

EPS

Experimental
Psychology
Society

LONDON MEETING

3 - 5 January 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 Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way, London, WC1H 0AP, between 3 - 5 January 2018.

The local organiser is Patti Adank.

Forty Sixth Bartlett Lecture

Thursday 4th January, 6:00pm

Control of task-set

Professor Stephen Monsell, University of Exeter

Symposium to accompany the 46th Bartlett Lecture

Thursday 4th January, 1:30pm- 5:00pm

Acquisition of a task-set: From instruction to procedure

Organiser: Professor Aureliu Lavric, University of Exeter

Local organiser symposium

Thursday 4th January, 9:00am- 12:00pm

Inhibiting actions

Organiser: Dr Patti Adank, University College London

Poster sessions and drinks reception

Due to the large number of posters, these will be displayed over 2 nights in conjunction with drinks receptions:

- Wednesday evening at 6:00pm in Room 305, with drinks being served in the Common Room 308 and
- Thursday evening at 7:00pm in the same place.

Delegates may put up posters from 5:00pm and should take them down by the end of the session.

Platform presentations

Sessions will be held in the Ground Floor and Lower Ground Floor Lecture Theatres. 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 organiser, Patti Adank (p.adank@ucl.ac.uk).

Conference Dinner

The conference dinner will be held on Thursday 4th January at 8:15pm in Pescatori, which is just a 10-15 minute walk from the meeting rooms. The restaurant address is 57 Charlotte Street, London, W1T 4PD.

Delegates need to complete the online booking form below and make the electronic payment using a credit or debit card (PayPal is not currently supported). Please complete all required information to ensure your place and menu choices at the dinner. Once booked, the system will generate an automatic receipt to your email address.

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

<http://tinyurl.com/London-Conference-Meal-2018>

The portal will close after 15th December and we cannot accommodate late admissions. No cash payments are possible.

PLEASE DO NOT SEND CHEQUES AS THESE CANNOT BE PROCESSED AND NO PLACE AT THE DINNER CAN BE SECURED.

- Places are limited and will be reserved on a first come/first served basis.
- Please indicate when booking, if you have any dietary requirements and the restaurant will be informed.

Contact Patti Adank (p.adank@ucl.ac.uk) with any questions or suggestions, but email UCL online store if anything is unclear about the booking process (uclonlinestore@ucl.ac.uk).

START OF PARALLEL SESSIONS

Session A

Ground Floor Lecture Theatre

- 2:00** **Marc Brysbaert** (Ghent University, Belgium)
Power analysis and effect size in mixed effects models
- 2:30** **Peter E Morris and Catherine O Fritz** (Lancaster University and University of Northampton)
We may be missing a lot: Low power levels in QJEP and BJP have improved, but need to be higher
- 3:00** **Tea / coffee**
- 3:30** **Catherine O Fritz and Peter E Morris** (University of Northampton and Lancaster University)
How broad is the target? Poor precision leads to results that provide little information
- 4:00** **Kasia Doniec* and Mark Haggard** (University of Cambridge)
EPS methods update (4): Rigour as potent liberation, not arbitrary confinement
- 4:30** **John Towse, Robert Davies* and Ben Gooding*** (Lancaster University)
LUSTRE: Student open science training in data management
- 6:00** **POSTERS AND DRINKS RECEPTION**
Posters displayed in Room 305, with drinks served in Room 308 (Common Room)

START OF PARALLEL SESSIONS

Session B

Lower Ground Floor Lecture Theatre

- 2:00** **Stephanie Baines*, Imca Hensels* and Ruud Custers*** (University of Manchester and Utrecht University, Netherlands) (Sponsor: Ellen Poliakoff)
Modulation of cognitive processing by reward value, consciousness and individual reward sensitivity
- 2:30** **Weng-Tink Chooi* and Robert Logie** (University of Malaysia and University of Edinburgh)
Response change patterns in n-back training
- 3:00** **Tea / coffee**
- 3:30** **Nura Sidarus*, Stefano Palminteri* and Valerian Chambon*** (PSL Research University, France) (Sponsor: Patrick Haggard)
Interactions between response conflict and instrumental learning
- 4:00** **Teresa McCormack, Patrick Burns*, Agnieszka Jaroslawska* and Eugene Caruso*** (Queen's University Belfast, University of Edinburgh and University of Chicago)
Thinking about the past or thinking about the future? Developmental changes in temporal focus
- 4:30** **Phillip L Morgan, Emma J Williams* and Jessica Lawrence*** (Cardiff University, University of Bath and University of the West of England)
Cyber-interruptions: Susceptibility to malevolent online influence communications masquerading as genuine computer updates
- 6:00** **POSTERS AND DRINKS RECEPTION**
Posters displayed in Room 305, with drinks served in Room 308 (Common Room)

Session A

Ground Floor Lecture Theatre

Symposium: Inhibiting actions

Organiser: Patti Adank

- 9:00** **Patrick Haggard** (University College London)
Voluntary inhibition of actions: searching for an internal signal
- 9:30** **Caroline Quoilin and Julie Duqué** (University of Louvain, Belgium)
Deficient neural motor inhibition in alcohol-dependence
- 10:00** **Bram B Zandbelt** (Radboud University, Netherlands)
Action-selective and stimulus-selective stopping violate race model assumptions and are similar in terms of performance and brain activation
- 10:30** **Tea / coffee**
- 11:00** **Christos Ganos** (University Medical Centre Hamburg-Eppendorf, Germany)
Voluntary inhibitory control over involuntary tic movements
- 11:30** **Sara Bögels** (Max Planck Institute for Psycholinguistics, Nijmegen, Netherlands)
Inhibition of upcoming responses during turn-taking?

End of symposium

- 12:00** **Alexandra L Georgescu*, Banika Ahuja* and Antonia Hamilton** (University College London)
The role of contiguity for the prosocial consequences of mimicry
- 12:30** **Lunch**

Session B

Lower Ground Floor Lecture Theatre

- 9:00** **Heather J Ferguson, Jo Black* and David Williams*** (University of Kent)
Tracking expectations of counterfactual worlds and personal desires in Autism Spectrum Disorder
- 9:30** **Victoria E A Brunsdon*, Elisabeth E F Bradford* and Heather Ferguson**
(University of Kent)
The development of perspective-taking from late childhood to young adulthood
- 10:00** **Elisabeth Bradford*, Vera Hukker*, Laura Smith* and Heather Ferguson**
(University of Kent)
Assessing belief-attribution in adults with and without Autism Spectrum Disorders using a computerized false-belief task
- 10:30** **Tea / coffee**
- 11:00** **Linda Bou-Ali*, Brittney Chere*, Yeachan Park*, Megan Elley*, James Negen* and Marko Nardini** (Durham University)
The development of single and multiple-landmark allocentric spatial recall and the role of executive functions
- 11:30** **Chunliang Yang*, Siew-Jong Chew*, Bukuan Sun* and David R Shanks**
(University College London and Fujian Normal University, China)
The forward effects of testing transfer to different domains of learning
- 12:00** **Cai S Longman, Fraser Milton, Andy J Wills and Frederick Verbruggen**
(University of Exeter, Plymouth University and Ghent University, Belgium)
Learning to learn: Transfer of highly abstract representations/strategies across tasks with a common structure
- 12:30** **Lunch**

Session A

Ground Floor Lecture Theatre

Symposium: **Acquisition of a task-set: From instruction to procedure**

Organiser: Aureliu Lavric

- 1:30** **Ulrich Mayr* and Atsushi Kikumoto*** (University of Oregon, USA)
Probing the nature of task-set representations
- 2:00** **Hannes Ruge*, Holger Mohr* and Uta Wolfensteller*** (University of Dresden, Germany)
Encoding and short-term automatization of explicitly instructed tasks
- 2:30** **John Duncan** (MRC-CBU, Cambridge)
Tasks sets in the frontal and parietal cortex of the behaving monkey
- 3:00** Tea / coffee
- 3:30** **Gesine Dreisbach*** (University of Regensburg, Germany)
The functional role of task rules in the context of task switching
- 4:00** **Baptist Liefoghe*** (Ghent University, Belgium)
The role of enactment in the implementation of instructions
- 4:30** **Martin Eimer and Anna Grubert** (Birkbeck University of London and Durham University)
The activation of attentional templates for target features during the preparation for visual search

End of symposium

- 5:00** **Lower Ground Floor Lecture Theatre - Annual General Meeting**
- 6:00** **Lower Ground Floor Lecture Theatre - 46th Bartlett Lecture**
Professor Stephen Monsell (University of Exeter)
Control of task-set
- 7:00** **Posters and drinks reception**
Posters displayed in Room 305, with drinks served in Room 308 (Common Room)
- 8:15** **Conference dinner at Pescatori**

Session B

Lower Ground Floor Lecture Theatre

- 1:30** **Monica S Castelhana*** (Queen's University, Kingston, Canada) (Sponsor: Simon Liversedge)
Scratching the surface: How scene surface and structure can inform search strategies
- 2:00** **Karla K Evans and Lucy Spencer*** (University of York)
Deployment of attention in a complex visual environment
- 2:30** **Valter Prpic*, Árni Kristjánsson* and Ian M Thornton*** (De Montfort University, University of Iceland and University of Malta) (Sponsor: Mark Scase)
Visual search and foraging behaviour: An iPad app for simulating foraging in the wild
- 3:00** **Tea / coffee**
- 3:30** **Laura Smith*, Annita Gkioka* and David Wilkinson** (University of Kent)
Galvanic vestibular stimulation improves the processing of spatial locations
- 4:00** **Karina J Linnell, Andrew J Bremner, Serge Caparos*, Jules Davidoff and Jan W de Fockert*** (Goldsmiths University of London and Université de Nîmes, France)
Urban experience alters lightness perception
- 5:00** **Lower Ground Floor Lecture Theatre – Annual General Meeting**
- 6:00** **Lower Ground Floor Lecture Theatre - 46th Bartlett Lecture**
Professor Stephen Monsell (University of Exeter)
Control of task-set
- 7:00** **Posters and drinks reception**
Posters displayed in Room 305, with drinks served in Room 308 (Common Room)
- 8:15** **Conference dinner at Pescatori**

Session A

Ground Floor Lecture Theatre

- 9:00** **Colin Davis** (University of Bristol)
Progress in the quest to crack the orthographic code
- 9:30** **Jennifer M Rodd, Hannah N Betts* and Rebecca A Gilbert*** (University College London and MRC-CBU, Cambridge)
Interference effects in word-meaning priming
- 10:00** **Gary Jones, Francesco Cabiddu* and Stephanie Stokes*** (Nottingham Trent University and University of Hong Kong)
How an associative learning account of language exposure predicts vocabulary growth by word length, word frequency, and neighbourhood density
- 10:30** **Tea / coffee**
- 11:00** **Matthew H. Davis, Helen Blank and Marlene Spangenberg*** (MRC-CBU, Cambridge, University Medical Center Hamburg-Eppendorf Martinistr, Germany and University of Oxford)
Neural representations of prediction error distinguish perception and misperception of speech
- 11:30** **Daniel R Lametti*, Harriet J Smith* and Douglas M Shiller*** (University of Oxford and l'Université de Montréal, Canada) (Sponsor: Patti Adank)
Auditory-sensory predictions shape the production of sentence-level speech
- 12:00** **Markus F Damian and Qingqing Qu*** (University of Bristol and Chinese Academy of Sciences, China)
Orthographic effects in native and second-language spoken word recognition: Evidence from Chinese
- 12:30** **Lunch**

Session B

Lower Ground Floor Lecture Theatre

- 9:00** **David Smailes*** (University of Sunderland) (Sponsor: Peter Moseley)
The effect of negative mood on reality discrimination
- 9:30** **Young-Jin Hur* and I Chris McManus** (University College London)
The Great Beauty; the effects of presentation size and height of photographs on sublimity perception
- 10:00** **Ciro Civile*, Rosamund McLaren* and Ian McLaren** (University of Exeter)
Perceptual learning and the face inversion effect: Proving that one causes the other
- 10:30** **Tea / coffee**
- 11:00** **Heike Elchlepp*, Aureliu Lavric and Stephen Monsell** (University of Exeter)
The ERP signature of facial emotion recognition is not influenced by task set. Or is it?
- 11:30** **David D Coggan*, David M Watson*, Robert Brownbridge*, Christopher Ellis*, Kathryn Jones*, Charlotte Kilroy*, Ao Wang* and Timothy J Andrews** (University of York)
The importance of low-level image properties in the neural representation of objects
- 12:00** **Cathleen Cortis Mack*, Caterina Cinel, Nigel Davies*, Michael Harding* and Geoff Ward** (University of Essex and Lancaster University)
Serial position, output order, and list length effects for words presented on smartphones over very long intervals
- 12:30** **Lunch**

Session A

Ground Floor Lecture Theatre

- 1:30** **Mengsi Wang*, Hazel I Blythe and Simon P Liversedge** (University of Southampton)
Demarcation and reading of newly learned Landolt-C Strings: There's something special about spaces
- 2:00** **Nina Mainz*, Alastair Smith* and Antje Meyer** (Max Planck Institute for Psycholinguistics, Netherlands and Radboud University Nijmegen, Netherlands)
Individual differences in adult word learning
- 2:30** **Carolyn McGettigan* and Nadine Lavan*** (Royal Holloway University of London) (Sponsor: Patti Adank)
Flexible voices: Effects of within-talker variability on identity perception from vocal signals
- 3:00** **Tea / coffee**
- 3:30** **Xin Wang* and Bronson Hui*** (University of Greenwich and University of Oxford) (Sponsor: Kevin Paterson)
Perceiving lexical tones when listening to English: evidence from Mandarin-English bilinguals
- 4:00** **Bo Yao* and Christoph Scheepers*** (University of Manchester and University of Glasgow) (Sponsor: Andrew Stewart)
Direct speech quotations promote low relative-clause attachment in silent reading of English
- 4:30** **Shiri Lev-Ari* and Natalie Sebanz*** (Max Planck Institute for Psycholinguistics, Netherlands, Royal Holloway University of London and Central European University, Hungary) (Sponsor: Antje Meyer)
Talking to more people improves communication skills even when the listeners don't talk back

End of meeting

Session B

Lower Ground Floor Lecture Theatre

- 1:30** **Sebastian Poloczek* and Chris Jarrold** (University of Bristol)
How children use verbal rehearsal in serial recall tasks of varying difficulty
- 2:00** **Stefano R Belli*** (University of Lincoln) (Sponsor: Frouke Hermens)
Gender stereotyping and interpersonal cognitive biases
- 2:30** **Tina S-T Huang* and David R Shanks** (University College London)
Processing fluency and memory for source information
- 3:00** **Tea / coffee**
- 3:30** **Fatma Ebru Ateş*, Dinkar Sharma and Zara Bergström** (University of Kent)
The biasing effect of unintentional recognition on intentional recognition: Neural mechanisms and modulatory effects of working memory
- 4:00** **Alicia Forsberg*, Wendy Johnson* and Robert Logie** (University of Edinburgh)
Verbal labels in visual working memory: Memory for colours and shapes in healthy cognitive ageing

End of meeting

1. **Megan Elley*, James E Negen* and Marko Nardini** (Durham University)
Can humans rapidly learn allocentric prior distributions for locations in space?
2. **Maria Gallagher*, Iqra Arshad* and Elisa Raffaella Ferrè** (Royal Holloway University of London)
Perceiving the gravitational-vertical: Head versus torso contributions to the Aubert effect
3. **Corinne A Holmes*, Sarah M Cooney* and Fiona N Newell** (Trinity College Dublin)
The role of development on the perception of angles across vision and haptics
4. **Sangyub Kim* and Kichun Nam*** (Korea University, South Korea) (Sponsor: Kevin Paterson)
The effect of aging on the working memory: N-back ERP study
5. **Jessica Lunn*, Amanda Sjoblom*, Jamie Ward, Salvador Soto-Faraco and Sophie Forster** (University of Sussex and Universitat Pompeu Fabra, Spain)
Multisensory attentional capture under load: Facilitation versus distraction
6. **Arianna Moccia*, Louisa Salhi* and Zara Bergström** (University of Kent)
Factors that affect learning of novel information during retrieval attempts
7. **Bence Palfi*, Anil Seth*, Ben Parris and Zoltan Dienes** (University of Sussex and University of Bournemouth)
Does unconscious control depend on experienced conflict?
8. **Michael Pilling & Milena Georgieva*** (Oxford Brookes University)
Feature synchrony as a guiding attribute in visual search
9. **Daniele Romano*, Elena Amoruso*, Luigi Tamè, Elena Azañon, Angelo Maravita* and Matthew Longo** (University of Milano-Bicocca, Italy, NeuroMi Milan Center for Neuroscience, Italy and Birkbeck University of London)
The standard posture of the hand is ready to grasp
10. **Angelique Volfart* and Bruno Rossion** (Université Catholique de Louvain, Belgium and Université de Lorraine, France)
Measuring face-name integration with fast periodic visual stimulation
11. **Lisa Wen*, Lore Thaler*, James Negen* and Marko Nardini** (Durham University)
Human adults rapidly learn to combine an echolocation-like cue to distance with vision

- 12. Kaichi Yanaoka*, Masataka Nakayama*, Christopher Jarrold and Satoru Saito** (Kyoto University, Japan, Carnegie Mellon University, USA and University of Bristol)
Determining the developmental requirements for Hebb repetition learning in young children: Short-term memory, grouping, and their interaction
- 13. Jasmine Virhia** (University College London) (Sponsor: Patti Adank)
Emotion inhibits cognitive control: A speech study
- 14. Martina De Lillo*, Victoria Brunsdon*, Elisabeth Bradford* and Heather J Ferguson** (University of Kent)
Training cognitive abilities using a 21-day adaptive procedure

1. **Mahsa Barzy*, Jo Black*, David Williams* and Heather J Ferguson**
(University of Kent)
The effect of personal pronouns on perspective and language comprehension in autism: An eye-tracking study
2. **Claudia Cera*, Caterina Paolazzi*, Nino Grillo* and Andrea Santi***
(University College London and University of York) (Sponsor: Jennifer Rodd)
Processing passive sentences with stative predicates: Difficulty beyond argument order
3. **Jeahong Kim* and Kichun Nam*** (Korea University, South Korea) (Sponsor: Kevin Paterson)
The time course of morphological differentiation while processing morphologically complex word in Korean
4. **Trevor J Crawford, Eleanor S Smith* and Donna M Berry*** (Lancaster University and Keele University)
Eye gaze and aging: The role of working memory and inhibitory control
5. **Clare Lally* and Rachel Pye*** (University of Reading) (Sponsor: Kathy Rastle)
Letter position and identity coding in regular and irregular words
6. **Nadine Lavan* and Lúcia Garrido** (Brunel University and Royal Holloway University of London)
How many voices did you hear? Within-speaker variability differentially affects identity judgements of familiar and unfamiliar listeners
7. **Chang Lee*** (Sogang University, Korea) (Sponsor: Kevin Paterson)
Testing phonological recoding using the words with a silent letter in naming and in lexical decision
8. **Louisa Salhi* and Zara Bergström** (University of Kent)
Intact encoding during retrieval attempts in older adults
9. **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
10. **Alice van de Walle de Ghelcke*, Aliette Lochy* and Bruno Rossion**
(Université Catholique de Louvain, Belgium)
Global learning method of reading induces an atypical brain activation in

beginning readers

11. **Xiaotong Wang*, Li Hua Zhang*, Xue Sui* and Sarah J White** (Liaoning Normal University, China and University of Leicester)
Reading and searching in Chinese: The role of lexical processing
12. **Youngdae Won* and Chang Lee*** (Sogang University, Korea) (Sponsor: Kevin Paterson)
The roles of a suffix and a morpheme in suffixed word and compound word recognition
13. **Fang Xie*, Jingxin Wang*, Lin Li*, Yingying Zhang*, Yuxiang Yao*, Sha Li* and Kevin B Paterson** (Tianjin Normal University, China and University of Leicester)
Pinyin word length effects during reading: Evidence from eye movements
14. **Eirini Zormpa*, Renske S Hoedemaker*, Laurel E Brehm* and Antje S Meyer** (Max Planck Institute for Psycholinguistics, Netherlands and Radboud University Nijmegen, Netherlands)
The production and generation effects during picture naming: How lexical access and articulation influence memory
15. **Manman Zhang*, Chuanli Zang*, Yufeng Xu*, Xuejun Bai*, Guoli Yan* and Simon P Liversedge** (Tianjin Normal University, China and University of Southampton)
Foveal lexical processing load does not modulate the preview benefit but does influence word skipping during Chinese reading

Power analysis and effect size in mixed effects models

Marc Brysbaert
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A revolution is taking place in the statistical analysis of psychological studies. Whereas before, analyses were limited to designs with a single random variable (either participants in so-called F1 analyses, or stimuli in so-called F2 analyses), mixed effects models currently allow researchers to take into account both participants and stimuli as random variables. Because the new analysis techniques are still being discovered, there is a need for papers explaining their use. In this talk, I examine the issues of power and effect size in such designs. In particular, I argue that most experiments in experimental psychology require a minimum of 1,600 observations per cell in the design (e.g., 40 participants and 40 stimuli), a number that is rarely reached.

We may be missing a lot: Low power levels in QJEP and BJP have improved, but need to be higher

Peter E Morris¹ and Catherine O Fritz²
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Power is the probability of a study obtaining a significant result if the researched effect is real. Power of 80%+ is often recommended. Low power reduces the likelihood of the study finding an effect and also the probability that the outcome will replicate. Since Cohen's (1962) original study, reviews of psychological publications have found that studies usually have insufficient power to detect even moderate effects reliably. We examined the first study of each paper published in the *Quarterly Journal of Experimental Psychology* (QJEP) in 1965/6 and 2016 and the *British Journal of Psychology* (BJP) in 2015/16, calculating the power associated with a key test. The median power levels for QJEP 1965/16 papers were 13%, 38%, and 73% for small, medium and large effects, respectively. By 2016 the median power of QJEP papers had improved to 16%, 57%, and 93%. These 2016 values are similar to those found by Clark-Carter (1997) for 1993/4 BJP (13%, 59%, and 93%). For 2015/16 BJP papers, median power was 23%, 78%, and 99%. For both journals, power levels have improved in recent years, but were lower than recommended. However, even with adequate power, effect size CIs were very large, conveying poor information about the effect.

Cohen, J. (1962). The statistical power of abnormal–social psychological research: A review. *Journal of Abnormal and Social Psychology*, 65, 145–153.

Clark-Carter, D. (1997). The account taken of statistical power in research published in

The British Journal of Psychology. British Journal of Psychology, 88, 71-83.

How broad is the target? Poor precision leads to results that provide little information

Catherine O Fritz¹ and Peter E Morris²

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Estimation of population parameters may vary in precision; more precise results better describe the population. For standardized mean difference, d , = 0.5 with precision +/- 0.1, the effect is clearly moderate, whereas +/- 0.4 encompasses very small to large effects. This paper follows Peter Morris's paper on power levels, analysing data from the first study of each paper published in the *Quarterly Journal of Experimental Psychology* (QJEP) in 1965/66 and 2016 and the *British Journal of Psychology* (BJP) in 2015/16. Effect sizes were estimated for the effects examined in the Morris paper and converted to a common metric: d . To assess precision, the 95% confidence interval (CI) for each d was calculated. The importance and value of considering precision is discussed using individual cases from the dataset. Many CIs were very wide, but BJP provided more precise estimates (narrower CIs) than QJEP, with median widths of 1.04 and 1.44, respectively. (Recall that .5 is often considered a medium sized effect.) Precision was moderately associated with power, with correlations in the range of -.33 to -.42. The data illustrate the benefits of considering precision, both post hoc and a priori. We provide guidance on calculating post hoc and a priori precision.

EPS methods update (4): Rigour as potent liberation, not arbitrary confinement

Kasia Doniec and Mark Haggard

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On our development, hearing, and life-impact data, we illustrate two useful methods to tackle analysis challenges in contemporary psychology and neuroscience. Multi-level modelling (MLM) handles additional higher-level sampling units: institutions, jurisdictions, or brain areas. Regression slopes might here differ between units, so it can justify, rationally and empirically, the decision to generalise or particularise. Whether MLM is required, or a categorical variable (particular hospital, etc.) in ordinary General Linear Models (GLM) suffices, will depend on the research question. Laboratory experimentalism disregards imputation, because entire cases from a pool, reasonably deemed equivalent, can usually be re-run. In longitudinal and intervention studies, where this is not possible, failing to impute missing values creates error, both bias and random (confounding and lower power). The avoidance of superficial factoidality requires an account of both missingness and the biases which it amplifies. From various imputation methods available, the sophistication adopted can be

proportionate to the severity of the problem (rate of missing, and likely strength of biases. Application of these two methods to extend the GLM has helped us separate claims of reasonable certainty and generality about the data from sketchy possibilities; this, not spurious precision over p-values, is the strategic scientific point.

LUSTRE: Student open science training in data management

John Towse, Robert Davies and Ben Gooding
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We discuss the development and implementation of LUSTRE, the *Lancaster University Statistics REsource*, which is designed to facilitate an appreciation of open science practices amongst (masters or undergraduate) psychology students working with empirical data. LUSTRE is an open source, online data catalogue system that attempts to capture key data management information about a student research project, drawing on digital record meta-data standards (e.g. Dublin Core). It is designed to work with and enhance the lifecycle of student research workflow from project conception to submission. Student projects can be filtered by for example topic type, outcome measure, analytic procedures or supervisor. The system can be installed as-is or configured for department or institutional need. We discuss the benefits of LUSTRE from the perspective of (a) a tool for engaging in realistic data analysis for students and staff; (b) a framework for students to appreciate data management, archiving standards, and open science; (c) a project information tool.

Modulation of cognitive processing by reward value, consciousness and individual reward sensitivity

Stephanie Baines¹, Imca Hensels¹ and Ruud Custers²
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We investigated how subliminal and supraliminal reward cues influence cognitive processing and performance. Masked cues were parametrically manipulated trial by trial (reward value: reward/no reward, consciousness: subliminal/supraliminal), followed by a challenging cognitive task (visual search/mental rotation). Trial by trial signal detection tests determined stimulus perceptibility and confidence. Individual differences in sensitivity to reward were measured. Electroencephalography was used to investigate modulation across time. A set of experiments determined optimal stimuli and parameters. Reward consistently increased response speed and accuracy, though effects were larger for supraliminal rewards. Threshold for detecting subliminally presented rewards was reduced in high reward sensitive participants. ERPs suggested cognitive processing at early stages may differ for subliminal presentation. N2 amplitudes showed

differential modulation by reward for subliminal stimuli only, suggesting subliminal rewards might influence allocation of attention. P3 amplitude, indexing working memory updating, was enhanced by reward comparably for subliminal and supraliminal cues. Results are consistent with a dual-stage processing model (Bijleveld et al., 2014), whereby subliminal and supraliminal reward stimuli modulate cognitive processing through both independent and common mechanisms at different stages of information processing.

Bijleveld, E., Custers, R., & Aarts, H. (2012). Adaptive reward pursuit: How effort requirements affect unconscious reward responses and conscious reward decisions. *Journal of Experimental Psychology: General*, 141(4), 728.

Response change patterns in n-back training

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The cognitive training literature currently agrees that repeated practice or training on an adaptive task produces improvements only on the practiced/trained task. In other words, only near transfer effects are detectable. To date, no studies have empirically explained the mechanism behind increased performance on a trained task, specifically the n-back task. We designed a verbal n-back task using eight pairs of homophone words to evaluate error distribution and changes in types of error made as training progressed by incorporating position and word lures. We investigated how improvements occurred by evaluating the error distribution for each load of the task (2-back, 3-back, etc.) over time. Participants in our study trained for 20 sessions (30 minutes/session) over five weeks. Results from 22 participants analyzed suggested that improved performance was due to reduced false alarms in both non-target and phonologically similar lure words accompanied by an increase in target words missed. We calculated d' (hit rate – false alarm rate) and c , response bias, to track changes in participants' response to the task and observed that improvements were due to a shift in responses that became more conservative as training progressed, hence the reduction in false alarms but also missing or rejecting more targets.

Interactions between response conflict and instrumental learning

Nura Sidarus, Stefano Palminteri and Valerian Chambon

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outcomes, to detect conflicts and correct behaviour accordingly. Conflict is considered aversive, and is typically avoided: people may choose easier tasks, or be biased by external suggestions. Yet, it remains unclear whether external stimuli could influence goal-directed decision-making. Conflict has also been shown to reduce the perceived control over action outcomes, and alter the perceived valence of subsequent events. However, the potential impact of response conflict on instrumental learning remains unclear. The present study aimed to address these questions by embedding irrelevant flankers within a reinforcement-learning task, with intermixed free and instructed trials. Results showed that participants could learn to adapt their choices to maximize rewards. Nevertheless, participants were still biased by flanker stimuli, and were more likely to choose to follow, than to go against, flankers' suggestions. The perceived cost of being in conflict with an irrelevant suggestion can sometimes trump the evaluation of internal value representations. This bias in decision-making could be captured by adapting computational models of reinforcement-learning. Preliminary model-based analyses further suggest that conflict may not affect learning when choosing freely what to do, but may influence learning when following instructions.

Thinking about the past or thinking about the future? Developmental changes in temporal focus

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Mind-wandering research indicates that adults spend more time thinking about the future than the past. This finding is taken as evidence that adults have a future-oriented temporal focus, where temporal focus refers to the relative amount of time individuals spend thinking about past, present and future. However, little is known about children's mind-wandering. Temporal focus is interesting developmentally because children are often considered to be less future-oriented than adults. We assessed developmental changes in temporal focus using two tasks. Children aged 6-to-7 and 9-to-10, adolescents, and adults completed a mind-wandering task in which past-, present-, and future-oriented thoughts were sampled. Participants also completed a cued mental time travel task in which they reported an event associated with a target word – participants were free to choose either a future or past event. Both tasks showed age-related differences in the tendency to engage in future-oriented thought. Adults but not children engaged in more future-oriented thought than past-oriented in the mind-wandering task and adults generated significantly more future episodes in the cue-word task. Although future-oriented thought has been characterized as more cognitively demanding, we found no evidence of a relation between working memory capacity and participants' tendency to focus on the future.

Cyber-interruptions: Susceptibility to malevolent online influence communications masquerading as genuine computer updates

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The rise in internet connectivity has contributed to an increase in fraudulent communications by hackers intent on infiltrating computer systems, including pop-up messages designed to persuade individuals to accept fraudulent updates. Recent research has shown that when such pop-ups occur as interruptions during a serial recall memory task, little time is spent viewing content. Participants accept a high number of pop-ups containing cues that otherwise invoke suspicion when viewed under no pressure to return to a primary task (Williams et al., 2017). Such interruptions also impair serial recall memory. Using an adapted paradigm, we explored participant characteristics (university staff and students), message source information (internal and external organisation), and whether an intervention to increase awareness of suspicious cues decreases susceptibility. The serial recall memory impairment was replicated. Fewer pop-ups containing suspicious cues experienced *before* and *referenced* in the intervention were accepted by the intervention group, although acceptance of those experienced *post-intervention* containing *unreferenced* cues was higher, suggesting a negative near transfer effect of the intervention. Students accepted a similar number of fraudulent pop-ups to staff, but spent markedly less time viewing them. Implications for theories such as the Suspicion, Cognition and Automaticity Model (Vishwanath et al., 2017) are discussed.

Williams, E., Morgan, P. L., & Joinson, A. (2017). Press accept to update now: Individual differences in susceptibility to malevolent interruptions. *Decision Support Systems*, 96, 119-129.

Vishwanath, A., Harrison, B., & Ng, Y. J. (2017, in press). Suspicion, cognition, and automaticity model of phishing susceptibility. *Communication Research*.

Symposium – Inhibiting actions

Organised by Patti Adank

Voluntary inhibition of actions: Searching for an internal signal

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Neuropsychology is the traditional guide for cognitive ontology: if a putative cognitive process truly exists in the brain, one should find patients whose behaviour can be understood as resulting from a deficiency in that process. Some frontal patients appear to be captured by the stimuli around them, in so-called ‘utilization behaviours’. This indeed suggests that the healthy brain houses inhibitory processes to suppress actions that might be evoked by environmental stimuli, but which are not appropriate given current goals. Experimental studies largely relied on stop-signal reactions to study inhibition of action. However, external stop signals are rare outside the laboratory: the key human cognitive capacity seems to involve an *internal* signal that allows one to inhibit prepotent but currently inappropriate actions. I will report two examples of such voluntary inhibition: inhibition of the ‘Kohnstamm phenomenon’ or lifting arm trick, and inhibition of involuntary tics in Gilles de la Tourette’s syndrome. Both point towards a volitional suppression of motor excitability, in which a form of ‘negative motor command’ arising in anterior frontal areas can regulate more posterior frontal areas such as primary motor cortex. Theories of executive function that dispense with any concept of inhibition cannot readily explain these results.

Deficient neural motor inhibition in alcohol-dependence

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Neural inhibition of the motor output pathway has emerged as a central aspect of healthy behavior. My talk will begin with a general overview of motor inhibitory processes in healthy subjects (as reviewed in Duque et al. Trends in Neurosciences 2017). It will then focus on a recent study in which we acquired neural inhibitory measures of motor activity in detoxified alcohol-dependent (AD) patients, using a standard transcranial magnetic stimulation (TMS) procedure whereby motor-evoked potentials (MEPs) are elicited in a choice reaction time task. Behavioral inhibitory aptitudes and trait impulsivity were also assessed in all participants. Finally, the patients were called back a year after the experiment to evaluate their relapse status and the potential relationship with motor inhibition. As expected, AD patients displayed poorer behavioral inhibition and higher trait impulsivity than controls. More importantly, the MEP data revealed a considerable shortage of motor inhibition in AD patients.

Interestingly, this neural defect was strongest in the patients who ended-up relapsing during the year following the experiment. These data suggest a strong motor component in the neural correlate of altered inhibitory control in AD patients, as well as an intriguing relationship with relapse.

Action-selective and stimulus-selective stopping violate race model assumptions and are similar in terms of performance and brain activation

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Stopping has long been studied using the standard stop-signal task that evokes simple (non-selective) stopping. However, simple stopping is limited as a framework of control, because it mimics situations that occur infrequently in daily life. Therefore, researchers have begun to use selective stopping tasks. These have greater ecological validity, but are also less well understood. I will present findings from a study addressing two gaps in the selective stopping literature. First, most studies assumed that the main theoretical framework of simple stopping - Logan's independent race model - extends to selective stopping. We tested this assumption, showing that in most participants, selective stopping performance violates the model's predictions. Results from selective stopping studies relying on this model should therefore be interpreted with caution. Second, selective stopping studies used a diverse set of tasks - some involving action-selective stopping (stopping certain actions while continuing others), others stimulus-selective stopping (stopping to certain stimuli while ignoring others) - but whether these measure the same form of control is unclear. We compared action-selective and stimulus-selective stopping in terms of performance and fMRI data, showing that the differences, if any, are small. Thus, action-selective and stimulus-selective stopping appear to involve the same form of control.

Voluntary inhibitory control over involuntary tic movements

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Inhibitory control is crucial for normal adaptive motor behaviour. It mediates the appropriate selection and initiation of actions, while keeping inappropriate behaviours suppressed. Although, the effects of inhibition are difficult to observe in daily living, as the inhibited behaviour never occurs, the importance of motor inhibitory control becomes apparent in the field of movement disorders. Here, particularly in hyperkinetic movement disorders, dysfunction of different inhibitory networks is thought to underlie the manifestation of the different abnormal movements. Paradoxically, some involuntary hyperkinesias can also be subjected to voluntary inhibitory control. In this context, tics,

such as those in primary tic disorders, are the hyperkinesias that are most susceptible to voluntary inhibitory control. During my talk, I will first focus on the puzzling interaction between the voluntary motor system and the involuntary tic behaviours, with a particular emphasis on voluntary tic suppression. I will present the range of methodologies we employ to study voluntary tic suppression and provide the state of the art on the topic. I will close my talk with a discussion on the significance of voluntary tic suppression with regards to tic pathophysiology and its relevance to the physiology of motor control.

Inhibition of upcoming responses during turn-taking?

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In conversation, inter-turn gaps are usually very short, most frequently only around 200 ms. Such short latencies imply overlap between comprehension and production planning, but controversy exists about how much; do listeners wait until the last moment, or do they start planning their next turn as soon as they can? If the latter holds, this implies that the response, once planned, has to be kept in a buffer and inhibited until the current speaker has finished speaking. In an EEG study, employing an interactive quiz paradigm, we showed two neural correlates that started as soon as participants could start planning their answer, sometimes midway through the question (Bögels, Magyari, & Levinson, 2015). These correlates were reduced when participants did not answer the questions and replicated in an independent question-answer paradigm. The first neural correlate, a positivity in the ERPs, was localized to language production areas. The second, a reduction in alpha power, was tentatively interpreted as a switch from comprehension to production processes, but might also be related to inhibition of a planned response (see also Piai et al., 2015). In conclusion, response planning in turn-taking appears to start as soon as possible, thus necessarily involving inhibition of the response.

Bögels, S., Magyari, L., & Levinson, S. C. (2015). Neural signatures of response planning occur midway through an incoming question in conversation. *Scientific reports*, 5.

Piai, V., Roelofs, A., Rommers, J., Dahlsätt, K., & Maris, E. (2015). Withholding planned speech is reflected in synchronized beta-band oscillations. *Frontiers in human neuroscience*, 9.

End of symposium

The role of contiguity for the prosocial consequences of mimicry

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The positive social consequences that have often been associated with behavioural mimicry have been inconsistently replicated in the past. In the current study, we investigated whether the timing modulates mimicry effects. To this end we used a paradigm that combines virtual reality and functional near-infrared spectroscopy (fNIRS) and tested 39 typical adult volunteers, of which we considered 19 for the fNIRS analysis. Participants interacted with two virtual partners in a picture description task while making hand-opening movements which were mimicked by their virtual partners at delays of either 0-1.5s (fast mimicry) or 2.5-3s (slow mimicry). Dependent variables involved participants making explicit ratings of perceived trustworthiness and affiliation of their partners, the number of times participants ask for advice from their partners in a virtual maze task and the oxyhaemoglobin signal data from the fNIRS measurement. Results show that timing does modulate responses to mimicry, in particular the explicit social judgements: Fast mimicry partners were rated as less trustworthy. On a neural level, for “fast mimicry” compared to “slow mimicry”, differential activations in the inferior parietal lobe were found, a region typically associated with differentiating self from other.

Tracking expectations of counterfactual worlds and personal desires in autism spectrum disorder

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Research has proposed a link between counterfactual thinking and understanding others' mental states, since they engage the same network of specialized cognitive processes. Impaired mentalizing is a core component of autism spectrum disorder (ASD), alongside difficulties processing linguistic information in context. We examined whether adults with ASD (compared to a TD group) can use novel contextual information about a counterfactual world (Experiment 1) or a character's personal desires (Experiment 2) to inform expectations about forthcoming events. We report two visual-world studies investigating real-time language-mediated eye movements towards objects in a scene. Experiment 1 depicted novel scenarios that violate reality (e.g. “If margarine contained soap, mum could use margarine in her washing/baking...”) and Experiment 2 described story characters' conflicting personal preferences/desires (e.g. “John doesn't want anyone to know that his favourite colour is pink. Last week he bought a new car and deliberately chose a green/pink car.”). Factual contexts (“Because...”) or no-conflict contexts (“John is always telling people that his favourite colour is pink”) provided baseline measures of contextual integration. Results revealed that while the ASD group clearly showed appropriate anticipation based on counterfactual worlds and personal preferences, these expectancy effects were weaker

and delayed relative to the TD group.

The development of perspective-taking from late childhood to young adulthood

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Social interactions depend on the ability to put ourselves in someone else's shoes, to see things from their visual perspective. The ability to know what another person can see (level 1 perspective-taking) is considered to be an automatic process, whereas knowing how another person can see something (level 2 perspective-taking) is considered to be effortful. Additionally, there is continued development of brain regions involved in perspective-taking and executive function during adolescence. We investigated the development of perspective-taking from late childhood through to early adulthood, and examined whether this ability is related to individual differences in executive function. Older children (10-12 years old), adolescents (13-17 years old), and young adults (18-21 years old) completed level 1 and 2 perspective-taking tasks (with eye-tracking) and a battery of executive function tasks. All age groups showed comparable ability to compute perspectives rapidly and effortlessly, though experienced interference when self and other perspectives were in conflict; this interference was greater in the older children on the level 1 task. In addition, inhibitory control improved through adolescence, and was significantly related to the degree of egocentric interference. Overall, children consistently reached 'adult-like' visual perspective-taking performance by age 13, and experienced increased perspective interference below that age.

Assessing belief-attribution in adults with and without Autism Spectrum Disorders using a computerized false-belief task

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Throughout our day-to-day lives, we need to infer information about the contents of other people's minds, such as what they can see and what they know, in order to engage in successful interactions. This is referred to as possession of a 'Theory of Mind' (ToM). Past research has shown that adults with Autistic Spectrum Disorders often show a deficit in general social communication abilities, although can successfully pass some tests of ToM. The current study used a computerized false-belief task to explore subtle differences in belief-attribution capacities, a core part of ToM, in adults with and without autism. In the task, participants were asked to attribute a belief-state to either themselves or another person, following establishment of a true or false-belief scenario (i.e., contents of a container revealed to be either expected, such as sugar in a sugar jar,

or unexpected, such as marbles in a sugar jar). Results revealed comparable speed of processing between groups, however autistic individuals showed a particular deficit in correctly identifying a belief-state in false-belief trials, in which two contrasting belief-states had to be held in mind (i.e., outdated belief vs. reality state), suggesting more difficulty disengaging from current, reality based belief-states than neuro-typical individuals.

The development of single and multiple-landmark allocentric spatial recall and the role of executive functions

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Spatial memory is the metaphorical hook on which our everyday experiences hang. One way of thinking about the development of spatial memory is as a progression from (a) egocentric (self-based) codings to (b) simple allocentric (world-based) codings relative to just one spatial reference to (c) codings using multiple allocentric spatial references together. We re-examined that timeline in a simplified virtual environment. Children aged 3-5 years saw a virtual penguin in relation to symmetric landmarks and then recalled its location after being ‘teleported’ to a new viewpoint. We found that children aged 3.5-4.0 years successfully used a single-landmark recall strategy, which is even younger than our previous work with a more cue-rich environment (Negen, Heywood-Everett, Roome & Nardini, 2017). Children succeeded at multiple-landmark allocentric recall at age 4.0-4.5 years, which is also younger than our previous findings in a more cue-rich environment. In addition, an inhibition measure was found to be a significant predictor of single-landmark strategies and recall accuracy. These findings suggest that single- and multi-landmark allocentric recall emerge earlier than previously thought, and that executive functions may form a bottleneck in environments that are not purposefully simplified to have fewer cues than naturalistic environments.

Negen, J., Heywood-Everett, E., Roome, H.E. & Nardini, M. (2017). Development of allocentric spatial recall from new viewpoints in virtual reality. *Developmental Science*. Online March 2nd 2017, DOI: 10.1111/desc.12496

The forward effects of testing transfer to different domains of learning

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Interim testing of studied information, compared to restudying or doing nothing, facilitates subsequent learning and retention of new information, a phenomenon known as the *forward testing effect*. Previous studies exploring this effect have shown that interim testing of studied information from a given domain (e.g., face-name pairs) enhances subsequent learning and retention of new information from the same domain. In the current research, we asked whether interim testing can enhance subsequent encoding and retention of new information from a different domain (e.g., foreign vocabulary learning). By employing a multi-list procedure and switching material types across lists in two experiments, we found that the forward testing effect is transferable across different domains of learning. This finding implies that administering interim low-stakes tests during a study phase can be profitably used to enhance learning of new information, regardless of whether it is from the same or a different domain.

Learning to learn: Transfer of highly abstract representations/strategies across tasks with a common structure

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We investigated how practice with specific task elements affected subsequent performance at test where participants classified dot patterns according to their similarity to category templates by entering response ‘codes’. We contrasted four training conditions: (a) a baseline condition where participants practiced several unique dot-pattern classification tasks similar to the task performed at test; (b) a response training condition, where participants practiced entering response codes (so they became familiar with the responses, without linking them to categories); (c) a spatial training condition, where participants had to respond to the location of the dot patterns (so they became familiar with the stimuli without classifying them); (d) a picture classification task, where participants practiced categorising different stimuli. Despite novel dot patterns, category templates and response codes being introduced at test, performance was better in the baseline condition than in all the other conditions indicating that participants had acquired a general task strategy, which was applied to different classifications of similar stimulus sets. A further analysis of the picture classification task condition showed that a performance cost remained even at the end of the test phase, indicating that carry-over of old categorisation strategies might also harm performance if the tasks differ too much.

Symposium - Acquisition of a task-set: From instruction to procedure

Organised by Aureliu Lavric

Probing the nature of task-set representations

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First, I examine the popular idea that task sets transition from declarative working memory (WM) to a proceduralized representational format. Using the EEG-derived, contralateral delay activity to index the WM load of S-R settings, we found that both novel and familiar task sets are represented in WM—however only familiar tasks are maintained in a load-independent manner. We propose that familiar S-R settings, rather than transitioning into a proceduralized format, are represented in a “compressed” and thus, load-independent manner in declarative WM—presumably through cues to long-term memory representations.

Second, I discuss novel work in which we assess the “representational strength” of both lower-level, stimulus/response and of higher-level task representations via EEG decoding analyses. These methods provide a precise account, not only of average activation dynamics, but also of when in a trial, which representations determine trial-to-trial variability in performance. Thus, we can now directly address some of the questions at the heart of Stephen Monsell’s work, such as “do cues or tasks control behavior?”, or “what is the role of ‘preconfiguration’”? Moreover, these analyses clearly indicate that different, action-relevant representations do not function independently. Rather, action selection requires dynamic, configural representations that bind lower-level, stimulus/response codes to abstract rules.

Encoding and short-term automatization of explicitly instructed tasks

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Instrumental action relies on acquired knowledge about the means that yield intended outcomes under specific context conditions. Learning proceeds most rapidly if such contingencies are explicitly stored in a mental task set or model. A novel task model is most efficiently established when actions that yield the intended outcomes are specified prospectively via explicit instructions rather than retrospectively via feedback in trial-and-error learning. Behavioural practice guided by an instructed task model enhances short-term task automatization, but instructions cannot easily overcome interference from previously established tasks. Initial brain imaging results suggested that instruction-based automatization is reflected by rapidly declining engagement of fronto-parietal network (FPN) areas paralleled by increasing engagement of other areas

including anterior caudate and frontal operculum. Recently, however, multivariate pattern analyses suggested that FPN areas continue to code task-specific information across short-term automatization and are increasingly coupled with other areas like the anterior caudate. Together, this suggests that instructed task information stored in FPN areas is increasingly used in cooperation with other areas as short-term automatization proceeds. Finally, shifting focus on global cortical network connectivity dynamics rather unexpectedly revealed that increasing coupling between the cingulo-opercular network and dorsal attention network is the most important indicator of instruction-based automatization processes.

Tasks sets in the frontal and parietal cortex of the behaving monkey

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“Task sets” consist of mental programs allowing the control of complex, hierarchically-structured behaviour, often rapidly created by verbal instructions. To address the neurophysiology of task set, I describe the activity of frontal and parietal neurons as a monkey learns which locations to touch in a visual display, and proceeds through a series of trials selecting these locations in turn. As the task unfolds, frontoparietal activity patterns suggest a sequence of control states. In both frontal and parietal cortex, activity patterns encode target locations, differentiate rapid learning from subsequent task execution, and selectively encode the contents of the current task step.

The functional role of task rules in the context of task switching

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Cognitive control enables humans to flexibly switch between different thoughts and actions. An important prerequisite for this cognitive flexibility is the human ability to form and apply general task rules. In my talk, I will present research investigating the functional role of task rules (as compared to stimulus-response rules), with an emphasis on two main findings: First, the shielding function of task rules helps guiding attention toward task-related information, thereby reducing possible distraction by irrelevant information. Second, this task shielding has to be relaxed whenever a task-rule changes, thereby making the cognitive system more vulnerable to the intrusion of distracting information. Possible costs and benefits of the shielding function of task rules will be discussed.

The role of enactment in the implementation of instructions

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Prior research established that newly instructed stimulus-response mappings, which have never been executed overtly before, can lead to automatic response-congruency effects. Such instruction-based congruency effects have been taken as evidence for the hypothesis that the intention to execute stimulus-response mappings results into functional associations in working memory that serve future task execution. The implementation of instructions thus leads to a state of preparedness, which is labeled intention-based reflexivity. In the current presentation, I will argue that some cautiousness is needed when using the instruction-based congruency effect as a proxy of intention-based reflexivity. Recent evidence indicates that these effects are not confined to the intention to execute instructions and the results suggesting that instructions are actively maintained in working memory are not parsimonious. An alternative view will be defended, arguing that instructions are mentally enacted, which leads to the formation of episodes in (activated) long-term memory, as it is the case for overt practice. Challenges for future research on the implementation of instructions are discussed.

The activation of attentional templates for target features during the preparation for visual search

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In visual search tasks where targets are defined by features or feature combinations, representations of these target-defining attributes (attentional templates) guide selective attention towards the locations of candidate target objects. Little is known about how such attentional templates are activated during the preparation for search. To track the time course and specificity of such template activation processes in real time, we developed a new rapid serial probe presentation paradigm. Participants' task was to find and respond to a colour-defined target in search displays that also contained multiple-colour distractors. Between successive search displays, a series of coloured probes was flashed in rapid succession. To find out whether and when these probes attracted attention, indicating the activation of colour-specific templates, N2pc components were measured separately for each probe. Only template-matching colour probes elicited N2pcs, but these components emerged only during the later phase of a preparation period, and were maximal just before search display onset. This demonstrates that activation states of attentional templates are not tonic, but are regulated in line with temporal expectations. Further experiments tracked the time course of template activation in contexts where the onset of successive search displays was either constant (predictable) or variable, and during multiple-colour search.

End of symposium

Scratching the surface: How scene surface and structure can inform search strategies

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The spatial relationship between objects and scenes and its effects on visual search performance has been well-established in previous studies. Here, we introduce a new theoretical framework to further explore attentional mechanisms during search. Based on the findings of the Contextual Guidance Model, the Surface Guidance Framework assumes search strategies are linked to the horizontal, 3D surfaces of the scene that are most associated with likely target placement. To operationalize the relationship between surfaces and objects, we divide scenes into three regions (upper, mid, lower) that correspond with possible surfaces (e.g., wall, countertop, floor). Target-relevant regions are defined as the region a target object is expected (e.g., painting, toaster, rug).

In Experiment 1, we manipulated set size within scene regions (target-relevant and target-irrelevant) and found only set size increases in target-relevant regions affected search performance. In Experiment 2, we manipulated where a suddenly-onsetting distractor object could appear (target-relevant or target-irrelevant region). We found fixations to the distractor were more likely and search performance negatively affected in the target-relevant condition. The Surface Guidance Framework allows further exploration of how spatial associations are used to narrow processing to specific target-relevant scene, allowing us to develop a new perspective on attention during search.

Deployment of attention in a complex visual environment

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Visual attention is a set of control mechanisms that adapt the visual system for perception of our complex environment. There are two prominent views on how allocation of this resource affords us the ability to recognize an object in a complex scene, and also register global properties of the same scene. One sees this as workings of one single process whose activity ranges from focused analysis of local binding of features, to global registration of image statistics. The opposing view argues that it is a result of two processes (selective and non-selective), but does not make a prediction of whether they work in parallel or not. Does perception operate along a continuum of one

process, or using two binary processes in serial or in parallel?

The three possible models were tested using a dual-task paradigm, in which a task requiring global processing is performed simultaneously with another task requiring the same, or with a task requiring focused processing. Comparing observers' performance while they performed two tasks simultaneously to their performance on single-task conditions resulted in focused processing task showing a greater reduction in performance during dual tasks. These results are in favour of two binary processes working in serial.

Treisman, A. (2006). How the deployment of attention determines what we see. *Visual cognition*, 14(4-8), 411-443.

Wolfe, J. M., Võ, M. L. H., Evans, K. K., & Greene, M. R. (2011). Visual search in scenes involves selective and nonselective pathways. *Trends in cognitive sciences*, 15(2), 77-84.

Visual search and foraging behaviour: An iPad app for simulating foraging in the wild

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Multiple target search can be a useful tool for exploring complex and temporally extended “foraging” behaviour. Kristjánsson, Jóhannesson & Thornton (2014) developed a simple 2D dot cancellation app modelled on a classic study of chick feeding behaviour (Dawkins, 1971). They found that participants typically selected at random from two available target categories when items were distinguished by a single feature (colour), but used long “runs” from the same category during conjunction (colour and shape) conditions. Here, we ask whether the same feature/conjunction manipulation also modulates behaviour in a situation more closely resembling foraging in the wild. We present a new experimental app where participants play the role of a squirrel foraging within a 3D “virtual park” environment. Target and distractor items were acorns or walnuts of different colours and we used the same feature/conjunction manipulation as in the 2D cancellation task. In contrast to the previous work, target selection from the two categories remained completely random in all conditions. Thus, in a more complex environment with more natural spatio-temporal task demands, the feature/conjunction manipulation did not constrain human “foraging” behaviour. We discuss implications of these results for a more general understanding of how cognitive load influences search-like behaviours in humans.

Dawkins, M. (1971). Shifts of ‘attention’ in chicks during feeding. *Animal Behaviour*,

19(3), 575-582.

Kristjánsson, Á., Jóhannesson, Ó. I., & Thornton, I. M. (2014). Common attentional constraints in visual foraging. *PloS one*, 9(6), e100752.

Galvanic vestibular stimulation improves the processing of spatial locations

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GVS, a non-invasive neuro-modulator, has been shown to enhance visual memory. However, little is understood about how this happens. We present two experiments where a single visual object, in a designated spatial location, was paired with a sub-sensory GVS pulse and compared to other unpaired visual stimuli.

Using an implicit memory task with two phases: priming (indirectly learn stimuli) and search (determine whether learnt or novel stimuli are present within a display), we assessed whether GVS pulses facilitated search performance, and if so which aspects of the stimulus representation were affected (object image/ spatial location). Experiment two also manipulated whether the search display orientation to explore whether vestibular signals might be coded in absolute or relative spatial terms.

Both experiments found that search responses were shorter towards the spatial location that was singularly paired with a GVS pulse during the detection task, while responses towards the paired object image were unaffected. Experiment 2 also showed that this effect occurred under absolute and relative spatial conditions.

Coincident vestibular signals appear to be retained in visuospatial representations (absolute and relative) that support visual search. GVS may benefit amnesic patients by marking one spatial location from another during topographic and way-finding tasks.

Urban experience alters lightness perception

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We present the first empirical evidence that experience alters lightness perception. The role of experience in lightness perception was investigated through a cross-cultural comparison of two visual contrast phenomena: simultaneous lightness contrast and White's illusion. The Himba, a traditional semi-nomadic group known to have a local bias in perception, showed enhanced simultaneous lightness contrast but reduced White's illusion compared to groups which have a more global perceptual style: Urban-dwelling Himba and Westerners. Thus, experience of the urban environment

alters lightness perception and we argue it does this by fostering the tendency to integrate information from across the visual scene.

Progress in the quest to crack the orthographic code

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An outstanding problem in the field of visual word recognition is the quest to crack the orthographic code underlying reading (Grainger, 2008). The dominant experimental paradigm for studying this problem has been masked form priming, which involves measuring responses to target words that are preceded by subliminal presentations of similarly spelt nonwords. A major step forward in this research programme was provided by the form priming project (FPP; Adelman et al., 2014), a masked priming megastudy in which over 1000 participants were tested across 14 universities. This experiment enabled priming to be measured very precisely for a large number of conditions. In this talk I will introduce a relatively simple model that can explain 99% of the variance in these priming estimates, and that can explain a large body of data from the published literature. I will also provide an update on FPP2, an even larger follow-up collaboration, which will further add to the empirical database, and provide critical tests of this new model.

Adelman, J. S., Johnson, R. L., McCormick, S.F., McKague, M., ... , & Davis, C. J. (2014). A behavioral database for masked form priming. *Behavior Research Methods*, 46, 1052–1067.

Grainger, J. (2008). Cracking the orthographic code: An introduction. *Language and Cognitive Processes*, 23, 1-35.

Interference effects in word-meaning priming

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Prior experience with a particular meaning of an ambiguous word (e.g., “the tree’s BARK ...”), increases the availability of that meaning for up to 40 minutes (Rodd et al., 2013; 2016). We refer to this phenomenon as word-meaning priming. These previous studies used a word-association task to demonstrate the increased availability of the primed meaning. One limitation of this method is that it cannot determine whether priming solely reflects a ‘boost’ for the primed meaning, or whether experience also results in an interference effect, i.e. reduced availability of the unprimed meaning (e.g., BARK-dog). Such an interference effect is strongly predicted by distributed connectionist models of lexical-semantic access, but are not necessarily predicted by other influential models of sentence comprehension. We report a set of four new

experiments where participants make semantic relatedness judgements to pictures that relate to one of the ambiguous words' two meanings to measure word-meaning priming. This task allows us to separately assess the impact of experience on the primed and unprimed meanings. A consistent pattern of results emerges: interference effects (for the unprimed meaning) are observed, but these effects are considerably smaller than the positive boost for the primed meanings.

Rodd, J. M., Cai, Z. G., Betts, H. N., Hanby, B., Hutchinson, C., & Adler, A. (2016).

The impact of recent and long-term experience on access to word meanings: Evidence from large-scale internet-based experiments. *Journal of Memory and Language*, 87.

Rodd, J. M., Lopez Cutrin, B., Kirsch, H., Millar, A., & Davis, M. H. (2013). Long-term priming of the meanings of ambiguous words. *Journal of Memory and Language*, 68(2).

How an associative learning account of language exposure predicts vocabulary growth by word length, word frequency, and neighbourhood density

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Children who hear lots of language have larger vocabularies. The words within the language also affect learning: short words, high frequency words, and words from dense neighbourhoods are all more likely to be learned quickly. However, little consideration has been given to the actual learning that occurs based on language exposure and how this subsequently influences word-level effects. We present a computational model of associative learning that extracts sublexical and lexical information based on exposure to the maternal utterances in twelve 2-3 year old mother-child dyads. By analysing the vocabulary of the mothers, children, and model, we show that both model and children are qualitatively different to the maternal input, showing: (a) superior learning for monosyllabic over bisyllabic words that reduces over time; (b) a decline in the proportion of high frequency words learned over time with marginal increases for mid and low frequency words; (c) greater likelihood of learning words from dense neighbourhoods; and (d) as word frequency declines, the influence of neighbourhood density dramatically increases. Associative learning operating on the linguistic environment of the child captures a range of effects seen in vocabulary learning over time, suggesting that word-level effects are largely determined by language exposure.

Neural representations of prediction error distinguish perception and misperception of speech

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Prior expectations improve perception, especially of sensory signals that are degraded or ambiguous. However, when sensory input deviates from prior expectations, perception depends on adjusting or rejecting our expectations. Listeners' failure to adjust priors can lead to perceptual illusions, especially if there is partial overlap (and hence partial mismatch) between prior expectations and sensory signals. Here we contrast two functional and neural mechanisms by which speech-sensitive brain regions could combine prior expectations and sensory signals during perception of degraded speech: (1) Representing speech segments that overlap with prior expectations, or (2) Representing segments that differ from prior expectations (i.e., prediction error). We used cross-modal predictions from written words (e.g. "kick") that partially matched degraded speech (6-channel vocoded spoken words like "pick" or "kip") and asked 24 listeners to judge on each trial whether or not written and spoken words matched. Behavioural and multivariate analysis of functional MRI data showed that veridical perception of degraded speech following partially matching text is signalled by neural representations of prediction error, rather than by representations of expected segments, in the left superior temporal sulcus. These findings uniquely support a predictive coding account of speech perception and spoken word recognition (cf. Blank & Davis, 2016).

Blank, H, Davis, M.H. (2016) Prediction errors but not sharpened signals simulate multivoxel fMRI patterns during speech perception. *PLoS-Biology*, 14(11): e1002577.

Auditory-sensory predictions shape the production of sentence-level speech

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Sensorimotor learning has been studied in speech using real-time alterations in speech feedback. Typically, participants produce words into a microphone and the acoustic structure of vowels is altered and played back to them through headphones with an unnoticeable delay. In response, learned changes in speech production are observed that lessen the induced acoustical error. This form of sensorimotor learning has only been studied during discrete word production, which is problematic because word production does not capture the complex dynamics of fluid speech. Here we used real-

time alterations in speech feedback to test for sensorimotor learning during sentence production. Twenty participants read 50 different sentences that averaged 8 words each. Following a baseline production phase, the acoustic properties of speech were systematically altered to create a sensory-motor mismatch. After 15 minutes of altered feedback, we observed changes in sentence-level production that precisely countered the induced acoustical error. These changes were global, generalizing to single words with differing vowel sounds. The results suggest that speech involves auditory-sensory predictions operating at multiple levels—from phoneme production to the complex acoustics of fluid speech. When changes in speech feedback violate expectations, even across sentences, the brain alters motor plans so that acoustical goals are maintained.

Orthographic effects in native and second-language spoken word recognition: Evidence from Chinese

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Extensive evidence suggests that spoken word processing involves involuntary orthographic access, with most of the evidence coming from alphabetic languages in which sound and spelling are closely interrelated. Less evidence exists regarding orthographic effects in non-alphabetic languages, in which the sound-spelling correspondence is largely arbitrary. Further, most existing work has focused on native spoken word processing, but it is less clear whether orthography is accessed when non-native listeners process language. To explore these issues, we investigated the role of orthography via a semantic relatedness judgment task: either native Mandarin speakers (L1), or Tibetan-Chinese bilinguals (L2), judged whether or not word pairs spoken in Mandarin were related in meaning. Word pairs were either semantically related, orthographically related (i.e., they shared an orthographic radical), or unrelated. Orthographic overlap on semantically unrelated word pairs significantly slowed response latencies compared to the unrelated condition, with a more pronounced effect in L2 than in L1 listeners. These findings indicate that native and non-native Chinese spoken-word recognition involves orthographic access, with a more prominent role of orthography in L2 than in L1.

The effect of negative mood on reality discrimination

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Cognitive models propose that reality discrimination biases play a role in the development of hallucinations. Negative mood inductions have been shown to exacerbate biases in auditory reality discrimination. This is consistent with the finding that, in patients' daily lives, negative emotions trigger auditory hallucinations. Patients also report that visual hallucinations can be triggered by negative emotions. The aim of this study was, therefore, to examine whether a negative mood induction modulated performance on a visual reality discrimination task. Participants (university students aged 18-42 years) were randomised to a neutral mood induction or a negative mood induction. They then completed a visual reality discrimination task, which involved judging whether or not a difficult-to-detect image had been presented in a series of bursts of visual noise. The main outcome was the number of false alarms made on the task. Participants who completed the negative mood induction did not make more false alarms than participants who completed the neutral induction. This finding suggests that the cognitive processes involved in auditory and visual hallucinations are modulated by different factors, and that the effect of negative mood on the occurrence of visual hallucinations is mediated by processes unrelated to reality discrimination.

The great beauty: The effects of presentation size and height of photographs on sublimity perception

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The sublime remains one of the most enduring aesthetic concepts in Western aesthetic discourse, and is portrayed often – most notably in Edmund Burke's *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful* from 1759 – as an aesthetic delight that evokes emotions of fear and shock. In two studies (Ns = 32 & 39), we explored the role of three physical characteristics often attributed central to an object that elicits feelings of sublimity, namely size (large vs. small), height (high vs. central) and colour (in colour vs. in black and white), in influencing ratings of sublimity in a large number of photographs (60 stimuli in each study). We report that after controlling for by-subject and by-item variations, as well as ratings of beauty, i.e. pleasure, the increase of size and height of presented objects were associated with significant increases of their sublimity ratings. Colour, while it did not influence ratings of sublimity, influenced ratings of beauty. Based on these results, we propose the selective influence of physical presentation forms on aesthetic perception.

Burke, E. (2009). *A philosophical inquiry into the origins of our ideas of the sublime and beautiful*. Oxon, UK: Routledge Classics. (Original work published 1759).

Perceptual learning and the face inversion effect: Proving that one causes the other

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We've known that exposure to or experience with a set of stimuli drawn from a prototype defined category can improve within category discrimination for some time. And there is also evidence that this can in turn lead to a type of inversion effect with artificial stimuli that is analogous to that found in faces. But can we prove that it is the basis of the inversion effect in faces? We are now able to report the result of a number of tDCS experiments that cast light on this issue. They show that 1. Anodal tDCS to Fp3 selectively reduces, perhaps even eliminates the inversion effect seen in highly controlled experiments with artificial stimuli (checkerboards), and 2. The same stimulation significantly reduces the face inversion effect. We conclude that the case for perceptual learning contributing to the face inversion effect has been substantially strengthened by these results.

The ERP signature of facial emotion recognition is not influenced by task set. Or is it?

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We investigated whether the ERP Emotion Expression Effect (EEE, the difference between an emotionally-expressive vs. a neutral face) is influenced by task set. In a previous study, participants switched unpredictably between auditorily-cued vowel/consonant and emotional/neutral classifications of letter-face compounds. The EEE was not reduced or delayed by switching to the face task relative to repeating it, and in fact did not seem to depend on which task was performed suggesting emotion recognition is independent of task-set. The current study tested whether this still holds when participants perform the two tasks for long periods without switching between them: eight 98-trial blocks of each task, half starting with the face task, half with the letter task. The EEE was absent in the letter task irrespectively of task order. Furthermore, even when the face task was performed first the EEE was only detectable in the first two blocks. The results suggest that (a) it is hard to ignore the expression of a fixated task-irrelevant face if expression was recently relevant, but this becomes possible if faces are irrelevant for extended and predictable periods, and (b) massed exposure to a limited set of faces and expressions alters the processes underlying the classification of expression.

The importance of low-level image properties in the neural representation of objects

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Distinct patterns of response to different object categories are found in the ventral visual pathway. However, the importance of low-level image properties in generating these patterns is not fully understood. To address this issue, we manipulated the low-level properties of faces and houses in a way that preserved the ability to perceive the category. Images were filtered using vertical-pass or horizontal-pass orientation filters or high-pass or low-pass spatial frequency filters. We then measured the effect of these manipulations on the neural response in the fusiform face area (FFA) and parahippocampal place area (PPA) using fMRI. First, MVPA was used to determine the relative importance of filter on the spatial pattern of response. Filter did not have a large effect on the patterns of response. For example, vertical-pass and horizontal-pass faces generated similar patterns in the FFA. Next, we used fMR-adaptation to determine the effect of the filter. Filter had a significant effect on the magnitude of the neural response. For example, the response to the same face image in the FFA was greater, if the filter was changed during a trial block. These results provide insights into the importance of low-level image properties in the neural representations of objects.

Serial position, output order, and list length effects for words presented on smartphones over very long intervals

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Three experiments examined whether or not benchmark findings observed in the immediate retrieval from episodic memory are similarly observed over much greater time-scales. Participants were presented with experimentally-controlled lists of words at the very slow rate of one word every hour using an iPhone recall application, RECAPP, which was also used to recall the words in either any order (free recall: Experiments 1 to 3) or the same order as presented (serial recall: Experiment 3). We found strong temporal contiguity effects, weak serial position effects with very limited recency, and clear list length effects in free recall; clear primacy effects and classic error gradients in serial recall; and recency effects in a final two-alternative forced choice recognition task (Experiments 2 and 3). Our findings extend the timescales over which temporal contiguity effects have been observed, but failed to find consistent evidence for strong long-term recency effects with experimenter-controlled stimuli.

Demarcation and reading of newly learned Landolt-C strings: There's something special about spaces

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To explore word learning and how learnt words are processed in reading in a tractable way, we developed a Landolt-C learning and reading paradigm. During the learning session, participants learnt Landolt-C triplets with high or low exposure frequency. Post-learning recognition was assessed in a lexical decision task. In the reading session, participants “read” sentence-like Landolt-C strings with different formats (unspaced, shaded, spaced) to decide whether a target triplet was present. During learning, processing time decreased with learning. More importantly, frequent exposure accelerated learning efficiency more than infrequent exposure. By the end of the learning session, accumulated frequency effects emerged. During reading, saccadic targeting and word identification were affected by word demarcation. However, exposure frequency effects did not carry over to the reading session. In relation to saccadic targeting, greater disruption was caused by the absence of word demarcation with linear landing position curves in unspaced/shaded conditions and quadratic landing position curves in the spaced condition. More interestingly, when subjects were split into two groups (based on target detection ability), the patterns of saccadic targeting were very similar between the two groups indicating that saccadic targeting is uninfluenced by a reader's knowledge of words.

Individual differences in adult word learning

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Understanding the cognitive factors that affect an individual's ability to learn new words has been an area of intense research. Factors such as phonological-short-term-memory, general processing speed and vocabulary size have all been implicated either in children or when studied in isolation in adults (Fernald, Perfors, & Marchman, 2006; Marchman & Fernald, 2008; Gupta & Tisdale, 2009). We present a comprehensive investigation of the relationship between individual differences in verbal (phonological-short-term-memory; vocabulary size) and non-verbal (general processing speed; general intelligence) cognitive abilities and word learning in adults in order to better understand the relative contribution of such factors during adult word learning.

As stimuli we use 39 existing but very low-frequency Dutch words, each paired with a coloured photograph. Dutch native speakers are trained on these form-meaning pairings using two tasks, where the frequency of exposure is manipulated between

words. Picture-matching and picture naming tasks are, then, administered to assess participants knowledge of these novel words. The two test tasks are performed on the day of training and one week later. The results indicate that an individual's vocabulary size is the best predictor of novel word form learning. We discuss the theoretical implications of this finding.

Fernald, A., Perfors, A., & Marchman, V. A. (2006). Picking up speed in understanding: Speech processing efficiency and vocabulary growth across the 2nd year. *Developmental psychology*, 42(1), 98-116.

Gupta, P., & Tisdale, J. (2009). Does phonological short-term memory causally determine vocabulary learning? Toward a computational resolution of the debate. *Journal of memory and language*, 61(4), 481-502.

Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental science*, 11(3), F9-F16.

Flexible voices: Effects of within-talker variability on identity perception from vocal signals

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Human voices are extremely variable: The same person can sound very different depending on whether they are speaking, laughing, shouting or whispering. In order to recognize someone, a listener needs to be able to generalize across these different vocal signals (i.e. ‘telling people together’; Burton, 2013). We describe a series of speaker discrimination studies in which we report detrimental effects of within-speaker variability on vocal identity perception. Accuracy is lower, for both familiar and unfamiliar listeners, when they are asked to generalize identity across sounds of different categories (e.g. vowels vs. laughter) or to perform discriminations on authentic emotional sounds (e.g. spontaneous laughter; Lavan, Scott & McGettigan, 2016). A recent follow-up examination of the latter effect further suggests that identity-related information is less successfully encoded in spontaneously produced (laughter) vocalisations, which are associated with an evolutionarily older vocal control system (Lavan et al., *under review*); we thus propose that claims for a limitless human capacity to process identity-related information from voices may be linked to the literature’s focus on articulate speech. In sum, we recommend that theoretical and methodological frameworks of person identity processing should be adjusted to explicitly include the full range of sounds produced by the human voice.

Mike Burton, A. (2013). Why has research in face recognition progressed so slowly?

The importance of variability. *The Quarterly Journal of Experimental Psychology*, 66(8), 1467-1485.

Lavan, N., Scott, S. K., & McGettigan, C. (2016). Impaired generalization of speaker identity in the perception of familiar and unfamiliar voices. *Journal of Experimental Psychology: General*, 145(12), 1604.

Perceiving lexical tones when listening to English: Evidence from Mandarin-English bilinguals

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Much of the literature surrounding bilingual spoken word recognition is based on bilinguals of non-tonal languages. It is unclear whether and how lexical tones contribute to bilingual language processing. A recent study demonstrates that tonal bilinguals require the availability of both supra-segmental and segmental information to induce cross-language lexical competition during bilingual lexical access, even without phonological overlap between the target and non-target language (Wang, Wang, Malins, 2017). The current study investigates whether overt phonological overlap between the target and non-target language would equally require both supra-segmental and segmental information available to induce cross-language lexical competition. We employed two auditory lexical decision experiments in English with both Mandarin-English bilinguals and English monolinguals to test whether inter-lingual homophones would induce lexical competition from the non-target language, L1 Mandarin. Our results show that cross-language lexical competition was only observed with the presence of lexical tones, in addition to segmental overlap.

Direct speech quotations promote low relative-clause attachment in silent reading of English

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The “default” implicit prosody in silent reading may promote a low-attachment preference in ambiguous relative-clause (RC) structures in English [1]. A more vivid form of implicit prosody is mentally simulated in silent reading of direct speech quotations [2]. We explored the relation between *default* implicit prosody and *simulated*

implicit prosody in the context of relative-clause (RC) attachment.

When completing sentence fragments like *I really liked the bells of the church that....*, participants (N=54) produced significantly more low-attachment completions (to “the church”) when the fragments were embedded in direct speech quotations than in narrative sentences.

In silent reading, participants (N=24) found low-attached RCs more “readable” (in subjective ratings) than high-attached RCs overall. The readability difference was significantly larger in the direct speech condition than in narrative sentences. However, this interaction was eliminated during oral reading (N=22) when prosodic representations are fully activated.

These results demonstrate a reliably more pronounced low-attachment preference in English RC structures that are embedded in direct speech quotations, suggesting a shared cognitive basis between default implicit prosody and simulated implicit prosody during silent reading.

Fodor, J. D. (2002). Prosodic disambiguation in silent reading. In *Proceedings-Nels* (Vol. 1, pp. 113–132).

Yao, B., Belin, P., & Scheepers, C. (2011). Silent reading of direct versus indirect speech activates voice-selective areas in the auditory cortex. *Journal of Cognitive Neuroscience*, 23(10), 3146–3152.

Talking to more people improves communication skills even when the listeners don’t talk back

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Recent research has found that having a larger social network improves linguistic skills by increasing the variability of the input. Research on motor rehabilitation suggests that varying one’s *own* actions can also improve performance. This study tests whether interacting with multiple partners can improve linguistic performance by inducing greater variability in own linguistic behaviour, even when there is no increased variability in input.

Participants described tangram images to a listener who selected and arranged them in order. Participants received feedback on listeners’ accuracy, but the listeners could not provide descriptions or information to the describers. Crucially, participants either described tangram images to the same listener for three rounds, or to a new listener in each round. All participants were tested with a new listener on the fourth round. A mixed model analysis over performance in the test round shows that participants who interacted with more listeners performed better at the test. Ongoing

analyses of the speech content examine whether this improvement in performance is due to an increase in the number of description strategies that participants used.

This study thus shows that having multiple interaction partners can enhance communicative skills even when the interaction partners do not provide any input.

How children use verbal rehearsal in serial recall tasks of varying difficulty

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Verbal rehearsal is key to some models of immediate memory. However, the benefit of rehearsal for immediate serial recall has been called into question and methods for studying the development of rehearsal have been criticised. To further understand the role of rehearsal in serial recall and to develop appropriate tools to examine rehearsal development, the present study of 97 primary school children combined different methods. Self-paced presentation times were obtained throughout the experiment as a behavioural indicator of strategy use, as cumulative rehearsal should produce presentation times increasing with serial position. On half of the trials, children additionally were asked to select their strategy immediately after each trial from a picture-supported strategies display or to follow a rehearse-aloud procedure. Results suggest that self-report methods can be trusted, as frequencies obtained for different strategies were similar under both self-report conditions, and as self-paced presentation times broadly matched the patterns expected for different strategies. Cumulative rehearsal, single rehearsal of the just presented word and listening (without rehearsal) were the most common strategies, with cumulative rehearsal being more prevalent on harder trials, especially if the trials surpassed a child's memory span.

Gender stereotyping and interpersonal cognitive biases

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Young women are subject to harmful stereotypes and show high levels of anxiety and depression¹. Cognitive biases (patterns of automatic information processing) are key components of how stereotypes are internalised². Other, distinct, cognitive biases (e.g. overly negative interpretations of ambiguous social situations³) are related to anxiety/depression, but can be modified experimentally⁴. Effects of these latter biases generalise across cognitive domains⁵ and protect against anxiety in stressful situations⁶. The current research aimed to link these sets of findings, examining potential paths to either resilience or risk for emotional symptoms as a result of internalising gender stereotypes or anti-stereotypes. We used a 2*2 between-subjects experiment where

male-identified and female-identified participants (n=84) were randomly allocated to watch adverts containing stereotype-congruent depictions of women, or containing stereotype-disrupting information. Outcome measures included an Implicit Association Test of gender bias, measures of interpretive bias for ambiguous social situations, Locus of Control and Self-Efficacy. Results showed a significant interaction where subverting gender stereotypes appeared to decrease negative interpersonal cognitions for female-identified participants, with the opposite effect occurring for males. Preliminary follow-up data suggest other factors may be important in moderating these effects of gender on emotional symptoms and their associated risk factors.

- ¹ Young Women's Trust (2016) *2016 Annual Survey: No Country for Young Women*.
- ² Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology*, 18(1), 36–88.
- ³ MacLeod, C. M., & Holmes, E. A. (2012). Cognitive bias modification: An intervention approach worth attending to. *American Journal of Psychiatry*, 169(2), 118–120.
- ⁴ Belli, S. R., & Lau, J. Y. (2014). Cognitive bias modification training in adolescents: Persistence of training effects. *Cognitive Therapy and Research*, 38(6), 640–651.
- ⁵ Hirsch, C. R., Hayes, S., & Mathews, A. (2009). Looking at the bright side: Accessing benign meanings reduces worry. *Journal of Abnormal Psychology*, 118, 44–54.
- ⁶ Lau, J. Y. F., Belli, S. R., & Chopra, R. B. (2013). Cognitive bias modification training in adolescents reduces anxiety to a psychological challenge. *Clinical Child Psychology and Psychiatry*, 18(3), 322–333.

Processing fluency and memory for source information

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Familiarity-based processes such as processing fluency have been shown to influence memory judgements in tests of item recognition, yet many conventional accounts of the organization of memory assume minimal influence of familiarity on memory for source information. The present experiments investigated the relationship between fluency and source memory accuracy. Participants studied words which differed in two source dimensions crossed at encoding (e.g., font size [large/small] and screen location [upper/lower]). On each trial at test, participant were asked to identify a gradually clarifying word selected from a list consisting of old words from the study

phase and new words, provide old/new judgements for the item, and report confidence ratings on the source dimensions. Response times (RTs) recorded from the item identification task formed the basis of a fluency measure, and the identification RTs were compared across categories of item recognition accuracy, source memory accuracy, and source confidence ratings. Amongst the words which were correctly recognised as old items, identification RTs were faster for trials with correct retrieval of source information compared to identification RTs for trials which with incorrectly remembered source dimensions. These findings are consistent with the assumption that familiarity-based processes can contribute to source memory judgements.

The biasing effect of unintentional recognition on intentional recognition: Neural mechanisms and modulatory effects of working memory

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Research suggests that unintentional recognition of distracting non-target stimuli can bias goal-related, intentional recognition judgements to target stimuli encountered in the same environment. We investigated how previously seen or not-seen distractors affect recognition of targets when working memory (WM) resources are manipulated by a secondary WM load task, using both behavioural and ERP measures. Behavioural results showed that participants were more likely to claim to recognise targets paired with previously seen distractors compared to not-seen distractors, and this response bias was equivalent regardless of working memory load. Both targets and distractors elicited familiarity-related ERPs, whereas only target recognition elicited the ERP marker of conscious recollection. Interestingly, a late posterior negativity, which may be related to post-retrieval response monitoring, was modulated by WM load across the left posterior scalp. The findings suggest that distractor-induced familiarity processes were not affected by WM load, however participants engaged in more post-retrieval monitoring following unintentional recognition when WM resources were available.

Verbal labels in visual Working Memory: Memory for colours and shapes in healthy cognitive ageing

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Visual Working Memory (WM) tends to decline more rapidly with ageing than verbal WM. Therefore, older adults might rely more on verbal strategies to remember visually presented stimuli. We compared memory for colours and shapes that were easier or harder to label verbally in younger and older adults. Overall, memory was better for items that were easier to label, and younger participants performed better than

older. Older adults had a significantly larger performance drop between easy- and difficult-to-name colours, which could be consistent with successful use of verbal memory strategies. Articulatory Suppression was associated with performance decline only for the older adults, for the easy-to-name colours. This further supports the hypothesis that older adults are more reliant on verbal strategies than younger adults. However, such an age-related benefit for easy-to-label items was not observed for memory for shapes.

Can humans rapidly learn allocentric prior distributions for locations in space?

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While humans often learn and use statistical distributions or “priors” to optimise their perception and action (Knill & Pouget, 2004), evidence of their ability to acquire such priors for spatial location in 3D locomotor environments has been mixed. Previous research showed mixed success at learning and using spatial priors in an allocentric frame of reference (from new viewpoints; contrast with egocentric; Smith, Hood & Gilchrist (2010). We further investigated adults’ abilities to learn spatial priors for allocentric recall, using a spatial memory task in virtual reality. In an initial condition, eight adult participants tried to recall three targets after moving from an initial viewing position. Targets were drawn from a prior (bivariate normal) distribution centred on an unmarked beacon. A one-tailed t-test shows that responses shifted towards points with higher prior probability than the targets on average, $t(7) = 2.667$, $p = 0.017$. These initial results suggest that adults can rapidly learn spatial priors and use them for allocentric recall. Additional conditions will use other priors to check that this effect reflects learning during the experiment.

Knill, D. C., & Pouget, A. (2004). The Bayesian brain: the role of uncertainty in neural coding and computation. *TRENDS in Neurosciences*, 27(12), 712-719.

Smith, A. D., Hood, B. M., & Gilchrist, I. D. (2010). Probabilistic cuing in large-scale environmental search. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 36(3), 605.

Perceiving the gravitational-vertical: Head versus torso contributions to the Aubert effect

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Verticality refers to what is “up” and “down” within the gravitational field, providing an essential reference for successful interactions with the environment. When standing, we can accurately estimate the vertical to within a few degrees. However, when roll-tilted, individuals tend to perceive the vertical towards the direction of the body-tilt, the so-called Aubert effect. Critically, human bodies are composed of parts, which can move independently. By analysing responses in a psychophysical subjective visual vertical task as a function of head and torso posture, we isolated the respective contribution of each part to the Aubert effect. Participants were presented with briefly flashed vertical or tilted lines and judged whether they were rotated clockwise or

anticlockwise. The task was performed while the head and torso were independently roll-tilted 30 degrees compared to the physical gravitational-vertical: both head and torso upright, head-only tilted, torso-only tilted, and head and torso tilted. The Aubert effect was selectively triggered by the posture of the head: when the head alone was tilted, the perception of verticality was biased toward the head-tilt. However, tilting the torso did not alter the perception of verticality. Our results demonstrate that the Aubert effect relies on reference frames centred on the head.

The role of development on the perception of angles across vision and haptics

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We perceive our environment through multiple sensory inputs. While it seems plausible that we are adapted to learn abstract concepts in the same multisensory manner, several studies have shown that optimal integration of visual and haptic information emerges long after formal education has commenced [1,2,3,4,5]. This study examined multisensory learning of geometric information through the individual and combined contributions of vision and haptics. Angular discrimination was tested using a 4-AFC paradigm in which participants (aged 6-12 years and adults) followed a two-point angular path and then chose a map that best represented the path explored. Participants explored the paths in one of three, within-subjects modality conditions: visual only, haptic only, or bimodal and were tested in vision only. Results show a significant difference in exploration modality during development $F_{(4, 96)} = 2.86, p = .027$. Vision is best for all children, although the addition of visual feedback in the bimodal condition provided a boost for older children $t_{(39)} = 3.72, p = .001$. By adulthood, angular discrimination is equally precise across all modalities. These results confirm that specific sensory modalities may be more suitable than others to teach children core geometric concepts. Findings will inform the design of educational technology.

Burr, D. and M. Gori (2012). Multisensory Integration Develops Late in Humans. *The Neural Bases of Multisensory Processes*. M. M. Murray and M. T. Wallace. Boca Raton (FL).

Gori, M., et al. (2008). Young children do not integrate visual and haptic form information. *Current Biology* 18(9): 694-698.

Gori, M., et al. (2010). Poor haptic orientation discrimination in nonsighted children may reflect disruption of cross-sensory calibration. *Curr Biology* 20(3): 223-225.

Nardini, M., et al. (2008). Development of cue integration in human navigation.. *Curr Biology* 18(9): 689-693.

Barrett, M. M. and F. N. Newell (2015). Task-Specific, Age Related Effects in the Cross- Modal Identification and Localisation of Objects. *Multisensory research* 28(1-2): 111- 151.

The effect of aging on the working memory: N-back ERP study

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Recently, many previous studies have been conducted on the human working memory. However, a few studies have investigated an effect of aging in working memory. In order to study the effect of aging, this study conducted a behavior experiment and measured EEG activation (in particular P300). Participants performed an n-back task in which the numbers were presented continuously. The age of the participants varied from 20s to 70s and was divided into three groups according to age (group 1: 20-38 years, group 2: 43-57 years, group 3: 61-71 years). The result of the behavioral performance showed that group 1 was significantly lower than the other groups in 2-back and 3-back error rates, and group 1 was significantly faster in response time of 1-back than the other groups. In addition, in the event-related potentials (ERPs) results, P300 effect was seen in group 1 performance, and no other effects was seen in the other groups. Consequently, the effect of aging was observed in both behavioral and ERPs data suggesting that the effect of aging is associated with working memory.

Multisensory attentional capture under load: Facilitation versus distraction

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Multisensory stimuli are argued to capture attention more effectively than unisensory stimuli (e.g. Santangelo & Spence, 2007), due to their ability to elicit a super-additive neuronal response (Wallace, Merideth & Stein, 1992). However, behavioural evidence for multisensory attentional capture is mixed, and conflicting evidence suggests that multisensory integration is itself dependent upon attention (e.g. Alsius, Navarra, Campbell & Soto-Faraco, 2005). The present research examines the effect of attentional task demands on two measures of attentional capture by multisensory stimuli: facilitation and distraction effects. Across a series of 5 studies, perceptual load was manipulated to determine whether multisensory stimuli are still able to capture attention in perceptually demanding situations, which would reduce attentional capture by most other types of stimuli. We consistently found that

multisensory stimuli are detected faster than unisensory stimuli regardless of perceptual load, although they are nevertheless subject to load modulation. In contrast, task irrelevant multisensory stimuli did not cause greater distraction than unisensory stimuli, suggesting that the enhanced attentional status of multisensory stimuli may be limited to facilitating top down search. Implications for alerts in driving and aviation are discussed.

Factors that affect learning of novel information during retrieval attempts

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Memory researchers often isolate episodic encoding and retrieval processes in separable “study” and “test” experimental phases. However, memories are also incidentally encoded during retrieval; new items (foils) in recognition tests are often later remembered. We investigated two factors that may modulate learning of foils during retrieval attempts: reward and metacognitive judgments. Participants studied and were tested on two word lists for which either high- or low-reward was awarded for accurate performance. On a final surprise test, foils from the prior tests were intermixed with completely new items. Participants were asked to recognize any previously seen words. Reward levels did not significantly affect performance, but foil recognition was strongly predicted by decision accuracy on the initial recognition tests. Foils that had been incorrectly recognized were later recognized significantly better than foils that had been correctly rejected. This pattern may be due to enhanced attention to response errors during the first test, which facilitates encoding. Alternatively, some foils, spontaneously associated with sources of pre-experimental familiarity, may have biased participants towards responding ‘old’, leading to errors on the first test when those items were new in the experimental context, but improving final recognition performance when those items were old in the experimental context.

Does unconscious control depend on experienced conflict?

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Unravelling the neurocognitive mechanisms which trigger executive control processes is a central question in cognitive science. Recent studies have shown that the subjective experience of conflict is closely associated with the activation of cognitive control, helping individuals to follow their own goals and execute their plans. In this study, we examined whether the association of conflict experience and control holds when people are not aware of their intentions (i.e., they experience involuntariness

regarding their behaviours). To induce unconscious control processes, we employed a post-hypnotic suggestion (word-blindness: that words will appear as a meaningless foreign script) on highly suggestible participants, a manipulation which has previously been shown to halve the Stroop effect. To alter the amount of experienced conflict, we manipulated the proportion of incongruent and congruent Stroop trials between blocks. The analysis revealed that the Stroop effect was reduced by the suggestion in the high conflict condition (mostly congruent trials), and barely at all in the low conflict condition (mostly incongruent), thus, supporting the idea that a certain amount of conflict is required to activate unconscious control. For the first time, we also measured the subjects' conscious experience of 'word meaningfulness' during the word-blindness suggestion, using subjective report.

Feature synchrony as a guiding attribute in visual search

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The sudden appearance (or disappearance) of an object in a display is associated with simultaneous changes across the multiple feature dimensions of the object at the onset (offset) location (Oriet & Enns, 2010). Feature synchrony may therefore be a useful cue used by the visual system to register a new object (or disappearance of an existing object); consequently feature synchrony is a possible candidate attribute for attentional guidance. A search task was given to test this. Observers searched for a vertical/ horizontal bar amongst oblique bars; each bar was surrounded by a coloured shape (a blue or red square or diamond) which periodically alternated between the two feature values on each dimension (colour & shape). These feature alternations occurred synchronously (in phase) or asynchronously (fully out of phase) with each other. Unique synchronous targets produced shallower search slopes than unique asynchronous targets or non-unique targets of either kind. This effect occurred across all display alternation rates (6.25-2.5 Hz). Results indicate that attention is intrinsically biased towards object locations containing a synchronous feature change. Further research is needed to understand this bias: whether it is due to co-occurring transients at the stimulus location or object-related factors associated with the synchronous changes.

Oriet, C., & Enns, J. T. (2010). The role of temporal synchrony in perceptual object formation and updating. *Visual Cognition*, 18(8), 1179-1213.

The standard posture of the hand is ready to grasp

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The perception of limb position in space relies on sensory signals and motor commands. Another potential source of input is standard representations of body posture, which may bias perceived limb position towards more common positions.

We recently found that tactile stimuli are processed more efficiently when they are delivered to a thumb in a relative low or to an index finger in a relative high position, supporting the existence of a standard posture of those two fingers. However they may have specific features because of their special roles in development.

We investigated the existence of a standard posture of the entire hand testing: a) if similar associations are detectable for different finger contrasts; b) if associations are properties of each specific digit ; c) the role of intermanual competition, and d) the neurophysiological features of standard posture by means of somatosensory evoked-potentials (SEP).

Results showed that the thumb is associated with low position, while the other fingers are associated with upper locations configuring the hand as a plier in a position ready to grasp. SEP analysis showed that preferential postures impact the P50 a component typically associated with the activity of primary somatosensory cortex.

Measuring face-name integration with fast periodic visual stimulation

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Associating specific names to faces is crucial for social interactions. We studied face and name representations with fast periodic stimulation in EEG. Healthy subjects (n=12) were exposed to randomly alternating face photographs and written names of a famous identity (base stimuli) at a fast rate (3.999 Hz) while recording their brain activity with scalp EEG. A change in identity (either presented as a face or a name) occurred every seven stimuli (i.e., 0.5713 Hz; “oddball” stimuli). Following a few minutes of recordings, there were significant electrophysiological responses at the frequency of identity change, suggesting integrated representations of faces and names.

Experiment 2 (n=20) replicated these findings, with two control conditions: A face only condition in which the specific identity names presented at the base rate were replaced by other famous names, and a name only condition which followed the same principle for names. There were much weaker amplitudes at the periodic change of identity in control conditions. Most importantly, the sum of the two control conditions was weaker than the effect found in the main condition, especially over the left occipito-temporal region.

Overall, these observations provide evidence for integrated face/name representations in the human brain, with a left occipito-temporal locus.

Human adults rapidly learn to combine an echolocation-like cue to distance with vision

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Human adults integrate information from multiple sensory sources to reduce perceptual uncertainty (Ernst & Banks, 2002). However, this ability does not develop until late childhood (e.g. Nardini et al., 2008). It is unclear whether this late development reflects either maturational changes or a need for extended experience. To investigate this, we tested whether 12 naïve adults could learn to combine a novel echo-like cue to distance (i.e. time delay between sound emission and returning echo), and a noisy visual cue. After 3 hours with cues presented individually and in combination, variable error with both cues available was significantly lower than with the best single cue, $z=2.994$, $p<.003$ (sign-rank test), suggesting that participants successfully combined cues. Participants still showed this benefit even when the echo-like cue was based on an untrained emission and after a change in the cues' relative reliabilities. These findings suggest that extensive experience with individual cues is unnecessary for cue combination in adults and that maturation rather than inexperience explains why children fail to combine cues to reduce uncertainty. Adults' abilities to rapidly integrate a new sensory skill with familiar senses are encouraging for strategies to train or substitute senses in populations with sensory impairments.

Ernst, M. O. & Banks, M. S. Humans integrate visual and haptic information in a statistically optimal fashion. *Nature* 415, 429–433 (2002).

Nardini, M., Jones, P., Bedford, R. & Braddick, O. Development of Cue Integration in Human Navigation. *Curr. Biol.* 18, 689–693 (2008).

Determining the developmental requirements for Hebb repetition learning in young children: Short-term memory, grouping, and their interaction

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The Hebb repetition paradigm has recently attracted attention as a measure of serial order learning, which underlies word-form learning abilities. Although children are good vocabulary learners, it is surprising that previous Hebb learning studies with young children show rather weak Hebb effects. In this study, we conducted two

experiments to identify developmental factors that drive an increase of the size of the Hebb effect in young children. Motivated by evidence from adult work, we focused on an ability to group a list into consistent sub-units and phonological short-term memory (STM) capacity. In Experiment 1 ($N = 98$), it was shown that 3- to 5-year-old children with high phonological STM capacity showed a Hebb effect, particularly in the latter experimental trials. In Experiment 2 ($N = 97$), temporal grouping of the lists in 2-2 sub lists further encouraged children with high phonological STM capacity to show the Hebb effect even in the former experimental trials and children with low STM capacity to show a trend towards a Hebb effect in the latter trials. These findings indicate that phonological STM, grouping consistency, and their interaction are developmental requirements for the Hebb effect to emerge.

Emotion inhibits cognitive control: A speech study

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Cognitive control, more specifically conflict processing abilities, are integral to daily human life. This study aimed to explore the relationship between the perception of emotional facial expressions and production of emotional speech sounds, through investigating how emotion influences conflict resolution. In an adapted version of Zinchenko et al.'s (2015) study, using visual stimuli only, participants were required to respond vocally to written prompts (task relevant stimuli) appearing over the mouth of a speaker in a video (task irrelevant stimuli). The study comprised of four conditions; neutral target- neutral distractor, neutral target-emotional distractor, emotional target-neutral distractor and emotional target-emotional distractor. The results show an overall stimulus response compatibility (SRC) effect for each condition. Overall response times were greatest when both prompt and distractor were emotional and lowest when prompt and distractor were neutral. No significant differences were found in RT data between emotional expression to neutral distractor and neutral expression to emotional distractor or the baseline neutral-neutral condition. Stimuli appearing later in the time course of a trial were responded to faster than earlier ones, and the resultant main effect that attending to task-relevant stimuli where emotional responses were required decreases cognitive control resulting in a larger SRC effects.

Zinchenko, A., Kanske, P., Obermeier, C., Schröger, E., & Kotz, S. (2015). Emotion and goal-directed behavior: ERP evidence on cognitive and emotional conflict. *Soc Cogn Affect Neurosci*, 10(11), 1577-1587.

Training cognitive abilities using a 21-day adaptive procedure

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Executive functions (EF) represent the base of our functioning, underpinning some crucial abilities like reasoning, maintaining information, planning actions and switching between different tasks. The present study tested the efficacy of a 21-day adaptive training procedure to enhance three components of EF (working memory, inhibitory control, and cognitive flexibility), using an online computer-based training protocol (12 sessions in total, each session lasting 15 minutes). Training outcomes were assessed on the trained task, and near and far transfer effects were measured using tasks that measured the same and different EFs. In the first session, participants aged 20-35 years (N=80) were assigned to one of three experimental EF-training conditions (1- working memory (N-back task), 2- inhibitory control (Stop-Signal Flanker task), 3- cognitive flexibility (Task switching), or to a control condition that did not train a specific EF (4- Lexical decision task). Results at post-test showed that performance on the trained task improved in all groups, with increased accuracy and shorter reaction times. Some near-transfer training effects were observed in the EF groups, and these effects varied in their generalisability to far transfer. Training in the control group did not lead to improvements on any measure of EF from pre- to post-test.

The effect of personal pronouns on perspective and language comprehension in autism:
An eye-tracking study

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Previous research has shown that personal pronouns (“I” and “you”) activate an internal perspective while 3rd person pronouns (“he/she”) activate an external perspective with the former showing more vivid representations and enhanced memory of described events (Brunyé et al., 2009; Jackson et al., 2006; Berry et al., 2003). We tested this personalization effect in adults with Autism Spectrum Disorder (ASD) versus typically developing (TD) adults using eye-tracking and the visual world paradigm. Participants listened to sentences with different subject pronouns, such as “I/you/he am/are/is slicing the fresh tomato” while viewing four images of hands performing actions- two from an internal and two from an external perspective. Participants were instructed to click on the picture that best matched the description. Their behavioural responses and eye-movements were recorded, and their memory for the actions was tested later. Results showed that TD participants distinguished both internal and external perspectives, and showed personalization effects for the pronoun “you”. In contrast, individuals with ASD were impaired in adopting the appropriate perspective following “he/she” and “you”, but were sensitive to personalization when the pronoun “I” was used. We interpret these results in relation to differences and difficulties of metalizing in ASD.

Berry, D. C., Michas, I. C., & Bersellini, E. (2003). Communicating information about medication: The benefits of making it personal. *Psychology and Health*, 18(1), 127- 139.

Brunyé, T. T., Ditman, T., Mahoney, C. R., Augustyn, J. S., & Taylor, H. A. (2009). When you and I share perspectives: Pronouns modulate perspective taking during narrative comprehension. *Psychological Science*, 20(1), 27-32.

Jackson, P. L., Brunet, E., Meltzoff, A. N., & Decety, J. (2006). Empathy examined through the neural mechanisms involved in imagining how I feel versus how you feel pain. *Neuropsychologia*, 44(5), 752-761.

Processing passive sentences with stative predicates: Difficulty beyond argument order

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Previous studies independently show passives have lower accuracy, but faster reading times, than actives. The online data is inconsistent with predictions from two theoretical frameworks that claim passives are difficult: (1) Good Enough and (2) Syntactic Complexity. To directly compare offline and online processing, we tested English speakers with both offline (comprehension questions) and online (eye-tracking) measures. In addition to manipulating syntax (active, passive), we manipulated the predicate semantics (eventive, stative). Stative passives are temporarily ambiguous between adjectival and verbal interpretations and their availability is more constrained than eventive passives within and across languages. Offline, we found a significantly lower accuracy with passive than active sentences. In line with this, immediately after the verb (prenominal adjective), passives were found to be read for longer durations than actives. Interestingly, at the verb and post-verbal noun an interaction was observed: passives of states were fixated for significantly longer durations than actives, whereas for eventives, the effect was reversed, but not significant. Unlike previous studies, an ecological method (eye-tracking) shows offline and online results converging on passives being more difficult. Moreover, the results enrich our understanding of the processing of passive sentences beyond simple word order by establishing its interaction with predicate semantics.

The time course of morphological differentiation while processing morphologically complex word in Korean

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Can people differentiate morphological differences implicitly while visual word recognition? The morphological process of the written word has been an interesting issue in visual word recognition studies. In particular, researchers argue whether the morphological processing occurs before (morpho-orthographic) or after (morpho-semantic) the semantic process. This study aims to investigate the time location of the morphological process in the morphologically complex Korean word recognition using with ERP method.

Korean is a linear and concatenated language in syllabic perspective and consists of various morphological sub units, such as semantic morpheme (e.g., noun, verb, and adjective) and functional morpheme (e.g., postposition and ending). This allows us to investigate morphological process with the transposition interference effect. In this study, four syllabled Korean words were used. Second and third syllable in these words were switched and yield two conditions: across-morpheme (e.g., 자리부터 – za/li/bu/tʌ, 자부터터 – za/bu/li/tʌ) and within-morpheme (e.g., 목소리가 – mok/so/li/ga, 목리소가 – mok/li/so/ga).

From the ERP data which was recorded while participants performing lexical

decision task with given stimuli, we found significant differences in two conditions in around 120-180 time window at CZ and CP2 electrodes. This evidence indicates that the time course of Korean morphologically complex word processing can be located in the morpho-orthographic stage.

Eye gaze and aging: The role of working memory and inhibitory control

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In order to understand the cognitive-biological markers for neuropsychological disorders, a more comprehensive understanding of neurotypical age-related effects on eye-gaze is essential. The *antisaccade task* requires participants to make saccadic eye movements away from a prepotent stimulus. Speculation around the cause of age-related differences in the *antisaccade task* centres two sources of cognitive dysfunction: declining inhibitory control mechanisms, or alternatively, working memory deterioration.

The current study assessed inhibitory control and working memory processes underpinning saccadic eye movements in young and older participants. This was achieved with three experimental conditions systematically varying the extent the two factors were taxed. A memory-guided task was used to explore the effect of increasing working memory load, a Go/No-go task was used to explore the effect of increasing inhibitory load, and a 'standard' antisaccade task retained the standard working memory and inhibitory loads.

Results revealed that neurotypical ageing is associated with changes in both inhibitory control and working memory. Increasing inhibitory load was associated with increased reaction times in the older group, whilst increased working memory load and inhibitory load contributed to an increase in the anti-saccade errors. These results reveal that neurotypical ageing is associated with changes in both inhibitory control and working memory.

Letter position and identity coding in regular and irregular words

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There is evidence that the computation of phonological codes is central to silent reading (Frost, 1998). Despite this, skilled readers are able to read irregular words with ease. Cognitive models of reading propose an intermediate stage in which representations are derived from print and used to compute the phonological code

(Coltheart et al, 2001; Perry et al, 2010, Seidenberg & McClelland, 1989), however models vary in their reliance on direct phoneme-grapheme conversion. To test model predictions, we compared readers' tolerance to various forms of letter disruption across regular and irregular words. Participants completed a masked priming lexical decision task, in which regular and irregular word targets were preceded by a prime which was either a match control, or had two letters transposed, substituted or rotated. The results indicated that regularity affected the speed of recognition but not the impact of letter disruption. There was a speed advantage for regular words, however this was not graded based on the extent of irregularity, which suggested that the presence of an irregularity had a global effect on strategy. These findings have critical implications for connectionist reading models, which propose that irregular grapheme-phoneme correspondences can be processed in a similar manner to regular correspondences.

Coltheart, M., Rastle, K., Perry, C., Langdon, R. & Ziegler, J. (2001). DRC: a dual route cascaded model of visual word recognition and reading aloud. *Psychological Review*, 108(1), 204-256. doi: 10.1037/0033-295X.108.1.204.

Frost, R. (1998). Toward a strong phonological theory of visual word recognition: true issues and false trails. *Psychological Bulletin*, 123(1), 71-99. doi: 10.1037//0033-2909.123.1.71.

Perry, C., Ziegler, J. C., & Zorzi, M. (2010). Beyond single syllables: Large-scale modelling of reading aloud with the Connectionist Dual Process (CDP++) model. *Cognitive Psychology*, 61(2), 106-151. doi: 10.1016/j.cogpsych.2010.04.001.

Seidenberg, M. S., & McClelland, J. L. (1989). A distributed, developmental model of word recognition and naming. *Psychological Review*, 96(4), 523-568. doi: 10.1037/0033-295X.96.4.523.

How many voices did you hear? Within-speaker variability differentially affects identity judgements of familiar and unfamiliar listeners

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Within-speaker variability across different recordings of a person's voice is substantial (Kreiman et al., 2015). When perceiving speaker identity, listeners therefore need to not only tell different voices *apart* but also generalize across within-person variability to tell different instances of the same voice *together* (Jenkins et al., 2011; Burton, 2013).

We asked listeners to voices to sort 30 short recordings of voices into different

identities. The task featured two identities (15 items each) from the TV show Orange is the New Black. To date, 44 listeners who are familiar and 33 listeners who are unfamiliar with the show have completed the study.

Results so far show that familiar listeners were more successful at generalizing identity-related information across variable signals: on average, familiar listeners sorted the clips into 4.25 identities ($SD = 2.99$), while unfamiliar listeners perceived 8.36 identities ($SD = 3.15$, $t[76] = 5.872$, $p < .001$). Confusion matrices indicate that familiar listeners' solutions were significantly more consistent across participants than unfamiliar listeners' solutions and thus unfamiliar listeners seem to use diverse strategies to solve the task. We will also fit candidate models to the data (e.g. representing acoustic features), in order to identify the factors affecting task performance.

Mike Burton, A. (2013). Why has research in face recognition progressed so slowly? The importance of variability. *The Quarterly Journal of Experimental Psychology*, 66(8), 1467-1485.

Jenkins, R., White, D., Van Montfort, X., & Burton, A. M. (2011). Variability in photos of the same face. *Cognition*, 121(3), 313-323.

Kreiman, J., Park, S. J., Keating, P. A., & Alwan, A. (2015). The relationship between acoustic and perceived intraspeaker variability in voice quality. In *Sixteenth Annual Conference of the International Speech Communication Association*.

Testing phonological recoding using the words with a silent letter in naming and in lexical decision

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One of the most intensely debated topics on word recognition in the last decade has been the manner in which the meaning of a printed word is accessed. The processing of a printed word must begin, obviously, with registration of the orthographic form of the word. At issue has been whether the meaning of the word is directly accessed from its orthographic form or, instead, phonological information that has been generated from the orthographic form mediates in the process of accessing meaning

English has words that have a silent letter in their letter strings (e.g., knowledge). Such words provide an opportunity of investigating the role of phonological information in multi-syllabic words by comparing them to words that do not have the silent letter in the corresponding position (e.g., available). Stimuli that excluded a silent letter (e.g., nowledge) were processed faster than those that excluded a sounding letter (e.g., vailable) in the naming task (Exp. 1) and in the lexical decision task (Exp. 2).

The evidence from this experiment provides seminal evidence of phonological recoding in multi-syllabic word recognition.

Intact encoding during retrieval attempts in older adults

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Increasing evidence shows that encoding processes are incidentally engaged to different degrees during episodic retrieval attempts. We investigated two factors that may enhance such encoding in young people: meaningful processing and rewards, and whether they are as effective for older adults.

Young ($M_{\text{age}} = 19$) and older ($M_{\text{age}} = 73$) participants encoded four lists of words by either meaningful (deep) versus less meaningful (shallow) processing, or with promises of reward versus no reward for accurate learning. Subsequently, their recognition memory for each list was tested by intermixing previously seen “old” words with novel “foils” in four separate tests (deep/shallow/reward/no reward). Finally, participants completed a surprise recognition test on ‘foils’ from all of the four previous tests, in order to compare how different types of retrieval test contexts influenced incidental encoding of foils during retrieval attempts.

Reward only had subtle effects on memory, but both young and older adults recognised foils better when they had previously been encountered in a “deep” than “shallow” retrieval test. This result suggests that strategic control processes that enhance learning by focusing retrieval towards meaningful information were intact in our sample of older adults, contrary to what has been found in prior literature¹.

Jacoby L. L., Shimizu Y., Velanova K., & Rhodes M. (2005). Age differences in depth of retrieval: memory for foils. *Journal of Memory and Language*, 52, 493–504.

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

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Mongolian is a cursive alphabetic language that conventionally is printed vertically (so that sentences are effectively rotated 90° from horizontal) and naturally read from top to bottom, but can also be printed and read horizontally. This language is

therefore ideal for assessing the versatility of oculomotor control when reading text in different directions. Two experiments addressed this issue by examining the influence of reading direction and both word frequency and word length on eye movement control during Mongolian reading. In both experiments, horizontal reading was slower than vertical reading. In addition, while effects of word frequency and word length were observed in both directions, these were larger when reading horizontally. Crucially, however, the initial landing positions of fixations on words were broadly similar in both directions, and in Experiment 2 were closer to the beginnings of longer words. Thus, while word identification was more difficult and reading generally slower for the less familiar horizontal reading direction, this did not disrupt normal saccade-targeting during reading. The present findings therefore reveal the versatility of oculomotor control when reading in different directions, and the influence of text format on reading efficiency.

Global learning method of reading induces an atypical brain activation in beginning readers

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Reading, a complex skill acquired after formal instruction, is supported by left hemisphere (LH) specialization¹. In Belgian schools, two totally different methods are used to teach reading : phonic (conversion of letters into sounds) or global (visual memorization of whole words). The phonic method ensures a more robust word representation^{2,3} than the global one, but little is known about their cortical impact in children. To our knowledge, only one previous EEG training study with artificial script⁴ revealed that phonic learning induces a LH N170, while global learning induces a right hemisphere N170, in adults. Here, we tested 42 children in grade 1 behaviorally and with EEG using Fast Periodic Visual Stimulation (oddball stimuli are inserted every 5 items in fast streams of base stimuli displayed at 6Hz). Base stimuli were constituted of pseudofont, and oddball stimuli were either words learned globally at school (logographs), matched unknown words, or pseudo-words. A clear left-lateralized oddball discrimination response appeared at 1.2Hz for unknown words and pseudo-words, while a bilateral response appeared for logographs. This suggests that learning to read by a global method involves the right hemisphere (known to support holistic processing and object recognition) rather than the specialized LH for reading.

McCandliss, B. D., Cohen, L., & Dehaene, S. (2003). The visual word form area: expertise for reading in the fusiform gyrus. *Trends in cognitive sciences*, 7(7), 293-299.

Perfetti, C. A. 1991. "Representations and awareness in the acquisition of reading competence." In *Learning to read: Basic research and its implications* Edited

by: Rieben, L. and Perfetti, C. A. 33-44. Hillsdale, NJ: L. Erlbaum Associates.

Share, D. L. and Stanovich, K. E. 1995. Cognitive processes in early reading development: Accommodating individual differences into a model of acquisition. *Issues in education*, 1 : 1-57.

Yoncheva, Y. N., Blau, V. C., Maurer, U., & McCandliss, B. D. (2010). Attentional focus during learning impacts N170 ERP responses to an artificial script. *Developmental neuropsychology*, 35(4), 423-445.

Reading and searching in Chinese: The role of lexical processing

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Eye movement behavior is compared during reading for comprehension and searching for a target word for Chinese text. The design was 2 (task: reading, searching) × 2 (critical word frequency: high frequency, low frequency). The study enables an examination of whether lexical processing of words occurs during search for a target word, as well as reading for comprehension, in Chinese. Participants completed two blocks of trials, a reading block and a searching block. Experimental sentences included a critical word (high or low frequency). There were also filler sentences within each block, each of which included the search target word. For the experimental items, sentence reading times were longer than search times. For the critical words, there were significant effects of word frequency for reading for comprehension, but not searching. The results indicate that lexical access does not usually occur during search for a target word within Chinese text. These results are in line with those of Rayner and Fischer (1996) for reading and searching in English. Together the results indicate that search for a target word may be achieved by visual form matching regardless of the type of orthography.

Rayner, K., & Fischer, M.H. (1996). Mindless reading revisited: Eye movements during reading and scanning are different. *Perception & Psychophysics*, 58, 734-747.

The roles of a suffix and a morpheme in suffixed word and compound word recognition

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Investigating on the role of morpheme position in word recognition have been

proven to be position specific for suffixed word and position invariant for compound word in English word recognition.

This study was conducted to investigate the role of morpheme position for Korean word recognition that has different lexical characteristics as compared to English. Korean are alpha-syllable orthography and the suffix form can be used in front as well as at the end. The transposition of suffixed word showed the significant effect of suffix transposition, which is a different result as compared to previous English studies. The transposition of the independent morpheme in Korean compound words, however, showed the morpheme transposition effect which is similar to the English previous studies.

These results indicate that the results of English studies cannot be generalized to other orthographies in morphemic word processing. Furthermore, the statistic properties of Korean syllable that can be appeared in any position can influence the perception of morpheme locations.

Pinyin word length effects during reading: Evidence from eye movements

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Pinyin is a Latinised transcription of written Chinese in which short mono-morphemic words replace characters and which children and second-language learners use to learn Chinese. The present research examined if word length effects on eye movements during reading in other alphabetic languages are also observed for Pinyin, and how this compares with standard Chinese. Participants were skilled readers whose eye movements were recorded while reading Pinyin sentences that contained a short, 2-3 letter or long, 5-6 letter word (e.g., ‘hai’, ‘huang’), and equivalent Chinese sentences containing the corresponding characters (e.g., 海, 黄), which were matched for frequency, complexity (number of strokes) and predictability. We observed clear word length effects for Pinyin, such that long words were skipped less often and fixated for longer than short words, and the location of initial fixations further to the left of word centre for long than short words, replicating effects for other alphabetic languages. By comparison, skipping rates, fixation times, and the location of initial fixations on characters during Chinese reading did not vary as a function of Pinyin word length. We discuss these findings in terms of the ubiquity of word length effects on eye movement control when reading alphabetic languages.

The production and generation effects during picture naming: How lexical access and articulation influence memory

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Previous work on memory phenomena shows that pictures and words lead to a production effect, i.e. better memory for aloud than silent items, and that this interacts with the picture superiority effect, i.e. better memory for pictures than words (Fawcett, Quinlan, & Taylor, 2012). We investigated the role of the generation effect, i.e. improved memory for generated words, in picture naming. As picture naming requires participants to think of an appropriate label, a generation effect might be elicited for pictures but not words. Forty-two participants named pictures silently or aloud and were given the correct picture name or an unreadable label; all conditions included pictures to control for the picture superiority effect. Memory was then tested using a yes/no recognition task. We found a production effect ($p < 0.001$) showing the role of articulation in memory, a generation effect ($p < 0.001$) showing the role of lexical access in memory, and an interaction ($p < 0.05$) between the two suggesting the non-independence of the effects. Ongoing work further tests the role of label reliability in eliciting these effects. This research demonstrates a role for the generation effect in picture naming, with implications for memory asymmetries at different stages in language production.

Fawcett, J. M., Quinlan, C. K., & Taylor, T. L. (2012). Interplay of the production and picture superiority effects: a signal detection analysis. *Memory*, 20(7), 655-666. doi: 10.1080/09658211.2012.693510

Foveal lexical processing load does not modulate the preview benefit but does influence word skipping during Chinese reading

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There is controversy regarding whether higher foveal load produces increased or decreased preview effect from parafovea while reading English. Chinese is a visually dense language and readers can obtain more parafoveal information from upcoming words, therefore, foveal load probably has a stronger modulatory influence on parafoveal preprocessing in Chinese reading. In the present study, 120 participants were asked to read each sentence with a two-character pre-target word varied in word frequency for foveal lexical processing load (high or low), and a single-character target word was manipulated for preview (identical or pseudo-character) using the boundary

paradigm (Rayner, 1975). Pre-target analyses showed robust frequency effects, but no parafoveal-on-foveal effect indicating foveal processing was not influenced by the upcoming parafoveal information. Standard preview effects were observed for target words on the first-pass reading times as well as skipping rate. Furthermore, foveal processing difficulty affected target word skipping but not reading times, suggesting different oculomotor control systems determine fixation times and word skipping. Interestingly, no interaction of the two factors occurred, demonstrating that parafoveal preview is not modulated by foveal lexical difficulty, but saccadic targeting is influenced by foveal lexical load independently from parafoveal preview in Chinese reading. Possible theoretical interpretations are discussed.

Rayner, K. (1975). The perceptual span and peripheral cues in reading. *Cognitive Psychology*, 7, 65-81.

London Accommodation

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

Hotel Name	Website	Booking Contact Number
Albany Hotel 34 Tavistock Place	http://albanyhotelwc1.co.uk/	0207 837 9139
Alhambra Hotel 17-19 Argyle Street	http://www.alhambrahotel.com/	0207 837 9575
Arosfa Hotel 83 Gower Street	http://www.arosfalondon.com/	0207 636 2115
Avonmore Hotel 57 Cartwright Gardens	http://www.avonmorehotel.net/	0207 387 1939
Chester Hotel Victoria 27-29 Longmoore Street	http://www.chesterhotelvictoria.com/	0207 834 3791
Double Tree by Hilton 92 Southampton Row	http://doubletree3.hilton.com/en/hotels/united-kingdom/doubletree-by-hilton-hotel-london-west-end-LHRLBDI/	0207 242 2828
Fitzroy Hotel 41 Fitzroy Street	http://www.fitzroy-hotel.net/index.php?page=contact	0207 387 7919
Grange Hotels Various locations	http://www.grangehotels.com/hotels-london/	0207 233 7888
Harlingford Hotel 61-63 Cartwright Gardens	http://www.harlingfordhotel.com/	0207 387 1551
Hotel Russell 1-8 Russell Square	http://www.hotelrusselllondon.co.uk/	0207 837 6470
Ibis London Euston 3 Cardington Street	http://www.ibis.com/gb/hotel-0921-ibis-london-euston-st-pancras/	0207 304 7712
Mentone Hotel 54-56 Cartwright Gardens	http://www.mentonehotel.com/	0207 387 3927
Mercure London Bloomsbury 130-134 Southampton Row	http://www.accorhotels.com/gb/hotel-8066-mercure-london-bloomsbury/	0207 833 3691
St Athans Hotel 20 Tavistock Place	https://www.stathanshotel.com/	0207 837 9140

The Academy Hotel 21 Gower	http://www.theacademyhotel.co.uk/	0207 631 4115
The George Hotel 58-60 Cartwright Gardens	http://www.georgehotels.co.uk/	0207 387 8777
The Wesley Euston Hotel 81-103 Euston St	http://www.thewesley.co.uk/	0207 380 0001
Thistle Bloomsbury Park Hotel 126 Southampton Row	http://www.thistle.com/en/hotels/united_kingdom/london/bloomsbury_park/	0871 376 9007
Travelodge Various	https://www.travelodge.co.uk/	08719 848484

See also dedicated hotel booking websites,

e.g. <http://www.trivago.co.uk/>

<http://www.booking.com/hotels>

<https://www.expedia.co.uk/hotels>

Travel

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

Full details of travel to UCL can be found at: <http://www.ucl.ac.uk/maps/public-transport/>

UCL campus map: <http://www.ucl.ac.uk/maps/downloads/campus-map-2014.pdf>

UCL in London: <http://www.ucl.ac.uk/maps/downloads/ucl-central-london-2014.jpeg>

Conference Dinner

The conference dinner will be held on Thursday 4th January at 8:15pm in Pescatori, which is a 10-15 minute walk from the meeting rooms. The restaurant address is 57 Charlotte Street, London, W1T 4PD.

As with last year in London, the menu, dinner bookings and payment will be exclusively online. Payments must be made electronically using a credit or debit card (Paypal is not currently supported). Please complete all required information to ensure your place and menu choices at the dinner. Once booked, the system will generate an automatic receipt to your email address.

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

Please book your place here before 15 December:

The portal will close after this date and we cannot accommodate late admissions this year. No cash payments are possible.

<http://tinyurl.com/London-Conference-Meal-2018>

PLEASE DO NOT SEND CHEQUES AS THESE CANNOT BE PROCESSED AND NO PLACE AT THE DINNER CAN BE SECURED.

- Places are limited and will be reserved on a first come/first served basis.
- Please indicate if you have any dietary requirements in the text box on the form and the restaurant will be informed.

Please contact Patti Adank (p.adank@ucl.ac.uk) with any questions or suggestions, but email UCL online store if anything is unclear about the booking process (uclonlinestore@ucl.ac.uk).

The Forty Sixth Bartlett Lecture



will be delivered by

Professor Stephen Monsell

Department of Psychology
University of Exeter

Control of task-set



6.00pm, Thursday 4th January 2018

Lower Ground Floor Lecture
Theatre
University College London
26 Bedford Way
London, WC1H 0AP

*The lecture will be open to the public.
This lecture, and its recording, is generously supported by Sage publications.*

Membership Proposal Form

(also available at: <http://www.eps.ac.uk/index.php/applying-to-join>)

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”)

--

Online access to QJEP is available to all EPS members via the EPS website, which provides authentication for access to Journal content. Members who wish to receive a hard copy of the Journal should contact the EPS administrator – eps@lancaster.ac.uk.

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. 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, Lancaster University, 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 at least 2 independent accounts of their work in reputable, peer-reviewed psychological journals, and
- c) personally delivered an oral paper to the Society at one of the three EPS meetings held each year.

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

Any candidate not selected as eligible by the 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.

London meeting 3 – 5 January 2018

The programme for the London meeting is enclosed with this mailing. Details are enclosed for booking the conference dinner at Pescatori, 57 Charlotte Street, London, W1T 4PD on Thursday 4th January at 8:15pm. If you wish to attend the dinner, please follow the instructions to make your online booking.

N.B. All bookings should be made by the closing date of 15th December 2017. Some places at the dinner are available to postgraduate students at half-price; bookings for these must be accompanied by a letter from an EPS member confirming the student's status.

The 70th Annual General Meeting will be held on Thursday 4th January at 5:00pm in the Lower Ground Floor Lecture Theatre.

The programme also includes:

Thursday 4th January 6:00pm 46th Bartlett Lecture:

Control of task-set

Professor Stephen Monsell (University of Exeter)

Thursday 4th January 1:30pm Symposium to accompany the Bartlett Lecture:

Acquisition of a task-set: From instruction to procedure

Organised by Professor Aureliu Lavric

Thursday 4th January 9:00am Symposium:

Inhibiting actions

Organised by Dr Patti Adank

Annual General Meeting

The 70th Annual General Meeting will be 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, London, WC1H 0AP.

AGENDA

- 18/1 Minutes of the Business Meeting held in the Madjeski Lecture Theatre, University of Reading, on Wednesday 12th July, 2017
- 18/2 Matters arising
- 18/3 Secretary's Report
 - 3.1 Annual Report of the Society (to be circulated)
- 18/4 Treasurer's Report
 - 4.1 Treasurer's Report (summary accounts to be circulated)
- 18/5 QJEP Editor's Report
 - 5.1 Editor's Report (to be circulated)

Due to the time constraints between the Committee Meeting and the date in early January of the London meeting, it has not been possible to include the Committee's award nominations and the names of officers and committee members for approval in this programme.

These will be circulated to members under separate cover.

- 18/6 President's Commendations for outstanding student presentation at an EPS meeting
- 18/7 Confirmation of Forty Seventh Bartlett Lecturer (to be circulated)
- 18/8 Confirmation of Seventeenth EPS Mid-Career Award (to be circulated)
- 18/9 Confirmation of Twenty Sixth EPS Prize Lecturer (to be circulated)
- 18/10 Confirmation of Seventh Frith Prize winner (to be circulated)
- 18/11 Election of Officers and Committee Members (to be circulated)
- 18/12 Admission of Ordinary Members

18/13 Arrangements for future meetings

18/14 Any other business

Date, time and place of next meeting

Minutes of July 2017 Business Meeting

A Business Meeting was held in the Madjeski Lecture Theatre, University of Reading, on Wednesday 12th July, 2017 at 5:30pm.

There were 28 members present at the meeting

- 17/23 Minutes of the Business Meeting held at Queen's University Belfast on 11th April 2017, were agreed and approved. These had been included as part of the Reading programme.
- 17/24 Matters Arising
 There were none
- 17/25 Secretary's Report
 A brief report was presented. The Hon Sec expressed his thanks to everyone involved in this meeting. With respect to Society business and activities, things remain healthy and vibrant. It was noted that consultations were still ongoing between Sage and Taylor & Francis over the transfer of QJEP. The EPS role was to ensure the smoothest transition and represent the interest of authors involved. The Hon Sec also reminded members that the EPS Carers Fund is now up and running.
 Moreover, an oral history collection via interviews with senior members is still ongoing.
- 17/26 Treasurer's Report
 The Hon Treasurer was not able to be at the meeting. The Hon Sec presented a report and slides based on the Treasurer's comments. These detailed the income and expenditure amounts for the year, and specified some of the different expenditure categories, including Grindley Grants, members' grants, and meeting expenses. It was noted that the EPS had become aware of a VAT liability because its income exceeded the threshold for reporting. This liability extends through past years, and the EPS is working hard with a number of people to reconcile accounts with HMRC. We have also become VAT registered.

A question was raised by a member - questioning the Grindley Grant maximum of £60 per night for accommodation given the campus accommodation was more than this. It was asked whether the maximum could be increased retrospectively. The Hon Sec

agreed to bring this up with PH as Treasurer as it was his decision as part of a review of realistic costs and current finances.

17/27

QJEP Editor's Report

The QJEP Editor reminded members we are in a transition period between Marc (Editor responsible for current content in the Journal) and Simon (taking new submission content). We are also in a transition between Sage and Taylor & Francis. The QJEP Editor confirmed that he was working well and working hard with Sage independently going forward even though changeover not until end December. Members were shown the newly agreed QJEP cover and size format. Given the in press backlog of papers, all papers currently in the system will be handled (post acceptance processing and later publishing) by Sage.

17/28

Arrangements for future meetings

The Conference Secretary again noted our thanks to the local organiser and the team for an excellent meeting. Looking forward, he reported on this very large and active meeting in Reading with 2 prize speakers and 4 symposia.

With respect to future meetings, next year will include a meeting in Leicester but also a meeting abroad (St Johns, Canada) so will be publicised in more detail as soon as information available.

17/29

Any Other Business

A member asked about EPS funded workshop policies. They commented that this was being held at the same time as the EPS meeting, and had attracted critical social media coverage over diversity issues. The member asked if the EPS has ways to address these issues. It was noted that the EPS normally examine workshop applications for dates, and work with organisers to avoid clashes where possible. The President confirmed that the committee had on a number of occasions reviewed its procedures and made changes in light of such reviews.

Date, time and place of next meeting

The next meeting will be the AGM in London in January 2018, details to be confirmed in the meeting programme.

