

EPS

Experimental
Psychology
Society

LEICESTER MEETING

18-20 April 2018

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 Twitter or Facebook) without the presenter's permission. For explicit guidance on reporting at EPS meetings, please refer to the EPS handbook.

A scientific meeting will be held at the George Davies Building/Centre for Medicine, University of Leicester, Lancaster Road, Leicester, LE1 7HA between 18 – 20 April 2018.

The local organisers are Kevin Paterson and Sarah White.

Sixteenth Mid-Career Prize Lecture

Thursday 19 April, 6:00pm

Neural mechanisms of spatial and episodic memory

Professor Neil Burgess, University College London

Accompanying symposium

Thursday 19 April, 1:30pm

Spatial memory from neurophysiology to PTSD

Organiser: Aidan Horner, University of York

Twenty Fifth EPS Prize Lecture

Wednesday 18 April, 6:00pm

Stability and change in developmental language disorders

Professor Courtenay Norbury, University College London

Accompanying symposium

Wednesday 18 April, 2:00pm

New insights into child language and language disorders

Organiser: Kathy Rastle, Royal Holloway University of London

Seventh Frith Prize Lecture

Wednesday 18 April, 1:00pm

Neurocomputational mechanisms of selfishness and prosociality

Dr Patricia Lockwood, University of Oxford

EPS/BSA Undergraduate Project Prize winner talk

Thursday 19 April, 5:00pm

Searching for bodies: Electrophysiological evidence for independent somatosensory processing during attentional selection of body postures

Irena Arslanova, City University London

Local organiser symposium

Thursday 19 April, 9:00am

Developments in eye movement research on reading across the lifespan

Organisers: Kevin Paterson and Sarah White

Poster Session – drinks reception

The poster session and drinks reception will be held on Wednesday evening at 7:00pm in the informal study space outside the Leicestershire and Rutland Freemason's Room (seminar room 0.32) on the ground floor of the George Davies Building/Centre for Medicine. Delegates may put up posters from 12:00pm and should take them down by the end of the session.

Platform Presentations

Sessions will be held in the Bina Popat Lecture Theatre (Lecture Theatre 2) on the first floor of George Davies/Centre for Medicine building and the Leicestershire and Rutland Freemason's Room (Seminar room 0.32) on the ground floor of the same building.

Both theatres have data projectors available for PowerPoint presentations. Presenters may provide their own laptops and connector leads, or bring USB keys for the on-site computers. Any queries about facilities in the theatres should be sent to the local organisers Kevin Paterson (kbp3@le.ac.uk) or Sarah White (s.j.white@le.ac.uk).

Conference Dinner

The conference dinner will be held on Thursday 19th April at 8:00pm at The Case Restaurant (<http://www.thecase.co.uk/>), 4-6 Hotel Street, St Martin's, Leicester, LE1 5AW. This is in the city centre and approximately a 20 minute walk or 10 minutes by taxi from the University. The meal must be booked by 29th March.

Please use the following link to book your place at the Conference Dinner:
<https://shop.le.ac.uk/product-catalogue/events-at-leicester/departments-of-neuroscience-psychology-and-behaviour-npb/eps-meal-at-the-case>

Session A

Bina Popat Lecture Theatre (Lecture Theatre 2)

Seventh Frith Prize Lecture:

1:00 Patricia Lockwood (University of Oxford)
Neurocomputational mechanisms of selfishness and prosociality

START OF PARALLEL SESSIONS

Symposium: **New insights into child language and language disorders**
Organiser: Kathy Rastle

2:00 Holly Branigan (University of Edinburgh)
Between you and me: What can children's interactive language use tell us about developmental language disorders?

2:30 Danielle Matthews and Michelle McGillion (University of Sheffield)
Promoting low SES infants' language development through caregiver contingent talk: Evidence from two RCTs

3:00 Lisa Henderson (University of York)
Understanding the role of sleep in vocabulary consolidation through the lens of developmental disorders

3:30 TEA / COFFEE

4:00 Isaac T Petersen, John E Bates, Brian M D'Onofrio, Angela D Staples, Claire A Coyne, Carol A Van Hulle, Gregory S Pettit, Jennifer E Lansford and Kenneth A Dodge (University of Iowa, Indiana University, Eastern Michigan University, Northwestern University, University of Wisconsin-Madison, Auburn University and Duke University)
The role of language ability in the development of behavior problems

4:30 Stuart J Richie (University of Edinburgh)
How does education affect cognitive abilities?

5:00 Dorothy Bishop (University of Oxford)
Integration of perspectives and discussion

Twenty fifth EPS Prize Lecture:

Bina Popat Lecture Theatre (Lecture Theatre 2)

6:00 **Professor Courtenay Norbury** (University College London)
Stability and change in developmental language disorders

7:00 **Posters and drinks reception**

Posters displayed outside the Leicestershire and Rutland Freemason's Room (seminar room 0.32) with drinks served in the same area.

Session B

**Seventh Frith Prize Lecture,
Bina Popat Lecture Theatre (Lecture Theatre 2):**

1:00 Patricia Lockwood (University of Oxford)
Neurocomputational mechanisms of selfishness and prosociality

START OF PARALLEL SESSIONS

Leicestershire and Rutland Freemason's Room (Seminar Room 0.32)

2:00 Victoria Laxton*, David Crundall, Christina J Howard and Duncan Guest (Nottingham Trent University)
Visual search in real dynamic environments: Lifeguard expertise affects detection speed for drowning targets

2:30 Ljubica Damjanovic, Alexandre Williot* and Isabelle Blanchette* (Liverpool John Moores University and Université du Québec à Trois-Rivières, Canada)
Is it dangerous? The role of affective visual search strategies in the detection of threatening objects

3:00 Alex Muhl-Richardson*, Hayward J Godwin*, Matthew Garner*, Julie A Hadwin*, Katherine Cornes*, Simon P Liversedge and Nick Donnelly (Nottingham Trent University, University of Southampton and Defence Science and Technology Laboratory)
Individual differences in dynamic visual search

3:30 TEA / COFFEE

4:00 Emily Crowe*, Christina J Howard, Angela Attwood* and Chris Kent (University of Bristol and Nottingham Trent University)
Reward driven unequal attention allocation in multiple object tracking

4:30 Christina J Howard, Duncan Guest, Amanda Hornsby*, Rebekah Pole*, Paulina Nowak* and Bradley Standen* (Nottingham Trent University)
Core resources supporting spatial attention and spatial memory are non-overlapping

5:00 Ryan Blything*, Casimir Ludwig*, Ivan Vankov* and Jeffrey Bowers (University of Bristol and New Bulgarian University, Bulgaria)
Translation invariance in vision

5:30 Ella Gale*, Nick Martin* and Jeffrey Bowers (University of Bristol)
Characterizing the conditions in which feedforward networks learn local ('grandmother cell')

representations

Twenty fifth EPS Prize Lecture:

Bina Popat Lecture Theatre (Lecture Theatre 2)

6:00 Professor Courtenay Norbury (University College London)
Stability and change in developmental language disorders

7:00 Posters and drinks reception

Posters displayed outside the Leicestershire and Rutland Freemason's Room (seminar room 0.32) with drinks served in the same area.

Session A

Bina Popat Lecture Theatre (Lecture Theatre 2)

Symposium: **Developments in eye movement research on reading across the lifespan**

Organiser: Kevin Paterson and Sarah White

- 9:00 Sascha Schroeder, Sarah Eilers, Simon Tiffin-Richards** (University of Berlin)
Investigating eye-movements across the lifespan: Findings from the Berlin DevTrack study
- 9:30 Hazel I Blythe, Jonathan H Dickins, Colin R Kennedy and Simon P Liversedge** (University of Southampton)
Phonological processing during silent sentence reading: A meta-analysis of typical development, hearing loss, and dyslexia in teenagers
- 10:00 Reinhold Kliegl** (University of Potsdam)
On the dynamics between reading fixation durations and their locations in the perceptual span
- 10:30 TEA / COFFEE**
- 11:00 Brennan R Payne** (University of Utah)
Spatial and temporal attentional constraints on reading comprehension in ageing
- 11:30 Lin Li, Sha Li, Yingying Zhang, Yuxiang Yao, Stoyan Kurtev, Kevin B Paterson and Jingxin Wang** (Tianjin Normal University, China, University of Leicester and University of Coventry)
Using blurring to investigate adult age differences in word identification during Chinese reading
- 12:00 Victoria A McGowan, Sarah J White, Kayleigh L Warrington, Lin Li, Sha Li, Jingxin Wang and Kevin B Paterson** (University of Leicester and Tianjin Normal University, China)
Adult age differences in reading: Examining the risky reading theory
- 12:30 LUNCH**

Session B

Leicestershire and Rutland Freemason's Room (Seminar Room 0.32)

- 9:00 Renata Sadibolova*, Luigi Tamè and Matthew R Longo** (Birkbeck University of London)
More than skin-deep: Integration of skin-based and musculo-skeletal reference frames in localisation of touch
- 9:30 Ralph Pawling*, Peter Cannon*, Paula Trotter*, Francis McGlone and Susannah Walker*** (Liverpool John Moores University, Massey University, New Zealand and Manchester Metropolitan University)
Perceptions of social touch in stressed and non-stressed participants: Experimental and electrophysiological findings
- 10:00 Maria Gallagher*, Agoston Torok*, Camille Lasbareilles* and Elisa Raffaella Ferrè** (Royal Holloway University of London and Hungarian Academy of Sciences)
Getting ready for Mars: how the brain perceives new gravitational environments
- 10:30 TEA / COFFEE**
- 11:00 Eva M Krockow*, Briony D Pulford, Andrew M Colman** (University of Leicester)
Far but finite horizons promote cooperation in the Centipede game
- 11:30 Briony D Pulford, Andrew M Colman, Eike K Buabang* and Eva Krockow*** (University of Leicester and Leiden University, Netherlands)
Persuading with confidence: Evidence for the confidence heuristic
- 12:00 Matthew A J Apps*, Mindaugas Jurgelis*, Tanja Mueller* and Masud Husain** (University of Oxford)
Too tired to work: A computational framework of momentary motivational and subjective fatigue
- 12:30 LUNCH**

Session A

Bina Popat Lecture Theatre (Lecture Theatre 2)

Symposium: **Spatial Memory: from neurophysiology to PTSD**
Organiser: Aidan Horner (University of York)

- 1:30 Kate J Jeffery, Jonathan Wilson and Hector Page** (University College London)
A dual-axis rule for maintaining a sense of direction in 3D space
- 2:00 Caswell Barry** (University College London)
Grid cells in an uncertain world
- 2:30 Alexandra Constantinescu, Jill O'Reilly and Tim Behrens** (University of Oxford
and University College London)
Organizing conceptual knowledge in humans with a gridlike code
- 3:00 TEA / COFFEE**
- 3:30 Tom Hartley** (University of York)
Walls and mountains: perception and memory of spatial structure
- 4:00 James A Bisby** (University College London)
Disruptive effects of negative emotion on the coherence of episodic memories
- 4:30 Emily Holmes (Karolinska Institute, Sweden)**
Reducing the number of intrusive memories after experimental trauma: from lab to
clinic

END OF SYMPOSIUM

EPS/BSA Undergraduate Project Prize winner talk:
Bina Popat Lecture Theatre (Lecture Theatre 2)

- 5:00 Irena Arslanova*** (City University of London)
Searching for bodies: Electrophysiological evidence for independent somatosensory
processing during attentional selection of body postures

5:30 EPS business meeting
Bina Popat Lecture Theatre (Lecture Theatre 2)

Sixteenth EPS Mid-Career Lecture, Bina Popat Lecture Theatre (Lecture Theatre 2):

6:00 **Professor Neil Burgess** (University College London)
Neural mechanisms of spatial and episodic memory

8:00 **Conference dinner at The Case**

Session B

Leicestershire and Rutland Freemason's Room (Seminar Room 0.32)

- 1:30 Janice Attard-Johnson*, Markus Bindemann and Caoilte Ó Ciardha***
(Bournemouth University and University of Kent)
Validity of pupillometry for measuring sexual interests
- 2:00 Matthew K Belmonte*, Matthew C Stief* and James Jones-Rounds*** (Nottingham Trent University and Cornell University, USA) (Sponsor: Duncan Guest)
Sexual orientation determines early attentional enhancement of preferred sexual stimuli
- 2:30 Ruth S Ogden, Jessica Henderson*, Michael Richter* and Francis McGlone**
(Liverpool John Moores University)
The relationship between physiological arousal and perceived duration: the effect of stimulus valence
- 3:00 TEA / COFFEE**
- 3:30 Matthew K Belmonte*, Dinh Vu*, Subhadip Paul*, Adita Arora*, Rashi Midha* and Prasun K Roy*** (The Com DEALL Trust, Bangalore, India, Nottingham Trent University, King's College London, Universität Salzburg, Austria and National Brain Research Centre, Manesar, India) (Sponsor: Duncan Guest)
Individual variations in autistic traits are reflected in brain network topologies: Behavioural, psychometric and neuroimaging assays
- 4:00 Daniel Poole, Emma Gowen, Eleanor Miles and Ellen Poliakoff** (University of Manchester and University of Sussex)
The modality shift effect in autism: exploring the nature of crossmodal switching
- 4:30 Lauren Marsh*, Danielle Ropar and Antonia Hamilton** (University of Nottingham and University College London)
Are you looking at me? How an audience impacts overimitation
- 5:30 EPS business meeting**
Bina Popat Lecture Theatre (Lecture Theatre 2)
- Sixteenth EPS Mid-Career Lecture:**
Bina Popat Lecture Theatre (Lecture Theatre 2)
- 6:00 Professor Neil Burgess** (University College London)

Neural mechanisms of spatial and episodic memory

8:00 Conference dinner at The Case

Session A

Bina Popat Lecture Theatre (Lecture Theatre 2)

- 9:00 Rosa K W Kwok*, Milena Kaestner*, Mattia I Gerin*, Rrezarta Avdyli*, Beatriz Bermúdez* and Fernando Cuetos*** (Coventry University, University of York, University College London and University of Oviedo, Spain) (Sponsor: Kevin Paterson)
Grain size and orthographic transparency: Word learning in English, German, Italian and Spanish
- 9:30 Michael G Cutter*, Andrea E Martin* and Patrick Sturt*** (University of Edinburgh and Max Planck Institute for Psycholinguistics, Netherlands) (Sponsor: Simon Liversedge)
Readers utilise proper noun capitalisation to determine syntactic class prior to direct fixation
- 10:00 Adam J Parker*, Julie A Kirkby and Timothy J Slattery** (Bournemouth University)
Word frequency and predictability effects for line initial words
- 10:30** TEA / COFFEE
- 11:00 Jo S H Taylor, Matthew H Davis and Kathleen Rastle** (Aston University, MRC-CBU Cambridge and Royal Holloway University of London)
Using artificial orthographies and fMRI to investigate abstraction along the ventral visual stream
- 11:30 Kathleen Rastle, Jo S H Taylor, Clare Lally* and Matthew H Davis** (Royal Holloway University of London, Aston University and MRC-CBU, Cambridge)
The dramatic impact of explicit instruction on learning to read an artificial orthography
- 12:00 Russell Turk*, Gary Jones, Duncan Guest, Angela Young* and Mark Andrews*** (Nottingham Trent University)
Transitional frequency is better than transitional probability in a sequence learning task
- 12:30** LUNCH

Session B

Leicestershire and Rutland Freemason's Room (Seminar Room 0.32)

- 9:00 Kinga Igloi*, Blanca Marin Bosch*, Aurélien Bringard*, Maria Grazia Logrieco*, Estelle Lauer*, Nathalie Imobersteg*, Aurélien Thomas*, Guido Ferretti* and Sophie Schwartz*** (University of Geneva, Switzerland, Geneva University Hospitals, Switzerland and University of Lausanne, Switzerland) (Sponsor: Aidan Horner)
Acute physical exercise improves memory consolidation in humans via BDNF and endocannabinoid signalling
- 9:30 Tina Seabrooke*, Tim Hollins, Andy Wills and Chris Mitchell*** (Plymouth University)
Learning from total failure: Errorful generation improves memory for cues and targets, but not their association
- 10:00 Bardur H Joensen*, M Gareth Gaskell and Aidan J Horner** (University of York)
United we fall: Complex episodic events are forgotten in an all-or-none manner
- 10:30 TEA / COFFEE**
- 11:00 James A Grange and Agnieszka W Kowalczyk*** (Keele University)
Is response selection in task switching impaired by inhibition or episodic retrieval? A diffusion model analysis
- 11:30 Robin Kramer, Jerrica Mulgrew* and Michael Reynolds*** (University of Lincoln and Trent University, Canada)
Unfamiliar face matching with photographs of infants and children
- 12:00 Harriet M J Smith*, Sally Andrews*, David White, Josh P Davis, Melissa F Colloff, Thom S Baguley and Heather D Flowe** (Nottingham Trent University, University of New South Wales, Australia, University of Greenwich and University of Birmingham)
A novel interactive face matching procedure: Performance of normal and superior face recognisers
- 12:30 LUNCH**

Session A

Bina Popat Lecture Theatre (Lecture Theatre 2)

- 1:30 Laura R Shapiro, Jessie Ricketts and Adrian P Burgess*** (Aston University and Royal Holloway University of London)
Why do better readers have larger vocabularies? Examining the influence of reading ability and reading practice on vocabulary knowledge
- 2:00 Catherine Davies and Anna Richardson*** (University of Leeds)
Semantic as well as referential relevance reduces reading times for modified noun phrases
- 2:30 Claudine Clucas* and Heather Wilkinson** (University of Chester)
The role of self-respect in influencing physiological measures of cognitive effort during a story recall task

End of meeting

Session B

Leicestershire and Rutland Freemason's Room (Seminar Room 0.32)

- 1:30 Sam C Berens*, Bardur H Joensen* and Aidan J Horner** (University of York)
The emergence of location-based representations in the parahippocampal place area
- 2:00 Anthony McGregor, Matthew G Buckley* and Joseph M Austen** (Durham University)
Individual differences in spatial strategies underlie differences in cue preference in navigation
- 2:30 Giulia Rampone*, Marco Bertamini and Alexis Makin** (University of Liverpool)
ERP responses to symmetry formed through temporal integration of transient and partial information

End of meeting

1. **Maryam A AlJassmi*, Victoria A McGowan*, Fang Xie* and Kevin B Paterson** (Zayed University, UAE, University of Leicester and Tianjin Normal University, China)
Parafoveal preview benefit effects in vertical alphabetic reading
2. **Juan Su*, Guoen Yin*, Simon P Liversedge, Xuejun Bai*, Guoli Yan* and Kevin B Paterson**
(Tianjin Normal University, China, Inner Mongolia Finance and Economics University, China, University of Southampton and University of Leicester)
Eye movement control and word identification during vertical and horizontal reading: Evidence from Mongolian
3. **Fang Xie*, Sainan Zhao*, Qianqian Xu*, Yingying Zhang*, Yuxiang Yao*, Sha Li*, Lin Li*, Jingxin Wang* and Kevin B Paterson** (Tianjin Normal University, China and University of Leicester)
Misspelling effects on eye movements during Chinese reading
4. **Xue Sui*, Yaqi Wang*, Chang Ruosong* and Sarah J White** (Liaoning Normal University, China and University of Leicester)
Reading and topic scanning in Chinese: Effects of word frequency and spacing
5. **Aris Terzopoulos*, Lynne Duncan, Georgia Niolaki and Jackie Masterson** (Coventry University, University of Dundee and University College London)
Bilingual children and adults differ in their semantic categorisation decisions for cognates and non-cognates
6. **Basma Elkhafif*, Anna Weighall, Melanie Burke* and Jelena Havelka** (University of Leeds)
The effect of syntactic priming on auditory word identification among second- language speakers
7. **Joanne Ingram, Sameera Sidat*, Anastasia Giannakopoulou* and Christopher J Hand** (University of the West of Scotland, University of Bedfordshire and Glasgow Caledonian University)
Asymmetric interference in the mono-, bi- and multi-lingual brain: Evidence from concurrent verbal-motor task performance
8. **Greg Maciejewski* and Ekaterini Klepousniotou** (University of Leeds)
Effects of sense relatedness in ambiguity processing
9. **Margriet A Groen, Barbara Hänel-Faulhaber*, Brigitte Röder* and Claudia K Friedrich*** (Radboud University, Netherlands, University of Hamburg, Germany and University of Tübingen, Germany)

Foundations of reading in bimodal-bilingual deaf children

10. **Chunyang Liang***, **Georgia Niolaki**, **Janet Vousden*** and **Laura Taylor*** (Coventry University)
Predictors of English reading and spelling for Mandarin-English bilingual students in higher education
11. **Valentina Nicole Pescuma***, **Maria Ktori***, **Benedetta Cevoli***, **Eleonora Lomi***, **Francesca Franzon*** and **Davide Crepaldi*** (International School for Advanced Studies (SISSA), Trieste, Italy, Royal Holloway University of London and University of Oxford) (Sponsor: Kathy Rastle)
An eye-tracking database of natural reading in Italian children
12. **Tarandeep Kang*** and **Hester Duffy*** (University of Warwick) (Sponsor: Elizabeth Maylor)
"You talkin' to me?" Can listeners perceive differences in Infant-Directed & Adult-Directed speech
13. **Yaling Hsiao***, **Megan Bird*** and **Kate Nation** (University of Oxford)
Frequency and semantic diversity both play a role in children's semantic judgment of words
14. **Julia M Carroll*** (Coventry University) (Sponsor: Giorgia Niolaki)
The role of early speech and language in predicting literacy outcomes: Secondary analysis of the ALSPAC dataset
15. **Georgia Z Niolaki**, **Laura M Taylor***, **Aris R Terzopoulos*** and **Anthony Brissett*** (Coventry University)
Phonological ability and visual attention span deficits in adults with atypical reading performance
16. **Sophie M Hardy***, **Katrien Segaert*** and **Linda Wheeldon** (University of Birmingham and University of Agder, Norway)
Ageing and sentence production: Impaired lexical access in the context of intact syntactic planning
17. **Charlotte Poulisse***, **Katrien Segaert*** and **Linda Wheeldon** (University of Birmingham and University of Agder, Norway)
Evidence against preserved syntactic comprehension in aging
18. **Maximillian Paulus***, **Valerie Hazan*** and **Patti Adank** (University College London)
Speaker-dependent perceptual learning of degraded speech

- 19. Yuchunzi Wu*, Bronwen Evans* and Patti Adank** (University College London)
The effects of sensorimotor experience on automatic imitation of visually perceived speech actions
- 20. Amy Atkinson*, Amanda Waterman*, Ed Berry* and Richard Allen** (University of Leeds)
Can children prioritise more valuable information in working memory?
- 21. Katherine Hall*, Julia Carroll* and Helen Breadmore*** (Coventry University)
(Sponsor: Georgia Niolaki)
Can patterns in memory and executive functioning explain the relationship between DDL and dyslexia?
- 22. Armelle Viard*, Justine Mutlu*, Fanny Dégeilh*, Jacques Dayan*, Francis Eustache* and Bérengère Guillery-Girard*** (INSERM, Caen, France, University of Caen Normandy, France, Ecole Pratique des Hautes Etudes, Caen, France, Caen University Hospital, France and Rennes University Hospital, France) (Sponsor: Neil Burgess)
Alterations in default-mode network connectivity in adolescents with posttraumatic stress disorder
- 23. Danielle Hett*, Matthew Brownsey*, Robin Jackson* and Heather Flowe** (University of Birmingham and Loughborough University)
How maladaptive metacognitive beliefs affect the encoding of analogue trauma
- 24. Luis S Contreras-Huerta*, Matthew Apps*, Patricia L Lockwood, Geoff Bird and Molly J Crockett*** (University of Oxford and Yale University, USA)
Computational mechanisms of social decision-making in sub-clinical personality disorder
- 25. Guglielmo Calvini* and Natalie Wyer** (St Mary's University and University of East Anglia)
The role of spontaneous perspective-taking in empathy
- 26. Tanja Müller*, Campbell Le Heron*, Masud Husain and Matthew A J Apps*** (University of Oxford)
Motivational fatigue: The impact of effortful exertion on subsequent motivation
- 27. Mariano D'Angelo*, Giuseppe di Pellegrino*, Stefano Seriani*, Paolo Gallina* and Francesca Frassinetti*** (University of Bologna, Italy, Hospital IRCCS, Italy, Bangor University and University of Trieste, Italy) (Sponsor: Matthew Longo)

How the sense of agency shapes body schema and peripersonal space

28. **Elena Amoruso*, Elena Azañón, Francesco Pavani* and Matthew R Longo** (Birkbeck University of London and University of Trento, Italy)
Correspondence between three-dimensional bodies and two-dimensional shadows
29. **Kelda Manser-Smith*, Luigi Tamè and Matthew R Longo** (Birkbeck University of London)
Tactile mislocalisation of the digits arises from higher-level representation of individual digits as complete 3D units
30. **Klaudia B Ambroziak*, Luigi Tamè, Alessandro Farnè* and Matthew R Longo** (Birkbeck, University of London and Lyon Neuroscience Research Center, France)
Distal bias in knuckle mislocalisation is reduced but not eliminated by hand inspection
31. **David Souto*, Lily Smith* and Marina Bloj*** (University of Leicester and University of Bradford) (Sponsor: Kevin Paterson)
Where the rubber meets the road: visual cues to inferring friction
32. **Tochukwu Onwuegbusi*, Frouke Hermens and Todd Hogue*** (University of Lincoln)
Gazing left or right: Politics on the move
33. **Melissa F Colloff, Christian A Meissner*, Lisa Smith*, Harriet M J Smith* and Heather D Flowe** (University of Birmingham, Iowa State University, USA, University of Leicester and Nottingham Trent University)
Can a novel interactive lineup procedure attenuate the own race bias?
34. **Jason Tipples** (Leeds Beckett University)
Sex differences in recognising and responding to angry and happy expressions: Evidence from Bayesian Hierarchical Diffusion Modelling
35. **Catherine Thompson** (University of Salford)
Emotional distracters reduce the Attentional Blink
36. **Maria Tsantani* and Lucia Garrido** (Brunel University)
A similar structure of social judgements from faces and voices for both familiar and unfamiliar people
37. **Maria RH Maio*, Sean J Fallon* and Masud Husain** (University of Oxford)
Retrieval cues influence quality of recall from short-term memory

- 38. **Abbie Ball*, Peter M Jones and Tim Hollins** (Plymouth University)
Metacognitive decisions in learning new material

- 39. **Rafat A Mohammed Jawad*, Jose Prados* and Claire V Hutchinson*** (University of Leicester and Muthanna University, Iraq) (Sponsor: Sarah J White)
Modelling associative learning, extinction and reinstatement in invertebrates (planaria)

- 40. **Michaela Bayliss*, Melissa Trotman-Lucas* and Claire L Gibson*** (University of Leicester) (Sponsor: Kevin Paterson)
Evaluating the functional outcome assessments employed following unilateral experimental stroke in rodents

- 41. **James MacGregor and J Barton Cunningham*** (University of Victoria, Canada)
Figure-ground reversal and insight problem solving

- 42. **Alexis D J Makin, Giulia Rampone and Marco Bertamini** (University of Liverpool)
SPN priming reveals the extrastriate symmetry code

- 43. **Ruth S Ogden, Fiona Simmons* and Tom Gallagher-Mitchell*** (Liverpool John Moores University and Liverpool Hope University)
Response-irrelevant number, duration and size information triggers the SQARC effect: Evidence from an implicit paradigm

- 44. **Stuart G Spicer*, Peter M Jones, Chris J Mitchell* and Andy J Wills** (Plymouth University)
The role of uncertainty in cue competition

- 45. **Raffaele Tucciarelli*, Elena Azañón and Matthew Longo** (Birkbeck University of London)
Spatial categories and the estimation of locations around objects

- 46. **Tara Zaksaitė* and William Brambley*** (Open University) (Sponsor: Peter M Jones)
Does financial education work? Findings using an objective measure of saving

Neurocomputational mechanisms of selfishness and prosociality

Patricia Lockwood
University of Oxford
patricia.l.lockwood@gmail.com

The question of whether humans are fundamentally selfish or prosocial has intrigued many disciplines from philosophy to economics for centuries. From small acts of kindness to major sacrifices, just how willing are humans to help others? Here I will describe a set of experiments that use computational modelling approaches derived from theoretical frameworks of effort-based decision making and associative learning to understand human selfishness and prosociality.

I will describe how social computations are reflected in anatomically distinct portions of the medial prefrontal cortex, and the individual differences that may drive variability between people. I will show that in general, people care more about their own outcomes and possessions than others, but that there are substantial individual differences that are linked to specific brain areas. These findings could have important implications for understanding everyday social decision-making and its disruption in disorders of social behaviour such as apathy and psychopathy.

Symposium - New insights into child language and language disorders
Organised by Kathy Rastle

Between you and me: What can children's interactive language use tell us about developmental language disorders?

Holly Branigan
University of Edinburgh
holly.branigan@ed.ac.uk

It is uncontroversial that young children's experiences of language are based in dialogue and interaction (e.g., Tomasello, 2003), and there is considerable evidence that characteristics of these experiences have a strong influence on children's language use and language development. In this talk, I will consider how evidence from children's interactive language use - and specifically their tendency to reuse aspects of their conversational partner's language - can be informative about both the representations and processes characterising typical language development and the nature of language impairment in developmental language disorders. Drawing on evidence from a series of recent studies, I will discuss how typically and atypically developing children's tendency to repeat syntactic structure can cast light not only on their syntactic representations (Branigan & Pickering, 2016), but also the way in which individual syntactic experiences influence their immediate language use and long-term language development.

Branigan, H.P., & Pickering, M.J. (2016). An experimental approach to linguistic

representation. *Behavioral and Brain Sciences*, 1-73.

Tomasello, M. (2003). Constructing a language. Constructing a language: A usage-based theory of language acquisition. *Cambridge MA: Harvard University Press*.

Promoting low SES infants' language development through caregiver contingent talk: Evidence from two RCTs

Danielle Matthews and Michelle McGillion
University of Sheffield
danielle.matthews@sheffield.ac.uk

Early language skills are important for later academic success. Lower socio-economic status (SES) children tend to start school with more limited language skills. We report two RCTs that test interventions to promote infant language learning through caregiver contingent talk (i.e., talking about what is in the focus of the infant's attention). In the first RCT (McGillion et al., 2017), 142 11-month-olds and their caregivers were randomly allocated to a contingent talk intervention or a dental health control. The intervention was effective in promoting caregiver contingent talk and this benefited low SES infants' language in the short term (at 15 and 18 months) but this benefit did not last one year post intervention (at 24 months). In the second RCT, 156 11-month-olds and their caregivers have been randomly allocated to a book sharing contingent talk intervention or a control condition where families are given the same books but no training (current practice in many areas). Book sharing tends to generate very high rates of high quality talk with infants and provides a tangible activity. However, it is culturally alien to many. This study tests how this trade-off plays out for child language outcomes. Vocabulary at 15 months will be reported.

McGillion M, Pine J, Herbert J & Matthews D (2017) A randomised controlled trial to test the effect of promoting caregiver contingent talk on language development in infants from diverse socioeconomic status backgrounds. *Journal of Child Psychology and Psychiatry*. 58 (10),1122–1131.

Understanding the role of sleep in vocabulary consolidation through the lens of developmental disorders

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Substantial evidence suggests that sleep facilitates memory consolidation: the process by which new and initially weak memories become strengthened and resistant to interference. For instance, sleep plays a crucial role in the consolidation of newly learned language, working to *strengthen* memory for new words exactly as they were learned, *integrate* new words with existing lexical knowledge, and *generalise* existing lexical knowledge to new exemplars. The

benefits of sleep for declarative memory are well established in adults, and more recent studies have revealed comparable or enhanced benefits in typically developing children. These findings are consistent with converging evidence that sleep is pivotal to brain plasticity and learning throughout development. However, there is great heterogeneity in the extent to which children learn and consolidate new knowledge which cannot yet be fully explained by existing theoretical models. This talk presents data that strives to better understand the sources of this heterogeneity from studies of typically developing children with varying existing knowledge, as well as from children with neurodevelopmental disorders including dyslexia and autism. Crucially, the deficits in sleep and language that are inherent in these atypical groups provide a testing ground for causal hypotheses of the mechanisms of memory consolidation in typical development.

The role of language ability in the development of behavior problems

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Numerous cross-sectional studies have shown that language and behavior problems are correlated. However, such studies have not been able to distinguish whether language deficits are a cause or consequence of behavior problems, or whether the association owes to a third variable. Moreover, very few studies have examined possible mediating mechanisms to understand the role that language ability may play in the development of behavior problems. In a series of longitudinal studies (Petersen et al., 2013; Petersen, Bates, & Staples, 2015), we observed that (1) language ability predicted the development of later behavior problems in children, including inattention-hyperactivity and externalizing problems, (2) language ability predicted the development of later behavior problems stronger than behavior problems predicted later language ability, (3) the association between language and later behavior problems held while controlling for plausible confounds (demographics, socioeconomic status, nonverbal abilities, working memory), and (4) the association between language and later behavior problems was mediated by self-regulatory skills. Findings were replicated in independent samples. Findings suggest that the direction of effect may be from language to behavior problems, and that language deficits may lead to the development of behavior problems, in part, because language serves a self-regulatory function.

Petersen, I. T., Bates, J. E., D'Onofrio, B. M., Coyne, C. A., Lansford, J. E., Dodge, K. A., . . . Van Hulle, C. A. (2013). Language ability predicts the development of behavior problems in children. *Journal of Abnormal Psychology*, 122, 542-557. doi: 10.1037/a0031963

Petersen, I. T., Bates, J. E., & Staples, A. D. (2015). The role of language ability and self-regulation in the development of inattentive-hyperactive behavior problems. *Development and Psychopathology*, 27, 221-237. doi: 10.1017/S0954579414000698

How does education affect cognitive abilities?

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Educational duration and cognitive ability are known to be correlated. It has been suggested that this relationship is reciprocal: individuals with higher ability are likely to remain in formal education for longer, and additional education may also improve cognitive performance. We meta-analysed studies of educational effects on cognitive abilities that used three different research designs: controlling the education-IQ relation for prior intelligence, examining the effects of government policy changes, and using regression-discontinuity designs on school-age cutoffs. All three designs showed significant, positive effects of education on intelligence. This talk will present these results and put forward some possible mechanistic explanations—including discussion of reading and language skills and their potential “scaffolding” effects on the development of cognitive abilities.

Integration of perspectives and discussion

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End of symposium

Visual search in real dynamic environments: Lifeguard expertise affects detection speed for drowning targets

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The majority of visual search studies are conducted under artificial, context-free conditions, such as searching for feature conjunctions in visual arrays. Studies have explored visual search in more naturalistic environments, but these tend to be restricted to static search displays (e.g. security scanning or radiology), which include specific target templates (e.g. a

knife in luggage). Research has also explored the effects of search expertise, however, it is unknown if these effects transfer into searches of complex dynamic stimuli. This current research will discuss two visual search studies that use a naturalistic, dynamic search area; a swimming pool viewed from the perspective of a lifeguard. Accuracy and responses times were recorded. The results consistently show an experience effect, with lifeguards detecting drowning targets faster and more often than non-lifeguards. A set size effect was noted across both studies in response accuracy, with drownings in the intermediate set size receiving more accurate responses than drownings in the lower set size. This set size effect diverges from the expected pattern often found in visual search studies. It is possible that the complex nature of real-world dynamic stimuli alters search strategies as set size increases and scenes become more cluttered with moving people.

Is it dangerous? The role of affective visual search strategies in the detection of threatening objects

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Counter-terrorism strategies rely on the on the assumption that it is possible to increase threat detection by providing explicit verbal instructions to orient people's attention to dangerous objects and hostile behaviours in their environment. Nevertheless, whether verbal cues can be used to enhance threat detection performance even further is currently unclear. Student participants were required to categorize a discrepant visual search target (i.e., a knife or a gun) on the basis of an affective strategy ("is it dangerous?") or a semantic strategy ("is it an object?"). The results showed a threat superiority effect for dangerous objects over neutral ones that was enhanced under affective visual search strategies (Experiment 1). In Experiment 2, whilst trainee police officers displayed a greater threat superiority effect than student controls, both groups benefitted from performing the task under an affective than a semantic visual search strategy. Manipulating situational threat levels with terrorism-related primes had very little effect on visual search performance. These findings corroborate and extend previous work on the real-world value of visual search tasks (e.g., Damjanovic, Pinkham, Clarke & Phillips, 2014) by emphasizing the importance of using verbal strategies to enhance our awareness of potential dangers in our environment.

Damjanovic L., Pinkham, A.E., Clarke, P., & Phillips, J. (2014). Enhanced threat detection in experienced riot police officers: Cognitive evidence from the face-in-the-crowd effect. *Quarterly Journal of Experimental Psychology*, 67, 1004-1018.

Individual differences in dynamic visual search

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Many real-world visual tasks involve searching dynamically changing displays. These must be monitored for change and can involve uncertainty around target onsets. Individual differences in working memory capacity (WMC), intolerance of uncertainty (IU) and target prediction ability may be important performance indicators.

Participants completed a search for colour targets within dynamically changing displays while their eye-movements were recorded. Trials contained squares that changed between 16 colours at varying rates. Target prediction was explored via a manipulation of display dynamics: stimuli changed in ordered sequences through colour space, disordered sequences or randomly. Individual differences in WMC and IU were examined alongside a manipulation target prevalence.

When display dynamics incorporated ordered sequences forthcoming targets were fixated pre-onset, but this was reduced in randomised and disordered displays. Participants with greater IU made more false alarms and those with higher WMC showed a reduced effect of IU.

We conclude that: (1) predictive target detection is limited and requires the support of broad target-templates that only operate when displays incorporate order in colour space; (2) IU impedes target detection via a liberal response criterion; (3) high WMC moderates this effect through additional cognitive resources. These findings have implications for real-world monitoring tasks and personnel selection.

Reward driven unequal attention allocation in multiple object tracking

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Attending to and tracking multiple moving objects is common in everyday life. Unequal attention allocation is a crucial component of tracking because it is rare that we need to allocate equal amounts of attention to distinct objects. However, very limited research has addressed the extent to which attention can be split unequally. Crowe et al. (2017) manipulated the importance of targets in a multiple object tracking (MOT) task and found evidence for unequal attention allocation in response to goal-directed instructions. We provide evidence for the effect of target-associated reward on unequal-tracking accuracy. Results from Experiment 1 reveal better tracking accuracy for high compared with low reward targets indicative of unequal attention allocation. Experiment 2 used a novel double-probe technique, in which indexes of tracking accuracy for two targets were obtained at the end of the trial. As with Experiment 1, participants allocated more and less attention, indexed by tracking accuracy, to high and low rewarded targets respectively. There was a smaller difference in tracking accuracy between the two targets presented simultaneously on unequal compared with equal splitting trials. This

suggests, to maximise reward, participants adopted different tracking strategies for different types of attention splitting.

Crowe, E. M., Howard, C. J., Attwood, A. S., & Kent, C. (2017). Unequally divided attention during multiple object tracking. Manuscript submitted for publication.

Core resources supporting spatial attention and spatial memory are non-overlapping

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There is a debate around the extent of overlap between memory processes and spatial attention as recruited by tasks such as the multiple object tracking (MOT) task. In three experiments, we investigated the relationship between spatial memory and spatial attention using a position encoding task and a position monitoring variant of the MOT task. Participants performed a dual task requiring them to encode the positions of a variable number of static memory targets and to attend to the changing positions of a variable number of moving attention targets. Participants were queried to report the position (or final position, in the case of position monitoring) of a subset of memory and attention targets. Although some interference was shown between tasks, it appeared to be moderate and dependent on task parameters. For position monitoring, we also examined the times of the display that best resembled position reports, and these were not affected by memory load. Furthermore, the magnitude of interference was not consistent with the core resources of the two tasks being shared. These results suggest that although spatial attention and spatial memory may at times recruit additional processes which are shared between tasks, their underlying core processes are non-overlapping.

Translation invariance in vision

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A major challenge for the visual system is to recognise objects independent of retinal position. To assess the extent of visual translation invariance, Bowers, Vankov, and Ludwig (2016) trained participants to identify six novel images in fixed retinal locations and tested their ability to identify the images at different locations. Participants identified the objects following a shift of 13 degrees, challenging theories that assume much less invariance. One limitation with this work, however, is that participants only learned 6 novel objects, and this raises the possibility that each object was identified on the basis of a few features, in which case, the invariance may not have extended to the objects themselves. We report a series of experiments

in which participants are trained with over 20 novel images using a range of different object types (e.g., 3D objects and faces). Under these conditions it is more difficult to identify an image based on isolated features. Images are trained at fixation and participants are asked to identify the objects at a range of retinal eccentricities when flashed briefly, using eye-tracking technology to ensure the images are presented at intended retinal locations. We will discuss the implications for theories of vision.

Bowers, J. S., Vankov, I. I., & Ludwig, C. J. (2016). The visual system supports online translation invariance for object identification *Psychonomic Bulletin & Review*, 23, 432-438.

Characterizing the conditions in which feedforward networks learn local ('grandmother cell') representations

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In previous work Bowers, Vankov, Damian, and Davis (2014, 2016) showed that recurrent PDP networks learn localist units (grandmother cells) when trained to activate many items at the same time in short-term memory. We argued that that distributed representations are poorly suited for this because co-active distributed representations are ambiguous (the so-called “superposition catastrophe”), and thus the models learned local codes under these conditions. In this work we explore the conditions under which feed-forward networks (that only activate items one-item-at-a-time) learn local codes, and, in addition, look for other interesting learned internal representations. In one series of simulations we trained simple networks on a range of standard datasets (e.g., Iris, MNIST, cifar10) and show that a range of different representations are learned, with only a subset of training conditions generating local representations. In another set of simulations, we manipulate stimuli as well as the models and show the conditions in which models learn localist representations, such as, the presence of an invariant feature shared between members of the same category. The findings have implications regarding when and why local codes are learned in artificial networks, and perhaps provide some clues as to why some neurons in cortex respond highly selectively.

Bowers, J. S., Vankov, I. I., Damian, M. F., & Davis, C. J. (2016). Why do some neurons in cortex respond to information in a selective manner? Insights from artificial neural networks. *Cognition*, 148, 47-63.

Bowers, J. S., Vankov, I. I., Damian, M. F., & Davis, C. J. (2014). Neural networks learn highly selective representations in order to overcome the superposition catastrophe. *Psychological Review*, 121, 248-261.

Symposium - Developments in eye movement research on reading across the lifespan

Organised by Kevin Paterson and Sarah White

On the dynamics between reading fixation durations and their locations in the perceptual span

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Durations, locations, and probabilities of reading fixations are sensitive to global and local processing difficulty with a canonical direction of effects: With few exceptions, high difficulty increases durations and probabilities and decreases locations within words with trivial consequences for aggregated measures of durations. The default data-analytic strategy is to carry out independent analyses of these dependent variables despite uncontroversial evidence for and often even mathematical necessity of their correlation. An alternative approach is to switch to theory-guided multivariate analyses that explicitly model the local dynamics between neighboring locations and durations of fixations in the perceptual span. Linked linear mixed models (Hohenstein et al., 2016, PsychBullRev) are one option to this end because they are uniquely suited to simultaneously and efficiently estimate experimental effects and individual (e.g., lifespan-related) differences in these experimental effects in fixation locations and associated durations, measured both during natural reading and on experimentally manipulated target words (and their neighbors). Examples of local dynamics uncovered with this approach are (a) dissociations of saccadic error and cognitive (e.g., lexical) contributions to fixation durations and (b) interactions between preview duration and type of preview in the boundary paradigm with strong theoretical implications for distributed processing in the perceptual span.

Investigating eye-movements across the lifespan: Findings from the Berlin DevTrack study

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Reading is a complex skill that changes continuously across the life span. These changes have a profound impact on eye-movement behaviour which are, however, not well understood. In this talk, I will present findings from the DevTrack study, in which we investigated the similarity and differences between the eye-movements of beginning readers (9 years), young adults (25 years), and older adults (75 years). All groups read the same materials created for children in order to investigate processing changes as a function of increasing reading experience. All participants were administered three experiments focusing on different aspects of foveal and parafoveal sentences reading. Results show that reading speed and major marker effects of linguistic processing (frequency effects) decrease continuously across reading development and amount of parafoveal processing increases. Reading speed of younger and

older adults was rather similar and older adults generally showed a “risky reading” pattern (less refixations, higher skipping and regression rates). This pattern was particularly prominent for long, infrequent words and not caused by inefficient parafoveal processing. Overall, our findings indicate that both beginning readers and older adults read less effectively but for completely different reasons which are related to the amount of activation of top-down and lexical activation.

Phonological processing during silent sentence reading: A meta-analysis of typical development, hearing loss, and dyslexia in teenagers

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Phonological processing is a key aspect of reading, and eye movement research has shown that skilled adult readers activate phonological information pre-lexically to identify words during silent sentence reading (Rayner, Pollatsek, & Binder, 1998; Pollatsek, Lesch, Morris & Rayner, 1992). We examined phonological processing during silent sentence in reading for both the fixated word (Experiment 1) and in parafoveal preview (Experiment 2) by conducting a meta-analysis of data from four participant groups: (1) teenagers with Permanent Childhood Hearing Loss (PCHI); (2) teenagers with dyslexia who were matched to group (1) on chronological age, reading age, and nonverbal IQ; (3) typically developing teenagers who were matched to both groups (1) and (2) on chronological age and nonverbal IQ; and (4) typically developing teenagers who were matched to both groups (1) and (2) on reading age and nonverbal IQ. Preliminary analyses indicate that although all four groups showed a pseudohomophone advantage, the time course of phonological processing was delayed in teenagers with PCHI relative to the other three groups. Overall, the data are indicative of developmental delays, rather than atypical development, with respect to phonological processing during reading in teenagers with both PCHI and dyslexia.

Spatial and temporal attentional constraints on reading comprehension in ageing

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In this talk, I provide an overview of recent work from our lab highlighting the effects of normative ageing on multiple aspects of context processing in sentence comprehension and the special role that attentional control plays in comprehension across the lifespan. I first focus on age-related changes in visuospatial attention during reading and show how recordings of event-related brain potentials reveal multiple mechanisms of visual attention allocation in reading. I present data revealing how attention is allocated to information outside of foveal vision, how parafoveal and foveal representations are integrated in the course of sentence processing, and how ageing impacts the use of parafoveal and foveal information. I then focus

on how the volitional control of temporal attention impacts comprehension processes in ageing. I show how inherent moment- to-moment fluctuations in behavioural performance and brain electrical activity reflect internal fluctuations in control capacity and I highlight the role that this intra-individual variability plays in understanding age-related changes in sentence comprehension. Collectively, these findings show that ageing results in diffuse changes and tradeoffs in spatial and temporal attention allocation that have important implications for comprehension and memory for language across the lifespan.

Using blurring to investigate adult age differences in word identification during Chinese reading

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We report four experiments that used blurring to investigate the processing of target words in sentences by young (18-30 years) and older (65+ years) Chinese readers. In Experiments 1 and 2, target words varied in lexical frequency or visual complexity (i.e., number of strokes), while other characteristics were controlled, and were displayed either normally or blurred to reduce their legibility. In Experiments 3 and 4, this manipulation was gaze-contingent so that upcoming words were always displayed either normally or blurred until fixated, at which point the word was shown normally. Results for Experiments 1 and 2 show a modulating influence of blur on word frequency and visual complexity effects but no difference in this influence across age-groups. Experiment 3 also showed a modulating influence of blur on word frequency that was similar across age-groups. However, in Experiment 4, blur selectively impaired the normal processing of more complex words by the young adults, suggesting the legibility of upcoming characters is especially important for the parafoveal processing of text by these readers. We discuss the findings from the experiments in terms of adult age differences in effects of word frequency and visual complexity on the process of word identification during Chinese reading.

Adult age differences in reading: Examining the risky reading theory

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Older adults (65+ years) are typically poorer readers than young adults (18-30 years) and so read more slowly, make more and longer fixations, and make more regressions. There is

also evidence that older readers are more likely to skip words and move their eyes further forward in the text, leading to suggestions that older readers adopt a “risky” strategy and so guess the identities of upcoming words using partial word information (Rayner et al., 2006). However, recent evidence has challenged this (Choi et al., 2017; Whitford et al., 2017). Here we present the results of a meta-analysis showing that, under normal reading conditions, older readers typically show a risky pattern of eye movements, and so read more slowly, make more regressions, but skip words more frequently and have longer forward saccades. Three experiments are also presented which examine risky reading in more detail by examining young and older readers’ use of contextual information (Experiments 1 and 2) and parafoveal information (Experiment 3). The results reveal that older readers can make greater use of contextual information than young adults when making risky decisions to skip upcoming words, and can make these risky decisions even when little useful parafoveal information is available.

Choi, W., Lowder, M.W., Ferreira, F., Swaab, T.Y., Henderson, J.M. (2017). Effects of word predictability and preview lexicality on eye movements during reading: A comparison between young and older adults. *Psychology and Aging*, 32, 232-242.

Rayner, K., Reichle, E., Stroud, M., Williams, C., & Pollatsek, A. (2006). The effect of word frequency, word predictability, and font difficulty on the eye movements of young and older readers. *Psychology and Aging*, 21, 448-465.

Whitford, V., & Titone, D. (2017). The effects of word frequency and word predictability during first- and second-language paragraph reading in bilingual older and younger adults. *Psychology and Aging*, 32, 158-177.

End of symposium

More than skin-deep: Integration of skin-based and musculo-skeletal reference frames in localisation of touch

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The skin of the forearm is, in one sense, a flat 2D sheet, but in another sense approximately cylindrical, mirroring the volumetric shape of the arm. When we rotate the forearm from a pronated to a supinated posture, skin on its surface is displaced. Thus, a marked location will slide with the skin across the underlying flesh, and the touch perceived at this location should follow this displacement if it is localised within a skin-based reference frame. We investigated, however, if the perceived tactile locations were also affected by the rearrangement in underlying musculo-skeletal structure, i.e. displaced medially and laterally on a pronated and supinated forearm, respectively. Participants pointed to perceived touches (Experiment 1), or marked them on a three-dimensional size-matched forearm (Experiment 2).

The perceived locations were displaced medially after forearm pronation in both response modalities. This misperception was reduced (Experiment 1), or absent (Experiment 2) in the supinated posture. The grid was perceptually stretched medial-laterally, and displaced distally, which suggests the influence of skin-based factors. Our study extends the tactile localisation literature focused on the skin-based reference frame and on the effects of spatial positions of body parts by implicating the musculo-skeletal reference frame in localisation of touch.

Perceptions of social touch in stressed and non-stressed participants: Experimental and electrophysiological findings

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The sense of touch is widely studied in terms of its discriminatory function, but only recently has research focused on the underpinnings of its role as a social cue. It is believed that the rewarding sensation of gentle touch is conveyed by nerves called C-tactile afferents (CTs). These fibres, found in hairy skin, respond optimally to slow, gentle touch, typical of caress, and CT-touch is typically perceived as feeling pleasant. The CT network is thought to facilitate the role that social touch plays in bonding, social support and in alleviating stress. However, research into CT-touch has typically relied on subjective ratings when measuring its affective value, and no research so far has addressed the interaction between stress states and CT-touch. Building on a program of experimental research we employed electrophysiological approaches to address the affective value of CT-touch. We also measured liking for CT-touch in participants who differed on cardiac indices of stress. We found significantly higher positive affective responses, measured with facial-EMG, to CT-touch as opposed to non-CT-touch. However, our findings in relation to stress suggested not the increased appetite for CT-touch in higher stress participants that we predicted, but an apparent reduction in sensitivity to its hedonic properties.

Getting ready for Mars: how the brain perceives new gravitational environments

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On Earth, we are continually exposed to the force of gravity. Gravity is detected by online sensory signals which are integrated to form an internal model of gravity. Understanding whether this model can adapt to new gravitational environments is vital as humans push the

boundaries of space exploration. Here we explored whether the internal model of gravity could be applied to new gravitational environments. On Earth, observers are more accurate at judging the speed of falling versus rising objects, as they comply with gravitational laws. We investigated whether participants showed the same “gravitational advantage” when they observed objects moving under a visually-simulated Mars gravity environment. Participants were shown a scene where a ball moved upwards or downwards under Earth (9.81 m/s²) or Mars (3.71 m/s²) gravity. Participants memorised the speed of the ball moving at a constant speed, then judged whether variable-speed trials were faster or slower than the memorised speed. Participants showed the same advantage for falling stimuli under both Earth and Mars gravity: downwards movement was more accurately detected than upwards movement. Although the internal model of gravity has been built up under Earth gravity, our results suggest that it can quickly adapt to a new gravitational environment.

Far but finite horizons promote cooperation in the Centipede game

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The sequential Centipede game models repeated reciprocal interaction, in which two players alternate in choosing between cooperation and defection. In an attempt to increase the game’s applicability to real-life decision contexts, we investigated the effects of game length and termination rules on cooperation in the Centipede game. We found that increasing the game length from 8 to 20 decision nodes increased cooperation, but only if the game’s end was known to participants. This was likely due to the increased opportunity for alternating cooperation and the norms of reciprocity invoked in longer games. Games with unknown ends manifested lower cooperation levels without an endgame effect (i.e., increased defection immediately before a known end), and participants’ decision making appeared to be guided by their own expectations about the game length. Expectations were influenced by the framing of the decision context, and adjusted over time in the light of increased experience with the decision task. Random game termination by the computer appeared to increase the percentage of games adhering to the Nash equilibrium outcome mandated by game theory, and generally lowered cooperation levels.

Persuading with confidence: Evidence for the confidence heuristic

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According to the confidence heuristic, when people communicate beliefs to one another, they generally express confidence proportional to their degree of certainty, based on their

relevant knowledge, and recipients tend to judge the persuasiveness of the communication according to the confidence with which it is expressed. Previous experiments have investigated the confidence–persuasiveness aspect of the heuristic but not the full knowledge–confidence–persuasiveness hypothesis. We report 3 experiments to test the confidence heuristic using incentivized interactive decisions with financial outcomes in which participants attempted to identify target stimuli after conferring with a partner who was also seeking the right answer and who had either stronger or weaker information about the target. Experiment 1, using a facial identification task, confirmed the confidence heuristic. Experiment 2, using geometric shapes as stimuli, found a much larger confidence heuristic effect. Experiment 3 found similar confidence heuristic effects through face-to-face and computer-mediated communication channels, suggesting that verbal rather than nonverbal communication drives the heuristic. Suggesting an answer first was typical of pair members with strong evidence and may therefore be a dominant cue that persuades. Our results establish the confidence heuristic with dissimilar classes of stimuli and through different communication channels.

Too tired to work: A computational framework of momentary motivational and subjective fatigue

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Fatigue - a feeling of exhaustion arising from exertion – is one of the most common symptoms in primary medicine and is highly prevalent in Parkinson’s Disease (PD). Healthy people also show effects of fatigue after exertion – with accuracy and vigour declining with time-on-task. Prominent theories propose that fatigue increases after effort, declines through rest, and that this fluctuating subjective “feeling” impacts on the motivation to exert effort. However, formal models that can account for fluctuations in both the feeling (subjective fatigue) and the willingness to exert effort (motivational fatigue) have not been forthcoming. Here, I put forward a computational framework of momentary fatigue. I test its ability to explain subjective and motivational fatigue in an effort-based decision-making task in healthy people and heightened levels of fatigue in PD. I present evidence that this model can precisely quantify trial-to-trial changes in (i) subjective ratings of fatigue and (ii) people’s willingness to put in effort to obtain rewards. Moreover, I show that this model can provide a computational signature of impaired motivation in PD and reveal new insights into the neural mechanisms underlying fatigue and the dynamics of motivation.

Symposium - Spatial Memory: from neurophysiology to PTSD
Organised by Aidan Horner

A dual-axis rule for maintaining a sense of direction in 3D space

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The sense of direction in mammals is supported by the head direction (HD) cells, each of which fires when an animal faces in a particular direction and is silent otherwise. On a planar surface, such as a floor, updating of HD cells' activity occurs by detection of rotation in that plane, around the animal's dorso-ventral (DV) axis. However, if rotations do not take place only on that plane - for example, if the animal is moving around over a curved surface like the trunk of a tree - then computing direction becomes potentially a much more complex problem. This talk will explain why, and then present evidence from our own and other labs, together with a computational model, that suggests a way in which the brain might be able to solve it. Specifically, we propose that the updating rule for HD cells takes into account not just rotations about the DV axis, but also rotations about the gravity axis. We suggest that this rule might be implemented with the help of the vestibulocerebellum, and show that with it, the brain could continue to use a planar HD compass even during arbitrarily complex movement through 3D space.

Grid cells in an uncertain world

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The hippocampal formation is necessary for the creation and maintenance of spatial and episodic memories. Hippocampal damage produces dense amnesia as well as severe impairments in the ability to recognise and navigate through space. Electrophysiological recordings made from animals revealed some of the neural mechanisms that support these functions. Place cells, neurons with spatially modulated firing were identified in the rodent hippocampus. More recently grid cells, with multiple spatial firing fields tessellated in a hexagonal array, were discovered in the entorhinal cortex. Grid cells are held to provide an efficient representation of self-location. This efficiency comes with a price – the grid code is susceptible to decoding errors arising from neural noise associated with spatial uncertainty. I will describe computational work indicating that the effect of spatial uncertainty is most pronounced when it lies aligned with the axes of the repeating grid pattern. Further, I will present evidence that, in humans, grid firing adapts to counter the effect of anisotropic uncertainty, misaligning to the axis of greatest uncertainty. Together these results suggest that the alignment of grid patterns interacts meaningfully with an animal's sensory environment and that the grid cell system attempts to optimise that interaction.

Organizing conceptual knowledge in humans with a gridlike code

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Neil Burgess and colleagues developed a novel method to detect grid cell coding with non-invasive functional magnetic resonance imaging in humans playing computer games for spatial navigation¹. Their pioneering study made us wonder whether this grid cell coding also worked in other non-spatial realms². It has been hypothesized that the brain organizes concepts into a mental map, allowing conceptual relationships to be navigated in a manner similar to that of space. Grid cells use a hexagonally symmetric code to organize spatial representations and are the likely source of a precise hexagonal symmetry in the functional magnetic resonance imaging signal. Humans navigating conceptual two-dimensional knowledge showed the same hexagonal signal in a set of brain regions markedly similar to those activated during spatial navigation. This gridlike signal is consistent across sessions acquired within an hour and more than a week apart. Our findings suggest that global relational codes may be used to organize nonspatial conceptual representations and that these codes may have a hexagonal gridlike pattern when conceptual knowledge is laid out in two continuous dimensions.

Doeller, C.F., Barry, C. & Burgess, N. *Nature* 463, 657–661 (2010)

Constantinescu, A.O., O'Reilly, J.X. & Behrens, T.E.J. *Science* 352, 1464–1468 (2016)

Walls and mountains: perception and memory of spatial structure

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This wide-ranging talk reviews a series of studies investigating the influence of geometric and topographical structure on spatial perception and memory, carried out with or inspired by Neil Burgess. Allocentric spatial memory, linked to the function of the hippocampus, depends on the extraction of view-invariant geometry and topography from visual scenes. Combined computer modelling and neuroimaging studies suggest that perceptual processing of relevant spatial information in the parahippocampal cortex depends on the distribution of low-level visual features. A new immersive virtual reality experiment indicates that the perception of environmental scale is systematically affected by low-level visual changes.

Disruptive effects of negative emotion on the coherence of episodic memories

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Events are thought to be stored in episodic memory as coherent representations, with which the constituent elements are bound together so that a cue can trigger re-experience of all elements via pattern completion. Negative events can influence memory in complex ways, strengthening memory for the emotional content whilst impairing important associations between the content and surrounding context, and in some situations resulting in severe memory disturbances as seen in posttraumatic stress disorder (PTSD). I will discuss behavioural and neuroimaging findings showing how the presence of negative items can disrupt associative memory and reduce the coherence in which multimodal events are remembered. I will highlight the key role of the hippocampus in supporting memory coherence and the way with which negative content might down modulate its function to weaken associative encoding and impair pattern completion. I will also consider how these characteristics of memory for negative events might contribute to the development and maintenance of distressing imagery in PTSD.

Reducing the number of intrusive memories after experimental trauma: from lab to clinic

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Clinicians and scientists must work together to understand and improve mental health treatments¹. It is therefore an honour to be at this experimental psychology society meeting in celebration of Prof Neil Burgess, whose work provides inspiration for the field of trauma. Intrusive memories of psychological trauma comprise mental images. I will discuss work concerning intrusive memory encoding using fMRI²; and a behavioural method (concurrent task interference) to reduce the frequency of intrusive memories of experimental trauma³ and hypothesised to disrupt memory (re)consolidation. Finally, we will discuss the first steps in translation of this intervention (memory reminder plus Tetris gameplay) to patients⁴. Results show the same brief intervention developed in the lab when delivered in a hospital emergency department soon after a traumatic motor vehicle accident also reduces the number of intrusive memories of trauma over the next week. Further work both understanding the mechanism and exploring translational questions is needed.

Holmes, E. A., Craske, M. G. & Graybiel, A. M. Psychological Treatments: a call for mental-health science. Clinicians and neuroscientists must work together to understand and improve psychological treatments. *Nature* 511, 287-289, doi:10.1038/511287a (2014).

Clark, I. A., Mackay, C. E., Woolrich, M. W. & Holmes, E. A. Intrusive memories to traumatic footage: the neural basis of their encoding and involuntary recall. *Psychological Medicine* 46, 505-518, doi:0.1017/S0033291715002007 (2016).

James, E. L. *et al.* Computer game play reduces intrusive memories of experimental trauma via reconsolidation update mechanisms. *Psychological Science* 26, 1201-2015, doi:10.1177/0956797615583071 (2015).

Iyadurai, L. *et al.* Preventing intrusive memories after trauma via a brief intervention involving Tetris computer game play in the emergency department: a proof-of-concept randomized controlled trial. *Molecular Psychiatry*, doi:10.1038/mp.2017.23 (2017).

End of symposium

Searching for bodies: Electrophysiological evidence for independent somatosensory processing during attentional selection of body postures

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Attention enables us to selectively process behaviorally relevant information by influencing neural activity within brain areas that represent that information. However, it has remained unclear whether attentional selection of body stimuli (e.g., visually perceived body postures) influences activity within visual areas that receive the visual percept, or within somatosensory areas that process functional bodily properties. Here, I recorded visual and somatosensory evoked activity during visual search task, whereby participants had to search for either visual (specific colour) or bodily (specific posture) properties that characterised target hand images. By dissociating somatosensory activity, associated with body processing, from initial visual input, I show that attentional selection of hand postures (but not hand colours) leads to modulation of independent somatosensory processing. This suggests that the effects of attention might be partially independent from input-sensory modality and instead affect activity within functionally relevant cortical areas. This provides evidence for flexible attention mechanisms that operate depending on the specific behavioural goals and the nature of attended stimuli.

Validity of pupillometry for measuring sexual interests

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In the visual processing of sexual content, pupil dilation is an indicator of sexual arousal that has been positively associated with observers' sexual orientation. Across a series of experiments we recently showed that this can also be extended to age-specific sexual preferences (Attard-Johnson, Bindemann, & Ó Ciardha, 2016, 2017). However, research on this new approach is limited and further evidence of its validity and sensitivity are required before it can be employed in clinical or forensic settings. In a series of experiments we address a number

of remaining questions. First, we compared the strength of pupillary responses of heterosexual men and women to naked and dressed portraits of adults. These results showed strong dilation during the viewing of the opposite sex that was equal for both naked and dressed stimuli. This indicates that this measure can provide a sex-specific measure that is responsive to highly sexually explicit and non-explicit content. Second, we correlated pupillary responses with latency-based measures of sexual interest (IAT, P-MST, and Viewing Time). Findings revealed a high degree of intercorrelation between measures indicating high convergent validity between the indices. These results strengthen the evidence base for pupillometry as a measure of sexual interests.

Attard-Johnson, J., Bindemann, M. and Ó Ciardha, C., 2016. Pupillary Response as an Age-Specific Measure of Sexual Interest. *Archives of Sexual Behavior*, 45 (4), 855-870.

Attard-Johnson, J., Bindemann, M. and Ó Ciardha, C., 2017. Heterosexual, Homosexual, and Bisexual Men's Pupillary Responses to Persons at Different Stages of Sexual Development. *Journal of Sex Research*, 54 (9), 1085-1096.

Sexual orientation determines early attentional enhancement of preferred sexual stimuli

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We tested whether covert attention were automatically captured by images of the preferred sex among a range of sexual orientations. 78 young adults reported their sexual orientation on a seven-point Kinsey scale and viewed male and female nudes presented 10 degrees left and right of fixation for 100ms. After 50ms a Gabor probe appeared in the left or right location. Homosexual men responded faster to probes following male images than those following female images, heterosexual men more quickly to probes following female than male images ($F(2, 47786)=19.49$, $p<0.001$). Homosexual women responded more quickly to probes following female images, but the effect was weaker than that for heterosexual and homosexual men. Bisexual men and women responded equally quickly to probes following male and female images. Surprisingly, heterosexual women responded more quickly to probes following female images than male images. Amplitudes of the P1 event-related potential in response to the probe mirrored these behavioural results, confirming a gender X orientation X probe_hemifield X stimulus_gender X hemisphere effect, $F(65, 1739)=1.698$, $p<0.001$ in which individuals oriented to stimuli of their preferred gender appearing in contralateral to the measured electrode. Early attentional processes correlate strongly with sexual orientation of men, but less reliably for women.

The relationship between physiological arousal and perceived duration: the effect of stimulus valence

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Theoretical models of emotional distortion of duration processing suggest that distortions to time result from changes in physiological arousal (Craig, 2002; Gil & Droit-Volet, 2012). It is hypothesised that increases in arousal lengthen perceived duration and decreases in arousal shorten perceived duration. We tested this hypothesis by measuring sympathetic nervous system (SNS) and parasympathetic nervous system (PSNS) activity during a verbal estimation task in which participants judged the duration of high and low arousal positive, negative and neutrally valenced IAPS images. SNS and PSNS activity were indexed by measuring Pre-Ejection Period (PEP) and High Frequency Heart-rate Variability (HF-HRV) respectively. SNS reactivity was predicative of perceived duration, but only for high arousal negatively valenced stimuli with decreases in PEP being associated with longer duration estimates. SNS and PSNS activity was not predictive of perceived duration for the low arousal negative stimuli or the low and high arousal positive stimuli. The findings suggest a complex relationship between physiological arousal and perceived duration which is not accurately explained by current theoretical models of emotional distortions to time perception.

Craig, A. D. (2009). Emotional moments across time: a possible neural basis for time perception in the anterior insula. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 364(1525), 1933-1942.

Gil, S., & Droit-Volet, S. (2012). Emotional time distortions: the fundamental role of arousal. *Cognition & Emotion*, 26(5), 847-862.

Individual variations in autistic traits are reflected in brain network topologies: Behavioural, psychometric and neuroimaging assays

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Accumulating behavioural evidence indicates that autistic traits extend dimensionally into the general population, forming a basis of individual cognitive differences. In a sample of normal individuals, we studied the relationship between anatomical (diffusion tensor imaging) and physiological (BOLD fMRI) measures of brain connectivity on the one hand and psychometric (Social Responsiveness Scale and Autism Spectrum Quotient) and behavioural (the Attention Network Test, and reaction time in a theory-of-mind video game) measures of autistic traits. Individuals high on autistic traits (as measured by the SRS, and with a matching

trend in the AQ Social subscale), and low on attentional orienting effect (as measured by the Attention Network Test) were typified by high clustering, low path length, and high overall network efficiency as measured by fMRI. Individuals who took longer to solve the theory-of-mind task trended towards lower overall clustering and lower efficiency as measured by DTI; this effect was strongly driven by right supramarginal gyrus, and also by anterior- and mid-temporal and other networks. This work extends behavioural observations of dimensional individual differences in autistic traits into the realm of brain structure and function, and is congruent with recent results on the role of right supramarginal gyrus in theory-of-mind.

The modality shift effect in autism: exploring the nature of crossmodal switching

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Real world perception involves shifting attention between the different sensory modalities (vision, touch, hearing). This is observed experimentally where response times are reduced when successive target stimuli are ipsimodal in comparison with crossmodal, termed the modality shift effect (MSE). Previous work has suggested that the MSE may be increased in autism, reflecting less effective crossmodal attention. However, the existing literature is limited, includes methodological issues and findings are mixed. In the present study, autistic adults (n = 24) and neurotypical controls (n = 24) made discrimination responses to visual, tactile and auditory targets which were separated by variable inter-trial intervals. MSEs were observed for each target modality, but the effect was not reduced with increasing inter-trial interval for either group. When speed-accuracy trade-offs were considered using a simple implementation of the drift diffusion model, neurotypical participants showed performance enhancements comparable to ipsimodal trials when responding to visual and tactile targets that were preceded by auditory targets, an effect which was not observed in the autistic group. This apparent benefit to processing stimuli preceded by auditory targets may have been masked in previous studies of the MSE. The implications for autistic and neurotypical crossmodal selective attention will be discussed.

Are you looking at me? How an audience impacts overimitation

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Recent work suggests that direct eye contact is a powerful social cue which influences learning, evaluation and imitation. However, it is not known how or why children respond differently to events when direct gaze is present. Here we test if gaze changes imitation behaviour in children by means of an audience effect - does the child take into account whether

an adult is watching during the response period? 88 primary school age children took part in this study. On each trial, the child saw an experimenter perform a sequence of actions to open a box, including an unnecessary action. The experimenter then observed the child, turned away, or left the room before the child had a chance to open the box. The number of times the child performed the unnecessary action was scored from video. Results showed that children copied the unnecessary action more when the adult was watching or when she left the room, but copied less when she turned away. This parallels infant studies which suggest that turning away from an event is a social cue to disengagement. The present data suggests that audience effects are important in determining which actions a child chooses to imitate.

Grain size and orthographic transparency: Word learning in English, German, Italian and Spanish

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English has an opaque orthography. Its' words are notoriously inconsistent in their spelling-sound correspondences. Other languages (including Spanish, German and Italian) have much more transparent orthographies. Their words have much more consistent spelling-sound correspondences. When skilled readers of English read aloud short and longer nonwords that are then repeated several times, the large length effect observed for the first presentation diminishes across the following presentations. Typically, the length effect becomes nonsignificant after 4-6 presentations (Kwok & Ellis, 2015; Maloney et al., 2009). We report a set of experiments involving word learning in three transparent orthographies (Spanish, German and Italian). Participants read aloud shorter and longer nonwords presented 10 times across 10 blocks of trials. Naming latencies decreased with repetition, but RTs did not converge as quickly or as completely in these transparent orthographies as they do in English. We propose that, in line with the grain size theory of Ziegler et al. (2001), lower-level units play a role in the conversion of orthography to phonology in transparent orthographies at a point where readers of English have largely switched to large-scale (lexical) units.

Kwok, R. K. W., & Ellis, A. W. (2015). Visual word learning in skilled readers of English. *The Quarterly Journal of Experimental Psychology*, 68(2), 326-349.

Maloney, E., Risko, E. F., O'Malley, S., & Besner, D. (2009). Tracking the transition from sublexical to lexical processing: On the creation of orthographic and phonological lexical representations. *The Quarterly Journal of Experimental Psychology*, 62(5), 858-867.

Ziegler, J. C., Perry, C., Jacobs, A. M., & Braun, M. (2001). Identical words are read differently in different languages. *Psychological Science*, 12, 379-384.

Readers utilise proper noun capitalisation to determine syntactic class prior to direct fixation

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Eye-tracking research has shown that readers process upcoming capitalised proper nouns in the parafovea to a greater extent than non-capitalised common nouns (Rayner & Schotter, 2014). Furthermore, Staub (2010) demonstrated that readers fixate the noun phrase within an object relative clause (ORC; e.g. 'the senator' in 'the reporter that the senator attacked...') for longer than in a subject relative clause (SRC; e.g. 'the reporter that attacked the senator...'). We investigated whether these effects occur during fixations prior to the noun phrase when the noun phrase is a capitalised proper noun. Participants read sentences containing either an ORC or SRC including a proper noun (e.g. 'The thin girl who Charlotte sunbathed with/sunbathed with Charlotte was tanned'), with sentences presented in either normal sentence casing or entirely in upper case. In upper case sentences the relative clause effect primarily appeared in the relative clause region, as in prior studies using non-capitalised nouns. In normally cased sentences the effect appeared while participants were fixated on the words girl who, suggesting that participants detected that they were processing an ORC on the basis of the capitalised parafoveal noun. We consider our findings in relation to theories of sentence processing and oculomotor control during reading.

Rayner, K., & Schotter, E. R. (2014). Semantic preview benefit in reading English: The effect of initial letter capitalization. *Journal of Experimental Psychology: Human Perception and Performance*, 40, 1617-1628. doi:10.1037/a0036763

Staub, A. (2010). Eye movements and processing difficulty in object relative clauses. *Cognition*, 116, 71-86. doi:10.1016/j.cognition.2010.04.002

Word frequency and predictability effects for line initial words

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Models of eye movement control during reading focus on the reading of single lines of text. Within these models, word frequency and predictability are important input variables which govern fixation durations and are considered to have an additive effect (Rayner, Ashby, Pollatsek, & Reichle, 2004). However, a comprehensive model of eye movement control will have to account for readers' eye movements across multi-line texts. Line initial words are unlike those presented mid-sentence; they are routinely unavailable for parafoveal pre-processing (Parker, Kirkby, & Slattery, 2017). Therefore, it is unclear if and how word frequency and predictability influence reading times on line initial words. We present an experiment in which we manipulated word frequency and predictability for line initial words. While word frequency consistently effected early (first-fixation duration, gaze duration) measures of processing, word predictability effects emerged later and were only evidenced in gaze duration. We believe that a lack of parafoveal preview is responsible for this observation. Post-hoc analysis revealed that predictability effects emerged in first-fixation duration only when undersweep fixations provided preview of the line initial word before it was directly fixated. We subsequently discuss implications for models of eye movement control during

reading.

Parker, A. J., Kirkby, J. A., & Slattery, T. J. (2017). Predictability effects during reading in the absence of parafoveal preview. *Journal of Cognitive Psychology*, 29(8), 902-911. DOI: 10.1080/20445911.2017.1340303.

Rayner, K., Ashby, J., Pollatsek, A., & Reichle, E. D. (2004). The effects of frequency and predictability on eye fixations in reading: implications for the E-Z Reader model. *Journal of Experimental Psychology: Human Perception and Performance*, 30(4), 720-732. DOI:10.1037/0096-1523.30.4.720.

Using artificial orthographies and fMRI to investigate abstraction along the ventral visual stream

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Learning to read involves abstracting from surface form to recognise letters independent of case, font, and position (b is the same in BAD and cab). Such abstraction may be achieved by ventral occipitotemporal cortex (vOT; Dehaene et al., 2005). Using artificial orthographies and Representational Similarity Analysis (Kriegeskorte et al., 2008) of fMRI data, we examined which vOT regions a) represent letters rather than visual form, b) abstract across position, and c) abstract from visual form to capture sound or meaning. 24 adults learned to read two sets of 24 pseudowords written in different artificial orthographies. Following two-weeks of training, participants read the learned words in an MRI scanner. Analysing neural patterns for items from the same orthography revealed that posterior vOT represented letters not basic visual form, but did not show position abstraction. In contrast, mid-to-anterior vOT showed position abstraction. Comparing neural patterns for items from different orthographies revealed that left anterior vOT abstracted from orthography entirely – items with overlapping sounds or meaning, but distinct visual forms, had similar neural patterns. Thus, mid-to-anterior vOT abstracts across letter-position and left anterior vOT representations are phonologically and semantically structured.

The dramatic impact of explicit instruction on learning to read an artificial orthography

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Reading acquisition involves coming to appreciate the statistical regularities of a writing system. We investigated the impact of explicit instruction on this process. Two groups of adults learned to read 48 novel words printed in an artificial script. One group learned the underlying print- sound and print-meaning regularities of the writing system implicitly; the other group received explicit instruction on these regularities before learning the novel words. We observed dramatic benefits of explicit instruction on participants' learning of the novel words, on their ability to generalize this knowledge to untrained words, and on their oral language knowledge. These benefits persisted after 9 days of training. Findings are discussed in the context of theories of learning, and how these speak to the persistent and intense debate around methods of reading instruction.

Transitional frequency is better than transitional probability in a sequence learning task

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Transitional probability is often used to describe distributional relationships in statistical learning paradigms. However, transitional frequency has been suggested as a more psychologically plausible mechanism of statistical learning. Participants were asked to shadow a target on a touch-screen display and their performance was assessed using the time taken to transition between items. Participants completed 222 trials comprising five repetitions of a 37-item sequence where both the transitional probability and transitional frequency of successive items were controlled. Mixed-effects models and direct comparisons of key pair-transitions using Bayesian equivalence testing suggest that transitional frequency presents a better predictor of task performance than transitional probability. This suggests that, although transitional probabilities may provide a more accurate representation of the distributional relationships between stimuli, transitional frequency may be more beneficial for learning.

Acute physical exercise improves memory consolidation in humans via BDNF and endocannabinoid signalling

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Regular physical exercise enhances memory functions and neurogenesis in the hippocampus, an effect partially mediated by BDNF (Brain Derived Neurotrophic Factor). Acute exercise promotes the release of endocannabinoids (especially anandamide, AEA), which enhance BDNF release and improve hippocampal plasticity in rodents. How acute

exercise affects BDNF and AEA levels and influences memory performance in humans remains to date unknown. Here we combined blood biomarkers, behavioral and fMRI measurements to assess the impact of moderate and high intensity acute physical exercise on memory and underlying neurophysiological mechanisms. We tested associative memory performance in nineteen healthy participants across three visits, composed each of a learning and a test part performed in fMRI separated by a period of exercise (moderate or high intensity) or rest. A long-term memory retest took place 3 months later. We report a selective increase in memory performance after moderate but not high intensity exercise or rest at test and retest. Acute exercise boosted both BDNF and AEA levels: AEA increase after moderate intensity exercise correlated with hippocampal activity during retrieval suggesting that AEA may have an acute effect on synaptic plasticity; whereas BDNF correlated with enhanced hippocampal memory representations after moderate intensity exercise and with long-term memory effects.

Learning from total failure: Errorful generation improves memory for cues and targets, but not their association

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Potts and Shanks (2014) recently reported that generating errors when learning novel word pairs improved subsequent retention compared with studying. This benefit of generating errors is counterintuitive, since it resulted in less study time and more opportunity for proactive interference. Four experiments examined whether this effect reflects a boost in item strength, associative strength, or both. Participants first attempted to learn the definitions of rare English words by guessing the definition before the correct definition was revealed, or by simply studying the words. Generating errors led to better subsequent recognition of both the cues (rare words) and targets (definitions) than studying. Tests of cued recall and associative recognition, by contrast, revealed no significant benefit of generating errors over studying. Furthermore, generating errors during encoding improved performance (relative to studying) on a two-alternative forced choice test when the target was presented with a novel foil, but not when the familiarity of the target and the foil was matched. Together, the results suggest that errorful generation strengthens cues and targets in isolation, but does not strengthen cue-target associations.

Potts, R., & Shanks, D. R. (2014). The benefit of generating errors during learning. *Journal of Experimental Psychology: General*, 143(2), 644–667.
<https://doi.org/10.1017/CBO9781107415324.004>

United we fall: Complex episodic events are forgotten in an all-or-none manner

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Do complex event representations fragment over time, or are they forgotten in an all-or-none manner? For example, if we meet a friend in a café, and they give us a present, do we forget the constituent elements of this event (location, person and object) independently, or is the whole event forgotten as one? Brady et al (2012) have shown that object-based memory traces are forgotten in a fragmented manner, finding differential forgetting rates for separate aspects of an object (i.e., colour, and ‘state’). However, we do not know how more complex episodic events are forgotten. This is critical given that object-based and event-based memory traces are supported by different regions of the medial temporal lobe (Vargha-Khadem et al., 1997; Aggleton & Brown, 1999), and are thought to undergo different forgetting processes (Sadeh et al., 2016). We assessed both retrieval accuracy and dependency for complex events over varying delays, where dependency refers to the statistical relationship between the retrieval successes of different within-event elements (Horner & Burgess, 2013). Despite variable forgetting rates, we consistently show dependency regardless of time. Thus, when events are retained, they are retrieved in an all-or-none manner. When they are forgotten, all constituent elements are forgotten.

Is response selection in task switching impaired by inhibition or episodic retrieval? A diffusion model analysis

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Inhibition is thought to be an essential mechanism for successful task switching behaviour. It is inferred from so-called $n-2$ task repetition costs: the observation that ABA task switching sequences are responded to slower and with poorer accuracy than CBA sequences. This is thought to reflect the persisting inhibition of task A, which hampers re-activation attempts. Diffusion model analysis of this effect has shown that the $n-2$ repetition cost is primarily driven by reductions in the drift rate parameter, which provides evidence that inhibition impairs response selection processes (Schuch, 2016). However, recent work from our lab (Grange et al., 2017) has shown that much of the $n-2$ task repetition cost can be explained by episodic retrieval effects, which calls into question the inhibition explanation of the $n-2$ task repetition cost. The purpose of the current study was to apply diffusion modelling to data from an experiment which controls for episodic retrieval effects to ascertain whether response selection is impaired by inhibition (as per Schuch, 2016) or episodic retrieval effects. Results show that response selection is impaired by episodic retrieval effects, not inhibition. We discuss our results within the context of theories of task switching.

Grange, J.A., Kowalczyk, A.W., & O’Loughlin, R. (2017). The effect of episodic retrieval on inhibition in task switching. *Journal of Experimental Psychology: Human Perception & Performance*, 43, 1568–1583. <http://dx.doi.org/10.1037/xhp0000411>

Schuch, S. (2016). Task inhibition and response inhibition in older vs. younger adults: A diffusion model analysis. *Frontiers in Psychology*, 7, 1722.

Unfamiliar face matching with photographs of infants and children

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Infants and children travel using passports that are typically valid for five years (e.g., Canada, United Kingdom, United States, Australia). However, research has not examined how useful the photographs in these passports are as a means of identification. Here, we investigated this question using a face matching task, where participants were presented with two images simultaneously and were asked whether the images depicted the same child or two different children. In Experiment 1, both images showed an infant (< 1 year old), and we found low levels of performance (72% accuracy). For Experiment 2, one image again showed an infant but the second image of the child was taken at 4-5 years of age. As expected, performance was lower still in this task (64% accuracy). In Experiment 3, we asked participants to complete shortened versions of both these tasks (selecting the most difficult trials) as well as the short form Glasgow face matching test. We found lower performance for the two infant tasks, and some evidence of within-person correlations in accuracies across tasks. Together, our results provide evidence that child passport photographs are ineffective for use in real-world identification.

A novel interactive face matching procedure: Performance of normal and superior face recognisers

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Unfamiliar face matching is error-prone. An accurate decision involves correctly assigning between-person variability to different identities and within-person variability to the same identity. To support image-based comparisons we have developed a novel interactive procedure, which involves rotating a facial image to different orientations. We investigated how ‘normal’ (Experiment 1) and ‘superior’ (Experiment 2) face recognisers performed using this procedure. In each trial, participants responded whether two images featured the same person. A Facebook image was shown on the left, and an image extracted from a high-quality recording was shown on the right. This was either a static face, a series of static images of different orientations, a video of the face moving from side-to-side, or an interactive image. In Experiment

1, in the interactive condition, unlike other conditions, ‘normals’ were more accurate on different compared to same identity trials. In Experiment 2, ‘superiors’ were less accurate on same identity trials in the static conditions, but not in the moving conditions. Overall, the results suggest that ‘normal’ face recognisers using the interactive system behave in a similar way to ‘superior’ face recognizers matching static faces. Further, despite their high accuracy levels with static images, the system also supports ‘superior’ recogniser performance.

Why do better readers have larger vocabularies? Examining the influence of reading ability and reading practice on vocabulary knowledge

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Reading ability is strongly associated with vocabulary knowledge. Is this because more able readers read more, gaining more exposure to text? Or is this because they are better at using text to learn new words? Participants from the Aston Literacy Project (N = 788, from Birmingham, UK) were assessed on their vocabulary and letter sound knowledge at school-entry (age 4 years). They were re-assessed at late-primary (age 10 years; n = 556) on vocabulary and word reading ability and given items from the PIRLS student questionnaire on the amount of reading they do for pleasure (reading practice). We built structural equation models of the relationship between word reading, reading practice and vocabulary at age 10, controlling for vocabulary and letter-sound knowledge at school-entry. All factors were significantly correlated. Both reading ability and reading practice significantly predicted concurrent vocabulary knowledge. Removing either the link from word reading or from reading practice to vocabulary significantly reduced model fit, suggesting that although correlated, both word reading ability and the amount of reading children do are critical for vocabulary in late-primary, over and above their pre-school vocabulary. Further longitudinal work will examine these influences on vocabulary growth during the transition to secondary school.

Semantic as well as referential relevance reduces reading times for modified noun phrases

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A number of studies have investigated whether overspecified referring expressions (e.g. ‘the stripy cup’ in a one-cup referential context) affect processing. Some studies have found that overspecification leads to faster identification of a target referent (Arts et al., 2011; Mangold & Pobel, 1988), while others conclude that it slows processing (Engelhardt et al., 2006; 2011; Fukumura & van Gompel, 2017). These studies typically use size or colour adjectives that are semantically irrelevant to the broader sentential context.

We manipulated the semantic relevance of adjectives to investigate whether referentially redundant adjectives would incur a processing cost even when relevant to the sentential context (e.g. ‘fed the hungry rabbit’) relative to when they are not (e.g. ‘tickled the hungry rabbit’). Significantly reduced reading times were found for referring expressions when they were in relevant semantic contexts ($M=772\text{ms}$, $SD=202$) compared to when they were in irrelevant semantic contexts ($M=874\text{ms}$, $SD=208$), $F(1,30) = 78.5$, $p < .001$. This pattern reflects the reduction in reading times when adjectives appeared in felicitous (i.e. 2-referent) contexts ($M=768\text{ms}$, $SD=194$) compared to overinformative (1-referent) contexts ($M=879\text{ms}$, $SD=213$),

$F(1,30) = 64.7, p < .001$. We conclude that both semantic and referential relevance facilitate the processing of modified referring expressions.

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The role of self-respect in influencing physiological measures of cognitive effort during a story recall task

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Despite the implications of cognitive effort for performance on tasks ranging from problem-solving in the workplace to more informed political attitudes (Cacioppo, Feinstein & Jarvis, 1996), little is known about factors influencing the choice to engage or withhold cognitive effort. This study investigates for the first time the role of trait self-respect, defined as one's self-evaluation as moral, principled and honourable across situations (Kumashiro, Finkel, & Rusbult, 2002). We examined whether levels of trait self-respect would predict greater motivation to expand cognitive effort on tasks that have important outcomes. Participants (N=109) completed validated measures of self-respect and global self-esteem, and a story recall task, administered in counterbalanced order. The number of correct items recalled was recorded, as well as participants' heart rate at baseline while reading the story and while recalling the story items, since measures of physiological arousal are typically used as indices of cognitive effort (Westbrook & Braver, 2015). Adjusting for global self-esteem, self-respect was a significant predictor of the number of story items recalled, increased heart rate reactivity while reading the story, and decreased heart rate reactivity while recalling story items. We aim to discuss these findings in relation to self-respect's motivational role in exerting cognitive effort.

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The emergence of location-based representations in the parahippocampal place area

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Scene-selective regions of the brain are known to form location-based representations of our environment that are insensitive to heading direction (Vass & Epstein, 2013; Robertson et al., 2016). Given the diverse perceptual input that accompanies differing viewpoints in a given environmental location, the formation of location-based representations is likely to depend on the integration of information across multiple viewpoints. Using fMRI, we tracked the emergence of such representations in scene-selective cortical regions for novel environmental locations. We estimated patterns of activity for specific viewpoints of unfamiliar locations, before and after a learning phase that required participants to integrate viewpoints from the same location. The learning phase presented two video conditions: a full-panorama video showing two viewpoints at opposite ends of the same location, and an incomplete-panorama video showing two viewpoints from different locations. Representational similarity analysis (RSA) revealed that representations in the right parahippocampal place area (PPA) for viewpoints belonging to the same location became more similar to each other after they had been presented in the full-panorama condition. No similar effect was seen in the incomplete-panorama condition. These results suggest that the PPA plays a role in the rapid formation of location-based representations that generalise across different viewpoints.

Individual differences in spatial strategies underlie differences in cue preference in navigation

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Reported differences in men's and women's reliance on different cue types during navigation may be mediated by sex differences in the use of verbal and non-verbal spatial strategies. This hypothesis was tested by training participants to locate an invisible goal in a computer-generated navigation task. The goal's location could be determined with reference to both the positions of distinctive landmarks within an arena, and with respect to the arena's

boundary, which was circular and oriented by the presence of distal cues on the environment's horizon. The time spent searching in the goal location was recorded in test trials at the end of training, in which the opportunity to find the goal was removed. In one test only the landmark cues were present and in the other only the boundary cues were present. In the first experiment verbal fluency best predicted spatial search with respect to the landmarks, whereas for boundary cues mental rotation ability best predicted performance. In the second experiment a concurrent articulatory suppression task impaired learning with respect to the landmarks, but had no effect on learning based on the boundary cues. The results suggest different spatial strategies underlie individual differences in cue preference in navigation.

ERP responses to symmetry formed through temporal integration of transient and partial information

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A symmetry-sensitive network in the extrastriate visual areas activates automatically when symmetry is displayed in the image. The magnitude of this response scales proportionally with regularity (Makin et al. 2016), suggesting a coding of *symmetry in the image*. We investigated the network's response to (bilateral) symmetry for dynamically occluded shapes (i.e. response to *symmetry in the object*). A bar occluded half of an abstract shape for 500ms. The bar then shifted to the other side occluding the previously visible half, and revealing the other for 1000ms. In this way, no symmetry was displayed at any point in time. Exp.1 and Exp.2 used vertical and horizontal axis, and in Exp.3 the occluder had same color as the background (invisible). Participants could detect symmetry with a > 80% accuracy. More importantly, ERP analysis showed symmetry-specific response from ~300ms after presentation of the second half of the shape. When symmetry was ignored (Exp.4) and parts were extracted from asymmetric whole shapes (Exp.5) no neural response was recorded. For the first time, we show the symmetry-network can assemble fragmented information into unitary perceived symmetry. This process only occurs with active symmetry discrimination and only if parts are perceived as belonging to the same object.

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Parafoveal preview benefit effects in vertical alphabetic reading

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Numerous studies have used the boundary paradigm to reveal parafoveal preview benefits during reading. In this paradigm, an invisible boundary is placed immediately before a target word in a sentence. This target word initially is shown either normally or replaced (e.g., by a pseudoword), so that the preview is accurate or inaccurate, and is rapidly changed to the target word immediately the reader's point of gaze crosses the invisible boundary. The standard finding is that fixation durations on the target are shorter when the preview is accurate rather than inaccurate. The present experiment examined if similar preview benefits are obtained when text is read in both conventional (horizontal) and unconventional (vertical) directions. Participants read sentences that were displayed either horizontally or vertically and included a boundary change where the preview was either accurate (i.e., identical to the target word) or inaccurate (i.e., a visually similar pseudo-word). Vertical displays were read more slowly than horizontal displays. However, preview benefits were obtained for both displays, although these were larger for horizontal than vertical displays. The findings indicate that parafoveal processing of text adjusts flexibly to reading direction and is broadly similar when reading text in a conventional horizontal or unconventional vertical direction.

Eye movement control and word identification during vertical and horizontal reading: Evidence from Mongolian

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Mongolian is a cursive alphabetic language (similar to Arabic) that is conventionally printed vertically (so that sentences are effectively rotated 90° from horizontal) and so naturally read from top to bottom, but can also be printed horizontally. This language is therefore ideal for assessing the versatility of word identification and oculomotor control when reading text in different directions. Two experiments addressed this issue by examining the influence of reading direction and both word frequency (Experiment 1) and word length (Experiment 2) on eye movement control. In both experiments, horizontal reading was slower compared to vertical reading, although effects of word frequency and word length were similar for the two reading directions. Crucially, the initial landing positions of saccades on words were also

broadly similar for the two reading directions, and in Experiment 2 were closer to the beginnings of longer words. Thus, while reading is generally slower for the less familiar (horizontal) reading direction, this did not disrupt normal processes of word identification or saccade-targeting (e.g., Rayner, 1979). The findings therefore reveal that processes of word identification and eye movement control during reading are highly adaptable to variation in reading direction.

Misspelling effects on eye movements during Chinese reading

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We report an experiment which examined the effects of character misspelling on eye movements during Chinese reading. Twenty skilled native Chinese readers read sentences that contained a specific two-character target word. This word was shown as normal (e.g., 项链, xiang lian, meaning “necklace”); or with the first character replaced by another character. The replacement characters were either (1) a visually similar pseudo-character that differed by only one or two strokes, (2) a character that was visually similar but phonologically dissimilar to the replaced character (e.g., 顶链, ding, meaning “top”), or (3) a character that was phonologically similar but visually dissimilar to the replaced character (e.g., 像链, xiang, meaning “like”). The replacement characters and pseudo-characters were matched for visual complexity (i.e., number of strokes), and the replacement characters were matched for frequency of written usage. The results showed that each of the replacement characters disrupted the normal processing of the target words, although this disruption was greatest for the phonologically similar characters, less for the visually similar characters, and least for the pseudo-characters. We discuss these findings in terms of the relative importance of visual and phonological cues to character identities when reading Chinese naturally.

Reading and topic scanning in Chinese: Effects of word frequency and spacing

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Eye movement behaviour during reading of Chinese text was compared for reading and topic scanning. In the reading task participants read sentences and responded to comprehension questions. In the topic scanning task participants scanned quickly to identify sentences relevant to the topic of clothing, and responded to questions following relevant (filler) sentences. A word frequency manipulation for the experimental (irrelevant) items enabled a comparison of

lexical processing during reading compared to scanning. Three variables were manipulated: reading task (reading, topic scanning), text format (no spacing, spaces between words) and word frequency (high and low frequency critical words). In line with previous work, there were shorter reading times for topic scanning compared to reading for comprehension (White, Warrington, McGowan, & Paterson, 2015) and inserting spaces between words in Chinese did not shorten overall reading times (Bai, Yan, Liversedge, Zang, & Rayner, 2008). However importantly there were interactions between reading task, the spacing between words, and word frequency. The results indicate that the time course of word frequency effects in Chinese is modulated by task and text format (spacing). The implications for effects of reading task on word recognition and eye movement control during reading in Chinese will be discussed.

Bilingual children and adults differ in their semantic categorisation decisions for cognates and non-cognates

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Two experiments investigated priming effects of cognate and non-cognate translations in Greek and English. Experiments 1 and 2 involved adults and children, respectively, with either Greek or English as their dominant language who participated in a masked priming semantic categorisation task. The experimental stimuli were cognate and non-cognate translations or unrelated pairs where either the prime was in the dominant language (L1) and the target in the non-dominant (L2) or vice versa. In Experiment 1, priming for cognate translations was observed relative to the control baselines only in the L1-L2 direction (priming asymmetry). There were no effects for non-cognates. In Experiment 2 the task was the same but participants were 10 to 11 year old bilingual children, with Greek or English as their dominant language. Priming effects were observed for cognates in the L2 - L1 direction, whereas non-cognates did not show any effects. The results for adults are in congruence with previous research with unbalanced bilinguals and are discussed within current models of bilingual semantic organisation. The results from the children experiment are discussed with reference to task demand characteristics and effects of new methods of teaching L2 to early learners which allows exploitation of their concepts.

The effect of syntactic priming on auditory word identification among second- language speakers

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Previous research does not enable investigation of the contextual syntactic effects on

word recognition in isolation from other effects (e.g. semantic or phonological). The present study used syntactic priming to isolate the syntactic level of representation and examine its separate role in auditory word identification among second language (L2) speakers of English. Participants were 48 L1 Arabic speakers with L2 English. Participants performed a lexical decision task (LDT) and an auditory masked word identification task in which the target word is heard through white noise. Critical words are embedded in sentences with either an ambiguous or unambiguous syntactic structure primed by either a congruent or incongruent preceding sentence. Preceding a sentence structure by a congruent sentence was shown to facilitate the recognition of the final target word in the lexical decision task; however, masked word identification results showed no priming. L2 speakers need clearer speech with less severe noise in order to be able to benefit from the primed context in the recognition of words in sentences.

Asymmetric interference in the mono-, bi- and multi-lingual brain: Evidence from concurrent verbal-motor task performance

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The functional distance hypothesis (FDH) predicts that tasks regulated by cerebral networks in closer anatomical proximity will cause more interference than tasks regulated by distant regions. Support for the FDH has been found in studies of left/right brain asymmetries in the interactions of concurrent communication and manual tasks. A mixed design was used to investigate the effects of dual-task interference. Fifty right-handed monolinguals, bilinguals and multilinguals underwent a test of phonemic verbal fluency (VF) with right- and left-handed motor activity, in isolation and concurrently. Monolingual participants were impaired when completing the VF task concurrently with right-hand motor activity; whilst bilingual and multilingual participants were impaired when completing the task concurrently with left-hand motor activity. Monolingual participants showed superior performance when performing the motor task concurrently with the VF task when using their left- as opposed to right-hand; whilst multilingual participants showed superior performance when using their right- as opposed to left-hand. The overall pattern of findings indicated the presence of some hemisphere-specific interference between groups. Findings and implications are discussed in line with the FDH and other neurophysiological evidence.

Effects of sense relatedness in ambiguity processing

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Most words are in some way ambiguous, such that understanding their representation and processing is central to any model of word processing. While the literature agrees that homonyms, words with unrelated meanings, have separate semantic representations and generally hinder processing, there is less consensus regarding polysemes, words with multiple related senses. Here, we examined the processing of polysemes out of context. Participants made relatedness decisions to metaphorical polysemes with literal and figurative senses (“chair”), metonymic polysemes with regular sense extension (“rabbit”), polysemes with irregular sense extension (“wire”), homonyms (“bank”), and unambiguous words (“lake”). Target words were either related to the dominant interpretation, the subordinate one, or were unrelated. The results showed that irregular polysemes were processed more slowly than unambiguous words. Like homonyms, these words seem to have separate semantic representations that compete with each other and slow comprehension. Metaphors and metonyms did not entail such competition, most likely due to a single representation for these words. A processing cost arose only when the word pairs instantiated the subordinate sense, pointing to additional processes involved in deriving that sense from the core representation. Overall, the findings support the distinction within polysemy and show its differential effects in word comprehension.

Foundations of reading in bimodal-bilingual deaf children

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Recent models of bilingual word recognition in hearing bilinguals assume that hearing bilinguals activate lexical items of both languages during auditory and visual word recognition (Kroll et al., 2006). Recently, co-activation of sign language during written or spoken word recognition in adult bimodal bilinguals has been investigated (Kubus et al. 2014; Morford et al. 2011, 2014), but very little is known about language processing in Deaf children. Using phonological priming, we investigated lexical access of German Sign Language (DGS) and of written German in Deaf children native in DGS (n=14) and hearing controls (spoken and written German, n=14). Sign/spoken onsets (primes) preceded targets, which were legal or meaningless signs or written words and pseudowords in a lexical decision task. In addition to reaction times, we recorded event-related potentials (ERPs). Both measures revealed that sign fragments facilitated the recognition of signs as well as of written words in native Deaf children. ERPs suggested that the priming effect was due to automatic lexical mapping processes. We conclude that native signers use their primary language processing route for literacy acquisition. Similar to spoken word form representations guiding reading in hearing participants, signed form representations seem to guide reading in native signers.

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Predictors of English reading and spelling for Mandarin-English bilingual students in higher education

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Previous research has demonstrated that English reading and spelling rely more on phonological decoding processes. However, most of the research has focused on school-age children. Little of this research examined whether similar results will be observed in reading and spelling abilities of skilled readers. The current study aims to identify differences in reading and spelling processes in bilingual Mandarin- and English-speaking and monolingual English-speaking participants.

33 English monolingual adults (mean age: 21.82 years, SD=7.548) and 25 Mandarin-English bilingual adults (mean age: 22.95 years, SD=2.984). The students were tested in non-verbal ability, reading, spelling, reading comprehension, and language skills. Inferential statistics and We found that reading accuracy in English for both groups was associated with the spelling accuracy. For the bilingual group, both reading and spelling accuracy of English were significantly correlated to English phonological awareness.

The results are interpreted to suggest that bilingual Mandarin- and English-speaking students and monolingual English-speaking participants rely on different skills to process English reading and spelling. Results of the bilingual group are consistent with Yeong, Fletcher & Bayliss (2016) who found that phonological processing skills of bilingual adults are important for their English reading ability.

An eye-tracking database of natural reading in Italian children

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Research in the past thirty years has revealed much about literacy acquisition. Yet, the cognitive mechanisms that allow young humans to become proficient readers are rather unclear. Also, much of what we know is based on highly non-ecological paradigms, which, while allowing experimental control in the lab, are far from everyday reading experience. We have tackled this limitation by studying eye movements in a large sample of Italian 3rd to 6th graders (N=80+), as they silently read excerpts from kids' books for comprehension. Robust effects of length and frequency emerge in later (e.g., total looking time) stages of processing, already in the youngest group of children, and effects of frequency emerge even in earlier stages of processing (e.g., first-of-many fixation duration). We also find significant, although smaller, effects of n-gram frequency for larger n-gram size (quadrigrams), suggesting that reading proficiency may develop via building progressively larger chunks. In addition, longer total looking times are observed on derived words, even in younger readers, which suggests early sensitivity to morphological structure. The database will be made freely available to the research community.

"You talkin' to me?" Can listeners perceive differences in Infant-Directed & Adult-Directed speech

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There is a body of research showing a word segmentation advantage for North American infants over Europeans. We propose that differences in the infant directedness of speech styles explain this. Indeed, it was expected that Canadian speech, -both infant directed speech (IDS) and adult directed speech (ADS),- would be judged as more infant directed than identical speech produced by British speakers. Participants were asked to rate speech samples in both registers, and from both countries, for perceived infant, and adult directedness. Although IDS was perceived as significantly more infant directed regardless of country, Canadian speech was not perceived as significantly more infant directed overall.

Frequency and semantic diversity both play a role in children's semantic judgment of words

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For adults, words high in semantic diversity (co-occurring with many different words) are easier to read, overtaking the word frequency effect. Conversely, diversity reduces

performance on semantic judgment, probably due to semantic competition. It is not clear how diversity affects children's semantic processing as the representations of words are still forming. We directly compared the performance of adults and children on the same semantic task, using the same materials. Participants listened to a short definition followed by a visual presentation of a word, and decided whether the word matched the definition (matched trials vs. non-matched trials). Diversity significantly slowed RTs on non-matched trials for both adults and children, but not on matched trials. Frequency was significantly associated with overall faster processing for children but not for adults. Results suggest that paradigms involving a higher degree of semantic processing (i.e. non-matched trials: all meanings need to be considered to make a rejection) are more sensitive to the negative effect of semantic diversity. Frequency is also an important factor in facilitating semantic processing in developing readers.

The role of early speech and language in predicting literacy outcomes: Secondary analysis of the ALSPAC dataset

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Purpose: Several studies have suggested that early speech difficulties are a risk factor for later literacy difficulties if the difficulties are persistent or are associated with broader language difficulties. However, this research evidence is almost entirely based on clinical samples. The current research examines the links between speech difficulties and literacy in a large, representative sample of children from the Avon Longitudinal Study of Parents and Children (ALSPAC).

Method: the ALSPAC study follows a sample of 11,000 children from birth to adulthood. Parents complete questionnaires about the children annually and 7,000 children completed literacy measures at 7 and 9 years of age. This study focuses on the parent reports of speech and language in the pre-school years in predicting literacy outcome at 7 and 9 years old.

Results and Conclusions: Parent report of pre-school vocabulary, intelligibility and concerns about speech were all small but significant predictors of later literacy outcome. Both early vocabulary and speech predicted later phonology. These data verify previous findings from smaller, clinical studies, that early speech and language play separable roles in literacy outcome, but that both have a role in the development of phonological processing skill.

Phonological ability and visual attention span deficits in adults with atypical reading performance

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The association between reading skill and phonological ability is considered to trade off as individuals grow and their experience with language becomes automatic and fluent. In the current study, we aimed to investigate the association between single word reading speed and a

timed measure of phonological ability and visual attention span tasks in a group of university students with typical and atypical reading performance (N=60, mean age: 19.7 years, SD: .69). Allocation into the two groups was based on two inclusive criteria: i) the individual's reading reaction times and ii) their standard score in reading. The students did not differ in non-verbal ability, but significant differences were observed in verbal ability. Results indicated that atypical readers had longer response times in reading (of regular, irregular and non-words) and phonological ability, and performed poorly in measures of whole and sequential visual attention span in comparison to typical readers. Thus, findings indicate the importance of both phonological ability and visual attention span in order to differentiate between adults with and without reading difficulties. Importantly, these results provide information about the role of visual attention span in adults with atypical reading performance, the implications of which will be discussed.

Ageing and sentence production: Impaired lexical access in the context of intact syntactic planning

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Sentence production requires rapid on-line generation of syntax and retrieval of lexical items. We investigated how these processes are affected by healthy ageing. Young ($M=19.8$ yrs) and older ($M=71.8$ yrs) adults first completed a picture description task (Smith & Wheeldon, 2001), producing syntactically related or unrelated prime and target sentences (e.g., "*the bell and the glove move up*"). Both groups showed similar benefits of syntactic priming. Participants then completed a planning scope task (Wheeldon et al., 2013) producing sentences with initial simple or coordinate phrases (e.g., "*the owl moves above the car and the harp*" / "*the owl and the car move above the harp*"). On half the trials, the second picture (e.g., car) was previewed. Without preview, both groups took significantly longer to initiate sentences with the larger initial coordinate phrase, suggesting similar phrasal planning scope. However, age differences emerged in the preview conditions. Young adults benefited when the preview fell both within and outside the first phrase. Older adults benefited from preview within the first phrase only, and preview outside the first phrase made them more error-prone. Thus, while syntactic planning appears unaffected by age, older adults do encounter problems with managing the activation and assignment of lexical items to syntactic frameworks.

Smith, M., & Wheeldon, L. (2001). Syntactic priming in spoken sentence production – an online study. *Cognition*, 78, 123-164.

Evidence against preserved syntactic comprehension in aging

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We investigated age-related differences in syntactic comprehension in young (M=19 years) and older (M=71 years) adults. Previous research has found no evidence of age-related decline in syntactic processing. We investigated elementary syntactic comprehension by testing processing of minimal sentences (e.g. *I cook*) in order to minimize the influence of working memory. We also investigated the contribution of semantic processing by comparing sentences consisting of real verbs (e.g. *I cook*) to pseudo-verbs (e.g. *I spuff*). We measured speed and accuracy to detect syntactic agreement errors (e.g., *I cooks*, *I spuffs*). Older adults were slower and less accurate than younger adults with both real and pseudo-verb sentences. The age-related decline in accuracy was smaller for the pseudo-verb sentences than the real verb sentences, whereas the age-related decline in speed was largest in the pseudo-verb sentences. Older adults therefore show a decline in syntactic comprehension. This decline increases in the absence of semantic information, which causes them to produce slower responses in order to make more accurate decisions. In line with these findings, accuracy for older adults was positively related to processing speed capacity. Taken together, our results provide evidence that comprehension performance on elementary syntactic structures declines in healthy ageing.

Speaker-dependent perceptual learning of degraded speech

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Speech perception is remarkably flexible; listeners can perceptually adapt to severe degradations including noise-vocoding [1]. Previous research has focused on the time course of adaptation for various types of degradations [2]. We aimed to identify whether and how gender and age-related acoustic features interact with perceptual learning of degraded speech. We collected a speech corpus consisting of younger and older male and female speakers (N=16). We measured various acoustics characteristics linked to speaker intelligibility [3]. We degraded recordings from all speakers using two separate distortions and tested perceptual adaptation to different combinations of distortion and speaker in a perceptual learning task for 64 listeners. Listening effort was also measured (pupil dilation). Results indicated that acoustic features associated with intelligibility processing [3] also influenced learning. Furthermore, results indicated that listening effort correlated negatively with perceptual learning.

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Samuel, A. G., & Kraljic, T. (2009). Perceptual learning for speech. *Attention, Perception, & Psychophysics*, 71(6), 1207-1218.

Hazan, V., & Markham, D. (2004). Acoustic-phonetic correlates of talker intelligibility for

adults and children. *JASA*, 116(5), 3108-3118

The effects of sensorimotor experience on automatic imitation of visually perceived speech actions

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Watching and/or listening to people speak activates the mechanism involved in producing speech and it causes automatic imitation (AI), which influences perceivers' subsequent articulation. According to the Associative Sequence Learning (ASL) model, the AI phenomenon results from the associative experience of observing and executing the same actions and is therefore subject to change through sensorimotor experience (Heyes, 2011). In controlled laboratory settings, AI is measured using the interference tasks, in which participants have to respond to a prompt by saying either /ba/ or /da/ while ignoring the speaker who is producing either a congruent or incongruent articulation in the background video. The interference effect is defined as the response time (RT) difference between the incongruent and congruent conditions and a larger interference effect (i.e., a larger RT difference) indicates more AI. Following the ASL hypotheses, studies have demonstrated that AI for manual gestures increases after compatible sensorimotor training and decreases after incompatible training. However, questions remain as to whether the same predictions could be applied to visually perceived speech actions. The present study investigates whether sensorimotor experience also modulates the AI for visually perceived speech actions and to what extent, or whether it does so differently.

Heyes, C. (2011). Automatic imitation. *Psychological bulletin*, 137(3), 463.

Can children prioritise more valuable information in working memory?

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Research suggests that adults can prioritise more valuable information in working memory, but that children cannot. The current set of experiments further explored the conditions under which effects of attentional direction might be detected in children aged 7-10 years old. The task involved sequential presentation of coloured shapes, followed by probed recall of one item's colour after a brief delay. Participants were either told the first serial position was worth more points (priority) or that all serial positions were equally valuable (control). In Experiment 1, the frequency with which the more valuable item was tested was also manipulated (probe frequency). A probe frequency effect was observed, whereby children responded more accurately to the first serial position if it was more likely to be tested. There was, however, no effect of prioritisation and no interaction between prioritisation and probe

frequency. This suggests that the manipulations yield independent effects and that increasing probe frequency does not encourage prioritisation effects to emerge. Follow-up experiments examined whether prioritisation boosts would be observed if other task factors were manipulated, including memory load and the motivation surrounding the points system. Together, these findings help indicate the conditions under which children can direct attention in working memory.

Can patterns in memory and executive functioning explain the relationship between DDL and dyslexia?

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Many children with Developmental Language Disorder (DLD) develop literacy difficulties but not all. Meanwhile, some children show literacy difficulties in the absence of language difficulties. This project contrasts the verbal and non-verbal executive functions of these groups.

Participants (11 – 15 years), 21 with DLD and dyslexia (DDL), 24 with only dyslexia, 10 with only DLD and 20 typically developing chronological age matched controls (CA) completed N-back tasks assessing updating of working memory. Participants were asked to identify whether a stimulus matched an invariable target (0-back), the immediately preceding target (1-back) or the penultimate target (2-back). Parallel stimuli were created for non-verbal and verbal tasks.

The DLD group performed similarly to controls regardless of modality. The dyslexic group performed worse than controls on the verbal 2-back task only and this persisted when baseline (0-back) performance was covaried. The DDL group showed poorer performance on the verbal 2-back task and the non-verbal 1-back task. Differences persisted when baseline (0-back) performance was covaried.

The causes of patterns of comorbidity between DDL and dyslexia may be explained by different patterns in memory and central executive functioning. Dyslexic participants show isolated difficulties in complex verbal tasks. The DDL group experience additional difficulty in non-verbal tasks.

Alterations in default-mode network connectivity in adolescents with posttraumatic stress disorder

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Objectives: Default-mode network (DMN) comprises interacting brain regions active at rest and their activity is altered in posttraumatic stress disorder (PTSD). Few studies have questioned the integrity of DMN activity in adolescents, a period of life in which brain regions continue to mature.

Methods: Fourteen adolescents with severe PTSD (mean age $\pm$ sd, 15.73 ± 1.51) underwent resting state fMRI versus 24 aged matched controls (15.99 ± 1.51). Seed-based connectivity analyses were used to examine connectivity between the DMN (PCC seeds) and the whole brain, including regions from other networks (salience network or SN, and central executive network or CEN). Relationships of network properties with symptom dimensions (severity, anxiety, depression) and episodic memory were also examined.

Results: Analyses revealed decreased within-DMN connectivity (between PCC and occipital cortex) in patients compared to controls. Within-DMN connectivity (between PCC and hippocampus) correlated negatively with severity and anxiety, while increased connectivity (DMN-SN and DMN-CEN) correlated positively with episodic memory measures.

Conclusions: These abnormal network properties found in adolescent PTSD corroborate those previously reported in PTSD adults. Decreased within-DMN connectivity and disrupted DMN-SN and DMN-CEN coupling could form the basis for intrusive trauma recollection and impaired episodic autobiographical recall in PTSD.

How maladaptive metacognitive beliefs affect the encoding of analogue trauma

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Background: Pre-existing maladaptive metacognitive beliefs are associated with the development and maintenance of PTSD symptoms. However, it remains unclear how metacognitive beliefs increase vulnerability to PTSD. One explanation, which we address in this study, is whether maladaptive metacognitive beliefs affect how people encode traumatic events.

Method: Participants (N = 30) completed several baseline measures (e.g., pre-existing metacognitive beliefs) prior to session 1. We used a median split to create ‘weak’ versus ‘strong’ maladaptive metacognitive belief groups at baseline. In session 1, we adopted the trauma film paradigm, and asked all participants to watch a distressing film clip, while we monitored their eye movements using remote eye-tracking equipment. Immediately following the film clip, all participants recalled everything they could remember about the film clip. For analysis, we selected three scenes with an equal proportion of threat (e.g., blood, injury) versus non-threat (e.g., paramedic, environment) information and analysed for dwell time and total fixations.

Results: Participants with strong maladaptive metacognitive beliefs fixated less on the most distressing regions of the film clip, compared to participants with weak metacognitive beliefs.

Conclusions: Results suggest that maladaptive metacognition may be associated with

avoidance of threat, rather than hyper-vigilance of threat, when processing distressing events.

Computational mechanisms of social decision-making in sub-clinical personality disorder

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Personality disorder (PD) is characterised by pervasive pattern of maladaptive traits and behaviours, with decreased ability to keep satisfactory social relationships. Despite its high prevalence and socioeconomic costs, the mechanisms underlying social dysfunction in PD are still poorly understood. As helping behaviour and aversion to harming others are central components of healthy social interactions, we hypothesized that social dysfunction in PD may in part be explained by reduced prosocial motivation. Using computational modelling, we showed that participants with subclinical PD traits are less prosocial compared to healthy participants in two different contexts: they are less averse to harming others in order to gain profit for themselves, and they are less willing to exert effort to benefit other people. Furthermore, we found that choices in the two contexts are correlated, suggesting a shared prosocial motivation underlying both. Finally, aversion to harming others was positively correlated with empathic concern in PD group but not in healthy participants, suggesting that although PD traits are related to reduced moral preferences, this deficit can be overcome by individual social skills. These findings shed lights on potential cognitive mechanisms underlying social dysfunction in PD, such that reduced prosocial motivation may interfere in keeping healthy interpersonal relationships.

The role of spontaneous perspective-taking in empathy

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Current theories argue that the ability to recognize the perspective of others is a key component of empathy. If so, we posited that the extent to which people spontaneously compute others' perspective should reliably, and positively, predict measures of empathy. In four experiments, we sought to investigate the relationship between individual differences in spontaneous visual perspective-taking and measures of cognitive and emotional empathy. Using an established measure of unintentional visual perspective-taking, we found only limited evidence of spontaneous perspective-taking in our total samples. However, to the extent that participants engaged in unintentional perspective-taking, this was inversely related to empathy. This suggests that empathy does not relate to perspective-taking per se, but may instead reflect an ability to differentiate one's own from others' perspectives.

Motivational fatigue: The impact of effortful exertion on subsequent motivation

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Fatigue – a feeling of exhaustion – is classically thought to arise through effortful exertion and decline through rest. Prominent theories suggest that fatigue also has a significant impact on motivation, reducing the willingness to exert effort over time. However, the majority of studies examining effort-based decisions assume that motivation is static. As a result, how previously exerted efforts impact on the willingness to exert effort – which we refer to as motivational fatigue – is poorly understood. Using an effort-based decision-making paradigm in combination with computational modelling and fMRI we investigated the effects of exerting effort on subsequent effort-based choices. Participants (N = 30) chose between taking a rest for 1 credit, or “working” which required the exertion of one of three levels of grip force (30-50% maximal grip strength) for one of three amounts of reward (6-10 credits). Computational modelling revealed that choices of higher effort work options declined over trials as a function of (i) the effort previously accumulated during the whole task and (ii) a recoverable component that increases after effortful trials and is restored by rest trials. These results provide insight into how fatigue impacts on motivation and provide a new way of probing its underlying brain mechanisms.

How the sense of agency shapes body schema and peripersonal space

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Body schema (BS), a sensorimotor representation of the body used for planning and executing movements, is plastic because it extends by using a tool to reach far objects[1]. Modifications of peripersonal space (PPS), i.e., a functional representation of the reaching space, co-occur with BS changes[2]. We hypothesized that BS and PPS plasticity depend on the experience of controlling the course of events in space through one’s own actions, i.e., the sense of agency. BS and PPS were assessed through a forearm bisection task and a reaching distance estimation task, respectively. Both tasks were performed before and after the participant’s sense of agency over a virtual hand was manipulated. In Experiment 1, the virtual hand was presented farther forward than actual hand location, whereas in Experiment 2 it was presented closer to the participants than actual hand location. Experiment 1 showed that BS and PPS are concurrently enlarged after participants experienced agency for the far virtual hand. Experiment 2 showed the opposite modulation: BS and PPS were contracted. Therefore, BS and PPS

representations derive from the dynamic mapping between intentional body movements and their consequences in space, in order to achieve control over the body and the environment.

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Correspondence between three-dimensional bodies and two-dimensional shadows

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Recent research has shown that shadows cast by human bodies play a unique and critical role in cognitive processing. Indeed, self-attributed body shadows promote binding between personal and peripersonal space (Pavani & Castiello, 2004) and automatically orient attention towards the body part casting the shadow (Galfano & Pavani, 2005). However, the visual information provided by shadows is only two-dimensional, while the body is a three-dimensional object containing two clear surfaces, the front and the back. The correspondence between the 2-D cast body shadow and the 3-D body parts remains unknown. Shadows could be perceived as a translation of the body surface facing the light source, or as a reflection of the body surface facing the shadow. In a series of four experiments, we demonstrate that people perceive the shadow of their own and of other people's hands as a translation of the surface casting it (i.e., the palm or the dorsum), and not as a specular reflection of the hand. Conversely, when observers are presented with shadows of objects, they perceive them as translations or reflections indistinctly. Such results challenge the long-held common linkage between shadows and specular reflections and confirm the highly peculiar nature of body shadows.

Galfano, G., & Pavani, F. (2005). Long-lasting capture of tactile attention by body shadows. *Experimental brain research*, 166(3-4), 518-527.

Pavani, F., & Castiello, U. (2004). Binding personal and extrapersonal space through body shadows. *Nature neuroscience*, 7(1), 14-16.

Tactile mislocalisation of the digits arises from higher-level representation of individual digits as complete 3D units

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Recent research has shown systematic patterns of mislocalisations and confusions between digits. These distortions appear highly stereotyped, and consistent across individuals. The present study addressed whether such mislocalisations arise from early somatosensory maps or from higher-level body representations. We obtained confusion matrices showing pattern of mislocalisation between toes and fingers on the glabrous and hairy surface of the foot and hand. As the two skin surfaces of the hands and feet have distinct representations in somatosensory cortex, an effect arising from early somatotopic maps may show distinct patterns on each skin surface. In contrast, if the effect arises from higher-level body representations which represent the digits as complete, volumetric units, similar patterns should be apparent regardless of which side of the digit is touched. Our results clearly replicated the distinct pattern of mislocalisations on the glabrous skin of the fingers and toes. Critically, these effects were highly similar on the hairy skin. Despite the pattern of mislocalisations being highly stereotyped across participants, there were consistent individual differences in task performance across the two skin surfaces. These results suggest that mislocalisations occur at the level of complete toes, rather than individual skin surfaces, consistent with their resulting from higher-level body representations.

Distal bias in knuckle mislocalisation is reduced but not eliminated by hand inspection

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Knowledge of knuckle location shows highly stereotyped distortions: people judge their knuckles as farther forward in the hand than they actually are. This distal bias does not rely on any specific stimulus cue or single sensory modality, but rather reflects a conceptual misrepresentation of hand structure (Ambroziak, in press; Longo, 2015). Here, in 2 experiments, we investigated whether distal bias can be eliminated by careful inspection of participant's own hand in movement. In Experiment 1, participants performed a knuckle localization task both before and after being allowed to explore the actual configuration of their hand. During the task, participants judged the location of their knuckles by pointing to the location on the palm directly opposite their knuckle. During the intervention, participants were inspecting their hand while bending their fingers. In Experiment 2, participants performed the same task three times: before any intervention, after inspecting the hand while splaying the fingers and after inspecting the hand while bending the fingers. In both experiments, after the interventions participants judged their knuckles to be closer to the actual location, however, significant distal bias still remained. These results showed that distal bias can be reduced but not eliminated by inspection of participant's own hand.

Ambroziak, K. B., Tamè, L., & Longo, M. R. (in press). Conceptual distortions of hand structure are robust to changes in stimulus information. *Consciousness and Cognition*.

Longo, M. R. (2015). Intuitive anatomy: Distortions of conceptual knowledge of hand structure. *Cognition*, 142, 230-235.

Where the rubber meets the road: visual cues to inferring friction

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The movement of an object can be disambiguated by combining prior knowledge of Newtonian physics with sensory information. Friction puts a strong constraint on an object's dynamics, but its role in motion perception has been little investigated. We tested whether inferred friction with the ground determines the perception of an ambiguously rotating pattern. We rendered naturalistic 3D scenes representing a beach ball rolling on the grass and tracked observers' eye movements. We found that the ball was perceived as rotating congruently with the direction of friction, but only so when observers were looking at the point of contact with the ground. Shadows that specified no contact of the ball with the ground did not influence rotation judgements, indicating that dynamic cues alone were used to disambiguate rotation. Even though the rotation and translation of an object can be specified by global motion cues, foveal vision appears necessary to resolve friction between two surfaces.

Gazing left or right: Politics on the move

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Recent advances in eye tracking technology have shifted the emphasis away from traditional static images or scenes to the study of dynamic stimuli. Although the aim is to maximise ecological validity, the use of such dynamic stimuli is not without challenges. The labour required in coding regions of interests (ROIs) frame by frame tends to limit researchers from using such stimuli. Moreover, it is not always clear what the relevant ROIs are when group comparisons are made. Here we present a first evaluation of a new data-driven method with the potential to address these issues. We measured political attitudes using questionnaires and used this to differentiate gaze behaviour between individuals with left and right-wing political orientations. A total of 30 participants watched 80 video clips of two left and two right wing politicians (20 per category). We will present data on how often the two political groups (left and right wing viewers) differ in their gaze position and what parts of videos clips are associated with such differences.

Can a novel interactive lineup procedure attenuate the own race bias?

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We tested whether a novel interactive lineup—wherein witnesses could rotate the lineup faces into any pose—could attenuate the own-race bias in face recognition. We used a 2 (perpetrator race: Caucasian, South Asian) x 2 (subject race: Caucasian, South Asian) x 2 (lineup procedure: interactive, static) x 2 (lineup: target-present, target-absent) between-subjects design. Over 6,000 subjects watched a mock-crime video, and were tested with a lineup. Our results suggest that identification performance could be improved by allowing witnesses to view lineup faces from multiple angles and have important implications for other-race identification decisions made in the Criminal Justice System.

Sex differences in recognising and responding to angry and happy expressions: Evidence from Bayesian Hierarchical Diffusion Modelling

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Based on evolutionary reasoning authors have argued for the existence of approach-avoidance and recognition biases for angry and happy facial expressions. There is consistent evidence for a face-gender recognition bias (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007) - people are faster to categorise a male face as “angry” and a female face as “happy”. Although there is some evidence for an approach-avoidance bias - people are faster to avoid angry faces (by pushing a joystick) and approach happy faces (by pulling the joystick) - the effects are generally weak (Seidel, Habel, Kirschner, Gur, & Derntl, 2010) and inconsistent across studies. Here, the goal was to increase sensitivity to detect approach-avoidance biases by 1) modelling sex differences in expression recognition and 2) applying the Bayesian Hierarchical Diffusion Model (BHDM). Sixty-five participants (33 female) categorized faces as either happy or angry by pushing and pulling a joystick. Analyses of median correct RTs and BHDM highlight the value of modelling sex differences- the face-gender recognition and approach-avoidance biases were larger in female compared to male participants.

Becker, D. V., Kenrick, D. T., Neuberg, S. L., Blackwell, K. C., & Smith, D. M. (2007). The confounded nature of angry men and happy women. *Journal of Personality and Social Psychology*, 92(2), 179–190. <https://doi.org/10.1037/0022-3514.92.2.179>

Seidel, E.-M., Habel, U., Kirschner, M., Gur, R. C., & Derntl, B. (2010). The impact of facial emotional expressions on behavioral tendencies in women and men. *Journal of*

Experimental Psychology: Human Perception and Performance, 36(2), 500–507.
<https://doi.org/10.1037/a0018169>

Emotional distracters reduce the Attentional Blink

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The Attentional Blink (AB) effect occurs when identification of a stimulus is impaired if it is presented in close temporal proximity to an initial stimulus. One explanation attributes the AB to a failure in controlling the top-down attentional set. However, findings show that allocating fewer resources to the task reduces the AB leading to the proposal that the effect is instead due to an overinvestment in the attentional set. An experiment was conducted to investigate the impact of attentional control in a rapid serial visual presentation task. In three blocks of trials participants were asked to detect two targets from a stream of irrelevant distracters. In two blocks emotional faces were presented at the beginning and end of each trial and these were either irrelevant to the task or required a response. The AB was reduced with the addition of emotional faces regardless of whether they were task-relevant, offering only marginal support for an overinvestment hypothesis. In addition, AB magnitude varied in relation to the emotion depicted by each face. The results provide support for the argument that the AB is due to difficulties in top-down control and are consistent with findings revealing that emotion influences attentional control.

A similar structure of social judgements from faces and voices for both familiar and unfamiliar people

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We aimed to investigate the influence of familiarity on the relationships between the different judgements that people make based on faces and voices, and on how these judgements compare across modalities. Two groups of participants rated the faces and voices of twelve familiar people (N=30) and twelve unfamiliar people (N=30) on trustworthiness, dominance, attractiveness, and positive-negative valence. Unfamiliar and familiar people were matched based on age, race, and nationality. The results showed that, for both familiar and unfamiliar people, ratings of trustworthiness, attractiveness, and valence were highly correlated with each other within modality (i.e. separately for faces and voices), whereas correlations between dominance and the other judgements were smaller and largely non-significant. Our findings suggest that the structure of these social judgements is largely stable across modalities and for both familiar and unfamiliar people. In addition, we found that ratings of faces and voices were correlated across modalities for all judgements, with correlations being significantly higher for familiar people compared with unfamiliar people. These results suggest that faces and voices

convey redundant socially-relevant information and that the degree of redundancy increases substantially with familiarity.

Retrieval cues influence quality of recall from short-term memory

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A great deal of research has focused on the effects of encoding and maintenance in short-term memory (STM). Here we test whether our ability to recall accurately depends also upon the type of information presented at retrieval.

Participants were asked to remember both the identity and location of memoranda which consisted of circles, each split in half to consist of semicircles of different colours. Information to-be-encoded was held constant while two factors were manipulated at retrieval. First, we varied how much information was presented by displaying one or two semicircles as retrieval cues. Second, the level of competition between cues and memoranda was manipulated by presenting either a novel semicircle or a horizontally flipped version of a semicircle presented in the memory array.

The results show that presenting more components of memoranda at retrieval improved identification and localisation performance. Additionally, increasing both the number of components and shared similarities decreased the likelihood of misreporting an item. These findings suggest that, rather than acting as a form of interference and impairing memory, more information at retrieval can improve access to items in STM. Thus, the nature of retrieval cues can significantly affect quality of memory reports.

Metacognitive decisions in learning new material

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People are often exposed to more information than they can remember, so they have to make decisions about what to learn. Murayama et al. (2016) examined whether participants would restrict exposure to new information to maximise performance on a word learning task. They found that participants commonly chose to stop the presentation of new words before the end of the study phase, even though this resulted in poorer performance during recall. According to Murayama et al., the decision to terminate study was likely a consequence of a maladaptive belief that exposure to late items would decrease the probability of recalling early items due to ‘information overload’. We sought to replicate these findings and to evaluate the claim that participants believed their performance would be enhanced by terminating study. As in Murayama et al.’s experiments, participants commonly chose to stop the study list early. However, we also found that the serial position at which participants stopped was correlated with their performance on a similar task with a fixed-length study list. Additionally, we have

found no evidence of a belief in ‘information overload’. Instead, we suggest that stopping behaviour is an adaptive response to declining marginal utility during the study phase.

Murayama, K., Blake, A. B., Kerr, T., & Castel, A. D. (2016). When enough is not enough: Information overload and metacognitive decisions to stop studying information. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 42(6), 914-924.

Modelling associative learning, extinction and reinstatement in invertebrates (planaria)

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Animals repeatedly exposed to rewarding substances in the presence of environmental cues learn to associate such cues with reward. Subsequent repeated exposure to these cues in the absence of the rewarding substance leads to extinction of the previously learned behaviour. However, re-exposure to the reward leads to reinstatement of the previously extinguished response. This study determined whether these effects, commonly observed in rodents, are evident in invertebrates, namely planaria. Planaria were exposed to 10% sucrose solution in one context in alternation with water in a different context. Test trials in which animals chose between contexts indicated development of conditioned place preference (CPP), a preference for the context associated with sucrose. Repeated test trials without sucrose led to extinction of CPP. Re-exposure to sucrose in a novel context after extinction reinstated CPP. Another group of animals were treated with atropine during extinction trials. Atropine is an antagonist at muscarinic acetylcholine receptors, known to be involved with learning and memory in mammals. In keeping with rodent studies, these planaria failed to show reinstatement after re-exposure to sucrose. These results show that addiction to sucrose is a learned response in planaria, based upon similar principles and mechanisms that govern associative learning in rodents.

Evaluating the functional outcome assessments employed following unilateral experimental stroke in rodents

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In the clinic, occlusion of the middle cerebral artery and resulting lost blood flow is a dominating cause of debilitating stroke. To model this at a pre-clinical level cerebral vessels can be artificially blocked or interrupted. This forms the basis for a large majority of experimental stroke models in the UK. These surgical approaches result in motor, sensory and cognitive deficits correlating to those seen in humans, e.g. severe one sided muscle weakness.

Tests are available experimentally that assess the physical outcomes that occur

following stroke in rodents, typically rats. These can be effective in showing unilateral deficits of the affected side of the body versus the non-affected side. The animal's natural behaviours and instincts are utilised to enable researchers to investigate potential neuroprotective therapies and their impact on post-stroke recovery.

Discussing here the pros and cons of each method, we have evaluated commonly used behavioural tests including Montoya Staircase Test, Adhesive removal test and Cylinder observational test, chosen from an array of available options. Their usefulness in detecting unilateral functional impairments, in preclinical research, over a prolonged recovery period is also discussed here. Data suggests their suitability as methods to detect potential improvements when paired with a therapeutic measure.

Figure-ground reversal and insight problem solving

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Previous research suggests a relationship between figure-ground reversals and insight problem solving: specifically, the stronger the propensity to perceive figural reversals, the greater the ability to solve insight problems.

The present research explored this relationship in two ways, experimental and correlational. Forty participants were exposed to 20 reversing figures and allowed 20 seconds to describe the first image and any alternate figure. Participants in a guided condition received prompts to see an alternate figure, if they did not do so spontaneously within 10 seconds. The dependent variable was the number of the figures that reversed. Following this, participants were tested on six insight problems. The dependent variable was the number of problems solved.

Hypotheses and results were:

H1: Participants in the prompted condition would perceive more figural reversals than in the unprompted condition, means= 18.6 and, 15.7 respectively, $p < .001$

H2: Participants in the prompted condition would solve more insight problems than in the unprompted condition, mean number solved= 3.4 and 3.3, respectively, $p > .05$.

H3: Figural reversals would have a positive correlation with number of insight problems solved, $r = .32$, $p < .05$. The results supported H1 and H3.

SPN priming reveals the extrastriate symmetry code

Alexis D J Makin, Giulia Rampone and Marco Bertamini,
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Previous ERP experiments show that amplitude at posterior electrodes is more negative for symmetrical than random patterns [1]. This 'Sustained Posterior Negativity' (SPN) is generated by the extrastriate cortex [2]. We know that SPN amplitude correlates with the salience, or 'goodness' of the symmetry gestalt [3]. However, we know very little about how

symmetry gestalts are formed in the brain. Perhaps a rapid, but iterative ‘bootstrapping’ process works along the axis of symmetry, and additional elements are integrated into the gestalt on each step? [4]. We developed a new repetition paradigm to examine putative sub-steps in gestalt formation. On each trial, three symmetrical or random patterns were shown in quick succession. We found that SPN amplitude increased with each new symmetry presentation, but not with repeat presentations of identical exemplars. This SPN priming effect suggests formation of symmetry gestalts involves discovery of new visual structure around pre-encoded axes. Supporting experiments found that SPN priming does not generalize between reflection and rotational symmetry, or across reflections with changing orientations. Our new paradigm is a promising new tool measuring sub-stages in gestalt formation, and for examining the way different regularities are coded in the brain.

M. Bertamini, A.D.J. Makin, Brain Activity in Response to Visual Symmetry, *Symmetry (Basel)*. 6 (2014) 975–996. doi:10.3390/sym6040975.

P.J. Kohler, A. Clarke, A. Yakovleva, Y. Liu, A.M. Norcia, Representation of maximally regular textures in human visual cortex., *J. Neurosci.* 36 (2016) 714–29. doi:10.1523/JNEUROSCI.2962-15.2016.

A.D.J. Makin, D. Wright, G. Rampone, L. Palumbo, M. Guest, R. Sheehan, H. Cleaver, M. Bertamini, An electrophysiological index of perceptual goodness, *Cereb. Cortex.* 26 (2016) 4416–4434. doi:doi: 10.1093/cercor/bhw255.

J. Wagemans, L. Vangool, V. Swinnen, J. Vanhorebeek, Higher-order structure in regularity detection, *Vision Res.* 33 (1993) 1067–1088. doi:10.1016/0042-6989(93)90241-n.

Response-irrelevant number, duration and size information triggers the SQARC effect: Evidence from an implicit paradigm

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When multiple magnitudes (duration, numerosity and size) are processed simultaneously, irrelevant information from one magnitude domain can disrupt judgements in another magnitude domain. SNARC and SQARC effects, in which faster left-sided responses to smaller numbers, sizes and durations and faster right-sided responses to larger numbers, sizes and duration are consistent with multiple magnitudes triggering an internal spatial representation. SNARC and SQARC effects are typically demonstrated, in paradigms where the explicit processing of number or quantity is required. The current study replicated previous findings where implicit task irrelevant number information triggered the SNARC effect and tested whether the implicit presentation of task irrelevant size and duration information could trigger a SQARC effect. In Experiment 1 participants made orientation judgments for triangles varying in numerosity and size. In Experiment 2 participants made orientation judgments for

triangles varying in numerosity and for a triangle preceded by a delay of varying duration. SNARC effects were observed for the numerosity conditions of Experiment 1 and 2 replicating Mitchell et al., (2012). SQARC effects were also observed for physical extent and duration. These findings demonstrate that SQARC effects can be implicitly triggered which offers further support for a universal magnitude processing system.

Mitchell, T., Bull, R., & Cleland, A. A. (2012). Implicit response-irrelevant number information triggers the SNARC effect: Evidence using a neural overlap paradigm. *The Quarterly Journal of Experimental Psychology*, 65(10), 1945-1961.

The role of uncertainty in cue competition

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Reduced learning because of cue competition is often explained as a failure of association. However, there is substantial evidence that cue competition effects in human causal learning are due at least in part to a lack of certainty. Despite this, the nature of the interaction between uncertainty and learning in humans has remained relatively unexplored within the literature. Here we present a series of experiments, using a compound conditioning procedure, to compare learning about cues that have a certain or uncertain status. In each case, participants demonstrated more learning about the cue with the uncertain status, suggesting that uncertainty drives learning in humans. These findings are more readily explained by an inferential reasoning account of cue competition than an association-failure account. In particular, several established learning theories are unable to account for the current findings.

Spatial categories and the estimation of locations around objects

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Recalling object locations from memory in impoverishment conditions requires the combination of two types of information, metric and categorical. The latter helps to increase the accuracy in performing the task when the former is noisy but it elicits spatial biases because responses are systematically directed towards the central value (or prototype) of the surrounding region (the category). This phenomenon has been observed for various geometrical shapes (Huttenlocher et al., 1991; Wedell et al., 2007) and natural objects (Holden et al., 2013) and it can be used to map the internal representational structure of objects. However, to our knowledge, no studies investigated if the same phenomenon can be observed when people have to remember a location in the space around an object, meaning when there is no surround that can help to segment the object. Here we report a series of experiments that show that spatial prototypes also emerge around objects. Participants had to locate a dot that was previously

presented in the vicinity of one object. We observed that responses were biased towards specific sub-regions around the object suggesting that people divided the surrounding space into four sub-quadrants. A new method for analysing the prototype effect is also discussed.

Does financial education work? Findings using an objective measure of saving

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The evidence on whether financial education works is mixed (e. g., Miller, Reichelstein, Salas & Zia, 2015). A number of studies have found improvements in people's financial knowledge and behavioural intentions (e. g. Garman et al. 1999; Hershey, Mowen & Jacobs-Lawson, 2003). However, these studies have often used self-report measures with objective behavioural data being relatively rare. This gap was addressed by the present study, which collaborated with a local credit union to examine the effects of a financial-education intervention on the amount of money in the participants' saving accounts. The intervention was delivered online, or as a workshop attended in person. It was found that the intervention resulted in some small increases in participants' saving balances relative to the control group. Therefore while financial education contributes positively to participants' level of savings, this effect seems to be relatively small. These findings also suggest that one reason for this small effect may be low rates of engaging with the course materials, particularly when they are presented online.

Garman, E. T., Kim, J., Kratzer, C.Y., Brunson, B. H., & Joo, S. (1999). Workplace financial education improves personal financial wellness. *Association for Financial Counseling and Planning Education*, 81-91.

Hershey, D. A., Mowen, J. C., & Jacobs-Lawson, J. M. (2003). An experimental comparison of retirement planning intervention seminars. *Educational Gerontology*, 29, 339–359.

Miller, M., Reichelstein, J., Salas, C., & Zia, B. (2015). Can you help someone become financially capable? A meta-analysis of the literature. *The World Bank Research Observer*, 30, 220-246.

Travelling to Leicester

<https://www2.le.ac.uk/offices/eltu/about/directions>

For information on directions and maps please visit the Leicester University website: www.le.ac.uk/maps. The conference will take place in the George Davies Building (listed on the maps as the Centre for Medicine) which is accessible from Lancaster Road.

By road

Leicester is a busy city with limited parking facilities. Please bear this in mind when planning your journey. There is no parking at the University, but if staying in a hotel you should check whether they can offer parking facilities.

By rail

Leicester has direct rail links to London, Birmingham, Sheffield, Nottingham, Derby, East Midlands Parkway (for East Midlands Airport), Peterborough, Luton and Stansted Airport.

Leicester Railway Station is within walking distance of the University (15 minutes). From the station entrance, turn left onto London Road, walk up the hill for about 400m, then turn right onto University Road and walk another 700m. The principal entrance to the Campus is Entrance 2, Mayor's Walk, on the left just before the Student's Union.

By coach and bus

National Express (www.nationalexpress.com) operates regular daily services from Leicester to St Margaret's bus station and a taxi rank is located at St Margaret's bus station.

The number 48 bus (Arriva) leaves Haymarket bus station every 15 minutes and takes approximately 10 minutes to reach the university (return bus is number 47). It takes around 40 minutes to walk from the bus station to the university.

By air

The nearest airport to Leicester is East Midlands Airport. The Leicester Skylink bus service connects the airport with St Margaret's bus station, and buses run every 30 minutes during the day.

There are also rail services to Leicester from Birmingham Airport (via Coleshill Parkway), Luton Airport (via Luton Airport Parkway) and Stansted Airport. There are also direct coach services between Leicester and Heathrow Airport and Gatwick Airport.

Local taxis

There is a taxi rank at Leicester train station (although the university is only a 15-minute walk from here). If you wish to call a taxi during your stay, Swift Taxis is recommended:

<http://www.swiftfoxcabs.co.uk/>

Accommodation

University accommodation is available to book at College Court (collegecourt.co.uk/). In addition, further information about student accommodation will be made available under details of the Leicester meeting on the EPS website.

In addition, there are 11 single rooms (with shared bathroom facilities) available in student accommodation at Freeman's Common, which is about 15 minutes walk to the meeting venue. These are available on the 18th and 19th April for £12.20 per night. Please contact Kevin Paterson (kbp3@le.ac.uk) if you would like to book one of these rooms.

Below is a list of some of the hotels and guest houses close to the University campus. The Ibis Leicester City and Premier Inn (City Centre) are very close to Leicester railway station and only a short walk from the University. The Belmont is a short walk from the railway station, on the historic New Walk, and only a few minutes' walk from the University. Spindle Lodge is a small, family run hotel on nearby West Walk. Other hotels are in the city centre, which is a short walk to the campus. The Regency Hotel is on London Road and roughly 30 minutes' walk from the campus. You should check the website and prices before making your booking.

Hotel name	Website	Contact number
Belmont Hotel	www.belmonthotel.co.uk	0116 254 4773
Ibis Leicester City	www.accorhotels.com	0116 2487200
Ramada Encore Leicester City Centre	www.wyndhamhotels.com/ramada/leicester-united-kingdom/ramada-encore-leicester-city-centre	0116 3660150
Mercure Leicester The Grand Hotel	www.mercureleicester.co.uk	0844 815 9012
Hotel Maiyango	www.maiyango.com	0116 251 88 98
Premier Inn	www.premierinn.com/gb/en/hotels/england/leicestershire/leicester/leicester-city-centre.html	0871 527 8596
Spindle Lodge	www.spindlelodge.co.uk/location.htm	0116 233 8801
Regency Hotel	www.the-regency-hotel.com/	0116 2709634

Cafés on campus

- The Atrium Café on the ground floor of George Davies Building / Centre for Medicine sells hot drinks, pre-prepared sandwiches, toasties, baked potatoes and salads.
- The Attenborough Café in the Attenborough Arts Centre on Lancaster Road (across the road from the George Davies Building / Centre for Medicine) serves a similar range of hot drinks and lunch options as the Atrium Café.

- The Charles Wilson Building has a canteen restaurant selling hot food, and also “Delicious!” which offers very good take-away options, while the Library Café in the David Wilson Library, also on the main campus, offers hot drinks and pre-prepared sandwiches.
- The Student’s Union (Percy Gee Building) has a Starbucks, and several food outlets selling snack food from around the world.

A full list of campus eateries is available here: <http://hereforu.org/outlets/>

Bars and Cafés serving lunch off campus:

- Café: 6 Degrees (London Road): Excellent coffee and tea, soup and freshly made sandwiches. It’s quite small but ideal for lunch.
- Madisons (London Road): Hot drinks and snacks but mainly very good ice-cream.
- The Marquis of Wellington (London Road): Sells the local Everards beers, which are highly recommended, and good quality pub food.
- Lansdowne (London Road): Quirky 1970s styling, a good range of beers, and good quality pub food.
- Jamie’s Bar, Belmont Hotel (New Walk): Some beers and a good range of wines and spirits. Also offers high quality sandwiches and lunches.
- The Hind (London Road): Used to be rough and ready. But good beers. And a pool table. Has a new menu.
- The Parcel Yard (adjacent to railway station): Good range of beers and high quality pub food. Can be a little noisy in the evening.
- The Old Horse (London Road): A short walk across Victoria Park, this is quirky with a good range of Everards beers and reasonably priced lunches and dinners.

Restaurants

A few minutes’ walk away on London Road there are a wide range of restaurants, bars and cafés. The following are especially recommended:

- Chinese restaurant: Red Lantern (Highfield Street). Small restaurant selling authentic Chinese food.
- Italian restaurant: OGGI Simply Italian. Modern restaurant offering pasta and Mediterranean dishes.
- Turkish restaurants: Konak, Saray Mangal (Highfield Street). Both excellent and reasonably priced. Note that both are alcohol free.

Leicester is renowned for its Indian food. There are several good options on London Road:

- Shimla Pinks: Delhi style cooking. Excellent but a little pricey.
- Santhi (Granby Street): Spicy South Indian and Indo-Chinese dishes.
- Kayal (Granby Street): Excellent South Indian restaurant specialising in seafood and Keralan cooking.
- Chettinad: Another excellent South Indian restaurant specialising in Keralan cooking.

Other options include:

- Shivalli (excellent vegetarian / vegan South Indian, Welford Road)
- Mumbai Inn (Nepalese)
- An Najeeb (Indian, alcohol free).

The more adventurous might wish to take a short taxi ride to Belgrave Road (“Curry mile”) to experience Leicester’s many vegetarian Gujarati restaurants (e.g., Bobby’s, Chaat House, Sayonara)

Queen’s Road in bohemian Clarendon Park is only a short walk across Victoria Park. The area includes several good restaurants (e.g., Jones, Barceloneta), cafés (e.g., Fingerprints, Salvador Deli, Northern Cobbler) and bars (e.g., Babelas, Bar Dos, Queen’s Road Tap).

If returning in the direction of the city centre after dark, it is recommended to walk around the park by the road (rather than through it).

Many interesting bars, cafés and restaurants are also located in the city centre, for example Peter Pizzeria (Welford Place), Delilah’s (St. Martins) and (for gelato) Gelato Village (St. Martins Square).

A number of restaurants are located in and around the Highcross shopping area (e.g. 1573, grill restaurant).

Places to visit

Leicester city’s tourist information has lots of information about local attractions and events (www.visitleicester.info).

- If you have time, take the opportunity to wander along New Walk, which runs parallel to London Road, and is reputed to be the oldest pedestrian walkway in the country. The New Walk Museum and Art Gallery is about half-way along, and is Leicester’s oldest museum, and features wide-ranging collections spanning the natural and cultural world.
- The King Richard III visitor centre (www.kriii.com) is located in the city centre, adjacent to Leicester Cathedral. The Kind Richard III tomb is located inside Leicester Cathedral (www.leicestercathedral.org/learn/richard-iii).

Other places of interest include:

- the National Space Centre (www.spacecentre.co.uk)
- Abbey Pumping Station (www.abbeypumpingstation.org) which houses Leicester City’s Museum of Science and Technology.

EPS Conference Dinner

The conference dinner will be held on Thursday 19th April at 8:00pm at The Case Restaurant (<http://www.thecase.co.uk/>), 4-6 Hotel Street, St Martin's, Leicester, LE1 5AW. This is in the city centre and approximately a 20 minute walk or 10 minutes by taxi from the University.

The Case Restaurant is a modern British food bar set in a stylishly converted luggage factory with high ceilings.

The dinner will cost £37 per person. Postgraduates can attend at a reduced price of £18.50. Postgraduates should request their supervisor to email the local organiser, Kevin Paterson/Sarah White, to confirm their status as postgraduate students.

The meal should be booked via this link:

<https://shop.le.ac.uk/product-catalogue/events-at-leicester/departments-of-neuroscience-psychology-and-behaviour-npb/eps-meal-at-the-case>

Dinner bookings must be made by 29 March and unfortunately late bookings cannot be accepted. If you have any special dietary requirements you should indicate what these are at the time of your booking. (We have been advised that only the spelt and barley butternut squash risotto is not gluten free).

If you have any queries about the dinner, please contact the local organisers:

Kevin Paterson (kbp3@le.ac.uk) or Sarah White (s.j.white@le.ac.uk)

The dinner choices can be seen overleaf.

Starter
Lemon & dill cured salmon, pickled apple, radish and ginger aioli
Broccoli & almond soup (vegan)
Sous vide pigeon breast with turnip mash, dehydrated shallot and jus
Mid course
Apple sorbet with or without vodka
Mains, served with greens and garlic and thyme new potatoes
Pan roast chicken supreme, spiced lentil puree, turnip and veal jus
Pan seared trout, asparagus & pea fricassee and salsa verde
Spelt & barley butternut squash risotto with or without gorgonzola (vegan option)
Desserts
Chocolate delice, caramelised banana and clotted cream ice cream
Lemon posset with raspberry textures
Rhubarb crumble with a granola crumb and soy custard (vegan)

The Sixteenth Mid-Career Prize Lecture



will be delivered by

Professor Neil Burgess

University College London

**Neural mechanisms of spatial and
episodic memory**



6.00pm, Thursday 19th April 2018

Bina Popat Lecture
Theatre (LT2)
University of Leicester

The lecture will be open to the public

EPS

Experimental
Psychology
Society

The Twenty fifth EPS Prize Lecture



will be delivered by

Professor Courtenay Norbury

University College London

**Stability and change in developmental
language disorders**



6.00pm, Wednesday 18th April 2018

Bina Popat Lecture
Theatre (LT2)
University of Leicester

The lecture will be open to the public

EPS

Experimental
Psychology
Society

The Seventh EPS Frith Prize Lecture



will be delivered by

Dr Patricia Lockwood

University of Oxford

Neurocomputational mechanisms of selfishness and prosociality



1.00pm, Wednesday 18th April 2018

Bina Popat Lecture
Theatre (LT2)
University of Leicester

The lecture will be open to the public

Membership Proposal Form

(also available at: <https://eps.ac.uk/applying-for-membership/>)

Please use BLACK ink

Title:

Age:

First Name:

Last Name:

Full current professional address

Email

Telephone

Degrees

Date

Degree

Class

University

Experience

Dates

Post

Current research interests

Oral Papers delivered to EPS meetings, with dates (*In the case of jointly authored papers, indicate speaker*)

Publications (at least two examples of senior authored and peer reviewed: published articles, not "in press")

Signature of applicant

Date

In supporting this candidate, we are agreeing that the applicant has made independent contributions to the publications cited above and merits membership of the Society

Proposer (print name)

Seconder (print name)

Signature

Signature

Email address:

Email address:

NOMINATIONS

Nominations for new members should be made using the form on the preceding page, or by accessing the form online at: <https://eps.ac.uk/applying-for-membership/>. Entries should be made in clear black type, using *one side of the form only*.

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; up to two recent examples, where the nominee is single or first author, are sufficient.

Applicants must be nominated by two EPS members.

These forms should be returned by 1st September to the EPS administrator: Sandra Harris, Department of Psychology, University of Lancaster, Lancaster, LA1 4YF.

CRITERIA AND PROCEDURES

Soon after the closing date of 1st September, brief details of all candidates will be circulated to members of the Society, who may request further information if they wish. The nomination forms will be considered by the Committee, usually in October. The Committee will decide whether each candidate is eligible for admission to Ordinary Membership, i.e. those candidates who have:

- a) secured a PhD
- b) published an independent account of their work in a reputable, peer-reviewed psychological journal, and
- c) personally delivered an oral paper to the Society.

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 Committee will be informed of this and will be advised whether he/she may again be proposed for membership in a future year and if so subject to what conditions. The list of those selected as eligible will be put to the Annual General Meeting in January for approval.

April Meeting, 18th - 20th April 2018

The programme for the April meeting is enclosed with this mailing.

Conference dinner:

The conference dinner will be held on Thursday 19th April at 8:00pm at The Case Restaurant (<http://www.thecase.co.uk/>), 4-6 Hotel Street, St Martin's, Leicester, LE1 5AW. This is in the city centre and approximately a 20 minute walk or 10 minutes by taxi from the University.

The programme also includes:

Thursday 19 April, 6:00pm - Sixteenth Mid-Career Prize lecture

Neural mechanisms of spatial and episodic memory
Professor Neil Burgess (University College London)

Wednesday 18 April, 6:00pm - Twenty fifth EPS Prize lecture

Stability and change in developmental language disorders
Professor Courtenay Norbury (University College London)

Wednesday 18 April, 1:00pm - Seventh Frith Prize lecture

Neurocomputational mechanisms of selfishness and prosociality
Dr Patricia Lockwood (University of Oxford)

Thursday 19 April, 5:00pm - EPS/BSA Undergraduate Project Prize winner talk:

Searching for bodies: Electrophysiological evidence for independent somatosensory processing during attentional selection of body postures
Irena Arslanova (City University London)

Thursday 19 April, 1:30pm - Symposium to accompany the 16th Mid-Career lecture:

Spatial memory from neurophysiology to PTSD
Organiser: Aidan Horner (University of York)

Wednesday 18 April, 2:00pm - Symposium to accompany 25th EPS Prize lecture:

New insights into child language and language disorders

Organiser: Professor Kathy Rastle (Royal Holloway University of London)

Thursday 19 April, 9:00am - Local organisers' Symposium:

Developments in eye movement research on reading across the lifespan

Organisers: Professor Kevin Paterson and Dr Sarah White (University of Leicester)

EPS/CSBBBCS joint meeting in St John's, Canada, 4 - 7 July 2018

Submissions were opened in February 2018 for this meeting.

The EPS will be sponsoring the following two symposia:

'Interactions between selective attention and working memory' organised by Martin Eimer.

'Experimental evidence of the interdependence between cognition and the social environment' organised by Doug Martin.

The local organiser is Aimee Surprenant with liaison through Dr Anna Weighall

A copy of the EPS Handbook 2018 is included in this mailing for members

Dr John Towse
Hon Secretary

The Business meeting will be held at 5:30pm on Thursday 19th April, 2018 in **Bina Popat Lecture Theatre (Lecture Theatre 2)**, George Davies Building/Centre for Medicine, University of Leicester, Lancaster Road, Leicester, LE1 7HA.

AGENDA

- | | |
|-------|---|
| 18/15 | Minutes of the 70 th Annual General Meeting held at University College London, 26 Bedford Way on Thursday 4 th January 2018 |
| 18/16 | Matters arising |
| 18/17 | Secretary's Report |
| 18/18 | Treasurer's Report |
| 18/19 | QJEP Editor's Report |
| 18/20 | Arrangements for future meetings |
| 18/21 | Any Other Business |

Date, time and place of next meeting

EXPERIMENTAL PSYCHOLOGY SOCIETY

Annual General Meeting

The 70th Annual General Meeting was held on Thursday 4th January 2018 at 5:00pm in the Lower Ground Floor Lecture Theatre, Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way.

MINUTES

The meeting was quorate: over 30 members were present.

18/1 Minutes of the Business Meeting held in the Madjeski Lecture Theatre, University of Reading, on Wednesday 12th July, 2017

As there were no issues raised, the Minutes of the July 2017 Business Meeting were approved by the President.

18/2 Matters arising
There were no matters arising

18/3 Hon Secretary's Report

3.1 Annual Report of the Society (to be circulated)

The Hon Sec described some of major EPS projects in the past twelve months. This included work to deliver a successful transition of QJEP to new publishers, the development of a new website, the implementation of new initiatives such as the EPS Carers Fund, and a set of successful scientific meetings through the year.

The Hon Sec. explained that the committee had given careful consideration to the structure of EPS prizes, and that the committee wanted to propose adjusting and clarifying the applicant eligibility for the Frith prize (to be 1 year post-Phd rather than 2) and EPS prize (to be 6 years post-PhD, rather than defined as "early career"). These were designed to make nominations more comparable. A member suggested that it be made clear these were full-time equivalent timescales, which was agreed. These changes were approved.

18/4 Hon Treasurer's Report

4.1 Treasurer's Report (summary accounts to be circulated)

The Hon Treasurer presented a detailed financial report outlining the principle sources of income and expenditure for the Society. The Hon Treasurer noted in particular that grant awards expenditure (ie including study visits and workshops) had increased, and this was a very positive step. The Hon Treasurer also gave an explanation of the VAT situation that developed in 2017, and is now resolved, along with our VAT registration. EPS management costs had risen in the past 12 months, and VAT payments will further increase these costs.

Financial Strategy. The Hon Treasurer noted that EPS has not previously articulated a financial strategy. However, our balance sheet and reserves are such that we should consider this more carefully. In particular, it was noted that we have large cash deposit reserves, which do not function as investments. We also have one charity-specialist equities holding account. It was proposed that the EPS committee be given permission to explore a more targeted financial strategy, in which a greater amount of reserves might be invested in stock-related funds. This would be capped (for example, at 40% of reserves), invested over a long time period to avoid short-term market fluctuations, and buying/selling would be approved by several officers not by the Hon Treasurer alone.

It was also proposed that the EPS explore making a significant contribution to an explicit ethical fund. EPS members engaged in a careful and thoughtful discussion. Questions were raised about the specific purpose of financial growth (what we want the money for), how to use any dividends (e.g. re-investment or capital growth for the EPS itself), the importance of having a basket of investments, the use of professional advice or algorithmic, tracker funds, and the extent of potential concerns from the Charity Commission over the size of our reserves. It was also noted that other Societies have (higher) member subscriptions but they are gift-aided. The President called for a vote on whether the Committee should continue to explore the development of a financial strategy. A clear majority of those present were in favour.

Grindley Grants. The Hon Treasurer noted that there was a substantial increase in GG expenditure for the Society, but also increasing evidence that GG requests were being used by applicants external to the Society (ie unlikely to become members) and to attend meetings of more peripheral interest to EPS. The committee proposal was that we change the procedure so that an applicant's first GG application should be to attend an EPS meeting, and a non-EPS meeting could be funded only afterwards. This would help keep the funds for more EPS events, and was approved by members.

18/5 QJEP Editor's Report

5.1 Editor's Report (to be circulated)

The QJEP Editor presented his report to the meeting. In particular, he noted that the transition to the new publishers and preparation for 2018 had involved a lot of work from the new publishers, who had completed a great deal in a short time to make us ready for launch. The QJEP Editor also stated that the new systems for the Journal were working well, and high quality submissions were being made and published.

The QJEP editor noted that new initiatives were coming on stream for the Journal. In particular, members would see developments for data lodging, OSF badging, registered reports, and a greater social media presence over time. Also, working with SAGE, members would see more material on the Journal website, including access to prize papers as collections and the 'classic papers revisited' section. An Editorial would soon be available detailing some of the changes and new directions. Finally, the Editor invited members to submit their very best work to the Journal to develop and maintain its important role with respect to the Society and the field of experimental psychology

A question was asked about a policy on press releases for Journal content. It was noted the Editor is working with the Journal social media editor and Sage to coordinate and manage visibility for relevant content.

EPS awards

Following final selection at EPS committee and circulation on email, nominated candidates were put to the AGM for confirmation by acclamation. The following Prize winners were confirmed and congratulated

- 18/6 – Announcement of 47th Bartlett Lecturer
Professor Dorothy Bishop
- 18/7 Announcement of 17th EPS Mid–Career Award
Professor Matthew Lambon Ralph
- 18/8 Announcement of 26th EPS Prize Lecturer
Dr Richard Cook
- 18/9 Announcement of 7th Frith Prize winner
Dr Patricia Lockwood
- 18/10 Election of Officers and Committee Members 2018

The following election was confirmed by acclamation

Officers of the Society

Hon Secretary Elect

Dr Heather Ferguson

The current Officers, eligible for continuation in 2018, were also formally approved by acclamation.

The following committee members were also approved by acclamation:

Dr Elisa Ferre
Prof Gareth Gaskell
Dr Jim Grange
Dr Mark Haselgrove
Prof Matt Longo
Dr Alastair Smith

- 18/11 Admission of Honorary members

Prof Andy Young
Prof John Findlay
Prof Sue Iverson - accepted

- 18/12 Admission of Ordinary members

The November Committee recommendations for admission to membership were all ratified at the AGM.

18/11 Arrangements for future meetings

The EPS Conference Secretary provided members with information about future meetings. He was able to confirm prize talks and meetings as follows:

EPS Meeting: University of Leicester, 18-20 April 2018

This meeting will include the Sixteenth Mid-Career Lecture by Professor Neil Burgess with an accompanying symposium organised by Aidan Horner entitled: '*Spatial memory from neurophysiology to PTSD*'.

The Twenty Fifth EPS Prize Lecture by Professor Courtenay Norbury will also take place at this meeting, with an accompanying symposium: '*New insights into child language and language disorders*' organised by Kathy Rastle.

The Seventh Frith Prize Lecture by Dr Patricia Lockwood will also take place at this meeting

As will the EPS/BSA Undergraduate Project Prize winner talk by Irena Arslanova

There will also be a local symposium organised by Kevin Paterson and Sarah White: '*Developments in eye movement research on reading across the lifespan*'.

Local organisers Kevin Paterson and Sarah White

EPS/CSBBCS joint meeting in St John's, Canada, 4 - 7 July 2018

The EPS will be sponsoring the following two symposia:

1. 'Interactions between selective attention and working memory' organised by Martin Eimer.
2. 'Experimental evidence of the interdependence between cognition and the social environment' organised by Doug Martin

Local organiser is Aimee Surprenant with liaison through Dr Anna Weighall

18/12 Any other business

No other business

The meeting expressed its considerable thanks to Patti Adank as local organiser for this meeting.

Date, time and place of next meeting

Next meeting will be a Business meeting at University of Leicester in April. Details to be circulated.

