALLEL SESSIONS

Session A - Lecture Theatre RCH/037

09:00 Poster Session with accompanying tea, coffee and pastries.

EPS Poster Session - Online Posters and Talk Through Videos

10:00 Linda Lidborg*, Mike Burton and Holger Wiese (Durham University, University of York) (Sponsor: Holger Wiese) Simultaneous activation of multiple face representations.

10:30 Matthew Rouse*, Siddharth Ramanan*, Ajay Halai*, Angelique Volfart*, Peter Garrard*, Karalyn Patterson, James Rowe* and Matthew Lambon Ralph (University of Cambridge, Queensland University of Technology, Australia, St George's, University of London) (Sponsor: Matthew Lambon Ralph) The impact of bilateral versus unilateral anterior temporal lobe damage on face recognition, person knowledge and semantic memory.

11:00 Judith Lowes*, Peter Hancock and Anna Bobak (University of Stirling) (Sponsor: Peter Hancock) An in-depth investigation of face perception in developmental prosopagnosia.


12:00 Lunch
START OF PARALLEL SESSIONS

Session B - Lakehouse Lecture Theatre

09:00  Poster Session with accompanying tea, coffee and pastries.

EPS Poster Session - Online Posters and Talk Through Videos

10:00  Rachael Hulme, Po-Heng Chen*, Chia-Lin Lee* and Jennifer Rodd (Heriot-Watt University, University College London, National Taiwan University, Taiwan) Learning new word meanings as we age.

10:30  Rob Davies, Sarah Chadwick*, Michael Ratajczak* and Mathew Gillings* (Lancaster University, Verian Group, Vienna University of Economics and Business, Austria) Does plain language result in clear communication?

11:00  Laurence White, Sven Mattys, Sarah Knight, Tess Saunders* and Laura Macbeath* (Newcastle University, University of York) Investigating durational predictions in speech via non-word segmentation tasks.

11:30  Cheng-Yu Hsieh*, Marco Marelli* and Kathleen Rastle (Royal Holloway, University of London, University of Milano-Bicocca, Italy, NeuroMI, Milan Center for Neuroscience, Italy) (Sponsor: Kathleen Rastle) Making sense of Chinese compound words.

12:00  Lunch
**Session A - Lecture Theatre RCH/037**

13:00  
**Sandra Lagator**, **Tom Beesley**, **Clara Muniz-Diez** and **Mark Haselgrove**  
(University of Nottingham, Lancaster University) (Sponsor: Mark Haselgrove)  
Modulation of within-stimulus learning by cue-outcome correlation.

13:30  
**Carlotta Zona** and **Martin Fischer** (University of Potsdam, Germany) (Sponsor: Martin Fischer)  
Mapping conceptual spaces for number retrieval.

14:00  
**Thora Bjorns dottir**, **Iris Holzleitner** and **Keiko Ishii** (University of Stirling,  
University of the West of England, Nagoya University, Japan)  
Culture and sexual orientation predict preferences for facial femininity/masculinity.

14:30  
**Shasha Wei**, **Catherine Preston** and **Daniel Baker** (University of York) (Sponsor:  
Daniel Baker)  
Suppression and (no) summation in vibrotactile signal combination between digits.

15:00  
**Break**

15:30  
**Soazig Casteau**, **Amanda Ellison** and **Daniel Smith** (Durham University)  
Do the eye-movement system and the arm-movement system contribute independently to  
attentional orienting: a TMS study.

15:45  
**Karla Evans** and **Lyndon Rakusen** (University of York)  
Different neuronal signatures of attentional allocation for two processes supporting visual awareness of  
complex scenes.

16:00  
**Daniel Smith** and **Soazig Casteau** (Durham University)  
Competitive interactions between VSWM and motor programming guide presaccadic attention.

16:15  
**Matthew Mak**, **Lewis Ball**, **Alice O’Hagan**, **Catherine Walsh** and **Gareth Gaskell**  
(University of Warwick, University of York, University of Oxford, National Institutes of Health, USA)  
Episodic involvement in language comprehension: Evidence from unrelated words.

16:30  
**End of Meeting**
Session B - Lakehouse Lecture Theatre

13:00 Maria Korochkina*, Marco Marelli*, Marc Brysbaert and Kathleen Rastle (Royal Holloway, University of London, University of Milano-Bicocca, Italy, Ghent University, Belgium) (Sponsor: Kathleen Rastle) What can children learn about English morphology through book reading?


14:00 Lena Blott, Anna Gowenlock*, Yifei Hu*, Rogier Kievit, Adam Parker, Kate Nation and Jennifer Rodd (University College London, University of Mannheim, Germany, Radboud University, The Netherlands, University of Oxford) Individual differences in word-meaning disambiguation in sentence contexts.

14:30 Ramya Balakrishnan*, Tirso Gonzalez Alam, Nick Souter, Bronte Mckeown*, Theodoros Karapanagiotidis*, Katya Krieger-Redwood* and Elizabeth Jefferies (University of York, University of Sussex, Queen’s University, Canada) (Sponsor: Elizabeth Jefferies) Investigating the effects of Stroke Infarct: Comparisons between simulated and real lesions and understanding post-stroke Semantic Aphasia in gradient space.

15:00 Break

15:30 Ruolan Zhang*, Colette Hirsch* and Charlotte Russell (King’s College London) (Sponsor: Charlotte Russell) Mood modulates the relationship between emotion and contextual details in episodic memory.

15:45 Ali Mair* (University of Leeds) (Sponsor: Richard Allen) Remembering repeated events.

16:00 Adam Curtis*, Maria Wimber and Aidan Horner (University of York, University of Glasgow) (Sponsor: Aidan Horner) Schema-effects in temporal order memory.

16:15 Hong-Viet Ngo-Dehning*, Julia Carbone, Jan Born and Niels Niethard (University of Essex, University of Tuebingen, Germany) (Sponsor: Geoffrey Ward) Closed-loop targeted memory reactivation to strengthen and forget memories?

16:30 End of Meeting
Poster session one will be held in the Atrium, Ron Cooke Hub, between 6pm and 7pm, with an accompanying wine reception.

EPS Poster Session - Online Posters and Talk Through Videos

1. Abigail Bradshaw, Clément Gaultier*, Clare Press and Matt Davis (MRC Cognition and Brain Sciences Unit, University of Cambridge, Experimental Psychology, University College London, Wellcome Centre for Human Neuroimaging, University College London) Effects of expectedness and clarity of speech auditory feedback on perception and motor control.


3. Alexandra Cleland (University of Aberdeen) SNARC effects for non-symbolic representations of quantity.


5. Connor Malby*, James Strachan* and Merryn Constable (Northumbria University, University Medical Center Hamburg-Eppendorf, Germany) (Sponsor: Andrew Bayliss) Novel stimuli and self-prioritization: AI generated art.


8. Damar Hoogland* and Laurence White (Newcastle University) (Sponsor: Laurence White) Listeners’ perceptions of conversational response timing in English and Dutch.

9. Daphne Weiss*, Arthur Samuel* and Efthymia Kapnoula (Basque Center on Cognition, Brain and Language (BCBL), Spain, University of the Basque Country (UPV/EHU), Spain, Stony Brook University, USA, Basque Foundation for Science (Ikerbasque), Spain) (Sponsor: Efthymia Kapnoula) The effect of lexical co-activation on novel word learning.


12. Greta Mohr* and David Lagnado (University College London) (Sponsor: David Lagnado) Research Plan - Exploring counterfactual thinking and confidence in everyday medical decision-making.
13. **Hannah Kirsop**, **Lisa Henderson** and **Scott Cairney** (University of York) (Sponsor: Lisa Henderson) Understanding the role of executive control in the sleep and mental health relationship.


15. **Helen Olawole-Scott**, **Sam Gilbert** and **Daniel Yon** (Birkbeck, University of London, Goldsmiths, University of London, University College London, l’Institut d’études avancées de Paris, France) (Sponsor: Daniel Yon) Expectations about precision in the human brain.


17. **Jasmine Spencer**, **Hasibe Kahraman** and **Elisabeth Beyersmann** (Macquarie University, Australia) (Sponsor: Kate Nation) The bestersell effect: Findings on positional encoding of morphemes in visual word recognition.


19. **Joseph Ventress**, **Merryn Constable** and **James Strachan** (Northumbria University, University Medical Center Hamburg-Eppendorf, Germany) (Sponsor: Andrew Bayliss) Research Plan - Investigating task difficulty and stakes in human-human handovers.

20. **Jason Rajsic** (Northumbria University) (Sponsor: Peter Moseley) Does target-location repetition bias attention in a competitive first-person shooter?

21. **Jemma Sedgmond**, **Jordan Beaumont**, **Cassandra Lowe** and **Scott Jones** (University of the West of England, Sheffield Hallam University, University of Exeter) (Sponsor: Scott Jones) Research Plan - The role of methodological differences and participant expectations on tDCS outcomes.

22. **Josh Khoo** and **Roni Tibon** (University of Nottingham) (Sponsor: Roni Tibon) Unitization based memory enhancement in younger and older adults.


27. **Sean McCarron*** and Kate Nation (University of Oxford) (Sponsor: Kate Nation) Predictive processing of L2 idioms: A web-based eye-tracking study.


29. **Sofia Hryniv**, Elian Fink*, Merideth Gattis* and Hana D'Souza (Cardiff University, University of Sussex) (Sponsor: Rob Honey) Everyday language environments of young children with Down syndrome.


31. **Einar Andreassen**, Chris Frith and Daniel Yon (Birkbeck, University of London, Institute of Philosophy, University of London, Wellcome Centre for Human Neuroimaging, l'Institut d'études avancées de Paris, France) (Sponsor: Daniel Yon) Public communication alters private confidence.

32. **Marius Boeltzig**, Nina Liedtke* and Ricarda Schubotz* (University of Muenster, Germany) (Sponsor: Aidan Horner) The effect of prediction errors on memory representations of naturalistic episodes.

33. **Yicheng Qiu**, Catie Hopkins*, Gareth Gaskell and Heather Ferguson (University of Kent, University of York) (Sponsor: Heather Ferguson) Testing the capacity of sleep to consolidate social interactions and memories.
Poster session two will be held in the Atrium, Ron Cooke Hub, between 9am and 10am, with accompanying pastries, tea and coffee.

EPS Poster Session - Online Posters and Talk Through Videos

1. **Arianna Moccia*, Simon James* and Aidan Horner** (University of York) (Sponsor: Aidan Horner) Research Plan - Assessing forgetting across a representational hierarchy.

2. **Beth Richards*, Henning Holle, Paul Skarratt and Shane Lindsay** (University of Hull) (Sponsor: Shane Lindsay) The impact of oral and nasal breathing on visual search performance: A pre-registered replication and extension.

3. **Catia Oliveira*, Amy Atkinson, Michelle St Clair*, Gareth Gaskell and Lisa Henderson** (University of York, University of Lancaster, University of Bath) (Sponsor: Lisa Henderson) The stability and role of early sleep on later mental health in children and adolescents.

4. **Drew McLaughlin* and Arthur Samuel*** (Basque Center on Cognition, Brain and Language, Department of Psychology, Stony Brook University, Ikerbasque) (Sponsor: Efthymia Kapnoula) Exposure to second language accent prompts recalibration of phonemic categories.

5. **Eleanor Burton*, Jennifer Shevchenko* and Matthew Coxon** (York St. John University) (Sponsor: Nicola Cutting) The effect of mental imagery on predictions of behavioural engagement in people experiencing dysphoria.


7. **Emel Küçük*, Matthew Foxwell*, Daniel Kaiser* and David Pitcher** (University of York, Justus-Liebig-Universität Gießen, Germany, Philipps-Universität Marburg, Germany) (Sponsor: David Pitcher) The third visual pathway and social information.

8. **Emily Jones*, Natalie Butcher and Christopher Wilson** (Teesside University) (Sponsor: Natalie Butcher) Does vividness extension extend to facial stimuli?

9. **Emma Tecwyn and Angela Nyhout** (York St John University, University of Kent) The development of mental simulation as a strategy for solving problems with multiple alternatives.

10. **Emmanuel Biau* and Francesca Branzi** (University of Liverpool) (Sponsor: Rebecca Jackson) Neural oscillatory dynamics in encoding and retrieval of verbal and non-verbal narratives.

11. **Eva Kimel, Dan Denis*, Gareth Gaskell and Lisa Henderson** (University of York) Developmental and individual differences in coupling between sleep spindles and slow oscillations.

12. **Ewan Murray*, Aidan Horner and Silke Goebel** (University of York, University of Oslo, Norway) (Sponsor: Silke Goebel) More steps, same effect: Spacing increases retention of mathematics procedures of varying complexity.


15. Jessica De La Mare*, Maisie Taylor* and Anthony Lee* (University of Stirling) (Sponsor: Thora Bjornsdottir) Gender role stereotypes, attitudes towards homosexuality, and sexual orientation judgements from faces.

16. Justin Claydon* and Amelia Hunt (University of Aberdeen) (Sponsor: Amelia Hunt) Can I make better decisions for others than I can for myself? The role of agency in a focus-divide dilemma.


23. Tabea-Maria Haase*, Denise Moerel*, Kevin Brooks*, Iain Gilchrist*, Christopher Kent and Anina Rich* (Macquarie University, Australia, University of Bristol, Western Sydney University, Australia) (Sponsor: Christopher Kent) Using magnetoencephalography (MEG) to uncover the neural pattern of motion silencing.
24. Tianyi Wang*, Liory Fern-Pollak* and Jackie Masterson (Department of Psychology and Human Development, IOE, UCL’s Faculty of Education and Society) (Sponsor: Jackie Masterson) Investigation of the influence of visual attention span (VAS) on spelling in Chinese-speaking children aged 10 to 12 years.


27. Yumeng Lyu*, Kevin Riggs and Shane Lindsay (University of Hull) (Sponsor: Shane Lindsay) Research Plan - Beyond correct responses: Test-retest reliability of additional verbal fluency measures.

28. Yvonne Akanno* and Blair Saunders* (University of Dundee) (Sponsor: Elisabeth Bradford) Exploring desire-goal conflict across cultures: A cross-sectional study of collectivist and individualistic cultures.


31. Ryan Elson*, Denis Schluppeck* and Alan Johnston (University of Nottingham) (Sponsor: Alan Johnston) Slightly non-frontal faces are represented more precisely than frontal faces.

32. Layla Unger*, Emily Weichart* and Vladimir Sloutsky* (University of York, Ohio State University, USA, Utah State University, USA) (Sponsor: Emma James) Without even trying: How incidental exposure shapes category learning.

33. Nicoleta Gavrila*, Tom Hartley* and Silke Goebel (University of York, University of Oslo, Norway) (Sponsor: Silke Goebel) Developmental changes in symbolic and non-symbolic number processing.

34. Brian Mathias and Johannes Koehn* (University of Aberdeen) Benefits of multimodal encoding in second language vocabulary acquisition.
No effects of predictability on word-meaning priming and incidental memory.

Vanessa Keller¹, Matthew Mak², Scott Cairney¹ and Gareth Gaskell¹
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Encountering a homonym in a sentential context that biases interpretation towards its subordinate meaning leads to that meaning subsequently being more easily accessible (word-meaning priming). Word-meaning priming is not restricted to homonyms (Curtis et al., 2022), and may be supported by general episodic memory processes (Gaskell et al., 2019). The episodic context account predicts that word-meaning priming may be affected by factors that have been shown to affect episodic learning (e.g., prediction error; Quent et al., 2022). Four pre-registered online experiments tested whether contextual predictability affects word-meaning priming and incidental memory for language. We exposed participants to sentences that emphasised a particular aspect of a sentence-final target word’s meaning. Importantly, target words differed in how predictable they were based on the sentence context (e.g., “You can get in a good workout by riding a bicycle” vs. “You can get in a good workout by lifting a bicycle”). Associate production and semantic relatedness judgement were used to assess the strength of word-meaning priming. Contrary to our hypotheses, while there was evidence for priming across experiments, we found no effects of contextual predictability in any of our experiments. Our findings suggest that prediction-error-based updating is rarely triggered during language comprehension.


The semantic control network preferentially activates for the control of meaningful stimuli, yet task process and stimulus format matter.

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The ability to selectively access and manipulate meaningful information based on context demands, relies upon a left-dominant ‘semantic control’ network (SCN) of frontal and posterior temporal cortices. Surprisingly, this appears to differ anatomically from the multiple demand network (MDN) proposed to perform similar control operations across domains. However, prior comparisons are confounded by variations in task design. We performed two fMRI experiments to elucidate these differences and determine their driving factors. Firstly, we disentangled the effects of task process and stimulus domain during cognitively demanding tasks for the first time. Participants performed an odd-one-out task requiring inhibition and selection, and an n-back working memory task, each with meaningful semantic and non-semantic stimuli, in a factorial design. While task process was
determined to be a confounding factor, core SCN areas preferentially engaged for semantic stimuli even with matched task processes. This differed from peripheral SCN and MDN regions. Secondly, we separated the effects of the meaningful nature of the stimuli from its verbal or pictorial format. We again compared activation for the controlled selection of meaningful words and meaningless shapes, while adding meaningful pictures. While frontal SCN regions are driven by meaning, posterior temporal regions show greater variation by stimulus format.

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Can the use of semantic elaboration explain working memory development in childhood?

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Children’s working memory (WM) capacity increases steadily during elementary school years, yet the sources of such development are not yet fully understood.Accounts have traditionally focused on speed-based explanations of WM development, e.g., faster rehearsal rates, and/or on storage growth, e.g., an enlarging attentional focus with storage properties. Here we investigated the role of a third possible driving mechanism of WM development: the proficiency in using semantic elaboration to encode the memorized material. If the ability to use elaboration can explain some of the development, we expected that training children on an elaboration strategy should mitigate age-differences in capacity. Thirty-two first-graders (elaboration group) were trained to create short stories to memorize lists of four objects for serial order reconstruction, and compared to 30 same-age peers (control group) and 28 adults to whom no strategy-specific instructions were given. All participants responded to a questionnaire on their strategy use at the end of the procedure. Although the training drastically changed children’s strategy reports (BFs < 100), it did not commensurately improve their WM capacity estimates (BF = 0.80). From our results thus far, growing levels of proficiency in using semantic elaboration cannot account for WM development in childhood.

Spatial listening in a bilingual dual-language context.

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In the context of speech perception, energetic masking (EM) refers to spectrotemporal overlap between to-be-attended (target) and to-be-ignored (masker) talkers. EM reduces target intelligibility, but can be ameliorated by spatially separating the talkers (spatial release from EM; SREM). Research demonstrates that EM is more detrimental to L2 (second language) than to L1 (first language) perception. We therefore examined how SREM impacts L1-Spanish and L2-English processing during a selective listening (SL, N=98, Experiment 1) and a divided listening (DL, N=80, Experiment 2) task. In both tasks, participants heard one English and one Spanish sentence
simultaneously, either collocated (diotic) or dichotic (one sentence in each ear). The target sentence was cued either before (SL) or after (DL) stimulus presentation. In both tasks, sentence transcription was better for L1 than L2. It was also better in the dichotic than the collocated condition (SREM), and this effect was larger in the SL task due to costs associated with spatial separation in the DL task. There were no interactions between language and spatial separation, suggesting that SREM did not impact L1 and L2 processing differently. This implies that bilinguals can utilise spatial cues to improve listening to the same extent in both languages.

Representation of actions within a conceptual space.

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We evaluate the actions of other individuals based upon their movements and postures that reveal critical information to guide our decision making and behavioural responses. These signals convey information about the actor, their goals, intentions and internal mental states. To understand the structure of the conceptual space underlying action representation we assessed which action qualities were fundamental, and how individuals perceived actions on these dimensions. 240 different actions were rated by 230 participants on 23 action characteristics. Exploratory Factor Analysis showed that action space was four-dimensional, with the dimensions: friendly-unfriendly, formidable-feeble, intentional-accidental, abduction-adduction. We developed an action morphing method that used source actions located within action space to generate novel actions that lay along the different action dimensions. We measured action discrimination along each dimension using adaptive 2-AFC procedures, and found considerable variation in perceptual thresholds, varying up to ~1100%. This interindividual variation in action perception could not be explained by autistic traits. Together, our results show that actions are perceived on 4 fundamental dimensions: Friendliness and Formidableness appear similar to dimensions underlying face trait evaluation, whilst Intentionality and Abduction appear unique to actions. Our isolation of these dimensions allows the investigation of the conceptual representation of human actions.

Testing boundary conditions to the lower acceptability of non-informational nudges.

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Nudges can be perceived as less acceptable if non-informational (e.g., Felsen et al., 2013), however it is possible that they could become more acceptable under some conditions. After replicating the acceptability of informational nudges over non-informational ones in Experiment 1, experiments 2 and 3 tested social urgency as a boundary condition (as proposed by Bovens, 2009). Reading a news article on financial distress due to debt (the nudge domain) did not affect the difference in
acceptability between informational and non-informational nudges (experiment 2); nor did learning about a higher base rate of people in financial distress. In experiment 4, we manipulated the beneficiary of the nudge, which could be the person being nudged or society more broadly, as well as the hypothetical target of it (i.e., the hypothetical decision maker); we found no evidence either of the acceptability of informational nudges varying according to the target or the beneficiary. Finally, in experiment 5, we tested if evaluating hypothetical or experienced nudges would influence their acceptability: transparent nudges were again perceived as more acceptable, even when participants learnt they were just exposed to it by the experimenter. We therefore discuss the robustness of the preference for informational nudges over non-informational ones.

Making oneness cognitively salient and examining its effect on helping Syrian and Ukrainian refugees.

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This study investigates the impact of enhancing cognitive salience of oneness with all humanity on prosocial behaviours towards Syrian and Ukrainian refugees. In one exploratory (N = 165) and one preregistered confirmatory experimental study (N = 180), we found that participants exposed to manipulations increasing the salience of oneness reported significantly higher levels of perceived oneness with both refugee groups compared to the control group. Moreover, individuals primed with the idea of oneness with all humanity reported heightened oneness with refugees, and this in turn predicted higher willingness to donate to both Syrian and Ukrainian refugees. The findings underline the potential of cognitive interventions in fostering oneness with all humanity to improve tangible support for refugees.

Sounds easy, looks nice: The crossmodal transfer of auditory processing fluency to visual object preference.

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Fluent (i.e., rapid and efficient) processing of perceptual objects is vital for humans to successfully navigate their environments. Fluent processing is supported by reinforcement processes, which trigger positive affect. This affect may then be misattributed to the objects themselves, meaning that easy-to-perceive objects are judged more positively. These fluency-based preference effects have been robustly demonstrated unimodally in situations in which fluency and preference are manipulated and measured for the same objects. However, little is known about how this effect operates crossmodally, when manipulations of fluency in one domain are combined with preference judgements for unmanipulated objects in another domain. In 5 experiments, we manipulated perceptual fluency in a simple auditory task. Participants performed this auditory task whilst viewing visual objects, which they then rated for liking. We found that objects presented with easier (more fluent) auditory stimuli received higher liking ratings. This effect persisted when a temporal lag was

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introduced between the auditory/visual components, and appeared to be weaker for static than moving objects. These results suggest that fluency-based effects extend crossmodally, furthering our understanding of both crossmodal perception and fluency-related judgements. They also have implications for real-world contexts involving preference and attitude change.

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Unravelling the Anxious Nexus- or what role does anxiety play in the interaction between ADHD, Autism and sensory processing traits in a sub-clinical sample.

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Attention deficit hyperactivity disorder (ADHD) and Autistic spectrum disorder (ASD) are the two most common neurodevelopmental disorders with 50-80% overlap. In addition, core symptoms of one can be identified in the other, such as the case with attention problems present in ASD. They also present with similar comorbid conditions, such as sensory processing difficulties. A voluminous body of research has shown the abnormal processing of sensory information in cohorts with ADHD and ASD. In our last study we used sensory processing to establish if the two come from a common neural substrate. Results suggested that intermediary conditions, more specifically somatic anxiety, are a stronger factor in connecting ADHD/ASD and sensory processing than a unitary neural substrate. Building upon these insights, we investigated the mediating role of anxiety in the interplay between sensory processing, ADHD, and ASD traits. We employed a comprehensive approach, combining assessments of sensory discrimination thresholds with self-reported measures of sensory experiences, ADHD symptoms, and ASD traits. Our findings revealed that anxiety fully mediated the relationship between sensory processing and ADHD-hyperactive subtype but the same was not confirmed for ASD, suggesting that these disorders are not solely products of a common neural substrate. Instead, their complex presentations are influenced by diverse intermediary (comorbid) factors.

Distractor suppression in autistic and neurotypical adults.

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The objectives of this work were a) to better characterise distractor interference in autistic and neurotypical participants b) to test whether location cues can improve distractor suppression. The ultimate aim is to assess whether autistic people can use advanced information to reduce distractor interference. In Experiment 1, 153 autistic and 147 neurotypical adults completed an online flanker task. In line with previous work, response time congruency effects were increased in the autistic group. Fitting participant data to a model of spatial selective attention developed from the drift diffusion framework (the shrinking spotlight model) revealed that interference time was increased in the autistic group. This provides evidence that distractors were less effectively suppressed. Notably,
response conservativeness was also increased in the autistic group, highlighting the value of modelling the decision-making process when comparing groups. In the second set of studies (with stage 1 acceptance as a registered report https://osf.io/v3749), we used a hybrid flanker-visual search-spatial cueing paradigm to investigate whether neurotypical participants can use explicit distractor location cues to facilitate suppression. Cues did not modulate reaction time congruency effects (Experiment 2), including when cue type was blocked (Experiment 3) nor when the foil and target location were separated (Experiment 4). This suggests that explicit location cues do facilitate distractor suppression.

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The importance of interoceptive evaluation and the validation of a novel questionnaire measure.

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Interoception, defined as one’s ability to detect and interpret internal, bodily signals, has been implicated in the development of various mental health conditions, including anxiety. It has also been linked to autism. This presentation will briefly outline results from a reflexive thematic analysis of interviews with thirteen autistic adolescents who reported experiencing significant anxiety. Interoceptive evaluation, defined as the cognitive appraisal and affective interpretation of interoceptive signals, emerged as a key theme when participants discussed the role interoception played in their experiences of anxiety. Many participants reported catastrophising about interoceptive sensations or finding them intensely unpleasant. These results, combined with the lack of well-validated quantitative measures of interoceptive evaluation, prompted the development of a novel measure of interoceptive evaluation: The Negative Interoceptive Evaluation Scale (NIES). This measure was validated on a combined sample of 1164 English speaking adults. This presentation will outline the results of this validation, including convergent and divergent validity, known group analyses, and exploratory and confirmatory factor analyses. Overall, results support the validity of the NIES, and findings show, as expected, that participants who report more negative evaluation of interoceptive sensations are more likely to self-report having a mental health condition.

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Is the ability to direct attention in working memory impaired in individuals with ADHD?

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There is clear evidence that adults can prioritise particularly valuable information in working memory. However, as research to date has primarily focused on neurotypical individuals, it is unclear whether this effect would be observed in other groups. Individuals with ADHD often experience difficulties with working memory tasks and may struggle to focus on particularly valuable information. A pair of experiments were conducted online to investigate this. Individuals with self-reported ADHD and controls were presented with sequences of coloured shapes. After a brief delay, the outline of each shape was presented, and participants were asked to report the colour associated with it. Prior to encoding, participants were either told that all items were worth the same number of points, or that the first item presented was worth more points than the rest. The experiments differed in their provision of feedback; with trial-by-trial feedback present in Experiment 1, but absent in Experiment 2. In both experiments, individuals with ADHD and controls were able to prioritise particularly valuable information in working memory, with no significant differences between groups. Taken together, these experiments demonstrate no impairment in the ability to prioritise valuable information in working memory in individuals with ADHD.

Vocal and facial communication: Tools for basic science, assessment and intervention.

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Social interaction is a driver to brain development, and socio-emotional cues are fundamentally multimodal in nature, with strong overlap between neural systems mediating production and perception (Frühholz & Schweinberger, 2021). Example 1 regards vocal emotion perception in cochlear implant (CI) users. Despite extensive research on speech comprehension with a CI, research on abilities to perceive emotional prosody is largely missing - despite findings that emotional communication skills can be as important for quality of life (QoL) as speech perception. Here we show how parameter-specific voice morphing tools can promote objective assessment of acoustic voice processing with a CI, and how perceptual training with emotional caricatures can help CI users to enhance vocal emotion perception skills. Example 2 uses automatic emotion recognition tools to quantify imitation. Our results show that emotion recognition of adults with autism can benefit from imitation, both in the face (2a) and voice domain (2b). Example 3 presents a training study with parameter-specific caricature training (shape vs. texture caricatures) which suggests that these different training regimes can elicit differential functional benefits in people with poor face
recognition skills. Overall, these digital tools are promising both for diagnostics of nonverbal social skills and for interventions that benefit communication.


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2 Competence Center for Interdisciplinary Prevention, Jena, Grant Reference 1.2.14.24

Emotion recognition and stress reactivity to solitude in subclinical anxiety and depression.

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Stress reactivity refers to increased negative affective responses to adverse daily experiences including social interactions and solitude. Altered cognitive processing of specific emotional stimuli in affective disorders may influence these reactions. This study investigated the effects of emotion recognition on momentary affect during solitude in 55 adults with subclinical depression and anxiety. Emotion recognition is tested using animated clips depicting morphed image sequences transitioning from neutral to sad, angry, happy or fearful expressions. Following the experiment, the Experience Sampling Method (ESM) was utilised to record participants' affect levels and subjective pleasantness of daily experiences seven times a day for six consecutive days. Results revealed no associations between emotion recognition ability and perceived stressfulness of solitude or momentary affect levels. Effects of the interactions between emotion recognition patterns for different facial expressions and solitude stressfulness on affect levels were discussed. The diminished ability to effectively identify negative and positive emotional facial expressions may contribute to variations in affective reactions to being alone, irrespective of depression and anxiety symptomology.

Personality information shapes judgment of emotion from expressions according to idiosyncratic priors and their precision.

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We do not infer the emotions of others in a vacuum of information about their traits. However, emotion recognition research, using anonymous target stimuli, has not considered how this potentially important source of information might be integrated. We theorised that providing personality information about targets (arbitrarily attributed and counterbalanced across participants) would alter the judgment of emotions from their facial expressions compared to judgments made prior to any trait information, depending on participants' idiosyncratic beliefs about the direction and magnitude of the relationships between traits and emotions. This hypothesis was supported across
five studies (total N = 455), using both artificially-generated and real static and dynamic expression stimuli, and employing two paradigms, one requiring explicit ratings of emotion and the other matching of expressions. Moreover, the effect of participants' trait priors was greatest when the prior was more precise (i.e., they believed the trait to be more diagnostic regarding the emotion) and combined with expressions judged to be less precise, aligning with Bayesian theories of cue integration. Our findings highlight an important role for trait information in shaping judgments of emotion, with broader implications regarding the relationship between the processes of impression formation and emotion inference.

Social category modulation of emotion categorisation.

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There is evidence emotion categorization is influenced by the social category membership of target faces, with sex and race modulating the ease with which perceivers can categorize happy and angry emotional expressions. However, theoretical interpretation has been constrained by gender and race imbalances in both the participant samples and target faces typically used in experiments (e.g., most participants have been White women and most Black targets have been men). The current research used gender and racial identity matched samples (Expt. 1), and manipulations of social context (Expt. 2 & Expt. 3), to establish whether the emotion categorization is influenced by interactions between the social category membership of perceivers and target faces. We found this was the case, with reliable happy face advantages in reaction times for in-group targets but not necessarily for out-group targets. White targets and female targets were the only categories associated with a reliable happy face advantage independent of perceiver category. The interactions between perceiver and target social category were eliminated when targets were blocked by social category (e.g., a block of all White female targets; Expt. 2). These findings support the possibility that contextually sensitive intergroup processes influence emotion categorization.
Social interaction is special. Yet, its successful elements and impact on learning remain unclear. This presentation explores how social interaction supports declarative learning, focusing on ecological validity. Through experiments featuring unconstrained teacher-learner interactions and documentary-like learning materials, this work examines knowledge acquisition dynamics. First, I discuss studies on adult learning in online contexts, including a large sample of autistic adults. Findings show that live interaction with a full view of the teacher results in the best performance compared to other conditions (e.g., recorded videos, obstructed views). Second, I present face-to-face interaction paradigms, using functional Near-Infrared Spectroscopy (fNIRS) hyperscanning and wavelet transform coherence (WTC) analysis to measure brain synchrony between interacting partners. Evidence shows that co-watching movies and engaging in conversation synchronise brain responses. Additionally, teacher-learner interactions are characterised by an intricate dynamic between neural responses and behavioural metrics, which act jointly to support learning. These results, discussed within the mutual-prediction hypothesis framework, emphasize the need for a multi-modal approach to fully understand social learning's cognitive mechanisms. This research advances our understanding of naturalistic social interaction, offering theoretical insights and practical implications for educational policies. The innovative multi-modal and ecologically valid approach provides an important example of real-world second-person social neuroscience.
Stronger incorrect (and then revised) predictions improve 4-year-olds’ sentence structure comprehension: Evidence from eye-tracking.

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The role of prediction errors in language learning is unclear [1]. To clarify their role in English 4-year-old’s developing comprehension of sentence structure, we focus on double object datives (DOs); sentences in which the recipient of a transfer action (e.g., giving) precedes the theme (e.g., the given object), e.g., “Marshall will give the elephant [recipient] an apple [theme]”. Recently, [2] found tentative evidence that 4-year-olds exposed to sentences encouraging generation of stronger incorrect linguistic predictions (more predictable condition) showed greater improvement in comprehension of DOs (measured by “acting out” the sentence) than those exposed to sentences that did not encourage strong predictions (less predictable condition). Here, we attempted to replicate this finding, additionally measuring prediction using eye-tracking. Unlike [2] we did not find more improvement in DO understanding for those in the more predictable compared to the less predictable condition. However, we found that children who made more strong incorrect predictions that they then revised (predict-and-revise score see [3,4]) showed greater improvements in DO understanding relative to their peers. This provides the first explicit evidence of the role of prediction error in sentence structure learning. We will discuss this novel evidence considering the conflicting finding between our study and [2].


The influence of individual and item-level characteristics on morphological processing in child and adolescent readers.

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Theories of morphological processing during visual word recognition posit that complex words are recognised on the basis of their component morphemes (e.g., kind + ness). However, these models do not account for the role of reading experience in shaping morphological representations. We examined how individual and item-level characteristics influence morphological processing in developing readers aged 11 to 17. Participants completed a lexical decision task which compared responses to nonwords containing an existing stem and suffix (e.g., nutful) and matched nonsuffixed controls (e.g., nutfil). Slower and less accurate responses to nutful compared to nutfil indicate that morphological structure interferes with categorisation of nonwords, known as the ‘morpheme interference effect’. Nonword suffixes varied in frequency in a large corpus of texts written for children (approximately 22 million words), providing an index of suffix familiarity. We also
collected data on individual differences in word reading ability using the Rapid Online Assessment
of Reading ability (ROAR; Yeatman et al., 2021). Nonwords containing more frequently occurring
suffixes showed a greater morpheme interference effect and this was stronger for individuals with
higher reading ability. Our findings indicate that morphological effects in visual word processing are
associated with statistics of the written input and reading expertise.

Yeatman, J. D., Tang, K. A., Donnelly, P. M., Yablonski, M., Ramamurthy, M., Karipidis, I. I.,
online assessment of reading ability. Scientific Reports, 11(1), 6396. https://doi.org/10.1038/s41598-
021-85907-x

Parafoveal preview of short words during reading and skimming.

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Parafoveal processing is central to the mechanisms underlying eye movement control during reading
for comprehension. However, little is known about the role of parafoveal preview during skimming
for gist. This OSF-preregistered study utilized a gaze-contingent boundary paradigm to assess how
task demands can affect parafoveal processing of short words. 64 participants read or skimmed
sentences containing a 3-letter low-frequency critical word (e.g., nap), for which the preview was
either identical or visually-similar (e.g., noy). For first-pass measures there were additive effects of
task and preview: for both tasks, words were more likely to be skipped, and had shorter single
fixations when receiving an identical preview. In contrast, there were larger preview effects during
reading for comprehension for later measures (e.g., regression path duration). The results indicate
that the effects of parafoveal preview on initial processing of short words can be similar during
reading and skimming, but task demands can modulate effects of preview on subsequent rereading
behaviour. We also employed a lexical decision cross-context repetition priming paradigm to
examine whether reading task can modulate continued lexical activation of words after reading. The
implications for developing theoretical accounts of the mechanisms underlying eye movement
control during skimming will be discussed.
Bilingual transfer of learning: The influence of multiple lexicons on learning.

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Despite the fact that over half of the world's population is bilingual (able to speak and understand two languages), our understanding of how bilingual individuals learn new information remains limited. In this research, we aimed to enhance our comprehension of bilingual learning through an adaptation of the Hebb repetition paradigm. We contrast two theoretical possibilities: 1) the dependent lexical hypothesis, which posits that learning in one's primary language facilitates similar learning in a second language; and 2) the independent lexical hypothesis, which suggests that learning in two languages occurs separately, akin to monolingual learning. Through a series of experiments, we presented lists of to-be-remembered items in French or in English in a pseudorandom distribution. Participants were monolingual and bilingual (French-English) individuals. One list was repeated and its language changed twice in the experiment. As expected under the dependent lexical hypothesis, our findings indicate that only bilinguals exhibit significant memory savings when initial learning in one language is followed by learning of the same list translated into the other language. We discuss the importance of embedding multiple lexicons into memory models to understand bilingual memory processes.

The Typability Index: A tool for measuring and controlling for typing difficulty.

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In many experiments, participants are asked to type presented or memorised text, either to ascertain typing speed or to assess the effect of manipulations such as typing practice, emotional induction, or differing input devices. However, fair comparison across conditions demands adequate control of the typing difficulty of text sets. Some conspicuous features are commonly controlled for, such as the number of capitals, numbers, and total characters. However, other features such as syllables per word, frequency of each word in the English language, or whether each letter pair is typically typed by one or two hands, are often neglected but have been found to affect typing behaviour. Using the 136 Million Keystrokes Dataset (Dhakal et al., 2018), where each of the 1,525 sentences were typed by 1,500-1,800 participants, we construct a multiple linear regression to predict the typing difficulty or ‘typability’ of text. From a set of 31 potential predictors, we used random forest regressions to select 10 predictors, which together account for ~75% of the variance in average typing difficulty. To ensure fair comparisons across conditions, where a typing method is employed, we advocate for controlling for text typability and offer an easy-to-use web app for this purpose.


This work was supported by the Leverhulme Trust and Wellcome Trust.
Humans generate auxiliary hypotheses in response to information conflicts.

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Although research in the area of belief updating has flourished in the last two decades, most studies do not treat beliefs as part of a complex and interactive network. In this study, we investigate humans' use of auxiliary hypotheses as a mechanism to resolve information conflicts. In Experiment 1, we replicate a study by Kahneman and Tversky, introducing two additional domain conditions (N=119). Participants construct an initial model, express a prior belief, and face conflicting information. They are then prompted to provide an explanation. Across three domains, only 37% of responses demonstrate belief updating, by attributing the information conflict to the original report being unreliable or invalid. In Experiment 2 (N=89), a within-participant’s manipulation of credibility showed that people are more likely to use auxiliary hypotheses when both sources of conflicting information have high credibility than when they both have low. The effect was not significant for any other combination of credibility cues, including when one source is more credible than the other. Even in the presence of credibility cues to explain away information conflicts by invoking the reliability of either source, participants instead generated auxiliary hypotheses to resolve them in 35% of the cases.

Modality switching (and the absence thereof) modulates the redundant signal effect.

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Responses to bimodal signals are faster than those to their unimodal constituents. This so-called redundant signal effect (RSE) is affected by sequential effects such as modality switching, where changing modality in a random trial sequence causes a slowing of responses. Critically, while unimodal trials can follow full modality switches (e.g., auditory following visual), bimodal trials can follow only partial switches (e.g., audiovisual following visual). Thus, the effect of full modality switches on bimodal responses is unknown. Here, in addition to the standard instruction to detect auditory/visual signals, we presented tactile target signals in the random trial sequence. Consequently, bi- and unimodal trials can follow full modality switches (e.g., an audiovisual following tactile signal). Our data show that modality switching modulates the RSE. Interestingly, unlike their unimodal counterparts, bimodal responses are not (or only marginally) affected by full modality switches. Thus, the observed modulation of the RSE is largely driven by unimodal responses that are slowed due to modality switching. Therefore, understanding modality switching and its differential effect on uni- and bimodal responses will be key to fully understanding the processes underlying the RSE.

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No evidence for goal priming or sensory specific satiety effects following exposure to ambient food odours.

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Sensory-specific satiety describes a decline in hedonic value of the taste of a food as it is consumed, relative to a non-consumed food - the pudding tummy phenomenon, with a decline in implicit motivation also being evident. Brief exposure to food odours, has shown not only goal-priming effects, but also, sensory-specific satiety effects, selectively reducing hedonic ratings and subsequent high calorie food choices. The present study investigated whether ambient food odour-exposure would impact implicit motivation for associated foods. Participants completed an ambient odour or food-consumption task and were randomly assigned to indulgent (chocolate) or non-indulgent (orange) food groups and completed an objective grip-force task. A grip-force transducer measured effort exerted “to win” briefly presented (33/200ms) food images. In both studies, exerted effort was greater for food items than control images. No satiety or priming effects were found following odour exposure; however, a classic sensory-specific satiety effect was found following food consumption. That is, force exerted for chocolate images declined significantly following chocolate consumption, in the absence of any decline in motivation for orange stimuli. While differences in odour-exposure findings could be explained by factors such as concentration, timing, and nature of exposure, questions remain about the robustness of previously reported effects.

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Does a joint numerical magnitude code underpin the processing of symbolic and non-symbolic quantities?

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The idea that a joint approximate numerical magnitude code underlies both symbolic and non-symbolic numerical information has been challenged. A joint code implies that intra-individual behavioural signature effects such as size and distance effects correlate significantly with each other in both notations. In contrast, recent studies employing a numerical magnitude comparison task (e.g. Krajici et al., 2017 Psych Bull Rev), have shown such correlation for non-symbolic quantities but not for symbolic stimuli. This lends support for the hypothesis of two different systems. However, the use of a limited stimulus range (0 - 9) may have mitigated the behavioural variance and hence masked potential correlations. Here (N=44), we (a) replicated and (b) extended previous results with symbolic and non-symbolic quantities using less familiar symbolic stimuli (two-digits decimals numbers ranging from -0.99 to 0.99) in a numerical magnitude comparison task. In the positive number range, we found a correlation between the size and distance effect (albeit in opposite directions). In the negative number range, we didn't find any effect. These results support the assumption of a common numerical magnitude code employed during the processing of symbolic and non-symbolic quantities but raises a question concerning the cognitive processes involved in comparing negative numerals.
View-symmetric representations of faces in human and artificial neural networks.

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The appearance a face can change dramatically as a person moves their head. The visual system must take into account changes in the image that result from changes in viewpoint in order to recognise identity. View symmetry has been suggested to be an important intermediate representation between view-specific and view-invariant representations of faces. Here, we compared view-symmetry in humans and an artificial neural network (ANN) trained to recognise faces. First, we compared the output of the ANN to head rotations in yaw (left-right) and pitch (up-down). We found that there was an initial view-specific representation in the early convolutional layers for yaw, but that a view-symmetric representation emerged in the later fully-connected layers. In contrast, we did not find a similar transition from view-specific to view-symmetric representations for pitch. These findings suggest that view-symmetry emerges when symmetric rotations lead to mirror images (yaw). Finally, we found that responses in the fully-connected layers of the ANN correlated with behavioural judgements of perceptual similarity and with the neural responses of higher visual regions. These findings suggest that view-symmetric representations may play an important role in the representations of faces in humans and artificial neural networks.

Investigating the relationship between dyadic person similarity and face judgement similarity.

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Research shows that our self-perception influences our judgements about others. By extension, it could be possible that people who judge themselves similarly also judge other faces similarly. These consistencies could serve as a basis for the formation of our relationships. The present study investigated whether similarities in dispositions are related to similarities in face judgments. 307 UK-based participants rated 24 faces on 6 social traits. Participants also rated themselves on 13 social traits and completed a personality questionnaire. We computed dissimilarities between pairs of participants (i.e. pairwise distances between vectors of ratings) for face judgments, self-traits, and personality traits, resulting in three dissimilarity matrices (RDMs). Using representational similarity analysis, the three RDMs were then correlated with each other. Results showed that both RDM self-trait and RDM personality significantly correlated with RDM face judgements (rho=0.13, p<.001 and rho=0.19, p<.001, respectively). These results showed that participants with more similar dispositions also judged the faces of others more similarly. This was the case even after controlling for age, gender, ethnicity, and geographical location (Self-traits: β=.19, R^2=.061, F=613.69, p<.001; Personality: β=.19, R^2=.078, F=795.01, p<.001). Findings may have implications for how we build connections and form relationships.
Own- and other-race face learning in high and low variability.

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Familiar faces are thought to have a robust representation in the memory which is built up from multiple exposure of a face in different context. Research suggests that faces learnt in high variability condition (pictures taken on different days, with different viewpoints and lighting) enhanced the learning of own-race identities compared to low variability (pictures taken on the same day, with similar lighting). However, it remains unclear how this variability affects the learning of other-race faces, as they are recognized differently compared to own-race faces. Thus, this study aims to examine the effect of high and low variability exposure on both own-race and other-race face learning. Chinese Malaysians and Caucasians participants were exposed to own- and other-race identities under high and low variability conditions. Identity recognition was assessed using a name verification task in Experiment 1 and an old-new recognition paradigm in Experiment 2. Results revealed enhanced learning of own-race faces under high variability conditions compared to low variability across both experiments. However, improved learning of other-race faces was evident only in the old-new recognition paradigm, not the name verification task. These findings suggest that high variability exposure benefits other-race face recognition but not the face-name association for other-race identities.

Individual differences in choice blindness predict unfamiliar face matching.

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Unfamiliar face matching is used in many situations; for example, police investigations and security at airports require the identification of individuals from photo-ID. The identification of unfamiliar faces is error prone, both for lay people and practitioners who perform this task. We investigated whether individual differences in choice blindness in an unfamiliar face matching task predicts face identification decisions in a separate unfamiliar face matching task. Participants (n=138) completed two unfamiliar face matching tasks (KFMT, GFMT-2) and a choice blindness task. In the choice blindness task, participants were informed of their choices on the GFMT-2 and asked to justify these choices. On critical trials, we informed participants that they made the opposite response to what they had actually made on the GFMT-2. Participants completed this procedure a second time, a week later. Choice blindness was reliable across sessions, and individual differences in choice blindness related to individual differences in sensitivity to identity (d') on the KFMT, but not criterion. These findings demonstrate that individuals with lower face matching ability are also worse at monitoring their identification decisions and demonstrates how these processes are intertwined.
The theoretical basis of recognition-ratings: An inferential approach vs a psychophysical approach to confidence.

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In the recognition memory literature, confidence ratings have been used in the absence of a binary yes/no or old/new judgement to effectively discriminate whether an image has been previously studied. While it may seem intuitive that models used to account for confidence in the psychophysics literature (e.g., signal detection theory, accumulator models etc.) would also apply to recognition-ratings, it could be that models developed to explain metacognitive judgements, such as judgements of learning (JOLs) and feelings of knowing (FOKs), provide a better account. To test this, we investigated how the presence of non-diagnostic information during the decision-making process would influence confidence ratings. Here, we report three experiments testing the theoretical mechanisms that shape recognition-ratings. Experiment 1 used a face recognition paradigm, Experiment 2 a landscape/house recognition paradigm (to test whether effects from Experiment 1 generalised beyond faces to other complex stimuli that might be less reliant on holistic processing), and Experiment 3 used a perceptual discrimination task asking participants to indicate their confidence that a dynamic grid was primarily blue or primarily orange. Across all three experiments, we found that confidence decreased as the amount of non-diagnostic information increased, providing support for Baranski & Petrusic’s doubt-scaling model of confidence.

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Recognising, identifying, interpreting and reacting to internal bodily signals during pregnancy: A scale development study.

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During pregnancy, women perceive, interpret and react to bodily signals like fatigue and hunger (interoception) differently to the general population due to vast psychological and physiological changes at this time. It is important to understand how interoception is experienced during pregnancy because it is considered a transdiagnostic factor across various mental health conditions, for which pregnancy represents increased vulnerability. Due to these differing experiences of internal sensations, self-report interoception scales may not be valid for pregnant populations. Therefore, we aimed to develop a pregnancy specific interoception scale using a mixed methods approach. We conducted online focus groups with pregnant women (N=32) to explore their experience of internal bodily sensations. Several themes were identified, with body trust underpinning many of these themes. From the qualitative data and interoceptive theory, we developed 53 initial scale items to measure pregnancy specific interoception. Interviews with pregnant women, post-natal women and midwives (N=14) provided qualitative feedback on interpretability and relevance of these items. 51 items were piloted on pregnant women and midwives (N=50), which further reduced the scale to 40 items. Validation data was collected from a large sample, allowing for explorative factor analysis to understand the latent factor structure and test the scale’s validity.
Positive perceptions of Autism in job applications by Autistic and allistic raters.

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Gaining meaningful employment is a significant challenge for many autistic people. Prior research has focused on how perceptions of autistic individuals differ at interview stage, compared to neurotypical peers. However, it is currently unclear how autistic individuals may be perceived at the job application stage. Here, we examine how job applications (cover letter and curriculum vitae) are perceived by 53 autistic and 47 allistic (non-autistic) individuals, when a diagnosis of autism is disclosed versus not disclosed. When rating job applications with an ASD disclosure, autistic participants rated the job applicant as more likeable than allistic participants; there was no difference in likeability ratings for job applications without an ASD disclosure. Perceived competency of applicants did not differ between job applications. Exploratory analysis revealed that autistic job applications were perceived as possessing higher intelligence, motivation to excel in employment, and ability to work efficiently, alongside less social competence, compared to job applications without an autism disclosure. Results indicate that disclosing a diagnosis of autism may generally lead to improved perceptions and evaluations of job applications by both autistic and allistic individuals, suggesting a potentially positive impact - or at least not detrimental - of diagnostic disclosure when applying for jobs.

An investigation of neural correlates of interpersonal distance.

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Interpersonal space is a well-defined construct in social psychology, however underlying neural mechanisms are not yet well understood. In our experiment we focus on interpersonal distance in an ecological context by investigating electroencephalographical (EEG) alpha band suppression: an index of attentional allocation and engagement. We predicted that reducing the interpersonal distance would be more behaviourally relevant and lead to greater alpha suppression. We recorded EEG activity while standing participants passively viewed a confederate that was either 1) approaching/receding from them or 2) standing still at the distances that constituted the start and end points of movement in the dynamic condition: 0.5m (within personal space) and 4.5m (outside personal space). Participants were encouraged to stand still and hold eye contact without further task instructions. For the first time we show that suppression in the alpha band relates to changes in interpersonal distance, as we found greater suppression in the conditions with higher behavioural relevancy - near/approaching compared to further away/receding. This serves as new evidence for the role of attention in the interpersonal space processing.
Credibility of eyewitness identification decisions depends on the format of confidence expression.

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Eyewitness often accompany lineup identification decisions with confidence statements. In two preregistered experiments (Pennekamp et al., 2023, https://osf.io/cqug3; Sutherland & Rubinova, 2022, https://osf.io/q64pe), we presented participants with confidence expressions accompanying suspect identifications made by an eyewitness. In a jury perception setting, we asked participants to evaluate decision credibility. In Experiment 1 (N = 111) we used low/medium/high levels of confidence expressed: (1) verbally, (2) numerically, (3) via lexicon combining verbal and numeric statements. Experiment 2 (N = 118) was a replication and extension that added (4) an AI classifier that provided classification of verbal statements. We found that evaluators: (1) were hesitant when interpreting numeric expressions of confidence; (2) poorly differentiated verbal expressions of low and medium confidence; and (3) benefited from tools that offer translation of confidence expressions. Our findings related to verbal expressions are consistent with linguistic directionality associated with verbal statements of low probabilities that tend to be perceived as more pessimistic than numeric statements. Credibility ratings accompanying lexicon and AI classifier expressions best mapped levels of expressed confidence. Our findings suggest that police could maximize the utility of confidence statements accompanying eyewitness identification decisions when using tools that offer translation of verbal statements.
Attending to hemispatial neglect: Insights and challenges from the research of Marlene Behrmann.

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Behrmann’s seminal research on hemispatial neglect sheds light on the brain mechanisms of spatial attention and their interaction with perceptual experience. In honor of these contributions, I will describe an interactive activation model that captures key aspects of her findings on the role of the lexical status of letter strings in the perception of those parts of these strings that are often, but not always, neglected by patients with hemispatial neglect. I will then discuss how Behrmann’s work on the frames of reference within which neglect occurs continues to challenge efforts to build explicit computational models that capture the nuances of the interplay between attention and the perceptual organization of space.

Cortical organization as optimization: Topography and lateralization in high-level vision.

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The high-level visual representations of objects, faces, words, and scenes exhibit distinct patterns of topographic organization and hemispheric lateralization, although selectivity both within and between hemispheres is graded rather than absolute, and there is substantial variability across individuals. The origin of this organization remains the subject of considerable theoretical controversy, and the factors that give rise to individual differences are not well understood. I will present results from computational simulations with topographic deep convolutional neural networks, and from functional and structural neuroimaging of human participants, that suggest that the organization of category selectivity in high-level vision can be understood as arising from the cooperative and competitive dynamics of neural learning as an optimization process that is subject to both functional and local connectivity constraints.

The curses of relearning specificity.

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People with strokes affecting the back of the brain often experience persistent problems perceiving words, faces and objects. So, how do we get them better? I will cover evidence from studies of mass-practice based visual rehabilitation, including Marlene’s instructive case study [Behrmann, et al. (2005) Journal of cognitive neuroscience, 17(4), 554-568], to show that visual relearning is painfully slow and item-specific. I will appeal to the literature on human expert performance and lesion studies of relearning in people with stroke to help us better understand why this might be so.
When “double vision” is good for you: Looking beyond the occipitotemporal cortex to the anterior temporal lobes, bilaterally, brings resilient meanings to life.

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The majority of cognitive and clinical neuroscience studies of visual recognition have focussed on functions of the occipital and occipitotemporal regions. In recent years, visual neuroscience has started to notice more anterior aspects of the ventral “visual” stream. Looking across to the parallel investigations of semantic representation and the importance of the anterior temporal lobes might be eye-opening. In this talk, I will briefly review the convergent cognitive, clinical and comparative evidence for the role of the ATLs in semantic representation and their importance in face and object recognition. Whilst it has been traditional to fixate on relatively small differences in function across left and right ATLs, recent observations from contrastive patient comparisons and computational models suggest that doubling up the neural underpinnings of single cognitive functions might be more important because it makes their functions resilient. I will finish by looking back, figuratively and anatomically, to the striking parallels in Behrmann’s seminal investigations of visual recognition, which have also shifted the field to focus on gradedly varying visual functions across both left and right vOT regions.

The neuropsychology of face, word and object recognition.

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The last decade has seen a stark increase in studies directly comparing word and face processing in neuropsychological studies. An important driver behind this was Behrmann & Plaut’s demonstration of associations between impairments in the two domains, challenging textbook neuropsychology. I will present data on word, object, and face processing from our studies of patients with stroke in the back of the brain, and participants with specific neurodevelopmental disorders, highlighting some of the methodological challenges in comparing across stimulus categories. The overall pattern in both populations is that face and word recognition may be selectively impaired, but for the brain injury patients in particular, this is the exception and not the rule.

Abnormal word length effects in reading: Two stones with one bird.

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One of Marlene Behrmann’s many impressive research areas has been an exploration and account of abnormal word length effects (AWLE) in the reading performance of patients with ‘pure’ alexia, who show the dramatic combination of impaired reading but unimpaired spelling/writing. In this presentation, I will discuss the characteristics of reading in two different disorders: pure alexia and semantic dementia. Cases with either of these two disorders display an AWLE; but striking differences in other aspects of their reading performance and in non-reading tasks indicate two different sources of this symptom.

End of Symposium
Bridging neurodiversity and open scholarship: How shared values can guide best practices for research integrity, social justice, and principled education.

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Not all people conform to what is socially construed as the norm and divergences should be expected. Neurodiversity is fundamental to the understanding of human behavior and cognition. However, neurodivergent individuals are often stigmatized, devalued, and objectified. This position statement presents the perspectives of academics and students, the majority of whom have personal lived experiences of neurodivergence(s), and discusses how research and academia can and should be improved in terms of research integrity, inclusivity and diversity. The authors describe future directions that relate to lived experience and systematic barriers, disclosure, directions on prevalence, stigma, intersection of neurodiversity and open scholarship, and provide recommendations that can lead to personal and systematic changes to improve acceptance of neurodivergent individuals’ lived experiences within academia.

Examining the relationship between caregiver and infants' visual cognition in rural India.

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Prior research has noted the importance of studying visual cognition in the laboratory (Rose et al., 2012) as well as naturalistic settings (Smith et al., 2015). However, the connection between the two remains largely unaddressed. The current research studies the relationship between measures of visual cognition from caregiver-infant interaction and preferential looking task as a lab-based Visual Working Memory (VWM-PL) measure (Ross-Sheehy et al., 2003). Thirty-seven caregivers and their 6- and 9-month-old infants, from rural India, completed both naturalistic caregiver-infant interaction sessions as well as lab-based VWM-PL tasks. Mixed-effects models showed that infants’ Mean Look Duration and Switch Rate measures from the interaction did not predict the equivalent lab-based
measures independently from task load, SES, and age, indicating differences in the deployment of visual cognition across settings. Further models, with the same control variables, indicated that VWM was positively associated with leading a greater proportion of joint attention (JA) bouts for both infants and their caregivers. That is, the greater the proportion of JA led by infants during the interactions, with their caregivers “following-in”, the higher their VWM capabilities. The same trend applied to caregivers. Findings serve to elucidate the complex links between measures in the lab and naturalistic settings and are discussed in the context of interventions in LMIC.

Testing motor timing theory of stuttering: conflicting evidence for neurotypical and stuttering talkers in a choral speech task.

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Talking chorally typically reduces stuttering in people who stutter (PWS). One explanation for this phenomenon is based on a motor timing theory, hypothesising that PWS become more fluent because they are presented with an external rhythm when talking chorally. This external signal provides a guide to help them initiate and time their own speech gestures, allowing them to match their partner and speak fluently. In this study, we used Energy Modulation Spectrum (EMS) analyses to investigate rhythm during choral speech production of a reading passage. Previous studies have shown changes in EMS full band peak frequency when PWS perform choral reading as compared to solo reading. The same effect has not yet been investigated in neurotypical speakers. This study thus compared neurotypical talkers with PWS to establish whether choral speech causes the same rhythmic changes in both groups. Surprisingly, we found opposite patterns for neurotypical speakers as compared to PWS. While PWS increased their full band peak frequency when reading chorally, neurotypical speakers reduced their full band peak frequency. This suggests that PWS´ fluency in choral speech is not actually due to the copying of their partner’s speech rhythm.

Surprising efficiency of small teams and the constraints of collective knowledge on group decision-making.

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We measured the performance of small teams and their individual members on general knowledge and novel problem-solving tasks. We then compared actual team performance to predictions based on actual individual performance. Direct comparisons of this type are surprisingly rare in the group decision-making literature. We first compared teams to crowdsourcing algorithms used in computational studies of collective intelligence and the “wisdom of the crowd”. These algorithms weight individual choice by individual ability to produce optimised crowd decisions. Actual teams readily outperformed such optimised estimates. Second, we compared team performance to team "collective knowledge". We define collective knowledge as the union of individual knowledge within the team. Collective knowledge correlated highly with team performance, and imposed a hard ceiling for teams, especially in general knowledge tasks. We consider how the best teams were able to outperform their individual members.

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The impact of sleep deprivation on social cognition.

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Sleep deprivation negatively affects perspective-taking, moral judgement, emotion-recognition, and empathy. Although it is known that sleep deprivation has a broad impact on social cognition, we know less about the mechanism for this. Traditional paradigms fail to distinguish between sleep deprivation impairing global performance, biasing people towards their own perspective, or making it more difficult to distinguish between perspectives. We examined the impact of one sleep deprivation night on performance on a range of social cognition tasks, compared to when rested. Participants were tested on Belief-Desire Reasoning, Empathy, Emotion Recognition, Social Motivation and Moral Reasoning. We also measured a range of domain general cognitive resources.

An interesting pattern of performance emerged. Across the night, participants’ social motivation and attention decreased, as sleepiness increased. On fast, less demanding tasks, participants showed the biggest impact on performance - becoming less fluent at social cognition than when rested. On more complex tasks, performance differences were still noted, but were less pronounced. Sleep deprivation has a complex impact on social cognition, that relates to the specific demands of the task, as well as with domain general and domain specific factors. Possible explanations for this and potential real-world consequences will be discussed.

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Evaluating virtual reality as a tool for cognition research.

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Immersive virtual reality (IVR) technology is becoming an increasingly popular tool for conducting ecologically valid experimental psychology research. However, there is still limited understanding of the potentially confounding effects virtual immersion has on cognitive performance. To address this, we compared performance in two visual cognition tasks (change blindness, irrelevant singleton search) in which the virtual immersivity of both environment and stimuli were systematically varied. Results showed that performance on these tasks varied according to the immersivity of the stimuli but not the environment. The discussion of these results will address key questions regarding the use of IVR in research. Can IVR replicate findings from traditional experimental paradigms? Can IVR be used to enhance the real-world applicability of experimental results? Does virtual immersion also affect cognitive performance? Overall, the presented research underscores the importance of careful design and interpretation within immersive research.

This work was supported by the ESRC White Rose DTP.
Adults recognize complex visual inputs, such as faces and words, with remarkable speed, accuracy and ease. In this talk, I will examine the mechanisms underlying this remarkable achievement. I will present studies that examine how visual computations and representations of faces and words become organized in the brain over the course of development, how competence is achieved in adulthood, and how these functions can be reorganized following brain damage, particularly during childhood. Much prior research conducted on adults has favoured a binary separation of faces and words, with the right hemisphere specialized for the representation of faces, and the left hemisphere specialized for the representation of words. Close scrutiny of the data, however, suggest a more graded and distributed hemispheric organization, as well as differing hemispheric profiles across individuals. Combining cross-sectional behavioral data with structural and functional imaging data reveals how the distribution of function both within and between the two cerebral hemispheres emerges over the course of development, and a computational account of this mature organization is offered and tested. Provocatively, this mature profile is more malleable than previously thought, and cross-sectional and longitudinal data acquired from individuals with hemispherectomy reveal how a single hemisphere can subserve both visual classes. Together, the findings support a view of cortical visual organization as plastic and dynamic, both within and between hemispheres.
Simultaneous activation of multiple face representations.

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Despite knowing thousands of identities, we confuse familiar faces only rarely. One explanation is that the activation of one face representation simultaneously inhibits others. Here, we used event-related potentials to test whether we can simultaneously recognise multiple faces. In three experiments, we used individually familiar celebrity faces in immediate repetition priming. Prime displays consisted of (i) two images of the subsequent target identity (Double Repetition), (ii) two different identities, one of which was the target (Single Repetition), or (iii) two identities, neither of which showed the target (Non-Repetition). While in Experiment 1 primes were presented left and right of a central fixation cross, both prime faces appeared either left or right of fixation in Experiment 2. In both experiments, we observed clear N250r priming effects, with more negative amplitudes for both Double and Single Repetition relative to Non-Repetition. In Experiment 3, a central prime was flanked by a peripheral prime presented either left or right of fixation; here, we only observed N250r effects for central primes. In contrast to the assumption of inhibition, two simultaneously shown facial identities are both recognised when both are presented peripherally. However, peripheral faces are not recognised when combined with a salient central face.

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The impact of bilateral versus unilateral anterior temporal lobe damage on face recognition, person knowledge and semantic memory.

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The functional importance of the anterior temporal lobes (ATLs) has come to prominence in two active, albeit unconnected literatures - (i) face recognition and (ii) semantic memory. To generate a unified account of the ATLs, we tested the predictions from each literature and examined the effects of bilateral versus unilateral ATL damage on face recognition, person knowledge and semantic memory. Sixteen people with bilateral ATL atrophy from semantic dementia (SD), 17 people with unilateral ATL resection for temporal lobe epilepsy (TLE; left = 10, right = 7), and 14 controls completed tasks assessing perceptual face matching, person knowledge and general semantic memory. People with SD were impaired across all semantic tasks, including person knowledge. Despite commensurate total ATL damage, unilateral resection generated mild impairments, with minimal differences between left- and right-ATL resection. Face matching performance was largely preserved but slightly reduced in SD and right TLE. All groups displayed the familiarity effect in face matching; however, it was reduced in SD and right TLE and was aligned with the level of item-specific semantic knowledge in all participants. We propose a neurocognitive framework whereby the ATLs underpin a resilient bilateral representation system that supports semantic memory, person knowledge and face recognition.
This work was supported by the Medical Research Council (SUAG/096 G116768 to M.A.R, MR/V031481/1 to A.D.H, MC_UU_00030/14 and MR/T033371/1 to J.B.R, MR/R023883/1 and MC_UU_00005/18 to M.A.L.R), the Universite de Lorraine (DrEAM/LUE grant to A.V), Wellcome Trust (220258 to J.B.R), and the NIHR Cambridge Biomedical Research Centre (NIHR203312 to J.B.R). The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

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

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Developmental prosopagnosia (DP) results in difficulty recognising familiar faces but little is known about the exact stage of the face processing system where difficulties occur, or indeed whether this is identical in all cases of DP. DPs (n = 20) completed six tasks measuring identity and non-identity aspects of face perception. Overall, the DP group showed impaired face perception, but object (house) perception was similar to that of typical controls. Impairments occurred at early, non-identity, stages of face processing including face detection (p = .008) and face gender categorisation (p = .015). Importantly, early-stage impairments were observed in most (13/20) of the DP group. A subgroup of DPs (n = 6) was impaired on ≤ 1 face perception task indicating broadly typical face perception and thus support for the idea of perceptual (affecting face perception and face memory) and mnemonic (affecting face memory only) sub types of DP. Three participants showed typical non-identity face perception and were impaired only on the Cambridge Face Perception Test (CFPT, Duchaine et al,. 2007) which tests facial identity perception. Among both DPs and controls, intraclass correlations showed clear intra-individual differences confirming that data from a single task (e.g. CFPT) cannot be taken as evidence of broader face perception ability.

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The importance of conceptual knowledge when becoming familiar with faces in naturalistic viewing.

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Although the ability to recognise familiar faces is a critical part of everyday life, the process by which a face becomes familiar is not fully understood. Previous work has focussed on perceptual experience. However, when we become familiar with people in the real world, conceptual knowledge also increases. Here, we used a natural viewing paradigm to investigate the role of conceptual knowledge when learning new faces. Participants viewed clips from a TV show that were manipulated by presenting events in the original order or a scrambled sequence. Although scrambling significantly decreased the conceptual understanding of the events, it had no effect on the
perceptual exposure to the faces. Nevertheless, we found that subsequent face recognition of characters from the TV show was greater in participants from the original group. Participants also viewed a new movie from the TV show while neural activity was recorded using fMRI. Greater neural similarity was evident between participants in the original group within regions that are associated with the processing of semantic, episodic and affective information. Together, these findings suggest that conceptual information is important for learning new faces, and that the neural correlates are evident in regions within and beyond the visual brain.

Learning new word meanings as we age.

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Newly-learned meanings for words can compete with original meanings for access in young adults, with larger competition and worse recall for new unrelated (e.g., “ant”: “Native American face painting”) than related meanings (e.g., “ant”: “small recording device”) [1, 2]. This study investigated impacts of ageing and vocabulary knowledge on new meaning learning. Fifty young and 50 older participants trained on artificial new meanings for 32 English words (16 related, 16 unrelated) over four days through reading paragraphs followed by exercises using these meanings. On Days 1 and 5, participants judged relatedness of probe words to trained/untrained target words’ original meaning (related: “ant-insect”; unrelated: “ant-cruise”). A meaning recall task on Day 5 assessed knowledge of new meanings. Vocabulary knowledge was assessed with a 4-minute test [3]. Participants recalled more related than unrelated meanings; older adults recalled fewer meanings overall; participants with higher vocabulary scores recalled more meanings. Regardless of participant age, meaning relatedness decision RTs to untrained words were shorter on Day 5 than Day 1, likely a practice effect, whereas RTs to trained words were not, indicating increased competition for newly-learned meanings. While ageing reduced overall learning performance, newly-acquired meanings impacted prior lexical knowledge similarly in younger and older adults.

Does plain language result in clear communication?

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Will our audience better understand us if we use plain language? Historically, in health communication, law, and other domains, producers of text for public consumption have worried that what they write will be too difficult. Policy responses have comprised guidance that writers must use plain language -- short common words and short simple sentences -- to close the gap between predicted reading levels of texts versus estimated average reading skills of audiences. Psychological accounts, distinct from guidance, assume that comprehension success will be predicted not just by sentence- or word-level properties but also by text-level cohesion. What works? To answer this question, we report, first, a systematic evidence review identifying two relevant research traditions: studies that either assess the readability of many texts but rarely test reader responses, or studies examining responses to few texts among many participants. Power analyses demonstrate that prior research likely lacks adequate sampling of participants and texts. We report, second, Bayesian multilevel models of data from 24 experimental studies, wherein 1304 participants responded to 105 health texts. We show that comprehension accuracy is predicted by: participant vocabulary, reading strategy, and health literacy; text readability; and interactions where cohesion effects are amplified given higher health literacy.

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Investigating durational predictions in speech via non-word segmentation tasks.

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Lengthening of word-initial and phrase-final speech segments provides cues to prosodic boundaries for listeners. Perceptual studies suggest that listeners generate expectations about segment duration based on foregoing speech rate, thus promoting the salience of lengthened segments. Moreover, preliminary findings indicate that utterance length is a critical factor in modulating durational predictions, with listeners entraining to syllable rate only once sufficient speech has been heard. We explored these hypotheses in four studies using a nonword segmentation paradigm, with trisyllabic nonword targets embedded in twelve-syllable nonsense streams. We manipulated target position (early, medial, late) and timing cues (notably, lengthening of nonword-initial consonants). In Experiments 1 and 2, nonsense streams were followed by target probes, with listeners making present/absent recognition decisions. In Experiments 3 and 4, target probes were presented before nonsense streams, with listeners responding immediately upon detection within the stream. Overall, better performance in later positions for post-stream probes and in earlier positions for pre-stream probes pointed to memory effects. Crucially, however, all studies showed timing cues were modulated by position, with in most cases - expected effects of timing cues only in utterance-late positions, supporting the temporal prediction hypothesis. Additionally, results indicated a complex interplay of learning effects and task demands.
Making sense of Chinese compound words.

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Most Chinese words are compounds, each of which contains multiple constituent characters. For example, “vase” in Chinese is composed of 花 (“flower”) and 瓶 (“bottle”). To understand compound word meaning, readers need to grasp the meanings of individual characters, and to understand how they function as constituents in compounds. However, characters can bear multiple meanings; for example, 花 also means “to spend money”. We present a series of analyses investigating how Chinese readers recognise and make sense of compounds despite this ambiguity. We quantified the reliability with which individual characters convey meaning and measured the impact of this variable on different lexical processing tasks. Results showed that the consistency with which characters communicate meaning influences the recognition of familiar and unfamiliar compounds. Moreover, in determining the meanings of unfamiliar compounds, both humans and computational models learn to weight characters more highly when they have a consistent meaningful function. Our research suggests that readers acquire graded knowledge of Chinese characters through their experience with those characters in compounds. This knowledge is deployed routinely in the processing of familiar compounds and allows readers to engage productively with unfamiliar compounds on a daily basis.

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Modulation of within-stimulus learning by cue-outcome correlation.

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Previous research has shown that both cue predictiveness and outcome uncertainty affect allocation of attention: participants spend longer attending to predictive relative to non-predictive cues; they also spend longer attending to cues when outcomes are uncertain. Our research aimed to investigate whether elevated attention towards cues under these conditions results in stronger within-compound associations. In our study, some cue compounds were established as outcome-predictive, others were non-predictive; we also varied outcome uncertainty. In a recognition memory task participants showed stronger memory for predictive relative to non-predictive cue pairings. However, there was no effect of outcome uncertainty. These results suggest that elevated gaze time towards cues might not always result in increased vigilance: while previous research has shown that both cue predictiveness and outcome uncertainty lead to longer dwell times, only the former may affect associations that form between cues.

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Mapping conceptual spaces for number retrieval.

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The hexagonal activation pattern of grid cells in entorhinal cortex divides our environment into 60°-sized sections, supporting navigation in physical and conceptual spaces. We aim to identify behavioural signatures of a grid-like spatial organization of numerical knowledge. Participants listened to spoken numbers (1–12) and pointed to a central dot on a touchscreen, then to the number’s location on a clockface. In four experiments, we hypothesized the (mis)alignment of targets with the hexagonal grid to modulate pointing behaviour in sighted and blindfolded participants. We examined whether targets spaced by 60° yielded common behavioural signatures in terms of (absolute and signed) angular error and response speed. Overall, targets aligned with a 0°+60° (vs. 30°+60°) phase yielded faster responses and lower absolute angular error, compatible with the hypothesized modulation of pointing behaviour every 60°. Phase did not affect signed angular error, indicating that its effects on angular variability reflected greater pointing variance, rather than systematic bias (e.g., over-/undershooting). While phase did not affect angular errors in blindfolded participants, they responded faster to targets on the 0°+60° (vs. 30°+60°) phase. These results provide preliminary evidence for a hexadirectional modulation of pointing behaviour, supporting the grid hypothesis of number knowledge, and warranting further investigation.

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Culture and sexual orientation predict preferences for facial femininity/masculinity.

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Judgments of attractiveness have many important social outcomes, highlighting the need to understand how people form these judgments. One aspect of appearance that impacts perceptions of attractiveness is facial femininity/masculinity. However, extant research has focused primarily on White, Western, heterosexual participants’ preferences for femininity/masculinity in White faces, limiting generalizability. Indeed, recent research indicates that these preferences vary by culture, and other work finds differences between gay/lesbian and heterosexual individuals. Aspects of identity such as culture and sexual orientation do not exist in isolation from one another, but rather intersect, leaving a critical gap in understanding. Our research bridged across these hitherto separate areas of inquiry to provide a more comprehensive understanding of facial femininity/masculinity preferences. We tested how individuals’ culture (British, Japanese), sexual orientation (including, crucially, bisexual individuals), and gender predict their femininity/masculinity preferences for White and East Asian women’s and men’s faces, using two experimental tasks (forced-choice, interactive). Results show that individuals’ culture and sexual orientation consistently interact to predict their preferences for femininity/masculinity in women’s and men’s faces, and we furthermore reveal bisexual individuals’ preferences to differ from those of other sexual orientations. Our findings highlight the importance of considering intersecting identities.
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Suppression and (no) summation in vibrotactile signal combination between digits.

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The mechanism by which the brain combines somatosensory information has been investigated less intensively than analogous processes in hearing and vision. In Experiment 1, discrimination thresholds were measured using a two-alternative-forced-choice (2AFC) task, for 26Hz vibrations delivered to the fingers. Thresholds exhibited a ‘dipper’ pattern when plotted against pedestal intensity. Detection thresholds decreased by ~1dB when all ten fingers were stimulated (‘dekadactyl’ condition) compared to when each alternate finger was stimulated (‘pentadactyl’ condition), suggesting a process of probability summation. When a target stimulus was presented to five digits and a pedestal stimulus to the remaining digits (‘dichodactyl’ condition) thresholds increased, consistent with suppression between digit representations. In Experiment 2, steady-state somatosensory evoked potential (SSSEP) signals were recorded. SSSEP amplitudes increased by a factor of ~1.4 between the pentadactyl and dekadactyl conditions, and there was evidence of suppression when using targets and masks of different frequencies. These results are consistent with a model featuring inhibition between digits, but no mandatory pooling; different from binocular vision (strong inhibition, mandatory pooling) and binaural hearing (weak inhibition, mandatory pooling). Our findings provide a framework for investigation of vibrotactile summation across body parts and in clinical conditions affecting tactile processing such as chronic hand pain.

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Do the eye-movement system and the arm-movement system contribute independently to attentional orienting: a TMS study.

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Saccadic eye-movements and arm-movements are preceded by a shift of attention (e.g., Deubel & Schneider, 1996, Donikaitis & Deubel, 2011), although attentional resources are thought to be allocated independently for both movements, implying separate attentional mechanisms. The Frontal Eye Fields (FEF) are known to play a central role in the coupling between eye movements and spatial attention, but the question remains whether this brain region is also involved in the coupling between arm-movements and attention. Using Transcranial Magnetic Stimulation (TMS), we stimulated the FEF whilst participants were either planning a saccadic or a pointing movement towards a specified location (movement target - MT) and made a discrimination judgment (discrimination target - DT). Our results showed that TMS over the FEF increased saccade latency, delayed the onset of pointing movements, and perturbed pre-saccadic perception, with a larger effect when the DT appeared contralateral to the saccade endpoint. Interestingly, perceptual performance was less affected by TMS in the pointing condition, suggesting that attentional resources for eye and
arm movements are indeed allocated independently, and the FEF may be more involved in the coupling between eye movements and attention than in the coupling between arm movements and attention.

Different neuronal signatures of attentional allocation for two processes supporting visual awareness of complex scenes.

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Visual awareness of complex scenes is supported by gist processing for rapid access to image identity and orienting in complex images, and a slower selective process providing individuation of objects within complex scenes. We tested the time course of interactions between the two, using the attentional blink (AB) paradigm, while recording event related potentials. The focus was on T2-locked subcomponents P3a and P3b when observers perform two different tasks during rapid visual serial perception (RSVP) of real scenes. The selective task required identification and localization of an object to a side in the scene and the gist task required categorization of the scene itself. In different blocks, observers are asked to perform two selective or two gist tasks or two different combinations of these two tasks, spaced with two different lags. Perceiving the location of two objects successively in different scenes, as opposed to just categorizing the scenes, induces an AB with higher P3b amplitude for perceived targets. Performing object localization before scene categorization results in deep AB, with decreased P3a amplitude, signaling decreased initial detection, and increased amplitude of P3b for processing perceived targets. Findings reveal that gist and selective processing interact in a serial fashion requiring different attention allocation.

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Competitive interactions between VSWM and motor programming guide presaccadic attention.

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Biased competition theory suggests that attention is biased towards visual stimuli that match the content of visual working memory (VWM). This bias may be due to competition between eye movement plans and the remembered object location. The present study investigated the effect of VWM content on pre-saccadic shifts of attention. Participants performed an eye movement to a specified location (Saccade Target, ST) and made a discrimination judgment (Discrimination Target, DT). They also had to retain a visual feature in VWM throughout the trial (Memory Target, MT). There were four conditions: 1) MT congruent with ST and DT, 2) MT congruent with DT but incongruent with ST, 3) MT congruent with ST but incongruent with DT, 4) MT incongruent with ST and DT. As expected, pre-saccadic attentional facilitation was greatest when the VWM content, saccade direction, and discrimination location were all congruent. This facilitation was eliminated when ST, DT, and MT were in different locations. Critically, when the ST and DT were in the same
location, but the MT was elsewhere, pre-saccadic attentional facilitation was significantly reduced. This suggests competition between the saccade goal and the VWM content. These results indicate that the attention bias linked to VWM content can be understood as competition between different saccade goals in the oculomotor system.

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Episodic involvement in language comprehension: Evidence from unrelated words.

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The episodic context account highlights a role of episodic memory in language comprehension (Gaskell et al., 2019). It posits that during comprehension, an episodic representation of the discourse is generated, binding different elements (e.g., words) together. We hypothesised that two words unrelated in meaning could be bound together via a shared sentential context, and this may subsequently influence their level of perceived relatedness. In Experiment 1, young adults first who read related (e.g., paper - pen) and unrelated (e.g., feet - pinecone) word pairs embedded in a meaningful sentence (e.g., His feet shuffled through the pinecones). Five minutes later, they made speeded relatedness judgement on the word pairs. Experiment 2 replicated Experiment 1 using abstract word pairs (e.g., enterprise - panic). Experiment 3 extended the delay between study and test to 20 minutes, while Experiment 4 extended it to 12 hours. Across all experiments, exposure to unrelated word pairs in sentences increased the likelihood of them being judged as related; this effect remains consistent across delays. These findings suggest that (1) episodic memory is routinely involved in language comprehension, binding words in the discourse together, and (2) Reading experience can lead to at least temporary updates in the mental lexicon.

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What can children learn about English morphology through book reading?

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Understanding morphological structure is important for quick access to the meanings of known printed words and for computing the meanings of unfamiliar printed words. However, because children receive little explicit morphological instruction, it is through reading that they must learn what information morphological units communicate. We used the CYP-LEX children’s books corpus (Korochkina et al., 2024) to investigate the morphological input that children aged 7-16 receive while engaging in independent reading. Our analysis showed that over half the unique words in the corpus are morphologically-complex, and that a large proportion of these are absent in television subtitles corpora, indicating that books may provide a richer source of information for learning about morphology than spoken language. Yet, morphologically-complex words tend to be lower in frequency and more poorly distributed across books than monomorphemic words, and this is particularly the case for prefixed (compared to suffixed) words. Further, the morphological status of many morphologically-complex words is obscured due to complex orthographic alterations (e.g., 'sustain'), and to the presence of bound stems (e.g., 'include') and pseudo-complex words (e.g., 'brother'). We propose that these distributional properties may explain why children typically do not show evidence of morphological decomposition until mid-to-late adolescence.

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The impact of exposure to language in video on linguistic development in children aged 3-11: A scoping review.

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Research suggests that early exposure to books can benefit language acquisition by expanding children’s linguistic experience and engaging them in a shared activity (Nation, Dawson, & Hsiao, 2022; Dowdall et al., 2020). Video media (including television) could potentially fulfil a similar role by exposing children to new linguistic phenomena in an engaging setting. However, while many studies have examined the impact of screen-time on cognitive development (for a review see Kostyrka-Allchorne et al., 2017), the findings relating specifically to language development remain unclear. The aim of this review was to understand how encountering language content in video media might impact a variety of oral language skills in children aged 3-11. This review maps the methods and findings of 93 studies that met the preregistered criteria with the goal of understanding which factors impact learning outcomes following video exposure. Results from observational (N=31) and experimental (N=62) studies reveal a divided literature in which television viewing is linked to short-term benefits for learning specific language structures, but negative or null long-term effects on standardised language measures. Results highlight various methodological difficulties and limitations faced by experimental and observational approaches and reveal the importance of video quality and viewing context for language learning.


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Individual differences in word-meaning disambiguation in sentence contexts.

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Many words have multiple meanings. Understanding language requires listeners to use context to access relevant word meanings. We developed a measure of “disambiguation skill”, using a two-step approach to first assess the viability of our approach using a standard group-level design, and then optimise this task to detect individual differences. In Experiment 1, 197 young adults listened to narratives ending in an ambiguous word (e.g., “organ”) and selected a picture from two alternatives. Performance in this Ambiguous condition was less accurate and slower than an item-wise matched Unambiguous condition (e.g., “piano”) and a set-matched Unambiguous condition suitable for individual-differences research. Experiment 2 used the same task, with only the Ambiguous and set-matched Unambiguous conditions. We found individual differences in disambiguation effects on accuracy and response time across 242 individuals (aged 18-60). We analysed condition difference scores and scores based on slopes from mixed effects models in terms of convergent and discriminant validity (by correlations with scores on language-related and unrelated cognitive tasks) and split-half reliability, finding somewhat inconsistent patterns. Although our task captures word-meaning disambiguation as a resource-intensive component of language comprehension characterised by inter-individual variability, this work highlights the challenges associated with adapting group-level designs to detect individual differences.

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Investigating the effects of Stroke Infarct: Comparisons between simulated and real lesions and understanding post-stroke Semantic Aphasia in gradient space.

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Semantic aphasia post-stroke isn't solely due to focal lesions but rather reflects distributed network-level disruptions affecting brain regions beyond the infarct (Jefferies et al., 2008, Dyson et al., 2021, Xiao et al., 2024). Connectivity gradients may capture functional disruptions caused by infarcts, locally and remotely. They offer a broad view of functional connectivity, potentially enhancing our understanding of brain architecture and its cognitive associations. Here, we i) compared real and simulated lesions in gradient space (n = 8) and ii) examined simulated stroke effects on connectivity gradients and their relation to semantic and executive functions (n = 21). Gradients were extracted from functional connectivity matrices of participants with semantic aphasia and used to simulate lesion effects, alongside measuring intrinsic connectivity with resting-state fMRI. Simulated lesion gradient changes correlated significantly with real lesions on gradients 1 and 2. Poorer semantic performance correlated with a shift towards the motor end of Gradient 2 in the right parahippocampal gyrus and towards the unimodal end of Gradient 1 in the left frontal pole/inferior frontal gyrus using a semantic control mask.

Mood modulates the relationship between emotion and contextual details in episodic memory.

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There are mixed results concerning the impact of emotional material on memory for concurrently presented neutral context. Some results demonstrate enhanced memory for neutral context in the presence of negative stimuli; others suggest that the presence of negative material detrimentally impacts memory for neutral context. We examined memory for negative, positive and neutral faces and their neutral backgrounds. We also probed participants’ mood at encoding. Forty-eight participants completed the Positive and Negative Affect Schedule (PANAS) before encoding the composite images and completing recognition trials, while a web camera tracked eye movements. During recognition, participants made old/new judgements to faces. If they responded ‘old’, they were asked to select the background previously paired with the face. Although analysis across all participants suggested that memory for contextual details did not vary by face valence, dividing it into groups according to the PANAS score revealed significantly better contextual memory for material paired with negative faces in the low positive affect group. This suggests that some previous conflicting results might be accounted for by the current mood. Unlike the behavioural results, analysis of eye movements during encoding revealed significantly longer and fewer fixations under the neutral context compared to neutral across all participants.

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Remembering repeated events.

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Autobiographical memory research is typically concerned with memory for unique events, yet constancy and repetition are central features of everyday life. The effect of this constancy and repetition on memory for both unique and repeated information has received relatively little attention. This study examined memory for scenes as a proxy for event memory. Participants viewed 10 similar scenes in sequence, each containing objects that were either unique within that scene or repeated multiple times (4x, 7x, 9x). Participants’ memory for object-scene associations was tested after exposure to 3 scenes (T1) and all 10 scenes (T2). Results showed that memory for unique objects (hits, FAs, and d’) declined between T1 and T2. At T2, hits and FAs increased, and d’ decreased, in line with the number of repetitions. Extrapolation of these findings to autobiographical memory suggests that as overall experience increases, it becomes harder to remember unique events. As experience with specific information increases (i.e., repeated objects), this information is more likely to be retrieved in both correct and incorrect contexts, resulting in an overall loss of sensitivity. These and additional data will be discussed in relation to the typical effects of ageing on autobiographical memory.

Schema-effects in temporal order memory.

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Memory retention can be enhanced when events are either congruent or incongruent with our existing schemas. Most studies have used schemas that are static, requiring knowledge of contextual rules or spatial organisations. However, schemas are also thought to have temporal structures, which facilitate temporal predictions that can in turn modulate encoding. If so, schema-effects should be observable when a core feature of a schema is the temporal order of events. Across two experiments, we used a temporal order memory paradigm where participants pre-learned the structure of sequences consisting of four exemplars. Schemas related to the order of the semantic categories in each context. Subsequently, participants learned sequences using the same categories but with novel exemplars. Critically, sequences either affirmed, violated, or were unrelated to the pre-learned schemas. Participants were required to recall category- and exemplar-level information; they were cued with an exemplar and asked to recall the following two items. Preliminary results suggest a congruency advantage at the category- but not exemplar-level, with no evidence of an incongruency advantage at either level. These results do not clearly align with models that suggest schemas facilitate temporal predictions at encoding, and may be driven by the use of schemas at retrieval instead.

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Closed-loop targeted memory reactivation to strengthen and forget memories?

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Sleep supports the consolidation of memories. A process assumed to rely on a spontaneous reactivation of recent memory traces and orchestrated by so-called 1-Hz delta waves. Naturally, this raises the question, whether corresponding mechanisms can be found in humans as well. Inspired by these findings, we use closed-loop targeted memory reactivation, i.e., an externally driven reactivation in-phase with SO or delta-waves through a re-exposure to memory-related sound cues during sleep, and examine its influence on the interplay between sleep oscillations and memory performance in the declarative and procedural domain. Our results indicate that reactivation during delta waves leads to memory impairment in comparison to uncued memories, suggesting that it may be possible to selectively induce forgetting.
Effects of expectedness and clarity of speech auditory feedback on perception and motor control.

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This behavioural study aimed to test whether prior expectations have an enhancing or suppressing effect on perceptual outcomes during speech production. Twenty-one participants completed a speech production task in which the sound of their voice (speech auditory feedback) was altered in real-time. While participants read aloud single words, we manipulated (1) the expectedness of speech auditory feedback (using random perturbations of the first formant to alter the vowel sound) and (2) the clarity of speech auditory feedback (using real-time noise vocoding to degrade the spectral detail in the speech signal). After each word production, participants were asked (1) to judge whether the vowel sounded different or not (i.e. did they detect the perturbation) and (2) to rate how clear their voice sounded on a scale from 1 (not at all clear) to 8 (very clear). We found that ratings of clarity were significantly higher for non-perturbed compared to perturbed speech trials; this effect decreased with decreasing clarity. Further analysis revealed that this effect of expectedness on perceived clarity was only apparent on trials where participants reported no perturbation. Overall, this evidence suggests that motor-based predictions during speech production have an enhancing (sharpening) effect on perception of speech auditory feedback.

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The effect of orientation and familiarity on detecting Thatcherized faces.

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Despite the assumption that faces are processed at a holistic level, it is generally accepted that unfamiliar faces are processed in a more featural manner. However, experimental evidence supporting these differences in processing between familiar and unfamiliar faces is scarce. The present study aims to further explore this issue by manipulating the vertical orientation of faces (from 0° to 180°, in steps of 30°) and whether the face was normal or Thatcherized (i.e., eyes and mouth presented inverted regarding the natural orientation of the face). Observers were asked if the face looked normal or grotesque. Regardless of familiarity with the face, observers were at ceiling in detecting Thatcherized faces when the face stimuli were presented at 0° until 90° rotation, but performance dropped from 120° and remained relatively stable until complete inversion. Interestingly, across all different orientations, observers were more accurate in detecting Thatcherized faces in unfamiliar faces, suggesting a stronger role of featural processing in unfamiliar faces.
SNARC effects for non-symbolic representations of quantity.

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People are generally faster to respond to smaller quantities with a left-sided response and larger quantities with a right-sided response (the SNARC, or Spatial Numerical Association of Response Codes effect). The SNARC effect suggests a fundamental link between number and space and is robust for responses to Arabic digits regardless of the task. However, the evidence for SNARC effects for non-symbolic, non-canonical representations of quantity is mixed and largely restricted to studies that involve magnitude decisions. Across six studies, we investigated whether SNARC effects occur for colour decisions to arrangements of circles. We found SNARC effects for colour decisions to circles, but only when (1) circles were arranged in a regular manner suggestive of numerical quantity or (2) the total surface area of the circles increased congruently with number. Our results suggest that non-symbolic representations of quantity can offer a route to magnitude and its spatial associations but that this is affected by the visual properties of the stimulus. We discuss these findings within the context of Working Memory (e.g., Fias & van Dijck, 2016) and Conceptual Coding (e.g., Gevers et al., 2006) accounts of the SNARC effect.

Revisiting the intentionality bias in action observation.

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When observing individuals in action, we often deduce their goals and intentions. Yet, in situations where actions are ambiguous and could be either intentionally generated or not, there is a tendency to perceive observed actions as internally driven more frequently than by chance. This intentionality bias is influenced by individual differences in schizotypal cognitive style. In our study, we examined how healthy individuals distinguish between intentional and unintentional actions when perceiving actions of a finger attached to a pulling device. Participants tended to attribute more intentionality to actions where the posture of the finger aligned with the final goal of the action (i.e., a bent finger pushing a button was perceived more intentional than a straight finger doing the same action). Interestingly, we observed contrasting tendencies depending on the congruency of the posture and schizotypal cognitive style. Those with a greater schizotypal scores were more likely to perceive the straight finger pushing a button as an intentional action, while those with a lower schizotypal scores tended to attribute more intentionality to actions performed with a bent finger. These findings challenge the existence of an intentionality bias and suggest that humans’ tendency to attribute intentions to others may rely on fundamental perceptual processes and individual differences.

Novel stimuli and self-prioritization: AI generated art.

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Self-prioritisation manifests in faster response times toward stimuli associated with self-relative to those associated with another person. Experimental tasks typically use individual or small sets of familiar stimuli (e.g. pictures of one's own face or sets of geometric shapes). In this experiment we investigated if self-prioritisation effects emerge for individual stimuli when the association with the self is made at a more abstract level that applies to a broad range of unfamiliar stimuli. It was hypothesised participants would form associations with the general stimulus category (styles of art) and as such would exhibit a self-prioritisation effect for novel artworks falling under that category. Participants were assigned to associated themselves and a stranger with one of two styles of art (Cubism and Expressionism) and performed a matching task on a series of novel AI-generated images (n=200). The matching task presented a cubist or expressionist image and a label ‘Yourself’ or ‘Stranger’. Participants indicated if the art and label matched or did not match. Our findings indicate that self-associations can be at abstract levels for novel stimuli. This indicates that processing self-relevant information does not require processing information about individual items in working memory but can accommodate new information.

 Investigating the modulatory effects of emotional expressions on short-term face familiarity.

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Successful facial emotion processing relies on a wide range of neuroanatomical structures that integrate information received from visual stimuli. Although the current literature describes the existence of two individual neural pathways involved in face recognition (dorsal and ventral), their level of independence is not currently well understood. To test the extent of their neural independence, we conducted an electrophysiological investigation of the effects of antithetic emotions (Happy, Angry, and Neutral) on processes of encoding and consolidation of morphed facial stimuli (Low, Medium, and High morphing levels). A mixed behavioural (accuracy - reaction time) and electrophysiological (event-related potentials) methodological approach was used to assess the time course and source localisation of short-term face familiarity processing, and to observe the modulatory effects of emotional expressions on such processing. We hypothesized that an increased amplitude and latency of the face recognition ERPs (N170, N250, P300), as well as an increased response time and accuracy for emotional compared to neutral stimuli would occur. Analyses of our data are currently underway and our results will be discussed in accordance with Duchaine and Yovel’s (2015) and Grill-Spector et al.’s (2017) theoretical dual-pathway accounts of face processing.

**Contextual cueing in change detection tasks.**

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Visual scenes contain detailed features and objects that form a global context. In visual search, constant contexts facilitate faster and more accurate target detection as compared to random contexts, indicating that contextual information is learned implicitly. We investigated whether contextual cueing can directly be measured at the level of working memory. We employed low-versus high-load change detection tasks (2 versus 4 items) and measured working memory capacity (K) and CDA amplitudes in trials with repeated versus novel stimulus contexts. Results revealed increased K values and attenuated CDA amplitudes in repeated as compared to novel contexts, suggesting that memory capacity was higher and retention effort lower for known as compared to unknown stimulus sets. Interestingly, this was only the case in the high-load condition. In the low-load condition, where K values exceeded the task load (K>2), K values and CDA amplitudes were identical in repeated and novel contexts. These findings suggest that previously observed contextual cueing effects in visual search may depend on implicit learning effects in visuospatial working memory, but possibly only when task loads exceed individual working memory capacity.  
This work was funded by a research grant of the Leverhulme Trust (RPG-2020-319) awarded to Anna Grubert.

**Listeners’ perceptions of conversational response timing in English and Dutch.**

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Between-speaker pauses are a meaningful aspect of conversations, since listeners tend to assign pragmatic and social interpretations to delayed responses. Other durational phenomena in speech tend to be subject to speech rate normalization (i.e, durations are perceived as longer when the preceding speech is uttered faster) but it is not clear if speech rate normalization also affects interpretations of between-speaker pause duration. We conducted two studies in which British English and Dutch speaking participants respectively rated the “timeliness” of responses in question-answer sequences in their own language. We tested whether participants’ rated responses as later when 1) the question’s speech rate was faster, and/or 2) the final syllable was uttered faster. Contrary to expectations, we found no effect of speech rate on participants’ ratings of response timeliness in either language. Also, for English, we found that ratings of response timeliness were modulated by the duration of the final syllable of the question, but in the opposite direction than expected: longer final syllables were associated with later ratings, not earlier ratings. In Dutch, there was a similar but non-significant trend. These results suggest that response delay is perceived as the combination of the pause itself and the preceding syllable.

AHRC Northern Bridge
The effect of lexical co-activation on novel word learning.

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Newly-learned words must be linked to existing lexical representations to be fully integrated into the mental lexicon. We examined whether co-activation of familiar with new words boosts early encoding and immediate integration in auditory word learning. In each experiment, participants learned twelve words across two training conditions. In Experiment 1, we manipulated the degree of global lexical activation; novel words were either interleaved with tones (non-lexical condition) or with familiar words (lexical condition). In Experiment 2, we manipulated the phonological similarity of new and familiar words; novel words were either interleaved with dissimilar words (unrelated condition) or with phonologically similar words (related condition). In a 4AFC visual world paradigm test, participants were significantly more likely to look at the correct referent when the word was learned with lexical relative to non-lexical interleaving (Exp.1), but there was no effect of phonological relatedness (Exp.2). A lexical decision task did not reveal robust training-driven differences in immediate integration in either experiment. This pattern suggests that interleaving with familiar words may benefit novel word learning, but may not affect immediate integration. Ongoing work examines the time course of the effect.

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Examining how object-exploration and explanation-generation influence innovative problem-solving in 5-7-year-olds.

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Many everyday tasks demand physical problem-solving skills, such as object manipulations or tool-generation, to solve. However, children display great difficulty in innovating solutions to physical problems independently until around 8-years-old. This pre-registered study explores whether encouraging children to (1) explore task materials or (2) generate explanations could enhance innovative problem-solving performance. 5-7-year-olds completed two tasks (a hook-tool generation and water displacement task). Functional items were presented alongside visually similar non-functional ‘distractors’ for each task. Children were randomly assigned to one of three conditions which involved: (1) exploring task materials, (2) explaining how the materials could be used to solve the task, or (3) a filler-task (control group). Analyses conducted on data collected so far (N=71) revealed condition did not significantly predict task success (hooks: $\chi^2(2) = 4.159$, p=.76; water displacement: $\chi^2(1) = .010$, p=.922) or whether children used the functional item first insertion
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(χ²(2)=2.70, p=.260; χ²(2)=1.02, p=.599). Latency to success also did not differ between conditions for successful children (F(2, 68)=.001, p=.999; F(2, 68)=.717, p=.492). Thus, neither guiding children to explore the materials nor explain their actions enhanced problem-solving performance. To further contextualise these findings, a detailed analysis of behaviour and verbalisations during problem-solving attempts is being undertaken.

The emotional impact of advertisements on product categorisation.

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Perceptual decision-making (PDM) and visual discrimination (VD) tasks are crucial cognitive processes that allow individuals to categorise visual stimuli accurately. Previous research has demonstrated that colour and texture can influence how stimuli are processed, categorised, and perceived in the environment by evoking emotions that affect our behaviour and that this process is influenced by the emotional valence and arousal of the background context. In this study, we investigated this interplay using fake advertisements, with participants categorising stimuli as luxury or basic, where backgrounds were manipulated regarding valence (low positive/high positive) and arousal (high/low). We recruited 60 participants for the product categorisation task, and recorded the speed and accuracy of their responses as well as eye movements using eye-tracking technology. Preliminary results suggest that both high arousal backgrounds and luxury products increase attention, as reflected by total fixation duration on the product stimulus, shorten reaction times, and improve classification accuracy. This research could significantly impact marketing strategies. By understanding how different emotional states influence product categorisation, companies could tailor their advertising strategies to evoke the desired emotional response and thus influence how consumers perceive their products.

Research Plan - Exploring counterfactual thinking and confidence in everyday medical decision-making.

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At present, psychology research still does not provide answers to many fundamental questions about how people make causal judgements in real-world decisions. (Lagnado et al., 2013). Crucially, these judgements hinge on counterfactual contrasts, namely what would have happened if the presumed cause had not occurred? The concept of causation is central to our understanding of the world and key to human decision making (Gerstenberg et al., 2015). Evidence shows that different causal beliefs tend to result in different health outcomes (Richens et al., 2020). In a recent pilot study, we have conducted a psychological experiment in the context of clinical case studies to probe causal decision-making among medical professionals. Initial results revealed a marked variability in proposed treatments, confidence judgements and counterfactual thinking among doctors. Building on this, we aim to extend these results to a general populations sample by exploring decision-making in the context of everyday health (e.g. treating a headache),...
with a particular focus on necessity and sufficiency in causal reasoning. Namely, what would have happened if the presumed cause (e.g., taking paracetamol) had not occurred? The results from this study will inform future experiments hoping to improve counterfactual thinking by targeting particularly weak aspects of decision-making processes.

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Understanding the role of executive control in the sleep and mental health relationship.

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Sleep problems are associated with anxiety and depression, however, the underpinning neurocognitive mechanisms are poorly understood. One theory proposes sleep deprivation impairs top-down executive control processes (e.g., inhibition, shifting attention) that govern the suppression of intrusive thoughts, giving rise to disordered mood (Harrington & Cairney, 2021). It is plausible that this mediatory role of executive control on mental health difficulties is particularly pertinent during adolescence, owing to increased sleep deprivation and critical periods of executive function development during this age. This study tested the hypothesis that adolescent mental health difficulties arising from disturbed sleep are mediated by executive control. N=81 adolescents (aged 13-15 years; 51.9% female) completed self-report measures of sleep (PSQI), mental health (HADS), and executive control (BRIEF-2; inhibition and shifting difficulties subscale). Mediation analysis revealed shifting difficulties partially mediated the relationship between sleep and anxiety and depression. Inhibition difficulties were found to partially mediate the relationship between sleep and anxiety, but not depression. These results lend support to the application of Harrington & Cairney’s (2021) theoretical framework to adolescence, suggesting that inhibition and shifting attention (i.e., away from maladaptive thoughts) may be hampered by sleep difficulties, compounding anxiety and depression symptoms.

The effect of positive episodic simulation on future predictions in anxious and non-anxious individuals.

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Individuals with anxiety and those with depressive disorders both tend to mentally construct future personal threat-related events with anticipated negative outcomes. For individuals experiencing significant levels of dysphoric mood and depressive symptoms, positive future episodic simulation can modify predictions about the likelihood of occurrence, perceived control, and importance of positive and negative future events (Boland et al., 2018). The current study (N = 49) examined the role of anxiety, which tends to be oriented to future events, in the relationship between positive future simulation and modification of future event appraisals. As expected, anxious individuals initially felt less in control of future events; this was not impacted by positive future simulation. Regardless of anxiety status, prediction ratings for the importance, likelihood, and vividness of
events increased post-simulation for positive events, and decreased post-simulation for negative events. However, only non-anxious individuals experienced a decrease in the vividness of the future events post-simulation. Results suggest that while positive imagery can successfully intervene on the nature of prospective thinking, it may not be any more effective for anxious than for non-anxious individuals, and the persistence of vivid mental simulations may be implicated.


Expectations about precision in the human brain.

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Expectations about the clarity of ‘precision’ of the sensory world can alter metacognition and perceptual awareness - such that we feel more confident, and visions seems more vivid when sensory signals are expected (Olawole-Scott & Yon, 2023). These results support an influential but largely untested tenant of Bayesian models of cognition: agents do not only ‘read out’ the reliability of incoming sensory information but integrate prior knowledge about how reliable or ‘precise’ different sources of information are likely to be. In this study, we extended this work - investigating how expectations about precision alter representations of evidence reliability in the human brain. In an MRI scanner, participants rated the clarity of moving dot clouds, which they expected to be either ‘strong’ or ‘weak’. Comparing ‘expected’ and ‘unexpected’ trials allowed us to determine how expectations shape neural representations of perceptual precision. Using a whole brain multivariate decoding approach, we found neural representations of perceptual precision (e.g., in visual, parietal, and prefrontal cortices), and revealed where in the brain precision representations are altered by expectations. These findings begin to reveal how prior beliefs about the vividness and clarity of the world around us could shape metacognition and awareness.


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INTRODUCTION: Chronic fatigue, increasingly reported after the COVID-19 pandemic, significantly contributes to road and work-related accidents. Transcranial direct current stimulation (tDCS) offers a potential treatment for various indicators, showing efficacy in reducing fatigue
effects in multiple sclerosis [1] and other conditions (e.g., Sjogren’s syndrome; [2]) with a mild side-effect profile. Its simplicity allows the creation of inexpensive home-use devices, enabling accessible treatment for everybody. The proposed study will evaluate the efficacy of home-based tDCS intervention to alleviate fatigue symptoms. METHODS: A double-blind randomised sham-controlled trial protocol will employ a large sample of participants, with varying fatigue severity, undergoing a 2-month tDCS home intervention. This will be complemented by EEG measurements in a subsample of participants for each group pre- [T1] and post-stimulation [T2] period, and after a 3-month follow-up [T3]. Additional physiological measurements (e.g., heart-rate and skin temperature) will be recorded, alongside subjective measurements of fatigue via questionnaires, and performance on attentional tasks (e.g., Sustained Attention to Response Task). APPROACH FOR STATISTICAL ANALYSIS: Questionnaires scores, EEG and physiological measurements, and performance on attentional tasks will be compared at T1, T2, AND T3, following a 2X3 design (active/sham vs time). Statistical methods will include Pearson’s r and R2 to observe correlation and regression within the data.

Linnhoff et al. (2019). Cognitive Fatigue in Multiple Sclerosis: An Objective Approach to Diagnosis and Treatment by Transcranial Electrical Stimulation. Brain Sciences

The bestersell effect: Findings on positional encoding of morphemes in visual word recognition.

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Four unprimed lexical decision experiments, each with 90 native English-speaking participants, investigated how affixes are recognised in a position-dependent manner compared to the position-independent encoding of embedded stems. Two initial experiments found transposed compound nonwords were harder to reject than their controls (e.g., dreamday vs. shadeday), whereas there was no difference between transposed suffixed (e.g., fulpain vs. dompain) or prefixed (e.g., qualifydis vs. qualifymis) nonwords and their controls (Spencer et al., 2024). However, fluent English speakers have no difficulty reading words such as ‘hopefulness’ with the suffix ‘-ful’ embedded in the middle of the letter string. This suggests there must be further nuance to the positional constraints imposed by the reading system on affixes, with implications for models of morphological processing. Using the same morpheme transposition paradigm, findings from two experiments in the current study suggest that suffixes are not as strictly positionally encoded as previously assumed, able to be meaningfully recognised in any position within a letter string except at its onset. Items like ‘bestersell’ interfered with lexical decision performance relative to controls by activating the representation of ‘bestseller’ in the lexicon, despite the suffix ‘-er’ being neither edge-aligned nor paired with a legal supporting stem.

Association between cognitive function and motor symptoms in Parkinson’s disease.

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Parkinson’s disease (PD) is best known for its motor symptoms, yet a significant proportion of patients may present with cognitive impairment. Emerging evidence suggests that cognitive deficits may contribute to specific motor impairments in PD (Kelly et al., 2012; Moustafa et al., 2016). Yet, whether standardised global cognitive assessments are sensitive to motor impairment is unclear. Previous research has suggested the Montreal Cognitive Assessment (MoCA) is a promising tool to diagnose mild cognitive impairment in PD (Kim et al., 2019). Therefore, as part of the Oxford QUantification In Parkinsonism (OxQUIP) study, PD patients (N=100) were tested using cognitive (MoCA) and motor (MDS-UPDRS-III) clinical rating scales. Cognitive performance was categorised as impaired (n=23) or unimpaired (n=77) based on MoCA scores and a linear regression analysis was conducted. Results revealed no significant main effect of cognitive status, or interaction between cognitive status and motor domain on motor scores in our cohort. This may suggest that global cognitive assessments may be less sensitive to motor impairment. It is possible that focusing on specific cognitive domains (e.g., executive function) may be more useful for illuminating the potential interplay between cognitive and motor dysfunction in PD. This knowledge may inform targeted therapeutic strategies to improve outcomes for cognitively impaired PD patients.

Research Plan - Investigating task difficulty and stakes in human-human handovers.

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Joint actions often involve what appear to be facilitatory behaviours stemming from the optimisation of aggregate physical and cognitive costs over individual costs. Previously, we evaluated how an agent’s facilitatory passing behaviour affects the movement and planning of a receiving agent, and whether the receiving agent's actions vary based on their expectation of facilitation during handover tasks. Findings indicated a difference associated with expectations of facilitation between human-human and human-robot handovers. This discrepancy might be attributed to human expertise in handover tasks with other humans, allowing for adaptability to various movement patterns. We present our subsequent research plan modifying the current human-human design by manipulating task difficulty and stakes. We expect that in more difficult high-stakes situations conforming to expectations may assist co-agents receiving actions: normalised time to peak velocity will be modulated between facilitatory and non-facilitatory conditions relative to individual expectations of facilitation. Task difficulty will be manipulated by altering the size of the goal location, demanding finer motor control. Stakes will change by altering object characteristics (e.g. filled vs empty mug). Linear mixed effects models will be used to determine if stakes, task difficulty and expectations of facilitation impact kinematics during facilitatory/non-facilitatory conditions.
Does target-location repetition bias attention in a competitive first-person shooter?

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The relationship between attention and video gaming has been the topic of many studies, but relatively little experimental work has addressed how attention is allocated during video gaming. Competitive video gaming (i.e., e-sports) is both increasingly popular and a relatively controlled environment, making it an interesting test-case for the generalisability of experimental psychology research findings. In the present work, I investigate whether the relationship between successive target locations affects the speed and accuracy of responses to targets as it does in laboratory research. In a first study, run online using scenes captured from a popular e-sport game (Counter-Strike: Global Offensive) and measuring speeded response-times to target presence through button-presses, I found that target location repetition impairs response time when targets onset into otherwise static scenes, but not when targets are revealed through a simulated shift in point-of-view; findings consistent with previous laboratory research (Redden, Klages, & Klein, 2017). In subsequent studies measuring response times in-game using custom levels, findings were mixed for both simple reaction times and aiming measures. These results provide some evidence that target location repetition in video gaming contexts can affect target detection, but this pattern may not generalise to gaming results on the server.


Research Plan - The role of methodological differences and participant expectations on tDCS outcomes.

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Transcranial direct current stimulation (tDCS) involves the application of a weak electrical current via scalp electrodes and is thought to modulate cortical responsiveness and therefore influence task performance. However, the literature has produced inconsistent findings which have been attributed to methodological differences in stimulation parameters (Beaumont et al., 2022) as well as participant’ expectations about the stimulation they will be receiving (Braga et al., 2021). This study aims to manipulate stimulation parameters and participant expectations to understand the impact on cognitive task performance. All participants will receive active anodal stimulation to the right inferior frontal gyrus across two sessions while completing a response inhibition task. Participant expectations will be manipulated by informing participants that they are receiving active stimulation, sham stimulation, or by not discussing the stimulation protocol. Stimulation will be delivered using either a neuroConn DC-Stimulator, Nurostym tES or HDCstim. Electrodes will either be encased in saline-soaked sponges or spread with a conductive paste. Mixed ANOVAs will be conducted to explore the effects of stimulation parameters and expectations on task performance and post-monitoring data.
Unitization based memory enhancement in younger and older adults.

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Memory for episodic associations declines with aging due to decreased recollection abilities. Unitization—the encoding of multiple items as one integrated entity—was shown to support familiarity-based retrieval that is independent of recollection and is relatively preserved in healthy aging. Accordingly, unitization was proposed as a promising strategy to attenuate age-related associative deficits. The current preregistered study aimed to establish whether unitization is a viable mnemonic strategy. First, we tested whether top-down unitization can attenuate the age-related associative deficit for initially unrelated materials. Participants were given an initially unrelated word-pairs in the context of either a definition which allows the words to be encoded as a unitized compound, or a sentence in which the words are encoded as separate entities. We find evidence for the unitization effect across both younger and older adult samples. Second, we tested whether unitization can be used as a self-initiated strategy in a condition where participants generated their own binding information (definitions / sentences). While generation improved associative memory overall, there was no additive effect of unitized definition encoding relative to sentence encoding in the generation condition. These results suggest that while unitization can enhance associative memory, the applicability of this as a useful strategy requires further investigation.

Somatosensory response changes during illusory finger stretching: A registered report.

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Resizing illusions, delivered using augmented reality, resize a body part through either stretching or shrinking manipulations. The neural underpinnings of resizing illusions are currently undefined. This registered report study sought to understand the neural mechanisms behind resizing illusions in participants without chronic pain (n = 46), by using somatosensory steady state evoked potentials in addition to subjective questionnaires. Resizing illusions can provide analgesia for individuals with chronic pain, therefore, this study also aimed to provide an empirical basis for investigations in chronic pain samples. Confirmatory results demonstrated significant differences in subjective experience between non-illusion and multisensory illusion conditions, and EEG data measuring somatosensory response across electrodes of interest (F1 & FC1) to 26Hz vibrotactile stimulation showed reduced amplitudes in illusory conditions compared to non-illusion conditions. Exploratory analysis of electrodes with the greatest SSEP response across conditions (FPZ & FCZ) showed reduced amplitudes in illusory and non-illusion tactile conditions, compared to the non-illusion condition. Findings demonstrate a potential sharpening of neural representations as a result of both illusory stretching and tactile input in participants without chronic pain, providing a basis for investigations in a chronic pain population, who are thought to have more diffuse neural representations of their affected body parts.

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Only deterministic stimulus associations elicit self-prioritization in instrumental learning.

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Material relevant to oneself tends to be prioritized compared to material related to others, such as a friend or a stranger. This prioritization of self-relevant information benefits various cognitive processes like attention, memory, and decision-making. However, it remains unclear whether the conditions under which self-related knowledge is acquired influence the emergence of this self-bias. To investigate this, an associative-learning paradigm was used in combination with a stimulus-classification task to examine how different learning experiences (i.e., deterministic vs probabilistic) affect self-prioritization. The results showed that prior learning experiences significantly influenced task performance, with self-prioritization observed only when participants learned stimulus-target associations under conditions of certainty (vs uncertainty). Additionally, a drift diffusion model analysis showed that differences in the efficiency of stimulus processing (i.e., rate of information uptake) underpinned this self-prioritization effect. These findings have implications for understanding the mechanisms underlying self-function.

Visual attention and working memory capacity in tasks with spatially predictable versus random target locations.

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Visual search for known objects is guided by target templates that are held in visual working memory (vWM). While we can hold up to four items in vWM, visual search for multiple targets is much less efficient and possibly limited to one target at a time. This dissociation between attentional template and vWM capacity might, at least partially, have methodological reasons: In search tasks, target locations are typically unknown, while they are fixed in traditional change detection tasks. Such spatial predictability in vWM tasks, but not in attention tasks, may serve as a retrieval cue and may be responsible for the higher capacity measures in change detection as compared to visual search tasks. To test this hypothesis, we compared performance in high- versus low-load search and change detection tasks with spatially predictable versus random target locations. Results revealed increased reaction times, error rates, and N2pc latencies in high- versus low-load search, and these load effects were substantially larger when target locations were spatially unpredictable. Similarly, change detection accuracy and vWM capacity (K, CDA amplitudes) were significantly lower under spatially variable target conditions. Together, these results provide converging evidence that spatial predictability significantly influences capacity measures of visual attention and vWM.

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The effect of vocal emotions on visual spatial attention in adolescents with traits of ADHD: An event related potential study.

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It is debated whether emotion dysregulation in attention-deficit hyperactivity disorder (ADHD) reflects attention deficits only (Barkley, 1997; Nigg et al., 2005) or additional perceptual processing atypicalities (Sonuga-Barke, 2005). The present ERP study aimed to explore a) atypicalities in the initial perception of vocal emotions in ADHD and b) the capture of visual attention by vocal emotions in ADHD. Sixty-one adolescents (12-16 years) with varying levels of inattention and hyperactivity participated in a novel emotional spatial cueing task. Participants responded to a visual target preceded by task-irrelevant vocal cues (angry, happy and neutral). Results showed adolescents with high levels of ADHD traits presented with significantly larger P2 amplitudes to happy and angry, but not neutral, voices compared to adolescents with low levels of ADHD traits. These results suggest that adolescents with high levels of ADHD traits perceive emotional voices as more salient than individuals with low levels of ADHD. Analyses of the P1 component to the visual target, reflecting the capture of attention by vocal emotions, are still being finalised. This is the first study to provide support for a preattentive hypervigilance to emotionally salient vocal stimuli in ADHD, in favour of perceptual processing theories.

Predictive processing of L2 idioms: A web-based eye-tracking study.

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Purpose: Evidence for predictive processing in L2 is limited. We examined French (L1) speakers’ processing of idioms as they listened to English (L2) sentences while viewing images related to literal or idiomatic meanings of sentences. We used a web-based version of the visual world paradigm (VWP) to capture eye movements, and we asked whether L2 reading experience is associated with anticipatory looks-to-targets. Method: The study has been pre-registered and data collection is underway. We recorded eye movements as L2 English participants (currently n=16) heard idiomatic and literal sentences, then selected images representing the intended meanings. We measured looks-to-targets in time windows prior to critical words which revealed the meanings of each sentence, as well as image selection accuracy. Print exposure and language proficiency were also measured. Results: Print exposure positively predicted VWP image selection accuracy for all trials, explaining unique variance beyond language proficiency. Additionally, print exposure was differentially associated with anticipatory looks-to-targets for idiomatic and figurative trials, showing increased target preference for idiomatic sentences as a function of reading experience. Conclusions: Findings suggest print exposure is an important factor in L2 predictive processing and knowledge of idiomatic language.
Investigating the relationship between social anxiety and face perception.

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Introduction: Social anxiety, which makes people avoid looking at faces in social situations, may be one of the reasons for individual differences in face perception. Previous research investigating the relationship between social anxiety and face perception has yield inconsistent results (Avery et al., 2016; Bobak et al., 2016; Davis et al., 2011). Thus, the reported study explores how social anxiety relates to both facial identity and facial expression recognition ability in the same individual.

Methods: We recruited participants (N=144) at the University of Manchester and more widely via Prolific. We conducted an online experiment involving multiple scales and face tests on Gorilla to investigate the relationship between social anxiety and face perception. Results: Mainly, we found a significant negative correlation between social anxiety and facial identity recognition (p=.006), but there was no significant correlation between facial expression recognition and social anxiety (p=.628). Conclusion: Overall, our findings suggested that participants with higher levels of social anxiety are more likely to have impairments in recognizing facial identity rather than facial expression.

Everyday language environments of young children with Down syndrome.

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Children with Down syndrome (DS) often show language difficulties relative to typically developing (TD) children, but the extent of their language difficulties can vary greatly. As most language learning opportunities occur at home, this is a potential source of variability in language outcomes. It is crucial to explore potential variability in the features of children’s daily language environments, how the language environments might change over time and differ for children with DS and TD children, and how this may relate to language outcomes. Automated technology such as Language ENvironment Analysis software (LENA) can facilitate such research. We explored two LENA measures, comparing adult word count (AWC) and child vocalisations for 22 children with DS (chronological age=35-58 months; developmental age=15.5-34.5 months) to 329 TD children (chronological/developmental age=2-48 months; LENA’s Natural Language study, Gilkerson & Richardson, 2008). While AWC was not significantly correlated with mental age in either DS or TD, child vocalisations correlated with mental age for TD but not DS. A lack of correlation between child vocalisations and AWC in DS also differed from established TD findings. This suggests that the language experiences and interactions of children with and without DS may differ, potentially contributing to differences in language profiles.
Neural correlates of familiar face versus person recognition: Evidence from self and semantic priming effects in event-related brain potentials.

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Recognizing faces of familiar people is typically highly accurate. Research contrasting event-related potentials (ERPs) has consistently revealed more negative amplitudes to personally familiar than unfamiliar faces at occipito-temporal channels, starting at 200ms (N250) and becoming particularly pronounced between 400-600ms (Sustained Familiality Effect; SFE). While the N250 reflects access to long-term visual representations, the functional properties of the SFE are still unclear. This study applied self- and semantic priming to examine to what extent the SFE reflects post-perceptual rather than visual recognition processes.

Participants’ ERPs were recorded while viewing personally familiar or unfamiliar faces, which were preceded either by the name of the depicted person or a different name (self-priming; Experiment 1), or by the name of a highly associated or unrelated person (semantic priming; Experiment 2). We found clear N250 familiarity effects, as well as more negative amplitudes for unprimed versus primed familiar faces around 400ms, reflecting the pre-activation of domain-general person representations. Relative to previous studies, both experiments found substantially reduced SFEs, which coincided with the observed priming effects. Accordingly, self- and semantic priming do not facilitate but interfere with the SFE. The effect more likely reflects the preparation for a potential interaction rather than accessing identity-specific information.

Public communication alters private confidence.

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We use feelings of subjective confidence to coordinate our interactions with others. For example, previous studies of cooperative decision--making have revealed ‘confidence matching’ – where the confidence we express gravitates towards the confidence that is expressed by our decision partners. Current theories suggest that we can strategically distort the confidence we express to others while leaving our private feelings unchanged. However, here we explore whether – in attempting to deceive others – we end up deceiving ourselves. Across two studies participants completed a perceptual decision making task – judging moving dot clouds and reporting their decision confidence. This task unfolded over three experimental phases – alone, together with a partner or alone again. Critically, separate groups of participants made joint decisions in the together phase with a partner that was programmed to have generally high or low confidence. Our results revealed robust evidence of confidence matching when make decisions together. More interestingly, we also found that these biases in confidence persisted after the interaction when participants were alone again. The results suggest that social interaction may have a lasting impact on the metacognitive sense of confidence. This may point to a mechanism that allows communication with others to change our private states of mind.
The effect of prediction errors on memory representations of naturalistic episodes.

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According to the predictive coding framework, the brain automatically makes predictions about what is going to happen next. When these predictions are incorrect, a prediction error arises, which is associated to encoding of the unexpected information as well as to a weakening of the original memory which the prediction was based on. However, it remains unclear when and how these similar memories can coexist.

In a five-session experiment, participants were exposed to naturalistic dialogues, which were encoded in an original form and later modified, inducing a prediction error. The modifications were either on the surface level, changing only the phrasing, or on a gist level, changing the overall meaning. Participants were later tested on original and modification recognition memory. Both the originals and modifications were recognized best after higher-rated gist changes compared to smaller gist changes. For surface changes, the magnitude of modification had no effect. Using representational similarity analysis, it will be elucidated whether the modifications induce changes in the original memories, and whether this as well as the size of the prediction error correlates with behavioural memory outcomes. The results will therefore shed light on the representational formats of old and new information after prediction errors.

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Testing the capacity of sleep to consolidate social interactions and memories.

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Social relationships can be affected by the quality of sleep; poor sleep is associated with increased conflict and prejudice, and reduced empathy (Gordon et al., 2017). Across two pre-registered experiments, we investigated whether sleep can enhance the quality of social interactions and social memories formed during conversation. In Experiment 1, pairs of participants (N=80) completed a picture-matching task (Branigan et al., 2011) before/after 12hrs of sleep/wake, and we measured their tendency to align lexical choices with their partner. Results showed the expected lexical alignment effect, which persisted 12hrs after the initial picture-matching interaction, however this was not influenced by sleep vs. wake. In Experiment 2, participants (N=96) completed a matcher-director task with two other people (McKinley et al., 2017), and we measured their recognition and source memory for items before/after 12hrs of sleep/wake. Results showed that recognition memory was unaffected by sleep but that source memory was enhanced after sleep vs. wake, and participants were more likely to maintain common ground to describe old (vs. new) items after sleep. These findings show that sleep has the capacity to enhance social interaction by consolidating memory of a previous conversation. Future work is needed to test boundary conditions for these effects.


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Research Plan - Assessing forgetting across a representational hierarchy.

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Forgetting is likely to differ depending on what you are trying to remember. For example, event narratives are forgotten less rapidly and more linearly than their lexical content (Fisher & Radvansky, 2019). Further, while event elements tend to decay together, such as object-person-location triplets (Joensen et al., 2020), memory for object features, such as colour and shape, sometimes fragments (Andermane et al., preprint). This suggests forgetting can both quantitatively and qualitatively differ dependent on the mnemonic representation. Specifically, object features might be forgotten more rapidly and in a more fragmented manner, while higher-order spatiotemporal events and temporally extended narratives might decay more slowly and holistically. To test this, we have constructed a stimulus set that captures all three levels of representation. From objects and their features (e.g., colour and size), to events and their elements (object, person and location), to narratives and their events (three causally linked events). We will assess forgetting at each level of representation (objects, events, and narratives) across multiple delays using measures of memory accuracy and retrieval dependency. The primary aim of this work is to understand the nature, rate, and form of forgetting at different levels of representation.

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The impact of oral and nasal breathing on visual search performance: A pre-registered replication and extension.

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The relationship between breathing and cognition is gaining increasing interest. Nasal breathing is linked to greater neurophysiological synchrony compared to oral breathing, which could impact cognitive functions like attention and memory. Yoshimura et al. (2019) examined whether respiratory pathway (oral vs. nasal) affects visual search efficiency. In their second experiment, oral breathing combined with reduced target discriminability led to increased reaction time (RT) intercepts compared to nasal breathing. However, the fact that even their most difficult search condition produced flat RT x set size slopes suggests their task may have lacked the sensitivity needed to detect potential slope effects. In this planned pre-registered study, we aim to replicate their finding regarding RT intercepts and extend their design to provide a more sensitive test of whether oral breathing reduces search efficiency. Using a within-subjects design, participants will complete visual search tasks under oral and nasal breathing conditions. The orientation discriminability between targets and distractors will range from easy (6°) to difficult (1°) to encourage slope effects. This will show whether oral breathing increases intercept for difficult conditions (replicating Yoshimura et al.) and reduces search slopes (extending their findings).
The stability and role of early sleep on later mental health in children and adolescents.

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Sleep problems are highly prevalent in children under five years old (25-40% [1]) and are negatively associated with an array of life outcomes; however, longitudinal research examining whether early sleep difficulties persist across childhood and whether sleep trajectories predict adolescent outcomes remains scarce. We assessed the stability of sleep over development via the ALSPAC [2] cohort through questionnaire data collected from 18 months (N=11485) to 9 years (N=7882). Exploratory factor analyses at each time point suggested two factors reflecting sleep quality and sleep timings. A cross-lagged model showed both constructs remained fairly stable over time at the group-level with negligible cross-lagged effects between constructs, thus indicating that the constructs are largely independent. Growth mixture models identified six sleep quality trajectories (persistent decreasing sleep problems through childhood/limited infant/preschool sleep problems/increased early childhood sleep problems/increased middle childhood sleep problems/mild sleep problems over time/no sleep problems) and five sleep timings trajectories (average sleep timings/delayed or very delayed sleep timings/early or very early sleep timings). Based on these results, sleep problems can persist, worsen and improve across development, suggesting that these constructs are modifiable, however each sleep construct may require different intervention approaches.


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Exposure to second language accent prompts recalibration of phonemic categories.

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We examine how first language (L1) Spanish listeners with varying levels of experience with English recalibrate their phonemic category boundaries following exposure to second language (L2), American English-accented Spanish. Specifically, we examine changes to voice onset time (VOT) boundaries, which are often positively-shifted when produced by American English-accented Spanish speakers (as compared to L1 Spanish speakers). Our results demonstrate that listeners make
adjustments to their phonemic category boundaries following exposure to accented words with the critical sounds in onset position (e.g., “bailar” and “parir”, meaning “to dance” and “to give birth”, for the /b/ and /p/ phonemic categories). In many cases generalization of phonemic learning was also observed, such that boundaries for categories that were not presented in training were also adjusted. Also notable was the role of the Spanish listeners’ experience with English: More experienced listeners showed more positively-shifted (English-like) boundaries in the pre-test session. This suggests that more experienced listeners may have rapidly identified the American English-accented Spanish and applied their English category boundaries accordingly. We conclude that listener accommodation of L2 accent is supported by a phonemic recalibration mechanism, and that experience with the L1 of an L2-accented speaker facilitates rapid recalibration of phonemic categories.

This work was supported by the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 101103964, the Basque Government through the BERC 2022-2025 program, and the Spanish State Research Agency through BCBL Severo Ochoa excellence accreditation CEX2020-001010-S.

The effect of mental imagery on predictions of behavioural engagement in people experiencing dysphoria.

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The negative cognitive triad states that people with depression have a negative perception of the world, the self, and the future (Beck, 1987). Succeeding research suggests negative views of the future may be a central factor of depression (Roepke & Seligman, 2016). Previous research into prospective thinking has found future event predictions can be improved using positive episodic future simulation (Boland et al., 2018). The present study aimed to extend upon previous research by investigating the effect of mental imagery on changes in predictions regarding behavioural engagement in people with, and without, dysphoria. A non-clinical sample of 144 participants took part in a between-groups experiment. Participants were randomly assigned to either an imagery intervention, whereby they vividly imagined engaging with four chosen activities, or a verbal reasoning intervention where they thought about the reasons why they would engage in their four activities. Activity predictions were measured pre and post intervention. It was anticipated that there would be improved positivity regarding activity predictions in the imagery condition in comparison to the verbal reasoning condition. It was found following the imagery condition, all participants reported a significant increase in both vividness ratings and anticipatory pleasure. Findings and their implications will be discussed.
When children get the gist: The development of rapid scene categorisation.

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Mechanisms underpinning rapid scene categorisation (the extraction of a scene’s gist) have been thoroughly investigated in adults, but little is known of its development through childhood. The goal of the current study was to understand if, and if so when, children demonstrate an adult-like ability to make accurate, rapid scene categorisation judgments. A large sample of children aged 5-10 years (N=102) and adults (N=31) made superordinate-level (e.g. inside vs outside) or basic-level (e.g. kitchen vs bathroom) categorisation judgments about natural scenes presented at four different durations (32ms, 64ms, 100ms, and 200ms). Children across all ages demonstrated a capacity to extract rapidly presented scene gist, with a gradual improvement in performance across age groups. For superordinate-level categorisation judgments, 5-6-year-old children reached adult-like accuracy at 200ms, while 7-8-year-old children showed similar performance at 100ms, and 9-10-year-old children at 32ms. For basic-level categorisation judgments, 5-6-year-old children did not reach an adult-like level of performance, while 7-8-year-old children did so at 200ms, and 9-10-year-old children at 100ms. These findings suggest a protracted development of rapid scene categorisation across childhood, particularly for basic-level judgements, and has significant implications for future research investigating how children extract visual information from natural scenes.

The third visual pathway and social information.

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The human cortex includes two distinct neuroanatomical pathways: the ventral pathway, specialised for object recognition and the dorsal pathway specialised for ‘vision for action’. A recently proposed third pathway attempts to account for neural processes underlying human social interaction. However, it is unclear whether different stimulus categories are processed differentially across this third pathway. In this study, participants (n=30) were scanned using fMRI while viewing moving or static faces, bodies, scenes and objects. A whole-brain group analysis revealed an increase in neural responses to moving bodies and objects in regions associated with the dorsal pathway, and an increase in neural responses to moving faces and bodies in regions associated with the third pathway. These findings imply a functional division between biological and non-biological stimuli across the dorsal and third pathways and suggest differential processing based on behavioural implications for specific stimulus categories. Although these findings suggest the third pathway is specialised for dynamic biological stimuli, we aim to further explore its involvement in social perception. Therefore, we plan to use 8-minute video extracts with varying levels of social interaction to investigate patterns of functional connectivity in the third visual pathway.
**Does vividness extension extend to facial stimuli?**

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Vividness Extension (VE) refers to the tendency to misremember images as more vivid than they are. VE occurs in scenic stimuli when images are manipulated using blur, saturation, and pixilation (Rivera-Aparicio, Yu, & Firestone, 2021). Though VE has been studied primarily in scenes, one study has found VE for faces in a Korean population (Kim & Jeong, 2023). Given cultural differences in face perception, the current study aimed to replicate VE for faces in a western population. 65 (14 males, M age= 40.89) participants completed an online vividness adjustment task. They were presented with a source image at a random level of blur, saturation, or pixilation, before being presented with a second version of the same image at a different level of vividness. The task was to adjust the second image to match the first as closely as they remember. Participant estimates reflect whether VE occurs. A significant VE effect was found, but only for blurred faces. For saturation, no significant VE was found, and for pixelation a reverse VE was revealed. These results expand our understanding of the VE effect by establishing VE for faces in a western population, but further work is needed to establish why VE is only observed for faces in the blur condition.


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**The development of mental simulation as a strategy for solving problems with multiple alternatives.**

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Adults readily work through alternative possibilities and their potential consequences in their minds before acting (mental simulation). This enables us to internally explore alternatives without incurring costs of acting in reality. Young children are highly exploratory in the real world, but little is known about their ability to internally explore via mental simulation. This preregistered study examines developmental changes in the use of mental simulation when solving problems with multiple options. Participants (to date: 33 adults, 30 4-5-year-olds, and 31 6-7-year-olds) completed 18 computer-based vertical maze puzzles where they chose which of three entrances to drop a ball into to reach a goal. An effective strategy is to simulate the path the ball will take through the maze. Across age groups, accuracy increased (F(2,93)=49.47, p<.001, η²=0.52) and latency to choice decreased (F(2,93)=39.15, p<.001, η²=0.46), with posthoc pairwise comparisons revealing differences between all three age groups on both measures (p<0.02 for all). Although younger children take longer to make their choices this does not lead to accuracy. Verbal explanations of strategy used imply different approaches across age groups. Our findings will contribute to
understanding children’s problem-solving and ability to compare alternatives, and could lead to a new conceptualization of exploratory behaviour.

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Neural oscillatory dynamics in encoding and retrieval of verbal and non-verbal narratives.

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Using high-spatial-resolution neuroimaging methods, we have identified the brain regions reflecting semantic cognition during narrative processing (1,2). However, the temporal dynamics of these processes and their influence on memory remain unclear. What are the oscillatory processes supporting semantic processing in verbal versus non-verbal tasks? To what extent do semantic-related oscillatory processes reflect the encoding of information in memory? Does the perceived coherence of a narrative affect its encoding and retrieval?

Thirty participants listened to 40-second-long narratives presented in both verbal and non-verbal formats and then provided coherence judgments. This was followed by a task where participants had to internally recall each narrative (cued) and then respond to a four-alternative-forced-choice memory test. Electroencephalogram (EEG) was recorded during the entire session. Irrespective of the modality, processing semantic information during narrative encoding led to decreased alpha-beta power, which predicted how well narratives were retrieved in the successive memory task. Perceived coherence during narrative encoding predicted memory performance, along with occipital-parietal alpha-beta power measured during the memory task. Modality effects (verbal versus non-verbal stimuli) were observed during both encoding and retrieval and consisted of differences in the lateralisation and the speed of the observed alpha-beta effects.


Developmental and individual differences in coupling between sleep spindles and slow oscillations.

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Decades of research link sleep and memory retention, and recent research points to the temporal coupling of sleep spindles and slow oscillations as a critical underpinning mechanism. However, few studies have assessed age-related changes in spindle-slow-oscillation coupling in children, despite findings that the maturation of sleep is associated with typical and atypical cognitive development. To address this, we analysed 124 polysomnography datasets from 7-15-year-olds: 84 typically
developing (TD), 40 neurotypical (23 with dyslexia, 17 with autism). For both groups, we found a highly significant association between age and coupling-consistency (extent to which the points on the slow oscillation where spindles occur are similar across spindle-slow-oscillation couples). However, while for TDs the density (spindles per minute) of coupled spindles increased with age, there was no significant increase with age in the neuroatypical group. The results suggest that the points at which spindles occurred during slow oscillations were more uniform across coupling events for adolescents than younger children, regardless of neurotypicality. The absence of a significant increase in the density of coupled spindles with age in the neuroatypical group in contrast to the TD group points to the developmental trajectory of spindle coupling as a putative transdiagnostic marker for persistent learning difficulties.

More steps, same effect: Spacing increases retention of mathematics procedures of varying complexity.

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The spacing effect, where practice is distributed over time rather than in a single session, often benefits long-term memory. However, it is less clear that spacing is effective for more complex material. As more educators harness the spacing effect, it is important to discern under what conditions it is most effective. We investigated the impact of procedural complexity on the efficacy of spacing, by varying the number of steps in arithmetic procedures. Participants were taught two procedures, either in a single session (massed) or over three sessions spanning three consecutive days (spaced). Experiment one compared learning a two-step procedure with a three-step procedure. We found a significant overall effect of spacing, but there was no difference between the two procedures. Experiment two compared learning a two-step procedure with a five-step procedure. Performance in the five-step procedure was significantly worse when compared to the two-step, yet both procedures benefited equally from spaced relative to massed learning. We found no evidence for an interaction between procedural complexity and the spacing effect. This suggests that increasing the number of steps in an arithmetic procedure does not negatively impact the efficacy of the spacing effect.

The role of social interaction in children’s learning of abstract concepts: An fNIRS hyperscanning study.

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Learning abstract concepts usually occurs within social interactions, yet the underlying mechanisms remain unknown. This ongoing multimodal hyperscanning study explores the behavioural and neural dynamics supporting children’s abstract concept learning during interactions with caregivers. To date, 23 dyads (from a targeted 30) involving caregivers and 8-to-9-year-old children have
participated in a novel interactive concept learning task assessing children’s comprehension and ability to generalise knowledge to new real-world situations. Preliminary results indicate that children successfully learn abstract concepts and generalise above chance levels. We employ an unprecedented verbal analysis pipeline, integrating AI-based transcription and automatic annotation of coordinative behaviours (e.g., question-answer, backchanneling) to identify specific behaviours contributing to learning. Preliminary findings suggest that children ask more questions and speak more in successful learning trials, emphasising the importance of comprehensive interaction analysis over caregiver or child individually. Brain activity is measured using a 22-channel fNIRS-hyperscanning setup, focusing on regions involved in social cognition and language: dorsolateral prefrontal cortex and temporoparietal junction. Preliminary Wavelet-Transform-Coherence results reveal brain-to-brain synchronisation patterns correlating with learning outcomes. We hypothesise that inter-brain synchrony, modulated by specific dyadic behaviours, facilitates successful learning. This study advances our understanding of brain-behaviour interplay in ecological social interactions supporting childhood abstract concept acquisition.

Information seeking without metacognition.

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Humans and other creatures seek information to improve their cognition and behaviour. Theories in cognitive neuroscience, developmental psychology, and animal cognition tend to assume a strong connection between information seeking behaviour and explicit metacognition - conscious introspection about our mental states and subjective metacognitive feelings like confidence or uncertainty. However, recent developments in computational neuroscience have stressed that metacognition and uncertainty are not equivalent, and many forms of uncertainty may be monitored in the brain without generating subjective metacognitive feelings. Here, across a series of experiments in adult humans, we show that information seeking and subjective confidence are controlled by distinct forms of uncertainty. In particular, information seeking (but not confidence) is controlled by uncertainty in sampled sensory evidence, while confidence (but not information seeking) is controlled by uncertainty caused by decision boundaries. This double dissociation suggests that separate computations in the mind and brain shape confidence and information seeking: questioning the idea that information seeking behaviour always depends on conscious introspection into our own states of mind.
Gender role stereotypes, attitudes towards homosexuality, and sexual orientation judgements from faces.

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Individual differences in the belief of associated stereotypes can influence how these stereotypes are used to make social judgments of others. Cues of facial gender typicality are used when making sexual orientation judgements. Therefore, the strength of belief in gender stereotypes will likely impact how facial gender typicality cues are used when making sexual orientation judgements. In Study 1, participants (n = 283) made sexual orientation judgements of 80 faces and completed a measure of belief in gender stereotypes. Study 2 presented participants (n = 219) with 80 faces that were more varied (i.e., in facial gender typicality and ethnicity) and measured participant attitudes towards homosexuality in addition to belief in gender stereotypes. Results indicate that strength in belief of gender stereotypes (Study 1 and 2) and negative attitudes towards homosexuality (Study 2) is associated with greater use of facial gender typicality cues when making sexual orientation judgements. Gender typical faces were more likely to be judged as heterosexual and gender atypical faces as non-heterosexual by participants who had greater belief in gender stereotypes, or more negative attitudes towards homosexuality. These results suggest that individual differences influence how cues of gender typicality are used when making sexual orientation judgements.

Can I make better decisions for others than I can for myself? The role of agency in a focus-divide dilemma.

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We often have many tasks to do, but limited resources with which to do them. The focus-divide dilemma is an experimental paradigm in which participants make tradeoffs between multitasking and focusing on a single task. The focus-divide dilemma has a simple optimal strategy: Focus resources when tasks are difficult, and divide them when tasks are easy. Most participants fail to realize this strategy, and make highly variable and suboptimal decisions. Indirect evidence from previous studies suggested that participants may fail to adopt an optimal strategy because they channel their effort and attention into task execution and neglect the strategic aspects of the situation. If true, this hypothesis predicts that participants with less agency (how much of the task is under the participants’ direct control) over elements of the task would have improved strategic decisions. Using a version of the focus-divide dilemma which has consistently produced variable and suboptimal decisions, we asked participants to make choices on behalf of a confederate instead of executing the task themselves. The results of Experiment 1 indicated this restriction improves decisions, but a thorough within-group replication produced no agency effect. The results suggest that restricting agency does not improve decisions in the focus-divide dilemma.
What is an impet? Effects of word expectancy and prediction errors in novel vocabulary learning.

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Sentences provide valuable contextual cues that allow listeners to predict upcoming words [1], and being able to predict the meanings of novel words can guide learning [2]. We explore whether being able to predict the meaning of a novel word from context aids vocabulary learning using the visual word paradigm. We also manipulate word meaning expectancy to investigate whether and how corrective/confirmatory feedback influences learning. Native speakers of English listened to strongly (e.g., The tutor smoked the last IMPET) or weakly (e.g., The tutor bought the last IMPET) constraining sentences, each ending with a novel word, while viewing displays containing four objects. Learners selected the object they expected novel words to refer to, and then received feedback. Participants rehearsed novel word-object associations, then performed a recognition test. Analyses compared memory performance across conditions when predictions were confirmed/disconfirmed. When novel word meanings were expected (but not unexpected), words were learned better in strongly constraining contexts, but guess accuracy during study did not influence memory performance. This suggests that, when target word meanings are expected, being able to predict the meaning of a new word can aid learning, but the type of feedback received does not influence learning.


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Differences in eye movement variability between children and adults reading English.

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Over numerous studies comparing adults’ and children’s eye movements during reading, a common finding is that standard deviations for measures are greater for children (e.g., Joseph, Nation, & Liversedge, 2013). Why does this greater variability occur in children’s eye movements when reading? We investigated this using a corpus of eye movement data and WIAT scores from 8-9-year-old English reading children and adults. Children’s reading scores were correlated with their eye movement behaviours, such that better readers had shorter sentence reading times, made fewer fixations, and had shorter fixation durations than poorer readers. Surprisingly, we found no significant correlations between WIAT scores and eye movement measures for adults. Further analyses assessed distributional and standard deviation (absolute vs. proportional) group differences with contrasting patterns. We also explored differential variability across groups in respect of inter-
individual and inter-stimulus variability. Our results provide insight into the nature of processing differences during reading between children and adults.

**Expected volatility and belief updating in paranoia: A reinforcement learning approach.**

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Belief formation and belief updating are greatly affected by how uncertain we perceive our environment to be. Problems with estimating this volatility seems to be a key driver of aberrant belief updating in numerous psychiatric conditions. For instance, highly paranoid individuals behave as though the world is a volatile and unstable place. Our study assessed how experienced and expected volatility affected learning and decision-making in individuals with high and low levels of paranoia. Participants completed a two-armed bandit task in different volatility blocks (true stable, true volatile, believe stable, believe volatile). In our critical ‘believe’ conditions, learners were exposed to environments with identical objective volatility, but different prior expectations about environmental uncertainty. This allowed us to isolate the effects of ‘volatility priors’ on learning and choice. We assessed task performance and switching rates and modelled the learning process with reinforcement learning. We found that prior beliefs about volatility and paranoia influenced switching rates and that these effects correlated directly with the model’s beta parameters. Our results suggest that paranoid individuals tend to perceive the environment as more volatile, and that similar patterns of behaviour can be engendered in non-paranoid people through explicit communication about uncertainty in the world around us.


This project was undertaken as part of the UCL-Birkbeck MRC-DTP PhD program, generously funded by the Medical Research Council, under the grant reference MR/W006774/1.

Matthew Kershaw¹, John Marsh¹, Philipp Ruhnau¹, Florian Kattner²
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Recent literature has focused on “stimulus specific” features of sound and how they capture attention, disrupting task performance. Findings have shown comprehensible spoken sentences (a language the participant understands) disrupt serial recall performance more than incomprehensible sentences (Kershaw et al., in preparation), supporting the notion that the semantic/syntactic properties of sentences drive a stimulus specific attentional capture which disrupts task performance. In a pilot to address whether semantic or syntactic properties of sentences are the most potent feature of a sentential distracter, jabberwocky sentences were created wherein pseudowords—which resemble actual words but contain minimal semantic content (Hahne & Jescheniak 2001)—replaced content words in normal sentences. It was hypothesized that to-be-ignored jabberwocky sentences would disrupt serial recall less than control sentences since jabberwocky sentences are incomprehensible. However, a pilot study showed jabberwocky sentences to disrupt serial recall performance more than the control sentences, contradicting this hypothesis. The aim of the planned research is to replicate this unexpected disruptive effect of jabberwocky sentences. This research plan will also test a hypothesis for the mechanism behind the increased disruption from Jabberwocky sentences—that they produce a system violation at the point of integrating the extracted syntax with semantic content during sentence reprocessing (see Huang et al., 2021; Matas et al., 2021).

The effects of sleep and wakeful rest on novel word learning in children.

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Sleep is one state proposed to support new word consolidation. Previous findings show greater improvements in new word recall over one week in children than adults. However, it is unclear whether this is underpinned by developmental differences in sleep architecture or the passive protective benefits of sleep, as suggested by declarative memory benefits following short post-learning “wakeful rest” compared to active wake. The effect of a 10-minute wakeful rest on the recall of newly learned words in 9-10-year-olds (n=158) and adults (planned n = 120) was examined. Participants learned 16 unfamiliar words paired with animal pictures in a group setting. Cued word form recall and picture naming tasks were administered immediately after learning, after 10 minutes of eyes-closed wakeful rest or active wake, during which participants completed timed spot-the-difference tasks, and after a 1-week delay. Children showed comparable word recall performance before and after the 10-minute retention period, but improved significantly after 1 week. There was no benefit of wakeful rest. The absence of gains in recall over the initial repeat tests and/or wakeful rest suggests that the gains in memory observed over longer consolidation periods are not likely due to developmental differences in the passive protective benefits of sleep.
Linguistic control and parallel language activation in bilingual picture naming: Cognate facilitation and a post-cognate effect.

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The cost observed when bilinguals switch between languages for production is thought to arise from the top-down language control required to resolve the involuntary ‘parallel activation’ of languages. One indicator of parallel activation is the cognate facilitation effect – faster naming of words which share form with their translation equivalent in the other language – documented thus far mainly in single-language contexts requiring little control. We investigated this effect in a language switching context, increasing the need for top-down control. We also examined whether the reduced language competition (and hence, control needed) when naming cognates modulates performance on the next trial. English-German bilinguals named pictured objects in the cued language. Some trials required switches to English when the object’s name was either a cognate or a matched non-cognate, followed by a switch to German for a (non-cognate) object name. Cognates were named 56±13ms* faster than non-cognates, suggesting reduced need for control (due to less conflict) on cognate trials. Objects immediately following cognates were named 33±11ms faster than those following non-cognates. This “post-cognate effect”, a marker of greater top-down control applied on the preceding non-cognate (compared to cognate) trial, was found even when controlling for reaction time on that preceding trial.

*mean ±S.E.  ESRC - South West Doctoral Training Partnership

Using magnetoencephalography (MEG) to uncover the neural pattern of motion silencing.

Tabea-Maria Haase¹², Denise Moerel³, Kevin Brooks¹, Iain Gilchrist², Christopher Kent² and Anina Rich¹
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² University of Bristol
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Detecting changes in our environment is critical for many tasks, however the Motion Silencing Effect demonstrates that feature changes cannot be reliably detected when objects move rapidly. We have shown that orientation changes are subject to silencing and that spatial attention modulates this effect. Here, we used MEG to examine the representation of silenced versus perceived orientation changes. Participants completed an orientation change detection task. We used Multivariate Pattern Analyses to train a classifier on different aspects of the stimulus and on participant responses to examine the neural time course of motion perception and motion silencing. We found that we can reliably decode the most salient signal, the direction of global motion of the stimulus, from 135 ms post stimulus onset. We found some evidence for decoding the presence or absence of a local orientation change around 640 ms. Finally, we demonstrate that we could decode perceived versus silenced changes from around 810 ms. These data provide key insights into the dynamics of the neural pattern during Motion Silencing and so improve our understanding of the interaction between the processing of motion and orientation.
This research was supported by a University of Bristol EPSRC Macquarie Cotutelle Award (Industrial and International Leverage Fund), and an International Cotutelle Macquarie University Research Excellence Scholarship awarded to T.M.H.

**Investigation of the influence of visual attention span (VAS) on spelling in Chinese-speaking children aged 10 to 12 years.**

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This study explored the influence of a range of literacy-related variables on word spelling in Mandarin-speaking children aged 10 to 12 years. The children were assessed with tasks of nonverbal ability, phonological awareness (PA), rapid automatized naming (RAN), visual attention span, character identification, morphological awareness (MA), and verbal short-term memory. Visual attention span (VAS) was assessed with a global report task using Chinese characters. In the analysis of results, the dependent variable was children’s accuracy in spelling a 60-word target list to dictation. Results of stepwise regression analysis, with chronological age and nonverbal ability entered as the first step, revealed that PA, RAN, MA, character identification and VAS were significant predictors of spelling accuracy. Theoretical implications of the findings are discussed.

**Facial first impressions are not mandatory: A priming investigation.**

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A common assertion is that, based around prominent character traits, first impressions are spontaneously extracted from faces. Specifically, mere exposure to a person is sufficient to trigger the involuntary extraction of core personality characteristics (e.g., trustworthiness, dominance, competence), an outcome that supports a range of significant judgments (e.g., hiring, investing, electing). But is this in fact the case? Noting ambiguities in the extant literature, here we used a repetition priming procedure to probe the extent to which impressions of dominance are extracted from faces absent the instruction to evaluate the stimuli in this way. Across five experiments in which either the character trait of interest was made increasingly obvious to participants (Expts. 1-3) or attention was explicitly directed toward the faces to generate low-level/high-level judgments (Expts. 4 & 5), no evidence for the spontaneous extraction of first impressions was observed. Instead, priming only emerged when judgments of dominance were an explicit requirement of the task at hand. Thus, at least using a priming methodology, the current findings contest the notion that first impressions are a mandatory product of person perception.
Exploring the role of face, context, and personality on emotion recognition.

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The extent to which faces and contexts influence emotion recognition remains an open question. Previous studies have focused on the significance of either faces or the contexts in which they appear. However, the presented study proposes that the influence of each on emotion recognition can fluctuate. The research investigates how context affects facial emotion recognition by assessing the role of facial intensity configuration, contextual valence, and personality traits. 100 people were recruited online to detect happy, sad, and neutral emotions from facial expressions presented on congruent and incongruent contexts. Happy and sad faces were morphed to depict both high and low intensity levels. Participants were asked to rate facial emotions on a -4 (strongly sad) to 4 (strongly happy) scale, and the Big Five personality traits were assessed. The results indicated that context significantly influences facial emotion recognition, as evidenced by a higher intensity rate, increased accuracy, and reduced response time in the congruent condition. The stronger facial intensity configuration enhanced recognition performance. Also, the Big Five traits significantly influenced emotion recognition, with individual differences affecting context sensitivity. Overall, context is critical in recognizing facial emotions, with contextual absence leading to the potential misrecognition of emotions.

Research Plan - Beyond correct responses: Test-retest reliability of additional verbal fluency measures.

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The Verbal Fluency Test (VFT) is a widely used and easily administered psychological assessment that requires participants to generate as many words as possible within a specific category (semantic fluency) or with a particular letter (phonemic fluency) in a short time period. While the VFT is typically scored based on the number of correct responses, recent research has highlighted the theoretical and potential clinical utility of additional measures, such as error types, response latency, clustering, switching, and lexical properties. However, the test-retest reliability (TRR) of these additional VFT measures remains unexplored. Establishing the reliability of these measures is an important step in validating their use as markers of executive functioning and language abilities. The current study aims to address this gap by assessing the reliability of various VFT measures in a healthy adult population across two sessions separated by one week. Participants will complete the VFT in both sessions, and performance will be compared across a range of measures, including correct responses, error types, response latency, clustering, switching, and lexical properties. Test-retest reliability will be evaluated using correlation coefficients, intra-class correlation, and Bland-Altman plots.

This work was supported by the China Scholarship Council.
Exploring desire-goal conflict across cultures: A cross-sectional study of collectivist and individualistic cultures.

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Objectives: We examined the patterns of desire, goals, and desire-goal conflicts across cultural orientations, focusing on one collectivist (Nigerian) and one individualistic (Scottish) culture. The main hypothesis is that Individuals from collectivist cultures (Nigerian) will differ in the prevalence of desire-goal conflicts compared to individuals from individualistic (Scottish) cultures, and collectivist culture will be associated with more interconnected desires and goals. Design: A cross-sectional design with a correlational and cross-cultural comparative approach was used, to give insights into the relationships between culture, self-regulation variables, and rated interconnectedness. Methods: University students from Nigeria (n=209) and Scotland (n=32) were recruited using snowball and convenience sampling methods. The study employed the Integrative Model of Self-Control (Kotabe & Hofmann, 2015) and validated tools (e.g., Inclusion of Others in the Self (IOS) scale, Aron et al., 1992; the Individualism-Collectivism Scale, Singelis et al., 1995) to measure self-regulation variables (i.e., desires, goals, and conflicts), cultural orientation, and interconnectedness. The survey was preregistered and conducted online using JISC survey software.

Results: Scottish participants demonstrated higher desire strength and lower desire-goal conflict, while Nigerians exhibited higher goal and desire interconnectedness. Horizontal-Collectivism negatively predicted desire strength, while Vertical-Collectivism positively predicted desire-goal conflict. Additionally, Horizontal-Individualism negatively predicted both desire-goal conflict and goal-interconnectedness. Moreover, Horizontal-Individualism showed a statistically significant negative relationship with goal-interconnectedness. Conclusion: Our findings unveil a correlation between cultural orientation and self-regulation dynamics, underscoring the imperative for culturally tailored interventions and policies. It is remarkable how individuals from collectivist cultures not only report interconnected goals, but also express interconnected desires, suggesting that the representation of the self and the other differs considerably in goal-desire dynamics between cultures.

Mask on, Mask off. Sequence-related differences in occlusion effects in trait impressions.

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Several studies have recently reported that the presence of a facial mask improves facial first impressions, e.g., attractiveness and trustworthiness. This phenomenon may in part reflect positive prosocial signalling associated with mask wearing. Yet there is evidence to support a perceptual mechanism that operates to ‘fill in the gaps’ based on an average/typical face representation (usually perceived more positively). Considering that boosted trait impressions are the product of more positive (but flawed) predictions regarding the missing information, it follows that ‘unmasking’ should reveal a mismatch with reality that is surprising or even disappointing/discomforting. We tested this hypothesis by having 97 adult participant’s complete trait ratings of a set of face identities
that were each presented twice, in four different masking sequences (occluded - un-occluded, un-
occluded - occluded, both occluded, both un-occluded). Results confirm significant sequence effects
upon ratings of attractiveness and trustworthiness. Broadly, people’s impressions of an individual
significantly suffer when the mask is removed (cf. added), and are unchanged in baseline conditions.
Moreover, variation in the strength of this effect with the attractiveness/trustworthiness of the
original images is consistent with more distinctive individuals presenting a stronger violation of
expectations.

This work was supported by an EPS Small Grant SG0122-01 / R211098.

Individual differences in neural correlates of face processing: An event-related brain potential study.

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Despite decades of research, event-related brain potential (ERP) correlates of face processing have
rarely been studied from an individual differences perspective. At the same time, substantial
variability in both face processing tasks and potentially related ERP measures are commonly
observed. Therefore, the present study investigated potential relationships between two well-
established psychometric tests (the Cambridge Face Memory Test, CFMT+, and the Glasgow Face
Matching Test, GFMT2) and two ERP effects: (i) the N170 inversion effect, reflecting the detection
of a basic facial configuration, and (ii) the N250r effect, a neural marker for accessing familiar face
representations. We found that both the CFMT+ and the GFMT2 predicted the N170 inversion
effect, meaning that more accurate performance in the two face tests was related to larger N170
differences between upright and inverted faces. At the same time, no reliable relationship between
the two behavioural tests and the N250r was found. We conclude that early perceptual processing
stages as reflected in the N170 (face detection) are related to behavioural measures of individual face
processing ability. However, despite emphasising within-identity variability (GFMT2) and learning
(CFMT+), neither of the two tests predicts individual differences in the activation of familiar face
representations relevant for identity recognition.

Slightly non-frontal faces are represented more precisely than frontal faces.

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In macaques, single unit recordings show more cells preferentially tuned to frontal, profile and Â¾
views of faces than intermediate views. Theoretically, these viewpoints should be processed with
more precision because more neurons are dedicated to these views, compared to intermediate
viewpoints that rely on the overlap of broad tuning curves of neurons tuned to other views. We
conducted a psychophysics experiment to test this in 10 human participants. Participants
discriminated which of a pair of faces was a veridical image, as opposed to a warped version of the
image, with varying degrees of warping. The viewpoint ranged from frontal (0*) to profile (90*) in
5* increments. We also presented picture plane inverted stimuli to control for low-level confounds.
Thresholds (the amount of warping required to reach 75% accuracy) were higher for inverted than upright faces and increased with the distance from frontal for both picture-plane orientations. For upright stimuli, contrary to our predictions, thresholds were slightly higher for 0°, ~45°, and 90° than intermediate views, indicating these poses were more difficult to distinguish from warped versions. These results suggest that the viewpoints processed with more precision may not be the ones neurons are specifically tuned to.

This work was supported by the Economic and Social Research Council [ES/P000711/1].

Without even trying: How incidental exposure shapes category learning.

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Our knowledge about the world is populated with categories like dog, chair, and cup. Yet much of what we understand about how we acquire this knowledge comes from studies of learning in circumstances that little resemble real-world experience. In the lab, category learning typically involves pursuing an explicit goal to learn categories that prompts a search for just one or a few features diagnostic of category membership. In contrast, everyday experience is full of incidental encounters that allow us to observe how features cluster together in categories, such observing the co-occurrence of four legs, tail, and snout in dogs we happen to pass on the street. Here, we investigated how incidental exposure shapes category learning using a combined behavioural, eye tracking, and computational modelling approach. We found that learners picked up on the way features clustered together in categories just from incidental exposure, with pronounced downstream consequences for category learning.

National Institutes of Health Grant R01HD078545.

Developmental changes in symbolic and non-symbolic number processing.

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Two distinct representations of number, a non-symbolic approximate number system (ANS), and a discrete semantic system (DSS) for symbolic numbers have been proposed. When comparing numbers, response times are affected by the distance between the numbers (distance effect) and their sum (size effect). Krajcsi (2017) found that the distance and size effects in adults were significantly correlated for non-symbolic, but not for symbolic comparisons suggesting that in adults those two systems are independent. We tested 54 adults and 283 children (4-13 years, 5 age groups) and replicated Krajcsi’s findings in adults. In children a significant correlation between distance and size effects for non-symbolic stimuli was only found for children aged 8 years and older (all rs < - 0.40,
all ps < 0.001). The correlation between distance and size effects for symbolic stimuli was non-significant for all children (all rs > -0.15, all ps > 0.323) except for the 12-13 year-olds (r = -0.288, p = 0.038). Overall our results are compatible with the idea that ANS and DSS are largely independent already in children aged 4 years and older. Interestingly our data also suggests that it takes several years before the distance and size effects for non-symbolic comparisons become correlated.

Economic and Social Research Council (ES/X00824X/1)

Benefits of multimodal encoding in second language vocabulary acquisition.

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Multimodal learning strategies can benefit educational outcomes across a variety of domains, from reading to mathematics. This study compared effects of two multimodal strategies on the learning of second language (L2) vocabulary, focusing on whether multimodal advantages are influenced by the presence of associative memory cues at test. Participants learned concrete and abstract L2 words and their English (L1) translations under three conditions: listening only, listening while viewing related pictures, or listening while performing related gestures. Following learning, they completed both cued recall (L1-L2 and L2-L1 translation) and free recall tests. Words learned with pictures or gestures were remembered better than words learned by listening only, with cued recall accuracy showing a greater multimodal learning advantage than free recall accuracy. Effects were consistent across both word types. The findings underscore the effectiveness of multimodal encoding in enhancing learning, even for abstract content. The discrepancy between cued and free recall outcomes suggests that cues present at test can boost multimodal advantages, consistent with several theories of multimodal learning benefits.
52nd EPS Bartlett Prize Lecture

will be delivered by

Prof Marlene Behrmann

University of Pittsburgh, USA

The development, hemispheric organization, and plasticity of high-level vision.

5.45pm, Thursday 4th July 2024

Lecture Theatre RCH/037, Ron Cooke Building

No registration is required to attend in person.
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 expsysmsoc@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.
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 research study 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

Below is a selection of hotels in York, which are close to the venue.

PLEASE NOTE these are not recommendations, and you should check the website and prices before making your booking:

All in the city centre, near a bus stop for bus 66/67 going to the conference venue on Campus East.

**Premier Inn Blossom Street South / Premier Inn Blossom Street North**  
**Travelodge York Central**  
**Holiday Inn York City Centre**  
**Hampton by Hilton York Piccadilly**  
**Radisson Hotel York**  
**Novotel York Centre**  
**Hilton York**

*Outside the city centre but closer to the conference venue:*

**Travelodge York Hull Road**

There are also some rooms available on Alcuin College, close to the meeting. The rooms can only be booked to check in on the Wednesday and need to be checked out on Friday.

**Alcuin College Room Bookings**
Travel

By Car

If travelling by car, take the York ring road to the junction with the A19 or A1079/A166.

The University is signposted from these junctions. Use the postcode YO10 5GY when travelling to Campus East.

Car Parking

University car parks on Campus East are Pay and Display.

Pay and Display Parking Information.

Further information regarding cars and parking.

By Bus

Download the First Bus App to live track your bus, buy and store tickets.

There are a number of First Bus services that stop at the University East campus. To learn more about University of York bus routes, please see the below.

First Bus Network Map - University of York Bus Routes.

View timetables by downloading the First Bus App or visit iTravelYork.

By Rail

There is a frequent, fast train service to York on the East Coast Main Line from London King’s Cross to Edinburgh. There is also a direct service between York, Leeds and Manchester Airport.

The University is a short bus journey from the railway station. There is a bus stop just outside the main station entrance, and a bus journey will take around 25 minutes.

www.nationalrail.co.uk

University of York (Campus East) - Online Map
**Conference Dinner**

The conference dinner for EPS York 2024 will be held on Thursday 4th July from 7.30pm at Impossible York, 3 St. Helen’s Square, York, YO1 8QN. A bus will be provided to take dinner attendees from the meeting to the restaurant, leaving at 7pm.

To reserve your place, please complete the form through the link below. This form will be available until midday on Friday 21st June, or until all spaces have been filled (if this is earlier than 21st June). When the form has closed, we will send instructions on how to pay and confirm your place at the conference dinner.

The standard dinner cost for EPS members is £35.00 this year. Please note that postgraduates can book at a reduced fee of £17.50, but must provide evidence of their postgraduate status by emailing a letter from their supervisor (or a direct email from the supervisor) to expsychsoc@kent.ac.uk.

Please choose one starter, one main and one dessert from the below menu.

If there are any special dietary requirements, these can be accommodated upon request.

**Starter**
- Broccoli & Stilton Soup (V) - Toasted Bread & Butter
- Prawn & Avocado Taco (GF) - Mango Salsa, Lime Cabbage
- Mussels in a White Wine Sauce - Toasted Ciabatta
- Hummus (VE) - Hazelnut Dukkha, Pita
- Mushroom Arancini (GF / VE) - Pickled Shimeji Mushroom, Truffle Mayo

**Main**
- Impossible’s Fish & Chips - Chunky Chips, Tartare Sauce, Minted Peas
- Corn Fed Chicken Breast (GF) - Creamy Mash, Tenderstem, Gravy
- Impossible Beef Burger - Cheddar, Lettuce, Tomato, Pickles, Burger Sauce
- Halloumi Burger (V) - Chipotle Mayonnaise, Salsa, Lettuce, Tomato
- Thyme Roasted Butternut Squash & Goats Cheese Salad (V / GF / VE on Request) - Walnuts, Mixed Leaves, Piquillo Pepper Sauce

**Dessert**
- Eton Mess (V / GF) - Chantilly Cream, Meringue, Raspberry Coulis,
- Sticky Toffee Pudding (V) - Butterscotch Sauce, Honey Comb, Vanilla Ice-cream
- Cheese Board (V) - Stilton, Brie, Cheddar, Crackers & Grapes
- Sorbet (VE)

[Conference Dinner Booking Form](#)
**Cafes on Campus**

The conference centre is on the York Campus East, which houses a few places that serve food.

Please see details below regarding the options on Campus East:

**Piazza Starbucks**
Serves Starbucks coffee and the usual favourites, as well as seasonal specials, confectionery and hot paninis.

**Piazza Restaurant**
Serves a range of lunch items including hot main meals, sandwiches, salad from our fresh salad bar and soup. Hot counters offer chicken, noodle bowls, burritos and more.

https://www.york.ac.uk/eat-drink-shop/eat-drink/#campus-east

Off campus there are two pubs and a sandwich shop in Heslington village:

**Charles XII Pub**

**The Deramore Arms Pub**

**Browns Of Heslington - Sandwich Shop**

There is also a Nisa, Greggs bakery and a Papa Johns Pizza shop all based at the top of the hill on Kimberlow Lane (a 5 minute walk from the Ron Cooke Hub).
**Pubs (with food) - All in the city centre:**
- **Brew York** - Brewery with Asian-inspired dishes from YUZU street food.
- **Trembling Madness (Lendal street)** - Describes itself as a "craft beer mansion", with good pub food.
- **Hop** - Good selection of drinks and pizza, and sometimes live music.
- **Eagle & Child** - Another excellent pub in a Grade II* listed building, with a varied food menu.
- **Spark** - An outdoor space with several independent, excellent food stalls.

**Other popular York pubs (not serving food):**
- **Pivni**
- **Ackhorne**
- **The Phoenix Inn**

**Restaurants:**
- **Cresci** - Best pizza in York.
- **Everest Gurkha** - Nepalese restaurant.
- **Blue Barbakan** - Eastern European food with excellent pierogies.
- **Forage** - Varied, locally sourced, and seasonal menu.

**Things to do in York:**
- **Walk the city walls**
  The longest town walls in England: around two miles encircling the historic city centre.

- **York Shambles**
  Probably the most famous street in York, with a lot of small shops (but perhaps most enjoyable in the evening, when the shops are closed and the crowds gone).

- **York Museum Gardens**
  Lovely gardens in the centre of town, with remains of the 11th century St Mary's Abbey and the Yorkshire Museum.

- **York Minster**
  You can visit the cathedral, its undercroft museum, and climb up the tower.

- **Treasurer's House**
  A Grade I listed, somewhat eclectic, historic house next to the York minster. Also known for the Roman soldiers' ghosts who, apparently, are still haunting it.

- **Clifford's Tower**
  Originally built by William the Conqueror "to subdue the rebellious north", according to its website. The **York Castle Museum** next to it is also worth a visit.

- **Jorvik Viking Centre**
  Probably one of the most well-known attractions in York, including a ride through the reconstructed village of Jorvik.

- **National Railway Museum**
  Next to the train station and well worth a visit. Admissions are free but they do recommend booking a ticket in advance.
**Business Meeting**

A Business Meeting will be held on Thursday 4th July 2024 between 12:00pm and 12:30pm in the Lecture Theatre RCH/037 in the Ron Cooke Hub, University of York, East Campus, 133 Deramore Lane, York YO10 5GE.

**AGENDA**

23/15 Minutes of the Business Meeting, held at Nottingham Trent University on Thursday 11th April 2024

See Attachment 1.

23/16 Matters Arising

23/17 Secretary’s Report

23/03.1 Hon. Secretary’s Report

23/18 Treasurer’s Report

23/04.1 Treasurer’s Report

23/19 QJEP Editor's Report

23/05.1 Editor’s Report

23/20 Arrangements for Future Meetings

23/21 Any Other Business

23/22 Date, Time and Place of Next Meeting
Business Meeting

A Business Meeting was held on Thursday 11\textsuperscript{th} April 2024 between 12:00pm and 1:00pm in the Adams Room in the Newton Building, Nottingham Trent University, City Campus, Nottingham, NG1 4BU.

MINUTES

~30 members in attendance

23/15 Minutes of the Annual General Meeting, held at University College London on Friday 6\textsuperscript{th} January 2024

Approved without any changes.

23/16 Matters Arising

President introduced new officers of the society and invited members to ask any questions, raise any points for discussion. There were no questions from the members.

Treasurer and QJEP Editor were not present, but president noted that all was well.

23/17 Secretary’s Report

23/03.1 Hon. Secretary’s Report

Secretary outlined funding schemes with upcoming deadlines.

23/18 Treasurer’s Report

23/04.1 Treasurer’s Report

23/19 QJEP Editor's Report

23/05.1 Editor’s Report

23/20 Arrangements for Future Meetings

Conference secretary gave comments on the current meeting, and details of upcoming meetings.

23/21 Any Other Business

No AoB was raised.

23/22 Date, Time and Place of Next Meeting

The next meeting will be at the University of York in July 2024.
Next Meeting: University College London. January 2025, Dates TBC.

This meeting will include the joint 23rd EPS Mid-Career Prize Lecture by Mike Le Pelley (with an accompanying symposium organised by Tom Beesley) and the 32nd EPS Prize Lecture by Daniel Yon (with an accompanying symposium organised by Clare Press).

Local Organiser: Adam Parker