

**EPS**

Experimental  
Psychology  
Society

**LONDON  
MEETING**

**6-7 JANUARY 2010**

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A scientific meeting will be held at the Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way, WC1 on 6/7 January, 2010. The local organiser is Shelley Channon.

### **Thirty- eighth Bartlett Lecture**

Wednesday 6 January 6.00pm

Why we need cognitive explanations of autism

Professor Uta Frith, Institute of Cognitive Neuroscience, UCL

### **Symposium - To accompany the Prize Lecture**

Wednesday 6 January 1.30pm – 5pm

Research on Autism Spectrum Disorders: The new wave

Organiser: Professor Francesca Happé

### **Symposium**

Thursday 7 January 2.30pm – 5.30pm

Social cognition and clinical disorders

Organisers: Professor Shelley Channon and Dr Patrizia Thoma

### **Poster Session**

This will be held in conjunction with the drinks reception on Wednesday evening at 7pm at UCL, 26 Bedford Way, WC1. Drinks will be served in the Third Floor Common Room, Room 308, and posters will be displayed in the Ground Floor Foyer. Delegates may put up posters from 5pm 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 of 26 Bedford Way, WC1. 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 which run Office XP under Windows NT/2000. Any queries about facilities in the theatres should be sent to the local organiser, Shelley Channon (s.channon@ucl.ac.uk)

Coffee will be served in Room 308 (Third Floor Common Room)

The conference dinner will be at 8.30pm at Pescatori, 57 Charlotte Street, London, W1T 4PD. (020-7580 3289). A booking form is enclosed.

## START OF PARALLEL SESSIONS

Session A**Ground Floor Lecture Theatre**

- 9.30            **Fang Liu\***, **Aniruddh D. Patel\*** and **Lauren Stewart** (Goldsmiths University of London, The Neurosciences Institute USA)  
Intonation perception abilities in congenital amusia.
- 10.00           **Victoria J. Williamson\*** and **Lauren Stewart** (Goldsmiths University of London)  
Memory for pitch in congenital amusia: Beyond a fine-grained pitch discrimination problem.
- 10.30           COFFEE
- 11.00           **Lisa Henderson\***, **Maggie Snowling** and **Paula Clarke\*** (University of York)  
The time course of access to semantic representations in children with ASD.
- 11.30           **Catherine Jones\***, **Francesca Happé** and **Tony Charman\*** (Institute of Education, Institute of Psychiatry)  
'Everyday memory' impairments in Autism Spectrum Disorders.
- 12.00           **Tony Charman\***, **Catherine Jones\*** and **Francesca Happé** (Institute of Education, Institute of Psychiatry)  
Emotion recognition ability in Autism Spectrum Disorders.
- 12.30–1.30    LUNCH

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START OF PARALLEL SESSIONS

*Session B*

**Lower Ground Floor Lecture Theatre**

- 9.30            **Mike Le Pelley and Tom Beesley\*** (Cardiff University, University College London)  
Overt and covert attentional orienting are influenced by predictive validity in human associative learning.
- 10.00           **Helen J. Cassaday, Ebrahim Kantini\*, Chris P. Hollis\* and Georgina M. Jackson** (University of Nottingham)  
The normal inhibition of associations is impaired by clonidine in Tourette Syndrome.
- 10.30           COFFEE
- 11.00           **Anthony McGregor, Yutaka Kosaki\*, Alex Easton\* and Steven L. Poulter\*** (University of Durham)  
Representation of geometric cues in the rat: New evidence from a spontaneous task.
- 11.30           **Harriet E.S. Rosenthal\*, Liam Norman\*, Shamus P. Smith\* and Anthony McGregor** (University of Durham)  
Stereotype threat in a navigational task: Effect of cue preference and task order.
- 12.00           **Katie L. Meadmore\*, Shui-I Shih\* and Simon P. Liversedge** (University of Southampton)  
Age effects on incidental memory for objects and their locations: The role of eye movements.
- 12.30–1.30    LUNCH

Session A**Ground Floor Lecture Theatre****Symposium:** Research on Autism Spectrum Disorders: The new wave

Organiser: Professor Francesca Happé

1.30 **Anna Remington\* and John Swettenham\*** (University College London)

Selective attention and perceptual load in Autism Spectrum Disorder.

2.00 **Sebastian Gaigg\* and Dermot Bowler\*** (City University)

Arousal and memory in ASD: How do they interact.

2.30 **Antonia Hamilton and Lauren Marsh\*** (University of Nottingham)

Be rational: Goal understanding in autism.

3.00 TEA

3.30 **Odette Megnin\*, Catherine Jones\*, Atlanta Flitton\*, Michelle de Haan, Torsten Baldeweg\* and Tony Charman\*** (University College London)

Do you see what I am saying? The effects of visual speech on auditory ERP responses to spoken words in Autism Spectrum Disorder.

4.00 **Sam Gilbert** (University College London)

Decoding mental representations from fMRI: What can we learn about autism?

4.30 **Francesca Happé** (Institute of Psychiatry)

Discussant

End of Symposium

5.00 Annual General Meeting (Room 206, 2nd floor)  
(EPS Members only)

6.00 **Bartlett Lecture - Professor Uta Frith** (Institute of Cognitive Neuroscience, UCL)

Why we need cognitive explanations of autism.  
(Lower Ground Floor Lecture Theatre)

7.00 POSTERS AND DRINKS RECEPTION (Ground Floor Foyer and Room 308)

8.30 CONFERENCE DINNER, PESCATORI

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*Session B***Lower Ground Floor Lecture Theatre**

- 1.30            **Jason R. Taylor\***, **Joseph Kibbler\***, **Lee J. Lindley\***, **Luciano G. Buratto\*** and **Richard N. Henson** (MRC Cognition and Brain Sciences Unit)  
Processing fluency and recognition memory: Repetition priming increases familiarity, conceptual priming increases (correct) recollection.
- 2.00            **Helen Brown and Gareth Gaskell** (University of York)  
Episodic and lexical effects follow different time-courses during word learning.
- 2.30            **Pascale M. J Engel\*** (University of Oxford) (Sponsor Dorothy V.M. Bishop)  
Working memory and learning: A 3-year longitudinal study of children growing up in a multilingual environment.
- 3.00            TEA
- 3.30            **Christos Pliatsikas\* and Theodoros Marinis\*** (University of Reading) (Sponsor Philip T. Smith)  
Processing of regular and irregular past tense morphology in highly proficient L2 learners of English: a self-paced reading study.
- 4.00            **Colin J. Davis, Samantha F. McCormick\*, Lise Van der Haegen\* and Marc Brysbaert** (Royal Holloway University of London, Ghent University)  
Factors affecting letter position uncertainty in reading.
- 4.30            **Marc Brysbaert, Samantha F. McCormick\*, Lise Van der Haegen\*, Emmanuel Keuleers\* and Colin J. Davis** (Ghent University, Royal Holloway University of London)  
Masked associative priming in visual word recognition: What matters and what does not?
- 5.00            Annual General Meeting (room 206, 2nd floor) (EPS Members only)
- 6.00            **Bartlett Lecture - Professor Uta Frith** (Institute of Cognitive Neuroscience, UCL)  
Why we need cognitive explanations of autism.  
(Lower Ground Floor Lecture Theatre)
- 7.00            POSTERS AND DRINKS RECEPTION (Ground Floor Foyer and Room 308)
- 8.30            CONFERENCE DINNER, PESCATORI

*Session A***Ground Floor Lecture Theatre**

- 9.00            **Olga Zubko\***, **Ciro Civile\***, **David Wilkinson** and **Robert Johnston**  
(University of Kent at Canterbury)  
Reducing individual differences in face recognition ability.
- 9.30            **Doris Eckstein** and **Richard Henson** (University of Bern, MRC  
Cognition and Brain Sciences Unit)  
Categorical priming of masked faces: Priming of stimulus-response at  
an abstract level.
- 10.00          **David J. Kelly\***, **Sebastien Miellet\***, **Helen Rodger\*** and **Roberto  
Caldara\*** (University of Glasgow) (Sponsor Jules Davidoff)  
Tracking cultural diversity in visual perception across development
- 10.30          COFFEE
- 11.00          **Glyn W. Humphreys** and **M. Jane Riddoch** (University of  
Birmingham)  
Sub-ordinate object recognition without viewpoint invariance  
following bilateral occipito-parietal damage.
- 11.30          **Jules Davidoff** (Goldsmiths University of London)  
Some limitations to the default role of language in perceptual  
categorization.
- 12.00          **Sotaro Kita\***, **Emily Conroy\*** and **Zeshu Shao\*** (University of  
Birmingham) (Sponsor Andrea Krott)  
Time course of speech-gesture integration in comprehension: Insights  
from gating experiments.
- 12.30          **Kathleen Rastle**, **Ivan Yuen\***, **Matthew H. Davis** and **Marc  
Brysbaert** (Royal Holloway University of London, MRC Cognition  
and Brain Sciences Unit, University of Ghent)  
Activation of articulatory information in speech perception.
- 1.00-2.00      LUNCH

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*Session B***Lower Ground Floor Lecture Theatre**

- 9.00            **Matthew Haigh\* and Andrew J. Stewart** (University of Manchester)  
Reasoning as we read: an investigation into conditional processing during comprehension.
- 9.30            **Magdalena Krol\* and Wael El-Deredy\*** (University of Manchester)  
(Sponsor Luke Jones)  
Expected utility shapes confidence in perceptual decisions.
- 10.00          **Fenja Ziegler\*, Louise Handley\* and Dana Samson** (University of Nottingham)  
Making decisions for others (rather than for ourselves) modulates gambling choices.
- 10.30          COFFEE
- 11.00          **Simon Farrell and Anna Lelièvre\*** (University of Bristol)  
Accessing multiple types of positional information in short-term memory.
- 11.30          **Martin Greaves\*, Kaz Pasiecznik\*, Klaus Oberauer, Simon Farrell and Christopher Jarrold** (University of Bristol.)  
Effects of distractor repetition in complex span: Evidence for an interference-based account of forgetting from working memory.
- 12.00          **Ellen M Migo\*, Daniela Montaldi\*, Kenneth A Norman\* and Andrew R Mayes** (Institute of Psychiatry, University of Manchester, Princeton University)  
Manipulating recognition memory test format to predict both recognition and recall performance.
- 12.30          **Patrick Rabbitt, Mary Lunn\* and Dan Lunn\*** (University of Oxford, University of Western Australia)  
Good days and bad days: Individual differences and variability in performance.
- 1.00-2.00      LUNCH

*Session A***Ground Floor Lecture Theatre**

2.00            **Silke M. Göbel\* and Carolyn A. Telford\*** (University of York)  
(Sponsor Martin H. Fischer)  
Spatial-numerical associations in students with math difficulties.

**Symposium:**    Social cognition and clinical disorders  
Organisers: Professor Shelley Channon and Dr Patrizia Thoma

2.30            **Shelley Channon** (University College London)  
Social judgement in acquired brain injury and Asperger's syndrome.

3.00            **Deborah Riby\*** (University of Newcastle)  
Perception and attention to faces in Williams syndrome: Evidence  
from engagement and disengagement mechanisms.

3.30            TEA

4.00            **James Blair\*** (National Institute of Mental Health, Bethesda, USA)  
Dysfunction in moral and other forms of decision making in youths  
with disruptive behaviour disorders and callous-unemotional traits.

4.30            **Ute Habel\*** (University Hospital Aachen, Germany)  
Social cognition in schizophrenia and depression.

5.00            **Louise Phillips\*** (University of Aberdeen)  
Alzheimer's Disease and the perception and regulation of emotion.

End of Symposium

End of meeting

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*Session B***Lower Ground Floor Lecture Theatre**

- 2.00            **André Vandierendonck, Kimberley Vandamme\*, Arnaud Szmalec\* and Baptist Liefoghe\*** (Ghent University)  
Lateralized readiness potential reveals a bias to repeat tasks in voluntary task switching.
- 2.30            **Aureliu Lavric, Cai Longman\* and Stephen Monsell** (University of Exeter)  
Attentional selection of perceptual attributes following a task switch.
- 3.00            **Doug Barrett** (University of Leicester)  
Costs in dual-target search: the winner takes (almost) all.
- 3.30            TEA
- 4.00            **Carmel Mevorach, John Hodsoll\*, Harriet Allen\*, Lilach Shalev\* and Glyn Humphreys** (University of Birmingham, The Hebrew University of Jerusalem)  
Ignoring the elephant in the room: A neural circuit to down-regulate salience.
- 4.30            **David Soto and Yi Pan\*** (Imperial College London, Hangzhou Normal University)  
The modulation of perceptual selection by working memory is dependent on the focus of spatial attention.
- 5.00            **JeongIm Kim\* and Glyn Humphreys** (University of Birmingham)  
Working memory biases hierarchical stimulus selection.

End of parallel sessions

End of meeting

**Reserve List**

- 1. Lauren Stewart, Joseph Sparks\*, Patrick Nasralla\* and Rinus Verdonschot\*** (Goldsmiths University of London, University of Leiden)  
Action in the service of perception: pitch/space mappings in musicians.
- 2. Mark Haselgrove and Peter M. Jones\*** (University of Nottingham)  
The role of relative and absolute predictive-validity in Pavlovian conditioning.
- 3. Robbie Cooper\* and Filipe Cristiano\*** (University of Bristol) (Sponsor Chris Jarrold)  
Eye movements to real and photographic faces.

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- 1. Alexander D. Clarke\*, Kirsten I. Taylor\*, Marina Papoutsis\* and Lorraine K. Tyler** (University of Cambridge, University Hospital Basel)  
Modulation of recurrent interactions in the object processing system: An MEG study.
  - 2. Jade Claxton\* and Luc Boutsen** (Aston University)  
The role of functional parts in action decisions to hand-held tools.
  - 3. Meera Desai\*, Marko Nardini, Rachael Bedford\* and Denis Mareschal\*** (University of Oxford, Birkbeck University of London, Institute of Ophthalmology, Institute of Education)  
Fusion of visual cues in adults but not six-year olds.
  - 4. Kumiko Fukumura\* and Roger P.G. van Gompel** (University of Dundee)  
Beyond similarity: the role of affordances in avoiding ambiguity.
  - 5. Emma Gowen\*, Karen Leneh Buckle\* and Ellen Poliakoff** (University of Manchester)  
Is visuotactile multisensory integration affected in autism?
  - 6. Maciej Hanczakowski\* and Tomasz Pasek\*** (University of Hull, Jagiellonian University) (Sponsor Paul Skarratt)  
How general is the impairment in recollection in the list-method directed forgetting?
  - 7. Lara Harris\*, Andrew Olson and Glyn Humphreys** (University of Birmingham)  
Exploring the impaired production of irregular past tense verbs in a patient with a semantic deficit.
  - 8. Setu G. Havanur\*, Glyn W. Humphreys and Harriet Allen\*** (University of Birmingham)  
Regular configurations capture attention in preview search.
  - 9. Peter James Hills and Billy Walton\*** (Anglia Ruskin University)  
Face distortion after effects produced by parent, familiar and unfamiliar faces.
  - 10. Lai-Sang Iao\*, Susan Leekam\* and Helen McConachie\*** (Cardiff University, University of Newcastle) (Sponsor John Findlay)  
Non-specificity of theory of mind in preschoolers: Evidence from a new non-verbal false sign task.
  - 11. Holly M. Johnson\*, Carl Senior\* and Laura R. Shapiro and Luc Boutsen** (Aston University)  
Once a bad manager, always a bad manager: evidence that the Fundamental Attribution Error is robust to the effects of time and management experience.
  - 12. Peter M. Jones\*, Dominic M. Dwyer and Mark Haselgrove** (University of Nottingham, Cardiff University)  
Overshadowing of flavour-preference learning.

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- 13. Marjolein P.M. Kammers\* and Patrick Haggard** (University College London)  
Touching on temperature and pain.
- 14. Anastasia Kourkoulou\*, John Findlay, Gustav Kuhn and Susan Leekam\***  
(Durham University, Brunel University, Cardiff University)  
Enhanced implicit learning in autism: An eye-tracking study.
- 15. Janek S. Lobmaier and Fred W. Mast\*** (University of Bern)  
I trust your eyes but not your face: How face information and gaze direction modulate trustworthiness.
- 16. Sebastian Loth\* and Colin J. Davis** (Royal Holloway University of London)  
Response congruency effects in masked primed lexical decision.
- 17. Rachael Ludford\*, Jane Riddoch and Glyn Humphreys** (University of Birmingham)  
Temporal segregation and the affordance effect.
- 18. Catherine Manning, Marko Nardini and Denis Mareschal** (University of Oxford, Birkbeck University of London, Institute of Ophthalmology)  
Localisation of targets by vision and proprioception in 8 year olds and adults.
- 19. Laura J. Naude\*, Gary Jones and Marco Tamburelli\*** (Nottingham Trent University)  
Lexical and phonological neighbourhoods in non-word repetition.
- 20. Andrew J.D. Nelson, Karen E. Thur, Clare Spicer, Charles A. Marsden and Helen J. Cassaday** (University of Nottingham)  
6-Hydroxydopamine lesions to the shell, not core, of the nucleus accumbens produce abnormally persistent latent inhibition with weak preexposure.
- 21. Sarah J. Rappaport\*, M. Jane Riddoch and Glyn W. Humphreys** (University of Birmingham)  
The grouping benefit in extinction: Overcoming the temporal order bias.
- 22. Rachel Rogers\* and Robert A. Johnston** (University of Kent)  
The effect of personality on the facial attractiveness of a described subject, and a subsequently presented face.
- 23. Adrian Roper\*** (University of Manchester) (Sponsor Andrew Mayes)  
The Domain Dichotomy Perspective: Familiarity as a function of similarity.
- 24. Islam Salama\* and Martin Gareth Edwards** (University of Birmingham)  
Effects of action observation on strength and dexterity.
- 25. Meghan D Slack\* and Helen J. Cassaday** (University of Nottingham)  
Inhibition and individual differences in anxiety.

- 26. Christoph Teufel\*, Dean M. Alexis\*, Nicola S. Clayton and Greg Davis\*** (University of Cambridge)  
Top-down modulation of gaze-cueing by mental state attribution.
- 27. Patrizia Thoma\*, Shelley Channon and Irene Daum\*** (Ruhr-University of Bochum, University College London)  
Empathy in the course of normal aging.
- 28. Sylvia Vitello\*, Jonathan E. Peelle\*, Jennifer M. Rodd and Matthew H. Davis** (University College London, MRC Cognition and Brain Sciences Unit)  
Attentional modulation of semantic processing in speech comprehension: an fMRI study.
- 29. Laurence White\*, Sven L. Mattys and Lukas Wiget\*** (University of Bristol)  
What underlies the perception of rhythmic differences in speech?
- 30. Kelly Wild\*, Emma Gowen\* and Ellen Poliakoff** (University of Manchester)  
Imitation and visuomotor integration in Autism Spectrum Disorder.

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Intonation perception abilities in congenital amusiaFang Liu<sup>1</sup>, Aniruddh D. Patel<sup>2</sup> and Lauren Stewart<sup>1</sup>

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Congenital amusia has previously been considered to affect music perception and production only. However, recent research indicates that this disorder may have implications for other domains as well. This study further explores the domain specificity of congenital amusia through intonation perception tasks. Sixteen British amusics and sixteen matched controls participated in five intonation tasks, which involved identification and imitation of statements and questions in natural speech, and discrimination of statement-question pairs (which differed in pitch direction of the final word: downward in statements and upward in questions) in natural speech, gliding-tone analogs, and nonsense-speech analogs. The following results were obtained: (1) amusics had significantly worse performance on all five intonation tasks than controls; (2) while controls' performance was not affected by different types of stimuli in the three discrimination tasks, amusics were significantly better at discriminating gliding-tone analogs than natural-speech stimuli, and significantly worse at discriminating nonsense-speech analogs than natural-speech stimuli; (3) both amusics and controls performed worse on identification of statements and questions than on imitation and discrimination of these sentences. These findings point to the non-domain specificity of amusia and thus constrain theories of the underlying neural mechanisms associated with this deficit.

Memory for pitch in congenital amusia: Beyond a fine-grained pitch discrimination problem

Victoria J. Williamson and Lauren Stewart

Goldsmiths University of London

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Congenital amusia is a neurodevelopmental disorder affecting the perception and production of music. While congenital amusia has been associated with deficits in pitch discrimination, several reports suggest that memory deficits also play a role. The present study investigated short-term memory span for verbal and tonal information in 14 individuals with congenital amusia and matched controls. Analogous adaptive-tracking procedures were used to generate digit and tone spans using stimuli that exceeded psychophysically measured pitch perception thresholds. Individuals with congenital amusia had significantly smaller tone spans, whereas their digits spans were of equivalent size to those of controls. An automated operation span task was used to determine working memory capacity. Working memory deficits were seen in only a small subgroup of individuals with congenital amusia. These findings support the existence of a pitch-specific component within short-term memory and suggest that congenital amusia is more than a disorder of fine-grained pitch perception.

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The time course of access to semantic representations in children with ASD

Lisa Henderson, Maggie Snowling and Paula Clarke  
University of York  
[L.Henderson@psych.york.ac.uk](mailto:L.Henderson@psych.york.ac.uk)

The nature of semantic processing in ASD remains elusive. The present experiments explored the time course of semantic activation of homonyms in single-word and context using semantic priming, in children with ASD and typically developing controls (matched on age, nonverbal ability, decoding and vocabulary). Both groups showed the same pattern of priming at an ISI of 250ms: in single-word context, priming effects were obtained for both dominant and subordinate targets when preceded by related homonym primes; In sentence context, priming effects were obtained for contextually appropriate (subordinate) but not inappropriate (dominant) targets when preceded by subordinately biased sentence primes. However, group differences were apparent for the 1000ms ISI. In single-word context, the controls showed dominant but not subordinate priming whereas the ASD group did not show any priming. In sentence context, the controls continued to show contextually appropriate priming but the ASD group also showed contextually inappropriate priming. These results suggest children with ASD have a deficit in the later stages of semantic processing; while they appear to access their semantic representations adequately, they subsequently fail to maintain them to select a single meaning. Findings will be discussed in relation to models of semantic priming and theories of ASD.

‘Everyday memory’ impairments in Autism Spectrum Disorders

Catherine Jones<sup>1</sup>, Francesca Happé<sup>2</sup> and Tony Charman<sup>1</sup>  
1. Institute of Education  
2. Institute of Psychiatry  
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‘Everyday memory’ is conceptualised as memory within the context of day-to-day life. Although anecdotal evidence would predict deficits in individuals with autism spectrum disorders (ASDs), this hypothesis has yet to be formally tested. We assessed 94 adolescents (mean age 15.6 years) with an ASD and 55 age and IQ-matched individuals without an ASD on selected measures of everyday memory from the Rivermead Behavioural Memory Test (RBMT) as well as a standard measure of word recall (Children’s Auditory Verbal Learning Test-2: CAVLT-2). As predicted, the group with ASD showed significant deficits on the RBMT, which occurred alongside significant difficulty on the CAVLT-2. However, social and communication ability (Autism Diagnostic Observation Schedule: ADOS) was significantly associated with spontaneous recall of items on the RBMT but not with memory for items on the CAVLT-2. The complex nature of everyday memory and its relevance to ASD is discussed.

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Emotion recognition ability in Autism Spectrum DisordersTony Charman<sup>1</sup>, Catherine Jones<sup>1</sup> and Francesca Happé<sup>2</sup>

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*Background:* Experimental investigations of emotion recognition ability in ASD have been equivocal; hampered by small sample sizes, narrow IQ range and over-focus on the visual modality. *Methods:* We tested 93 adolescents (mean age 15;6 years, mean IQ 85) with an ASD and 54 adolescents without an ASD (mean age 15;6 years, mean IQ 88) on a facial emotion recognition task and two vocal emotion recognition tasks (one verbal; one non-verbal). Recognition of happiness, sadness, fear, anger, surprise and disgust were tested. Using structural equation modelling, we conceptualised emotion recognition ability as a cross-modal construct, measured by the three tasks. *Results:* There was no significant difference between groups for the majority of emotions and analysis of error patterns suggested that the ASD group were vulnerable to the same pattern of confusions between emotions as the non-ASD group. However, recognition ability was significantly impaired in the ASD group for surprise. IQ had a significant effect on performance for the recognition of all six emotions, with higher IQ adolescents outperforming lower IQ adolescents. *Conclusions:* The findings do not suggest a fundamental difficulty with the recognition of basic emotions in adolescents with ASD.

Overt and covert attentional orienting are influenced by predictive validity in human associative learningMike Le Pelley<sup>1</sup> and Tom Beesley<sup>2</sup>

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Many studies of animal and human associative learning have demonstrated that the readiness of a stimulus to engage in novel learning is influenced by the stimulus's predictive validity: its ability to predict the occurrence of significant events (such as rewards or punishments). Such findings led to the development of theories allowing for changes in the "associability" of a stimulus as a function of predictive validity (e.g. Kruschke, 2003; Mackintosh, 1975; Pearce & Hall, 1980). This leads to question: what is the psychological nature of associability? One widely-held view is that it reflects the attention paid to a stimulus, but this view has received little direct empirical scrutiny; differences in attention are simply inferred from observed differences in learning rate. We report data from several studies of human associative learning, investigating the effect of predictive validity on different effects that have been established as characteristic of attention in the wider cognitive psychology literature. The results of these experiments support the suggestion that predictive validity influences attention. Our findings are also consistent with the further assumption made by attentional theories of learning, that attention influences the rate of subsequent learning; however, support for this assumption is less clear-cut.

Kruschke, J.K. (2003). Attention in learning. *Current Directions in Psychological Science*, 12, 171-175.

Mackintosh, N.J. (1975). A theory of attention: Variations in the associability of stimuli with reinforcement. *Psychological Review*, 82, 276-298.

Pearce, J.M., & Hall, G. (1980). A model for Pavlovian conditioning: Variations in the effectiveness of conditioned but not of unconditioned stimuli. *Psychological Review*, 87, 532-552.

### The normal inhibition of associations is impaired by clonidine in Tourette Syndrome

Helen J. Cassaday, Ebrahim Kantini, Chris P. Hollis and Georgina M. Jackson  
University of Nottingham  
[helen.cassaday@nottingham.ac.uk](mailto:helen.cassaday@nottingham.ac.uk)

Whilst difficulties with the inhibition of particular kinds of response confirm the diagnosis of Tourette Syndrome (TS), experimental studies of response inhibition in TS participants have shown little difference in performance relative to controls. However, to date, no research has examined the inhibition of stimulus-stimulus associations (formally 'conditioned inhibition') in TS. The present study used video game style conditioned inhibition procedures suitable for younger participants. These were children and adolescents with a clinical diagnosis TS (in the absence of co-morbid attention deficit hyperactivity disorder) and typically developing age and sex matched controls. All groups showed overall normal inhibition of stimulus-stimulus associations, and there was no correlation between inhibitory learning scores and symptom severity ratings in TS participants. However, there was a clear reduction in the expression of conditioned inhibition in TS participants medicated with clonidine. There was no significant effect of medication on excitatory learning of the stimulus-stimulus associations. We suggest that the selective effect on inhibitory as opposed to excitatory learning could be related to clonidine's anxiolytic action (Gray 1982). In cases of TS, this would have an unwanted side effect in the form of reduced ability to learn to control associative triggers for tics (Leckman et al 2003).

Gray J.A, (1982): *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. Oxford University Press: pp 308-320; 359-363.

Leckman J.F., Walker DE, Cohen DJ (1993): Premonitory urges in Tourette's syndrome. *American Journal of Psychiatry* 150:98-102.

### Representation of geometric cues in the rat: New evidence from a spontaneous task

Anthony McGregor, Yutaka Kosaki, Alex Easton and Steven L. Poulter  
University of Durham  
[anthony.mcgregor@durham.ac.uk](mailto:anthony.mcgregor@durham.ac.uk)

In two experiments we examined the nature of the rat's representation of space in an environment with a distinctive shape. Gallistel (1990) claimed that rats represent the overall geometry of an environment to form a cognitive map. However, Pearce, Good, Jones, and McGregor (2004) showed that rats transfer spatial behaviour between arenas with different shapes that shared local geometric cues. A criticism of this study, however,

is that behaviour in the second arena may have been a result of the rats' overtraining in the first. Here we present evidence to support Pearce et al. (2004) from a spontaneous object recognition task in which rats were allowed to explore different objects in two geometrically distinct corners of an arena with two long and two short walls. Identical copies of one of the objects were then placed in both the geometrically equivalent and mirror image corners of an arena that was also made of two long and two short walls, but for which the overall shape was different. Rats showed a preference for exploring the novel object-corner combination in the rearranged arena, suggesting they had represented the local geometry of corners in the first arena rather than the overall shape.

Gallistel, C.R. (1990). *The Organization of Learning*. Cambridge, MA: MIT press

Pearce, J.M., Good, M.A., Jones, P.M., & McGregor, A. (2004). Transfer of spatial behavior between different environments: Implications for theories of spatial learning and the role of the hippocampus in spatial learning. *Journal of Experimental Psychology: Animal Behavior Processes*, 30, 135-147.

#### Stereotype threat in a navigational task: Effect of cue preference and task order

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While a stereotype exists that men are better navigators than women, previous navigational research has found that actual sex-differences are dependent on the task employed. Two experiments assessed: (i) sex differences in preference for navigational cues; (ii) the effect of known stereotypes on navigational performance. Experiment 1 established that in a virtual navigation task women exhibited a preference for landmark-cues over shape-cues when seeking a hidden goal, while men exhibited no cue-type preference. Experiment 2 examined the effect of stereotype threat (the fear of conforming to one's negative group stereotype, which can result in underperformance) within this context. The expectation was that women who were informed the genders were to be compared (stereotype threat) would underperform. Female participants who completed the (conceptually harder) shape-cue task prior to the (preferred) landmark-cue task underperformed on the shape-cue task following stereotype threat, compared to those in the control condition. However, when the landmark-cue task was completed prior to the shape-cue task female participants did not underperform, suggesting a potential stereotype threat intervention technique. Performance for men did not differ as a function of condition, task, or task order, suggesting performance for women on the shape-cue task was affected by the negative stereotype.

#### Age effects on incidental memory for objects and their locations: The role of eye movements

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We investigated age effects on the relationship between viewing and memory. We recorded eye movements of 10 young and 12 older adults ( $M = 23.6$  vs.  $72.8$  years) while they viewed, for 10 seconds, a photograph depicting a cubicle with 12 household objects. We then took them to the actual cubicle for surprise memory tests. Participants were first asked to identify the 12 objects among 12 distractors. They were then given the 12 objects to place to their “home” locations. Participants also gave confidence ratings for each object identification and placement. Object memory, indexed by identification accuracy, was significantly higher in the young than older participants [ $0.52$  vs.  $0.26$  after guessing correction]. Young participants were also more confident about correctly identified objects. More importantly, the accuracy was contingent on fixation in the older, but not young, group. Object-location memory, indexed by displacement distance between placed and home locations, showed no age effect. However, confidence in the placement was again contingent on fixations in the older, but not young, group. In conclusion, accuracy and confidence in object and object-location memory were related to eye movements during scene inspection. The relationship is stronger in the older group.

**Symposium :** Research on Autism Spectrum Disorders: The new wave  
Organiser: Professor Francesca Happé

Selective attention and perceptual load in Autism Spectrum Disorder

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Selective attention, the ability to focus on tasks while ignoring distractors is crucial to everyday life. Existing literature on selective attention in ASD is mixed - some research suggesting over-focused attention, while others highlight an abnormally broad attentional lens (Burack, 1997). Our research has, for the first time, examined selective attention in ASD using the Load Theory of attention and cognitive control (Lavie et al, 2004). According to Load Theory, the extent of distractor processing depends on the perceptual-load (amount of potentially task relevant information) of the task. Results showed that individuals with ASD continue to be affected by distractors at higher levels of perceptual-load than controls; indicative of increased perceptual capacity in ASD (Remington et al, 2009). While the initial study used indirect measures (reaction times) to draw conclusions regarding distractor processing, such measures cannot be used to infer whether task-irrelevant stimuli are consciously perceived. Our latest study investigated this by using a dual-task paradigm to examine how increased distractibility in ASD relates to conscious perception and awareness. The findings reinforce the view that individuals with ASD have increased perceptual capacity and imply that they can consciously perceive a larger number of visual stimuli at any given time.

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#### Arousal and memory in ASD: How do they interact?

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Several recent studies suggest that Autism Spectrum Disorder (ASD) may be characterised by abnormalities in the way stimulus-induced arousal (e.g. changes in Galvanic Skin Response) modulates processes such as learning, memory and attention. The majority of such studies, however, used tasks involving single words as materials, making it difficult to ascertain how general atypicalities in the interaction between arousal and cognition are in ASD. In the present study we used a paradigm developed by Heuer & Reisberg (1990) to address this issue. Individuals were shown a narrated slideshow that told either a neutral or emotionally salient story, and memory for the narrative was subsequently assessed through multiple choice and free recall procedures. Similar to typical individuals, those with a diagnosis of ASD remembered the emotional narrative (in particular the emotional episode) better than the neutral one, but unlike typical individuals they did not exhibit enhanced levels of autonomic arousal during the most salient emotional slides. An additional version of the task is currently being employed in order to determine whether individuals with ASD continue to exhibit typical levels of memory for the materials when the narrative structure of the story is disrupted (i.e. slides presented in random order).

Heuer, F. & Reisberg, D. (1990). Vivid memories of emotional events: The accuracy of remembered minutiae. *Memory & Cognition*, 18, 496-506.

#### Be rational: Goal understanding in autism

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In contrast to the intense focus on belief understanding in autism, much less attention has been paid to the ability to understand goals, intentions and desires. Brain systems for goal understanding have been identified in the inferior parietal and inferior frontal cortex, and dysfunction of these areas has been associated with autism. However, the integrity of these areas in autistic individuals has not been fully tested. In this talk, we present new functional magnetic imaging data examining the response of the autistic brain during observation of goal directed hand actions. We find evidence of similarities between typical and autistic neural responses in early visual processing and in the response to repeated goal directed hand actions in the anterior intraparietal sulcus. This suggests that basic visual processing of biological motion and of action goals is intact in

autism. In contrast, we found differences between typical and autistic neural responses in the medial prefrontal cortex when viewing irrational actions. This suggests that only higher order processing of other people's actions is disrupted in autism, and implies links between the ability to process irrational actions and the ability to comprehend beliefs.

Do you see what I am saying? The effects of visual speech on auditory ERP responses to spoken words in Autism Spectrum Disorder.

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Language and communicative impairments are among the primary characteristics of autism. During face-to-face conversation, the auditory modality provides the phonetic information necessary to convey a linguistic message, while the visual modality can provide place of articulation, prosodic and extralinguistic information (see Granström & House, 2005). There is behavioural evidence that AV integration may be atypical in ASD (e.g. Bebko et al, 2006). However, examining the effects of visual speech on auditory event-related potentials (ERPs) elucidates the neural mechanisms of AV integration, even in cases where compensation strategies may result in intact integration at the behavioural level (Magnée et al, 2008). The present study examines AV effects on three auditory ERP components: the N1 as a measure of sensitivity to sound onset, the P2 as a measure of transition from phonetic to lexical-semantic processing; and the N4 as a measure of semantic integration. ERP responses to single sensory modality and AV monosyllabic words were recorded from 11 adolescent boys with ASD and 11 age- and IQ-matched controls. Significant group differences were found in AV interaction effects on the P2 component, and a trend suggested on the N4 component, implying that the lexical-semantic processing of AV speech may be atypical in ASD.

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Granström, B., House, D. (2005) Audiovisual representation of prosody in expressive speech communication. *Speech Communication*, 46(3-4), 473-484.

Magnée, M.J.C.M., de Gelder, B., van Engeland, H., Kemner, C. (2008) Audiovisual speech integration in pervasive developmental disorder: evidence from event-related potentials. *Journal of Child Psychology and Psychiatry*, 49(9), 995-1000.

Decoding mental representations from fMRI: what can we learn about autism?

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Recent functional neuroimaging techniques permit investigation of the information represented within particular brain regions, rather than whether or not they

are “activated”. Such techniques are well placed to make links between cognitive, computational modelling, and neuroscientific approaches. This talk will discuss the possible contribution of information-based functional neuroimaging to the study of autism. Data will be presented showing that the manner in which medial prefrontal cortex is divided into functionally specialised regions is atypical in high-functioning autism. Furthermore, multi-voxel pattern analysis techniques reveal that, whereas similar tasks elicit similar patterns of medial prefrontal brain activity in control participants, this pattern is disrupted in autism. These findings suggest 1) that autism is associated with abnormal functional brain specialisation, possibly accounting for idiosyncratic patterns of strengths and weaknesses, and 2) that autism may be characterised by the use of distinct neural circuits for similar tasks. This may underlie difficulties in generalising between similar experiences.

### End of Symposium

#### Processing fluency and recognition memory: Repetition priming increases familiarity, conceptual priming increases (correct) recollection

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Unexpected fluency of recognition memory test cues may be (mis)attributed to past exposure. Masked repetition priming increases the likelihood an item will be endorsed as 'Old' (Jacoby & Whitehouse, 1989) via 'knowing' (as opposed to 'remembering'; Rajaram, 1993; Woollams et al., 2008). Semantic priming also increases 'know' responses (Rajaram & Geraci, 2000), suggesting that conceptual fluency contributes to familiarity. However, words in that study were both conceptually related and lexically associated, so it is unknown whether increased familiarity was due to fluency at the lexical or conceptual level. We investigated the influence of non-associated conceptual priming and repetition priming on recognition memory judgments. Primes were displayed briefly (50ms) and masked, followed by the Target word (test cue). Subjects judged whether the Target had been presented previously ('Old') or not ('New'), and if 'Old', whether they recollected episodic details of the previous encounter ('Remember') or it was simply more familiar ('Familiar'). Primes and Targets were either unrelated (50%), the same word (25%), or conceptually related (25%). Repetition priming increased Familiar hits and false alarms; however, conceptual priming increased Remember hits only. These findings suggest that fluency beneath the conceptual level may be interpreted as familiarity, whereas conceptual fluency aids correct recollection.

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### Episodic and lexical effects follow different time-courses during word learning

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Recent research has indicated that while novel phonological representations are formed immediately after encountering a new word, and that these representations contain detailed episodic information (Creel, Aslin, & Tanenhaus, 2008), some aspects of word learning such as engagement in lexical competition and free recall benefit from periods of offline consolidation (Dumay & Gaskell, 2007). However, the time-course of episodic effects for novel words has not yet been investigated. Research has indicated that episodic effects for real words are present immediately but fade over time (Goldinger, 1996). Here we present three experiments demonstrating that whilst talker-specific effects are present in immediate memory for novel words as well as up to one week later, these episodic effects do not benefit from offline consolidation. In contrast, the same novel words do not engage in lexical competition with phonologically similar real words until after a period of offline consolidation. Our findings are interpreted within a complementary learning systems framework (McClelland, McNaughton, & O'Reilly, 1995), which proposes that hippocampal areas mediate newly formed memory representations, but that offline consolidation strengthens neocortical representations. We argue that episodic effects are mediated by hippocampal areas, but that lexical competition effects are dependent on more abstract neocortical representations.

Creel, S. C., Aslin, R. N., & Tanenhaus, M. K. (2008). Heeding the voice of experience: The role of talker variation in lexical access. *Cognition*, 106(2), 633-664.

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Working memory and learning: A 3-year longitudinal study of children growing up in a multilingual environment

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This study presents the findings of a 3-wave, latent variable longitudinal study, exploring variations of working memory in children and its contributions to key domains of learning. A sample of 119 Luxembourgish children, learning German and French as secondary languages, were followed from kindergarten to second grade and completed multiple assessments of working memory, short-term memory, phonological awareness, fluid intelligence, vocabulary, language comprehension, foreign language knowledge, reading, spelling, and mathematics. Results indicate that relations between the measures were best characterized by a model consisting of two related but separable constructs - corresponding to short-term storage and a central executive - that were highly stable across the years. Whereas verbal short-term memory was more specifically linked to vocabulary, the central executive supported learning in a wide range of learning domains, including language comprehension, literacy, and mathematics. The findings suggest that verbal short-term memory is one of the main contributors to vocabulary development by supporting the formation of stable phonological representations of new words in long-term memory. The central executive in contrast makes general rather than specific contributions to learning - possibly in terms of an attentional control system that actively maintains crucial information and regulates controlling processes during complex cognitive activities.

Processing of regular and irregular past tense morphology in highly proficient L2 learners of English: a self-paced reading study.

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Dual-models of processing suggest that processing of English past-tense morphology involves two distinct routes: regular verbs involve the application of a rule, whereas irregular verbs are retrieved directly from memory (Pinker, 1999). When Second Language (L2) learners are concerned, Ullman (2001) suggested that for the processing of regular verbs, they should rely more on memory than rule application. This was recently supported in a masked priming experiment with L2 learners of English (Silva & Clahsen, 2008). This study investigates effects of L2 exposure in processing of regularly and irregularly inflected verbs along with regularised and irregularised verbs, embedded in sentences, using the self-paced reading paradigm. Regular and irregular verbs were matched on frequency, length and neighbourhood density. The task was administered to 30 native speakers of English and 60 highly proficient Greek learners of English, 30 with naturalistic L2 exposure and 30 with classroom exposure. Reaction Time (RT) data at the critical segment (verb) revealed that regular verbs showed longer RTs than irregular verbs in all three groups. This suggests that, like native speakers, highly proficient L2 learners of English are capable of using combinatorial processing of morphologically complex words when they process verbs embedded in sentences irrespectively of their type of L2 exposure.

Pinker, S. (1999). *Words and Rules: The ingredients of language*. London: Weidenfeld & Nicolson.

Silva, R. & Clahsen, H. (2008): Morphologically Complex Words in L1 and L2 Processing: Evidence from Masked Priming Experiments in English, *Bilingualism: Language and Cognition*.

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#### Factors affecting letter position uncertainty in reading.

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Results from the masked form priming literature indicate that there is considerable uncertainty regarding the positions of letters within words early in the process of visual word identification. In this talk we describe some recent work that has started to investigate the factors affecting letter position uncertainty. We show that there is a linear effect of distance from fixation on position uncertainty. Subsequent experiments reveal effects of word length and bigram frequency on the precision of position coding. Finally, we discuss how to incorporate these influences in current models of orthographic input coding.

#### Masked associative priming in visual word recognition: What matters and what does not?

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A review of the literature on the masked associative/semantic priming effect shows that the priming effect increases linearly from a prime duration of 30 ms (when it is nearly absent) to a prime duration of 100 ms, and that the size of the effect correlates positively with the association strength between prime and target. These findings are predicted from an elementary activation model according to which the input to the target based on the prime depends on the lexical activity of the prime multiplied by the weight of the prime-target association. Such a model also predicts an effect of prime frequency. In two experiments we failed to obtain such an effect, however. We argue that the most likely explanation of this finding is the fact that high-frequency primes are comparatively less likely to be followed in discourse by their targets than low-frequency primes.

**Bartlett Lecture**Why we need cognitive explanations of autism

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In the 50 years following the first description of autism experimental psychologists have concentrated on paradigms associated with the cognitive revolution in psychology, which put information processing models centre stage. However, there has been an enduring tension between theories that explain the signs and symptoms of autism in terms of sensory-motor deficits and those that focus on dysfunction at a more abstract level of processing. This tension is still unresolved, but it is clear that defects in central cognitive processes can explain many of the puzzling features of autism, including some atypical behaviour in sensory input and motor output processing. Two theories in particular have made solid links between brain and behaviour and point to two distinct cognitive phenotypes of autism. The ‘mindblindness’ idea has proved robust and can explain the defining difficulties in reciprocal social interaction. The ‘detail- focus’ idea can explain the non-social features manifest in an uneven profile of abilities and special talents. However, other ideas, e.g., poor executive control and faulty mirror neurons remain in play. Future developments are likely to involve learning theories framed in terms of computational reward based mechanisms, which are also likely to be atypical in autism. The progress made so far amply demonstrates that we need cognitive explanations to guide future research on the neuro-genetic basis of autism.

Reducing individual differences in face recognition ability

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The ability to recognize faces is highly variable across individuals. Some people remark that they ‘never forget a face’ while others are ‘terrible with faces’. In general terms, face recognition involves two main processes; the formation of a structural description followed by its semantic identification. Recognition performance will therefore likely depend on the ability to carry out either one or both forms of process. In the present study, we attempted to improve the efficiency with which these were carried out. An old/new task was administered consisting of two conditions; (1) a perceptual condition in which participants were encouraged to focus on both the local and global details of faces during encoding, and (2) a semantic condition in which they were told to instead focus on the personality of the face. Relative to baseline, below-average performers improved in both conditions while above-average performers did not. The implication is that above-average performers already utilised the perceptual and semantic strategies that we sought to induce, while below-average performers did not. Together with other data that will be presented, we conclude that individual differences in face recognition change over time and depend partly on the voluntary manner in which faces are committed to memory.

Categorical priming of masked faces: Priming of stimulus-response at an abstract level

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Masked category priming was used to investigate whether semantic information about a face can be retrieved without awareness of that face. Participants categorized a probe face preceded by a sandwich-masked prime face of the same or opposite category, using a sex or fame categorization task. Category priming was defined as the decrease in reaction times for same-category relative to opposite-category pairs. Priming by faces that had previously been seen as probes was reliable across five experiments. This suggests some form of Stimulus-Response (S-R) learning, whereby responses become learned to stimuli when they appear as probes, and those responses are implicitly retrieved when the same stimuli are presented as masked primes. However, priming generalised across different responses and tasks, which implies that any S-R learning must occur at an abstract level: We propose one possibility that participants were mentally categorizing every probe face not just on the current task, but on all tasks they had been asked to perform.

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Tracking cultural diversity in visual perception across development

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Cultural differences in perception and eye movements have recently been reported in adults. Adults from Western cultures tend to process information *analytically* (i.e. local processing) whereas adults from Eastern cultures process information more *holistically* (i.e. global processing; see Nisbett & Miyamoto, 2005). In terms of eye movements, face processing studies conducted in Western countries have found that adults typically direct fixations towards the eye and mouth regions (e.g., Henderson, et al., 2005). By contrast, Blais, Jack, Scheepers, Fiset, and Caldara (2008) reported that East Asian adults fixate centrally on the nose region and generally avoid the eyes during face processing. Such findings challenge previously held notions regarding the universality of perception. The purpose of the current studies was to explore the development of cultural differences in perception and eye movements. British and Chinese Children aged 5-12 years of age completed a behavioural experiment with Navon figures (e.g., Davidoff et al., 2008) and old/new recognition tasks with human faces, sheep faces and *greebles* whilst eye movements were recorded. Relative to British children, Chinese displayed an increasing global processing bias across development. Eye movement strategies were seen to ‘fine-tune’ across development, with divergent and adult-like strategies emerging by 11-12 years of age.

Blais, C., Jack, R.E., Scheepers, C., Fiset, D., & Caldara, R. (2008). Culture shapes how we look at faces. *PLoS ONE*, 3, e3022.

Davidoff, J., Fonteneau, E., & Fagot, J. (2008). Local and global processing: Observations from a remote culture. *Cognition*, 108, 702-709.

Henderson, J.M., Williams, C.C., & Falk, R.J. (2005). Eye movements are functional during face learning. *Memory and Cognition*, 33, 98-106.

Nisbett, R.E., & Miyatomo, Y. (2005). The influence of culture: holistic versus analytic perception. *Trends in Cognitive Science*, 9, 467-473.

Sub-ordinate object recognition without viewpoint invariance following bilateral occipito-parietal damage

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Many theories of object recognition hold that viewpoint invariance is computed prior to object recognition taking place. We present data from a patient, RB, who suffered bilateral occipito-parietal damage and presented with a range of visuo-perceptual impairments. RB showed a reasonably preserved ability to recognize line drawings of familiar objects shown in prototypical views but was markedly impaired when presented with overlapping figures and figures shown from unusual views. Interestingly, his ability to identify drawings of objects at a sub-ordinate level was largely preserved, but he was

unable to make discriminations based on parts of objects. RB's case indicates that subordinate object recognition can be achieved even when there are marked impairments to both parts-based coding of objects and to the processes subserving viewpoint invariance

This supports the argument for a wholistic pattern recognition process operating through ventral visual cortex, tuned to prototypical viewpoint.

#### Some limitations to the default role of language in perceptual categorization

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In the human adult, there is now growing agreement that language networks are active in colour comparisons. New evidence will be presented to confirm the absence of colour categories in the monkey. However, a reassessment is given of published human data using the matching-to-sample paradigm. Varying the range of stimuli, new modeling data give a similar strong tendency to divide the range of coloured stimuli into two equal groups in Western (English or French) speakers and in a remote population (Himba). The boundary depended on the range of stimuli and hence overrides established colour category boundaries whether thought universal or language induced. Binary division is suggested as the more basic mechanism through which labels act to promote colour categories. A distinctive stimulus (focal colour) in the range affected the equal division though observers again made a boundary. Most important for the role of language, range differences largely did not affect the names given to the colours by either Western or Himba observers and other experiments will be reported for which range differences are immaterial to colour boundaries (categorization).

#### Time course of speech-gesture integration in comprehension: Insights from gating experiments

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When we speak, we often spontaneously produce hand gestures as well. The current study investigated the time course of how the listener/viewer integrates information from speech and gesture in two experiments, using the "gating paradigm". The stimuli consisted of three types of video clips: those with a spoken verb (e.g., to rotate) and an iconic gesture (a circling hand depicting rotation) (multi-modal condition), those with just a spoken verb (audio-only condition), those with just a gesture (visual-only condition). Participants were first presented with the initial part of a video clip, and then with successively longer clips. In Experiment 1, the participants were asked to recognise the verb in the multimodal and audio-only conditions. In Experiment 2, the participants were asked to indicate the meaning of the gesture in the multimodal and visual-only conditions. It was found that multimodal presentation facilitated word recognition and gesture interpretation (Experiments 1 and 2). Furthermore, multimodal presentation initially increased the number of candidate word types (Experiment 1), but it did not increase the number of candidate gesture interpretation types (Experiment 2). The

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results indicate that gesture and speech are incrementally integrated with each other, with qualitatively different consequences for each modality initially.

#### Activation of articulatory information in speech perception

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Emerging neurophysiological evidence indicates that motor systems are activated during the perception of speech, but whether this activity reflects basic processes underlying speech perception remains controversial. Our contribution is to report the first direct behavioral evidence that specific articulatory commands are activated *automatically* and *involuntarily* during speech perception. We used electropalatography to measure whether motor information activated from spoken distractors would yield specific distortions on the articulation of visually-presented target syllables. Participants produced target syllables beginning with /k/ or /s/ while listening to the same syllables or to incongruent rhyming syllables beginning with /t/. Tongue-palate contact for target productions was measured during the articulatory closure of /k/ and during the frication of /s/. Results revealed sub-categorical ‘traces’ of the incongruent distractors on target productions, with the incongruent /t/-initial distractors inducing greater alveolar contact in the articulation of /k/ and /s/ than the congruent distractors. Two additional experiments established that the nature of this interference effect is dependent specifically on the articulatory properties of the spoken distractors and that this interference effect arises only when distractors are presented in the auditory modality. Results are discussed in terms of a broader emerging framework whereby the perception of action entails motor activation.

#### Reasoning as we read: an investigation into conditional processing during comprehension

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Conditional statements of the form *if p then q* (e.g., *if student tuition fees rise, then applications for university places will fall*) invite people to hypothetically consider a possible event (p) and one of its possible consequences (q). In three reading time experiments we examined the processes that allow readers to rapidly comprehend and evaluate conditional information during comprehension. Our results suggest that readers are easily able to engage in hypothetical thinking for indicative but not for counterfactual conditionals (Experiment 1). By engaging in hypothetical thinking readers are able to suspend their evaluation of the individual clauses and base their belief in the statement as a whole on the conditional probability of q given p (Experiment 2). This occurs even in the absence of any contingency between p and q (Experiment 3). Our data support a suppositional based account of conditional processing for indicative conditionals.

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Expected utility shapes confidence in perceptual decisions

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The choice of an option with less probable outcome may be more beneficial if it leads to lower cost or higher reward. Within the Bayesian approach to perception, the ideal observer chooses an interpretation of sensory input with maximum expected utility. Expected utility of the distribution of outcomes is the sum of utilities of those outcomes weighted by probabilities of their occurrence. Thus, according to the Bayesian approach, expected utility should shape not only our conscious, rational choices, but also processing on subconscious level. In this study, 30 participants were shown morphed pictures of cats and dogs. They played a game where they decided if the cat (or dog) dominated the picture and gained (or lost) points in return. In the “liberal” condition, “target-dominates” responses were favoured, while in the “conservative” condition “target does not dominate” responses were related to higher expected utility. Hit rate,  $t(29)=5.36, p<0.001$ ) and hits-related confidence ( $t(29)=2.37, p<0.05$ ) were significantly higher in the liberal condition, compared to the conservative condition. Thus, participants not only chose the stimulus interpretations related to higher expected utility, but also were more confident about those choices. This suggests that expected utility can change our confidence about what we perceive.

Making decisions for others (rather than for ourselves) modulates gambling choices.

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We know a great deal at both the behavioural and neural levels about risk seeking and risk aversive behaviour when we make decisions for ourselves (e.g. Loewenstein et al., 2008), but we know comparatively little about the processes that underlie making decisions for others. We tested 39 undergraduate students in a gambling task (De Martino et al., 2006), asking them to make forced choice decisions between a sure option, framed as loss or gain, and a risky gamble option both for themselves and for another person. Participants who were susceptible to the framing effect for self-decisions (choosing to gamble when the sure option was framed as a loss but avoiding the risk of gambling if the sure option was framed as a gain), continued to gamble in the loss frame when making decision for others but also started to gamble more in the gain frame. Participants who were risk neutral and not influenced by the framing for self decisions, became susceptible to framing when making decisions for others. Thus, participants who were susceptible to framing in self decisions moved towards risk neutrality for others, but those not susceptible for self moved away from risk neutrality when making decisions for others.

De Martino, B., Kumaran, D., Seymour, B., & Dolan, R. J. (2006). *Frames, Biases, and Rational Decision-Making in the Human Brain. Science, 313, 684-687.*

Loewenstein, G., Rick, S., & Cohen, J. D. (2008). *Neuroeconomics. Annual Review of Psychology, 59, 647-672.*

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Accessing multiple types of positional information in short-term memory

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Most current models of serial order memory assume that positional information is represented at (at least) two levels: the position of an element in a group, and some coarser representation of the position or item in the list overall. Most theories assume that these two types of positional cues are combined at recall and simultaneously used to cue an element in the sequence. We present data from two experiments in which participants were probed to recall elements from particular positions in temporally grouped sequences. The data strongly suggests that both types of information are not cued simultaneously, and that access to a sequence element requires access to the coarser representation of position before the more specific item-level representation can be obtained. The data suggest a hierarchical rather than factorial access to multiple types of positional information in short-term memory.

Effects of distractor repetition in complex span: Evidence for an interference-based account of forgetting from working memory.

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Repeating distractors in the complex span task reduces the forgetting from working memory due to distraction, a finding that is consistent with an interference-based account of forgetting (Oberauer & Lewandowsky, 2008). However, previous studies did not control the available free time following distractor processing, such that that reduced forgetting for repeated distractors may merely reflect that those distractors are processed more quickly. We examined the effects of distractor repetition in a complex span task in which the effective free time was controlled across three distractor presentation conditions (a single distractor; same distractor repeated four times; a sequence of four unique distractors). Distractor processing times for the complex span task were obtained using a PRP (Psychological Refractory Period) task that measured reaction time to a change in text colour while speaking in each distractor condition. Even when the slightly longer time required to process unique distractors was accounted for in the complex span task, these distractors still produced worse recall of list items than repeated distractors. These findings suggest that interference produces a substantial amount of forgetting in working memory.

Oberauer, K., & Lewandowsky, S. (2008). Forgetting in immediate serial recall: Decay, temporal distinctiveness, or interference? *Psychological Review*, *115*, 544-576.

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Manipulating recognition memory test format to predict both recognition and recall performance

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Recognition memory is underlain by the separable processes of recollection and familiarity. Recollection involves the recall of specific details from a previous encounter whereas familiarity is a general feeling of memory without recall. Following patient work (Holdstock et al., 2002) and neural network model predictions (Norman & O'Reilly, 2003), we present evidence from young volunteers that manipulating test format within a recognition test, where each target has similar distractors, can affect the degree to which familiarity can support task performance (Migo et al., 2009). Specifically, in a forced choice test, presenting an item with its corresponding distractor allows familiarity to solve the task, whereas presenting an item with a distractor to another target requires recollection. Further data using healthy older adults has validated a single recognition test composed of both formats. Participants completed the experimental test alongside a standardised neuropsychological test battery; performance on the non-corresponding version of the test was associated with standardised recall and recognition measures, whereas performance on the corresponding version was only associated with recognition. This suggests that a single recognition test, easy to administer and to translate to patient studies, could quickly capture information on both recollection and familiarity abilities.

Good days and bad days: individual differences and variability in performance

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We show that variability in performance from moment to moment, from day to day, and between different tasks performed on the same day are all shown to be driven by the same statistical and logical constraints. Older individuals and those who score lower on paper and pencil intelligence tests are more variable from moment to moment and so, also, from day to day and between tasks performed during the same testing session. However other kinds of systematic variability, such as circadian variability, are not simply driven by statistical necessity, but are also stable characteristics of individuals. To these two different kinds of systematic variability we now can add a third: systematic variability between days, such that individuals have “good days”; on which they perform relatively better on all of 6 different tasks that they are asked to carry out within a 1 hour session, and, equally, “bad days”; on which, if they perform relatively poorly on one task they also perform relatively poorly on all the others. We explore, and suggest reasons for, systematic individual differences in this third type of variability.

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Spatial-numerical associations in students with math difficulties

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Behavioural and neuroimaging studies suggest that there is a close link between numerical and spatial representations. In parity judgment smaller numbers are typically responded to faster with a left than right hand response while the opposite pattern is observed for large numbers (horizontal SNARC effect). An association between number magnitude and bottom/top responses (vertical SNARC effect) has been proposed too. The strength of these associations might be related to math ability. We investigated the SNARC effect and speeded calculation in university students with math difficulties (MD) and matched control participants. As expected, the group with math difficulties performed significantly worse on the speeded calculation task. Overall, we found a significant SNARC effect for both horizontal and vertical dimensions. In both dimensions the MD group had a weaker SNARC effect than the control group. The strength of individuals' SNARC effect, however, was not significantly related to their performance on speeded calculation or a standardized arithmetic test. This suggests that inter-individual differences in the link between numerical and spatial representations are not related to arithmetic ability, but rather to experience with numbers in general or strategy use [185].

**Symposium:** Social cognition and clinical disorders

Organisers: Professor Shelley Channon and Dr Patrizia Thoma

Social judgment in acquired brain injury and Asperger's syndrome

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Social cognition includes ability to interpret others' thoughts, behaviour and emotions, and to understand and regulate our own. Understanding the nature of any processing deficits underpinning everyday life difficulties poses a complex challenge, since they may result from impairment in multiple cognitive/emotional components. Multiple cognitive/emotional routes to the development of everyday life difficulties pose a complex challenge both in understanding the nature of the relevant processes and in developing adequate methods for clinical assessment. Evidence from participants with adult-acquired lesions involving frontal lobe dysfunction and adults with Asperger's syndrome, a neurodevelopmental disorder, are considered. Studies relating to different types of social judgment will be presented, including causal inference, social communication and problem-solving. The possible contributions of component skills are considered in relation to everyday performance.

Perception and attention to faces in Williams syndrome: Evidence from engagement and disengagement mechanisms

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The genetic disorder Williams syndrome (WS) is associated with a social phenotype that includes hyper-sociability and an increased drive towards social engagement. During social interactions individuals with WS tend to hold face gaze for a prolonged period of time, evidenced through observational methods and recent eye tracking research. I discuss whether prolonged face gaze is associated with increased attention capture from socially salient information (specifically faces) or whether gaze behaviour is more closely related to problems of attention shifting / disengagement. I present evidence from eye tracking research which is supported by a behavioural task probing attention capture and disengagement from face and non-face stimuli in WS and typical development.

Dysfunction in moral and other forms of decision making in youths with disruptive behavior disorders and callous-unemotional traits.

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There appears to be some heterogeneity within the population of individuals classified as presenting with Conduct Disorder (CD). Within the group of individuals presenting with CD are those who also show heightened levels of callous and unemotional (CU) traits. These individuals show heightened levels of behavioral problems even relative to other individuals with CD and are at significantly elevated risk for psychopathy in adulthood. Previous fMRI work with this population has concentrated on examining their empathy deficit; their impairment in responding to the fear of others. This paper will present two studies examining stimulus-reinforcement based decision making. In these studies, adolescents with CD+CU and healthy comparison adolescents (N = 15 in both groups) were presented with two paradigms. The first was a passive avoidance learning paradigm where the participant has to learn to respond to some stimuli in order to gain reward while withholding from other stimuli to avoid punishment. The second was a moral judgment paradigm. In both studies, patients with CD+CU showed reduced amygdala responsiveness. In the passive avoidance paradigm this was accompanied by anomalous reinforcement signaling in orbital frontal cortex. In the moral reasoning paradigm, this was accompanied by reduced amygdala-orbital frontal cortex connectivity. These results will be discussed in terms of dominant models of the disorder.

Social cognition in schizophrenia and depression

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The ability to show empathic behavior plays a critical role for social communities. Several definitions of empathy have been proposed and most models agree on three core constituents (Decety & Jackson, 2004): 1) emotion recognition (perceptive component), 2) affective reaction (emotional experience), and 3) cognitive component (perspective taking). Schizophrenia patients are impaired in all competencies of empathy. These deficits are furthermore associated with psychopathology. Similar deficits have also been described in depressed patients. In different studies using 3T fMRI we investigated emotion recognition, affective responsiveness, emotional perspective with static as well as dynamic stimulus material in different subgroups of schizophrenia and depressed patients. Behavioral data point to significant empathy deficits in schizophrenia patients further supporting the assumption of a general empathic deficit. Similarly deficits in humor processing and empathy have been observed in depression, however less pronounced. The functional data indicate task-specific as well as consistent (across tasks) disorder specific and unspecific neural dysfunctions in brain regions associated with emotion processing and perspective taking. We would hence suggest a multi-faceted disturbance of neuronal networks sustaining the perception and processing of empathy-related stimuli in schizophrenia, which is apparent in behavioral deficits, neural dysfunctions and the clinically observed impairments in social interaction.

Decety, J., & Jackson, P.L. (2004). The functional architecture of human empathy. *Behavioral and Cognitive Neuroscience Reviews*, 3, 71-100.

#### Alzheimer's Disease and the perception and regulation of emotion

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While the cognitive effects of Alzheimer's Disease (AD) are well documented, less is known about the impact of the condition on emotional skills. Our recent studies have explored the effects of AD on the ability to perceive and regulate emotions. AD impairs the ability to perceive most facial expressions of emotion, with the exception of preserved ability to identify disgust. While impaired executive function in AD predicts the ability to carry out emotion labelling tasks requiring complex decision-making, more basic aspects of visual perception are implicated in AD-related impairments in simpler tasks of emotion recognition. The emotion labelling difficulties in AD were associated with reduced frontal lobe activity in SPECT scans. This relationship could not be explained by variance in dementia severity or cognitive function. In contrast to these declines in emotion perception, another study indicated that people with AD showed remarkably intact ability to follow instructions to deliberately suppress behavioural expressions of emotion. However, they did struggle to amplify their emotional expressions of emotion, and this difficulty overlapped with problems in cognition and theory of mind. Overall, AD results in both spared and impaired emotional skills, which are not entirely overlapping with cognitive changes in dementia.

**End of Symposium**

Lateralized readiness potential reveals a bias to repeat tasks in voluntary task switching

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The imposed random selection of tasks in voluntary task switching (VTS) typically results in a preference for immediate task repetitions, known as “task-repetition bias”. This repetition bias has been shown to depend both on bottom-up as well as on top-down factors. The present study used the lateralized readiness potential (LRP) as a marker for task-choice processes in VTS. In two ERP experiments, subjects switched voluntarily between two tasks. In order to calculate the LRP, each task was assigned to one hand, so that task switching coincided with hand switching. In Experiment 1, the standard VTS procedure was used. In Experiment 2, each trial started with a probe that required a verbal response to indicate the selected task. The following stimulus was categorized on the basis of this task with a manual response. The stimulus-locked LRP (Experiment 1) and the probe-locked LRP (Experiment 2) peaked prior to trial onset, revealing a bias towards repeating the same task. These experiments show that, on average, there is a tendency to repeat the same task and that this tendency is present before the start of the trial. The relevance for understanding task selection in VTS is discussed.

Attentional selection of perceptual attributes following a task switch

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Task switch costs have a component that can be eliminated by active preparation (including task-set “reconfiguration” when the task changes) and a component that cannot — the “residual cost” (typically attributed to “task-set inertia”). To explore the role of attentional selection of perceptual attribute(s) in these components of the switch cost, we conducted an eye-tracking experiment. The stimulus was a face with a letter superimposed on the forehead. The participant was cued to identify the face or the letter as one of four with a keypress. Dwell time and number of fixations on facial features vs. the letter were measured. The eyes fixated the currently relevant attributes less (and irrelevant attributes more) on switch than on repeat trials during the 400 ms following the stimulus. During the next 200 ms, attention caught up: there were now more fixations on the relevant attributes on the switch trials. The size of these effects was correlated with switch costs over individuals. Allowing more time for preparation between cue and stimulus reduced both eye-fixation effects and the RT switch costs, but did not eliminate either. Hence the task-set inertia responsible for the residual cost includes inertia in attentional bias to the previously relevant attribute.

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Costs in dual-target search: the winner takes (almost) all

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Simultaneous search for two targets has been shown to be slower and less accurate than independent searches for the same two targets (Meneer et al., 2007; 2009). The current experiment investigated the mechanism of this dual-target cost for target items defined by variability within a single feature dimension (luminance). Small variations in search efficiency for single targets led to distinct patterns of performance in corresponding dual-target conditions. For the target yielding the fastest and most accurate single-target search, dual- and single target performance were equivalent when the target was present in the display. For the target yielding the slowest and least accurate single-target search, there was a reliable increase in RT and decrease in perceptual sensitivity for dual- compared to single-target searches. This asymmetry between targets is consistent with competitive models of selective attention (e.g. Desimone & Duncan, 1995). When multiple targets are defined by separate values within a feature dimension, the data suggests search proceeds from the most to the least salient target in a serial fashion. This temporal prioritisation has implications for accuracy as well as speed, with discrimination performance for the deferred target reduced in dual- compared to single-target searches.

Desimone, R., & Duncan, J. (1995). Neural mechanisms of selective visual attention. *Annual Review of Neuroscience*, 18, 193-192.

Meneer, T., Barrett D. J. K., Phillips, L, Donnelly, N., & Cave, K. R. (2007). Costs in searching for two targets: Dividing search across target types could improve airport security screening. *Applied Cognitive Psychology*, 21, 915-932.

Meneer, T., Cave, K. R., & Donnelly, N. (2009). The cost of searching for multiple targets: effects of practice and target similarity. *Journal of Experimental Psychology: Applied*, 15(2), 125-139.

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Ignoring the elephant in the room: A neural circuit to down-regulate salience

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Since bottom-up processes would favour high saliency, detection of a low salient target in the presence of highly salient distractors requires top-down attentional guidance. Previous studies have demonstrated that top-down attention can modulate perceptual processing but also that the control of attention is driven by fronto-parietal regions. However, to date there is no direct evidence on the cause and effect relation between control regions and perceptual processing. Here we report evidence demonstrating a neural circuit for the down-regulation of salient distractors when a low-salient target is selected, combining brain imaging using fMRI with brain stimulation by trans-crania

magnetic stimulation (TMS). Through this methodology we were able to identify a cause and effect relationship between the left Intra-Parietal Sulcus (IPS) and the left Occipital Pole in suppressing saliency. In particular, low salient stimuli are selected through the left IPS suppressing early visual areas (left occipital pole) that would otherwise respond to a high saliency distractor. Apart from providing a first documentation of the neural circuit supporting selection by saliency, these data can be critical for understanding the underlying causes of problems in ignoring irrelevant salience that are found in both acquired and neuro-developmental disorders (e.g., ADHD or Autism).

The modulation of perceptual selection by working memory is dependent on the focus of spatial attention

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Recent research suggests that visual selection can be automatically biased to those stimuli matching the contents of working memory (WM; Soto, Hodsoll, Rotshtein & Humphreys, 2008). However, a complete functional account of the interplay between WM and attention remains to be established. Here, the authors investigate the influence of the attentional focus of the observer (i.e., diffused vs. focused) by assessing the effect of spatial precues on attentional capture by WM. Experiments 1 and 2 showed that relative to a neutral condition without memory-matching stimuli, the presence of a memory distractor can trigger attentional capture despite being entirely irrelevant for the attention task but this happened only when the item was actively maintained in WM and not when it was merely repeated. Experiments 3a, 3b and 3c showed that attentional capture by WM can be modulated by endogenous spatial precueing of the incoming target of selection. The authors conclude that WM-driven capture of visual selection is dependent on the focus of spatial attention.

Soto, D., Hodsoll, J.P., Rotshtein, P. & Humphreys, G.W. (2008). Automatic guidance of attention from working memory. *Trends in Cognitive Sciences*, 12, 342-348

Working memory biases hierarchical stimulus selection

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Previous work has shown that stimuli held in working memory can automatically bias spatial attention in subsequent search displays. In this paper we demonstrate that biases from working memory can also affect the selection of hierarchical stimuli. An item held in working memory biased the selection of a target that was part of a hierarchical compound stimulus, facilitation responses when it matched the target (on valid trials) but disrupting responses when the item in working memory matched the distractor level of the hierarchical stimulus (on invalid trials). This result occurred automatically, even when no valid trials were included and it was maximal under conditions of divided rather than selective attention. Interestingly, when the initial cue was identified but not held in

working memory, then performance was facilitated on invalid as well as on valid priming trials compared with a neutral condition when the cue did not re-appear in the hierarchical stimulus. The results suggest that working memory can bias attention to a matching level of a hierarchical stimulus. In contrast, bottom-up priming (in the identification-only condition) affects perception without affecting visual selection.

### **Reserve List for oral presentations**

#### Action in the service of perception: pitch/space mappings in musicians

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When an action is experienced in the context of its perceptual consequence, there is potential for the establishment of a joint cognitive representation of the action and its perceptual effect. With repeated pairing, the perceptual consequences of an action may become sufficient to elicit the representations of the actions themselves (Prinz, 1990). The present study investigated action/perceptual coupling in pianists. In experiment 1, an auditory Stroop-type test was used. Participants made keypresses to spoken numbers, at pitches that were or were not congruent with the pitches that typically accompanied these specified actions. Pianists, but not non-musicians, showed a significant reaction time difference between congruent and incongruent trials. In experiment 2, we considered the possible role of a stimulus-response compatibility effect, termed the SMARC/SPARC effect (Rusconi, 2005; Lidji et al., 2007). By stretching the pitch range over which the spoken numbers were heard, we dissociated pitch/space mappings attributable to learned couplings from those attributable to a stimulus-response compatibility effect. The finding of a significantly smaller interference effect in this stretched condition suggests that our original effect is attributable to learned action/perception coupling. Our current experiments, in string players, explore whether these pitch-space mappings are coded in hand-centric or allocentric co-ordinates.

Prinz, W. (1990). A common coding approach to perception and action. In O. Neumann & W. Prinz (Eds.), *Relationships between perception and action: Current approaches* (pp. 167–201). New York: Springer.

Rusconi, E., Kwan, B., Giordano, B., Umiltà, C., Butterworth, B. (2006). Spatial representation of pitch height: the SMARC effect. *Cognition* 99(2), 113-129.

Lidji, P., Kolinsky, R., Lochy, A. & Morais, J. (2007) *Spatial Associations for Musical Stimuli : A Piano in the Head? Journal of Experimental Psychology: Human Perception and performance.* 33 (5), 1189-1207.

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The role of relative and absolute predictive-validity in Pavlovian conditioning.

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According to the Mackintosh (1975) model of conditioning, stimuli which are the best predictors of a trial outcome will come to command more attention than stimuli which are poorer predictors of a trial outcome. In contrast, according to the Pearce & Hall (1980) model of conditioning, stimuli which are followed by unpredictable outcomes come to command more attention than stimuli which are followed by predicted outcomes. Using identical testing procedures and stimuli, two appetitive conditioning experiments with rats will be described that provide evidence for both of these, seemingly contradictory, theories. By acknowledging variations in the impact of the *relative* or *absolute* predictive-validity of stimuli, the results of these experiments can be resolved, and indeed modelled, with a hybrid theory of learning and attention.

Mackintosh, N. J. (1975). A theory of attention: Variations in the associability of stimuli with reinforcement. *Psychological Review*, 82, 276–298.

Pearce, J. M., & Hall, G. (1980). A model for Pavlovian conditioning: Variations in the effectiveness of conditioned but not of unconditioned stimuli. *Psychological Review*, 87, 532–552.

Eye movements to real and photographic faces

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Little is known about whether reported psychological effects described in experiments using photographic images of faces generalise beyond these stimuli. This is a limitation for face research in general but of particular importance when the research is measuring the effects of social signal (e.g., gaze direction) on a process such as attention. We report an experiment in which participants ( $n = 16$ ) view either a real face or a photographic image of a face while their eye movements are recorded. The faces are shown to participants for 0.5, 1, 2, or 8 seconds followed by the illumination of a peripheral target to which participants have to saccade. The observed face has its eyes either directed at the viewer or averted to the floor. Regardless of face type (real or photographic) and regardless of where on the face participants were looking when the target illuminated, participants took longer to saccade away from the face in the direct gaze condition. Differences in scan patterns were noted between gazing at a real face or at the monitor and will be discussed. These findings have important implications for research on face processing and attention.

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Modulation of recurrent interactions in the object processing system: An MEG study

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Meaningful object recognition is accomplished through recurrent, interactive processing whereby an initial feedforward sweep through the ventral stream is followed by recurrent interactions. However, critical questions remain regarding the factors that mediate the degree of recurrent interactions during object recognition. fMRI studies have shown activity in the ventral stream is modulated by the degree of semantic integration required for recognition, with anteromedial temporal cortex engaged when semantic integration demands are high (Tyler et al., 2004, Moss et al., 2005). The novel prediction we tested is that increasing semantic integration demands result in increasing recurrent interactions within the ventral stream. We recorded MEG data while participants named visual objects in low and high integration conditions defined by the stimuli (nonliving vs. living objects) and task (category-level vs. unique naming). We found that MEG responses were modulated by the level of semantic integration required. Specifically, source reconstructed time-courses and phase synchronisation measures showed increased recurrent interactions between left anterior temporal and left posterior fusiform regions for unique over category naming, and for living over nonliving things. These findings demonstrate that the cortical dynamics during object processing are modulated by the complexity of conceptual information required.

Tyler, L. K., E. A. Stamatakis, et al. (2004). Processing objects at different levels of specificity. *Journal Of Cognitive Neuroscience* 16(3): 351-362.

Moss, H. E., J. M. Rodd, et al. (2005). Anteromedial temporal cortex supports fine-grained differentiation among objects. *Cerebral Cortex* 15(5): 616-627.

The role of functional parts in action decisions to hand-held tools

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Action decisions towards tools are modulated by several factors: object affordances (e.g. graspable features such as a tool's handle), object orientation in relation to the responding hand, and perceived hand grip. The correct identification of the functional parts of an object (e.g. a knife's blade) is critical for activating the appropriate action. We investigated the role of functional parts in the perceptual representations underlying action decisions. In two experiments, observers matched action words to pictures of hand-held tools (Yoon & Humphreys, 2005). Processing biases towards functional part information were investigated through masking of the relevant part in Experiment 1, or to spatially locating the matching action word near the functional part in Experiment 2. In Experiment 1, masking the functional part slowed action decisions, but it still produced grip congruency effects. In Experiment 2 an attentional bias towards functional parts was demonstrated through faster responses when target words were

located near the functional parts. We discuss the relative importance of functional parts alongside object orientation and hand grip effects in the direct visual route to action.

Yoon, E. Y., & Humphreys, G. W. (2005). Direct and indirect effects of action on object classification. *Memory & Cognition*, 33, 1131-1146.

#### Fusion of visual cues in adults but not six-year olds

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Previous experiments have shown that adults, but not six-year-olds, integrate texture and stereo cues to slant (Bedford, Nardini, & Mareschal, 2009). We predicted that given stimuli in which there is a discrepancy between these cues, six-year-olds may outperform adults. This is because integrating discrepant cues can lead to “sensory fusion” (Hillis, et al, 2002) in which the ability to judge individual cues in isolation is lost. Participants judged whether pairs of planes viewed in 3D were of same or different slant. Adults, but not six-year-olds, were significantly less accurate at judgments involving two discrepant cues than those involving either cue on its own. Thus by keeping the cues separate, children could outperform adults given discrepant cues. However, children’s stimuli had to have slant differences of 25° compared with adults’ 12.5° so that neither group performed at floor or ceiling. To test whether adults would still show fusion given the easier child level (25°) we experimented with adding different types of noise, such as having a large proportion of the tiles missing or introducing random variations in the slants of individual tiles. These initial studies have not yet shown fusion in adults; however, it is not yet clear which, if any, type of noise is appropriate to use.

Bedford, R., Nardini, M., Mareschal, D. (2009). Development of integration for disparity and texture cues to slant. Poster presented at EPS meeting, London, January.

Hillis, J. M. et al (2002). Combining sensory information: mandatory fusion within, but not between, senses. *Science*, 298, 1627-30.

#### Beyond similarity: the role of affordances in avoiding ambiguity

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Researchers have suggested that avoidance of gender ambiguous pronouns may result from semantic competition: A same-gender competitor is semantically more similar to the referent, reducing the referent's activation (Arnold & Griffin, 2007). Our research examined whether speakers go beyond similarity and check whether their reference is consistent with the competitor. Using a referential communication task, we examined

whether the affordances of a referential competitor affect the choice of pronouns over repeated noun phrases. The results from two experiments showed that speakers used fewer pronouns when describing a referent's action such as getting off a horse in a context where a competitor was also on a horse and could also be the agent of the action than in a context where the competitor was not on a horse and did not afford the same action. Crucially, this effect was obtained even after perceptual similarity between the entities (whether both characters were on a horse or not) was controlled for, suggesting that ambiguity avoidance is not only affected by competition but also involves speaker's assessment of whether the competitor could also be interpreted as the referent.

Arnold, J. E., & Griffin, Z. (2007). The effect of additional characters on choice of referring expression: Everyone counts. *Journal of Memory and Language*, 56, 521-536.

#### Is visuotactile multisensory integration affected in autism?

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Individuals with autism spectrum disorder (ASD) frequently report altered sensory experiences. Here, we examined whether sensory disturbances may be related to abnormal multisensory integration using the crossmodal congruency task. In this task, a congruency effect is observed: participants respond faster to a vibrotactile stimulus when it is presented with a matching visual distractor (congruent condition) compared to a mismatching visual distractor (incongruent condition). Typically this congruency effect is larger when the visual distractor is presented in close temporal and spatial proximity to the tactile stimulus, reflecting stronger multisensory integration. 7 ASD and 7 control participants held a foam cube containing a vibrotactile bone conductor under their right index finger and responded using foot pedals to indicate whether they perceived a single or double vibrotactile pulse. Single or double visual distractors were presented close to their right hand or from the opposite hemifield and were presented almost simultaneously with the vibration or 100ms after. The control group exhibited reduced congruency effects when the visual distractors were separated from the vibration in either space or time. However, the ASD group exhibited strong congruency effects in all conditions, suggesting that people with ASD may “over integrate” sensory information from vision and touch.

#### How general is the impairment in recollection in the list-method directed forgetting?

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In studies employing a list-method directed forgetting paradigm it has been shown that people can intentionally forget a subset of information which results in both impaired free recall and impairment to recollection (e.g. Bjork & Bjork, 2003). Retrieval inhibition and context-change mechanisms have been proposed to account for this directed forgetting effect (DF). According to the retrieval inhibition account people are

able to inhibit access to out-dated information that would interfere with learning new information. According to context-change account people use mental distraction when asked to forget information, which results in establishing new mental context that is ineffective as a cue for retrieval of to-be-forgotten information. The context-change account of DF predicts that the effect will be present only when contextual cues are used at test, whereas the inhibitory account predicts general impairment of cue-dependent memory. In the present study recollection not dependent on contextual cues was examined. In two experiments no DF was found using variants of associative recognition tasks. The findings indicate that impairment to recollection is not general and is not found when the test is independent of contextual cues. The current results support the context-change account of the directed forgetting effect.

Bjork, E. L., & Bjork, R. A. (2003). Intentional forgetting can increase, not decrease, the residual influences of to-be-forgotten information. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 29, 524-531.

Exploring the impaired production of irregular past tense verbs in a patient with a semantic deficit

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A single mechanism account of language processing maintains that past tense verb production is mediated by frequency, neighbourhood support and semantics (Lambon Ralph, Braber, McClelland, and Patterson 2005; McClelland and Patterson 2002). In this view, low frequency irregular verbs that are less assisted by neighbourly support rely heavily on semantic input, and in cases where this semantic information is degraded; these irregular verbs are susceptible to competition from the regular inflection. The current study assessed the relative contributions of frequency, neighbourhood support and semantic knowledge to past tense verb production in JF, a primary progressive aphasic patient with impaired semantic knowledge. We tested JF's ability to produce past tense verbs in free production and primed sentence production modalities, along with testing his knowledge of meaning about the verbs. Irregular verb production was poorest with low frequency / low n-size (LFLN) irregulars, and performance on these items was mediated by meaning knowledge. Past tense priming conditions produced a facilitatory effect (reduced over-regularisation errors) for low frequency irregulars, confirming our expectation that these irregulars would be most influenced by phonological primes. We conclude that the production of irregular past tense verbs is influenced by frequency, neighbourhood support and semantics in this patient case.

Lambon Ralph, M. A., Braber, N., McClelland, J. L. & Patterson, K. (2005). What underlies the neuropsychological pattern of irregular > regular past-tense verb production? *Brain and Language*, 93, 109-119.

McClelland, J. L. & Patterson, K. (2002a). 'Words Or Rules' cannot exploit the regularity in exceptions: Reply to Pinker and Ullman. *Trends in Cognitive Science*, 6, 464-465.

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Regular configurations capture attention in preview search

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Perceptual objects can capture attention even when they are task irrelevant. Two studies were conducted to look at the effect of regular configurations in the preview search paradigm, to assess whether regular configurations are easy to ignore and whether there are conditions where they capture attention. We manipulated whether a regular configuration was in the preview and whether it changes location when the new items appeared. Participants were slower in finding the target when a regular configuration was present compared to when an irregular was present, and the configuration changed locations. This was particularly so for the bigger display size, as shown by an interaction between configuration and display size. However, in the no change condition a regular preview facilitated RTs. The data suggest that a change in the preview led to it capturing attention when a regular array was re-presented in the new display. On the other hand, maintaining the preview's location enabled a regular preview to be ignored more easily. Experiment 2 manipulated when the target appeared inside or outside the configuration. We found that targets inside the configurations were found faster than those outside in the change condition, consistent with regular configurations capturing attention.

Face distortion after effects produced by parent, familiar and unfamiliar faces

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A number of researchers argue that face perception and recognition appears to use norm-based encoding by comparing every perceived face to an internal representation or prototype. Before now this prototype was thought to have been a construction of the average of every previously viewed face (Schwaninger, Carbon, & Leder, 2003). However, the influence of the most frequently encountered faces (i.e., personally familiar faces) has been generally understated. The current research explored The Face Distortion After Effect (FDAE) in unfamiliar, famous, and personally familiar faces (each subject's parent). Twelve adult participants rated the distortion levels of a series of images that included unfamiliar, famous, and personally familiar faces. Each image had been distorted by shifting the eyes along the vertical axis. The number of faces perceived to be distorted was measured prior to, as well as after, adaptation to the most extreme distortion. Participants were adapted to either an unfamiliar, famous, or personally familiar face. An after effect was observed following adaptation to unfamiliar and personally familiar faces but not to famous faces. The after effect appeared to transfer across all stimuli types equally.

Schwaninger, A., Carbon, C.C., & Leder, H. (2003). Expert face processing: Specialization and constraints. In G. Schwarzer & H. Leder (Eds.), *Development of face processing* (pp. 81-97), Göttingen: Hogrefe.

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Non-specificity of theory of mind in preschoolers: Evidence from a new non-verbal false sign task

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We present evidence from a new non-verbal false sign task showing that preschoolers' difficulty on false beliefs may be explained as a problem in understanding representations rather than mental states specifically. This non-verbal false sign task was modelled on the non-verbal false belief and false photograph tasks devised by Apperly et al. (2004, 2007) which used the minimum level of language, eliminated the requirement of inhibiting one's knowledge about reality, and controlled for incidental executive demands. Performance on all three tasks showed no significant difference when tested on 24 3- to 5-year-olds, except performance on the working memory control trials of the false photograph task was significantly better than that of the false belief task. Where participants failed the false belief and false sign tasks it was because they failed to meet the incidental working memory demand of the tasks. Results suggested that the false sign task was closely matched to the false belief task. The association previously found between tasks assessing false belief and false sign still holds in the current non-verbal reality-unknown context, suggesting the association between the tasks probably reflects the same underlying skills in representational understanding and working memory rather than language and inhibitory processing.

Apperly, I., Samson, D., Chiavarino, C., & Humphreys, G. (2004). Frontal and temporo-parietal lobe contributions to theory of mind: Neuropsychological evidence from a false-belief task with reduced language and executive demands. *Journal of Cognitive Neuroscience*, 16, 1773-1784.

Apperly, I., Samson, D., Chiavarino, C., Bickerton, W., & Humphreys, G. (2007). Testing the domain-specificity of a theory of mind deficit in brain-injured patients: Evidence for consistent performance on non-verbal, "reality-unknown" false belief and false photograph tasks. *Cognition*, 103, 300-321.

Once a bad manager, always a bad manager: evidence that the Fundamental Attribution Error is robust to the effects of time and management experience.

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The fundamental attribution error (FAE) is a cognitive bias that affects our inferences about the causes of people's behaviour. We investigated the effects of management experience and time on the severity of the FAE. Twenty nine participants (15 managers, 14 non-managers) took part in a mock human resource exercise over four weeks. Participants were initially shown vignettes describing good vs. bad behaviour associated with two randomly selected faces. These faces were then morphed to create a continuum of 12 and we confirmed that participants perceived the faces as two categories using a categorical perception task. In the second, third and fourth sessions, participants completed the same categorical perception task, followed by a hiring scenario and an

FAE task in which they judged whether new behaviours were caused by internal (due to effort) or external (due to luck) factors. Participants consistently perceived the faces as two categories; were consistently biased to hire faces from the 'good' category, and to attribute good behaviour as due to effort for the 'good' faces and due to luck for the 'bad' faces (vice versa for bad behaviour). These effects were not diminished by time or management experience.

#### Overshadowing of flavour-preference learning

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In two experiments, hungry rats received pairings of neutral flavours with maltodextrin. This resulted in the development of a preference for those flavours; however, this preference was reduced if the flavour was conditioned in compound with a second flavour. This overshadowing effect is in contrast to a number of previous flavour-preference conditioning experiments, which have either failed to demonstrate overshadowing or revealed an opposite potentiation effect. Two possible explanations for this discrepancy are considered: the contribution of within-compound associations, and the impact of between-compound generalisation.

#### Touching on temperature and pain

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The remarkable flexibility of human pain processing arises from two distinct mechanisms. Psychologists focused on top-down modulations of pain, such as mental imagery training. Physiologists showed bottom-up interactions, such as the strong effects of touch and temperature on pain. For example, in the Thermal Grill Illusion (TGI) interaction between non-painful touch and non-painful temperature produces a dramatic illusion of painful heat. More specifically, when people touch two warm objects surrounding a central, mildly cool object, the central, cold object feels painfully hot. However, the interaction between top-down processes and bottom-up interactions has not been considered. Here we show a top-down influence of mental body representation on the TGI. We immersed ring and index fingers in warm water, and the middle finger in cold water, to produce a novel version of TGI. Interestingly, when people pressed together two TGIs, one induced on each hand, the basic TGI effect was not enhanced, as one might expect, but was dramatically reduced. The knowledge that one touched one's own body profoundly altered afferent interactions between bodily sensations. The representation of one's body as both source of sensation and physical object has a powerful structuring effect on bodily perception.

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Enhanced implicit learning in autism: An eye-tracking study

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Superior perceptual and attentional skills such as feature detection have been reported among individuals with Autism Spectrum Disorder (ASD), but less is known about the extent to which this superiority can also support or be extended to implicit learning of perceptual material. Using a visual search paradigm (Contextual Cueing: Chun & Jiang, 1998), we examined the ability of individuals with ASD to implicitly learn the configuration of distractors in repeated displays and use this as a cue for faster target detection. We found firstly, that the ASD group showed superior implicit learning, compared to the control group, under a condition that heavily involved attention to local cues and discrimination. Secondly, eye-movements results supported the view that contextual cueing is most probably a local processing task, since both groups attended to local cues for longer periods of time. It is concluded that individuals with ASD show *enhanced perceptual learning* under conditions that promote their superior skills. Implications regarding the possible role of enhanced detection of isomorphisms in autism (Mottron, Dawson, & Soulieres, 2009) as a mechanism of enhanced implicit learning will also be discussed.

Chun, M. M., & Jiang, Y. H. (1998). Contextual cueing: Implicit learning and memory of visual context guides spatial attention. *Cognitive Psychology*, 36, 28-71.

Mottron, L., Dawson, M., & Soulieres, I. (2009). Enhanced perception in savant syndrome: patterns, structure and creativity. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1522), 1385-1391.

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I trust your eyes but not your face: How face information and gaze direction modulate trustworthiness

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Recent research suggests that personality judgments from pictures of faces are made automatically and very quickly and that facial attractiveness is positively related to positive personality traits. In the present study we investigated the interrelationship between eye gaze direction, attractiveness and apparent trustworthiness of a face. We asked 50 observers to rate a series of faces for trustworthiness. These faces either looked directly at the observer, or their gaze was turned slightly upwards, downwards, or to the right. Two conditions were tested: either the whole face was visible, or only the eye region was present. In a subsequent rating we assessed the attractiveness of each face. In both conditions faces looking down or up were rated less trustworthy than faces making eye contact or looking to the right. Whole faces were rated less trustworthy than the eye regions of the same faces, and attractiveness was positively correlated with apparent trustworthiness. Trustworthiness and facial attractiveness were positively related. We

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conclude that gaze direction is an important cue to apparent personality traits such as trustworthiness.

#### Response congruency effects in masked primed lexical decision

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Response priming occurs when prime and target are members of the same category in categorisation tasks. Prior research has demonstrated these effects, e.g. in number magnitude categorisation tasks, but has failed to establish a congruency priming effect in masked primed lexical decision. We present a series of five experiments that demonstrate clear prime congruency effects in lexical decision. The data show that the size of the congruency priming effect is influenced by the difficulty of the word-nonword discrimination. This sensitivity can explain the failure to find prime congruency effects in previous studies. Furthermore, the data suggest that the lexical decision is dependent on an evidence accumulating process, allowing the prime to bias speed and accuracy. We discuss the implications of these results for computational models of visual word identification and lexical decision.

#### Temporal segregation and the affordance effect

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Green and Hummel (2006) have shown that participants match a verbal label to a target picture faster when the target was part of an action related pair than when it was not. Since Ellis & Tucker (1998) have shown effects of hand of response with singly-presented tools with left and right –side handles, we were interested to see whether similar effects might be observed with action pairs and whether effects might be modulated by the dominance of the responding hand. In the current experiment participants viewed action pairs presented either simultaneous or presented sequentially with a varying inter-stimulus interval (ISI). At the most brief ISI participants were faster and more accurate to respond to items presented in the correct co-locations for action (replicating the finding of Green & Hummel, 2006). At longer ISI's participants showed no effect of positioning for action, but instead were fastest and most accurate to respond to tools that were presented congruently with their dominant hand. This would seem to suggest that action related stimuli have two components, an early 'affordance' based component, and a later 'effector' based one.

Green, C. B., & Hummel, J. E. (2006). Familiar interacting object pairs are perceptually grouped. *Journal of Experimental Psychology: Human Perception and Performance*, 32 (5), 1107-1119.

Tucker, M., & Ellis, R. (1998). On the relations of seen objects and components of potential actions. *Journal of Experimental Psychology: Human Perception and Performance*, 24, 830–846.

Tucker, M., & Ellis, R. (2001). The potentiation of grasp types during visual object categorization. *Visual Cognition*, 8, 769–800.

#### Localisation of targets by vision and proprioception in 8 year olds and adults

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Both visual and proprioceptive information can be used to localise the hand. Van Beers et al (1996) found that adults integrate these cues highly effectively to reduce the variance of their estimates. We were interested in the development of this ability in childhood. However, to test a Bayesian model of cue integration, it is necessary to quantify the errors in proprioception-based estimates in detail. In this experiment we studied the variability of 8 year olds' and adults' points to visual targets, without vision of the hand. So that they could not see their own hand, participants pointed to targets on a table-top, seen in a mirror. We compared four conditions; dominant and non-dominant hands, localising targets both above and below the table. Although directions of constant error differed across conditions, neither eight-year-old nor adult groups differed in variance across the four conditions. The result that variance is approximately equal with both hands, both above and below the table, confirms that one of the assumptions needed to apply a Bayesian model to data from a second study is met. This second study will show the developmental time course of optimal integration for proprioceptive and visual cues for localising the hand.

Van Beers, R. J., Sittig, A. C. and Denier, J. J. (1996). How humans combine simultaneous proprioceptive and visual position information. *Experimental Brain Research*, 111, 253-261.

#### Lexical and phonological neighbourhoods in non-word repetition

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Non-word repetition (NWR) data is used extensively to show that children's learning of novel sound sequences is influenced by factors such as length and phonotactic probability. However, although neighbourhood effects are also found in NWR, stimuli are confounded by phonotactic probability. 28 language-normal 5-6 year old children took part in two studies where: (1) the word-initial onsets of non-words had either a high or low number of phonologically similar neighbours; and (2) non-words were constructed from CVC nonsense syllables having either a high or low number of lexical items as neighbours. All non-words were matched for phonotactic probability. There were clear effects of both phonological and lexical neighbourhood: (1) accuracy was greater for onsets having few phonologically similar neighbours; and (2) accuracy was greater for non-words having a high number of lexical neighbours. Furthermore, onset/coda analyses by syllable position showed that while non-words with a high lexical neighbourhood are

stable, low lexical neighbourhood non-words attract more errors for word-initial onsets than all other positions. The data show that neighbourhood can be examined while controlling for variables such as frequency, and in doing so differences in repetition performance between low and high neighbourhoods can be isolated to involve the word-initial onset.

6-Hydroxydopamine lesions to the shell, not core, of the nucleus accumbens produce abnormally persistent latent inhibition with weak preexposure

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Latent inhibition (LI) refers to the process whereby non-reinforced preexposure to a stimulus retards subsequent learning of an association with that stimulus. It is well established that LI can be potentiated by reduced mesoaccumbal dopamine (DA) function but the locus within the nucleus accumbens of this effect is as yet not firmly established. Here, we tested whether 6-OHDA-induced lesions of DA terminals within the core and medial shell subregions of the nucleus accumbens (NAc) would induce abnormally persistent LI under conditions that disrupt LI in controls (weak preexposure). LI was measured in a thirst motivated conditioned emotional response procedure with 10 preexposures (tone CS) and 2 conditioning trials. Sham-operated and core-lesioned animals did not show LI and conditioned to the preexposed CS at comparable levels to the non-preexposed controls. 6-OHDA lesions to the medial shell, however, produced potentiation of LI, an effect that persisted in a subsequent extinction test. These results underscore the dissociable roles of core and shell subregions of the NAc in mediating the expression of LI and demonstrate that reduced DA function within the medial shell leads to enhanced LI.

The grouping benefit in extinction: Overcoming the temporal order bias

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In the present study we consider whether temporal processing is influenced by perceptual grouping of two rival items; a paradigm that robustly moderates the spatial bias of extinction but has yet to be considered in relation to temporal processing.

The effect of personality on the facial attractiveness of a described subject, and a subsequently presented face

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Much experimental research has focussed on identifying the physical determinants of visually derived semantic codes, such as, facial attractiveness and kindness. However, certain verbally manipulated, observed, and inferred personality traits, that have a strong association with liking, have also been found to impact on initial, and previously formed, perceptions of physical attractiveness. The current study was designed to explore whether these effects were specific to the face to which the personality description referred, or whether they extended to a subsequently presented face. When Face 1 was described as likeable, both Face 1 and Face 2 were rated as more attractive than when Face 1 was described as dislikeable. However, this carry-over effect did not appear to be related to whether the second face physically resembled the first, or whether the second face was an associate of the first. Physical resemblance did, however, have an independent effect (i.e., Face 2 was rated as more attractive when it physically resembled Face 1). When making ratings of facial kindness, on the other hand, the carry-over effect was only present when the second face physically resembled the first, or was an associate of the first. Possible explanations for these results are discussed.

#### The Domain Dichotomy Perspective: Familiarity as a function of similarity

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Recognition memory comprises two different kinds of memory; familiarity and recollection. While much research has looked at item recognition it is still not clear how associative recognition is supported. The Domain Dichotomy Perspective proposes that the relative contribution of familiarity to associative recognition is greater for within-domain (or category) than for between-domain associations. The first part of the present study sought to assess the similarity between different kinds of stimulus using systematic similarity ratings. These ratings were collected for both perceptual and semantic similarity using traditional pairwise comparisons and the Visual Sorting Task. The results showed that within-domain similarity far exceeded between-domain similarity regardless of the measures used. The second part of the experiment sought to test the Domain Dichotomy Perspective by assessing the contribution of familiarity for pairs of items when those items were similar (within-domain) and dissimilar (between-domain). Preliminary results suggest that learning rates are higher for some within-domain pairs than others. For example, pairs of animals are better remembered than abstract sounds. However, the relative contribution of familiarity to associative recognition varies as a function of the similarity of the components. Implications of the findings for the Domain Dichotomy Perspective will be discussed.

#### Effects of action observation on strength and dexterity

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Research has shown that the observation of action activates the same area of the brain as that used in execution (Rizzolatti et al. 1996; Buccino et al. 2001). Based on this evidence, others have reported that repeated observation of action primes subsequent

execution (see for example, Edwards et al. 2003; Kilner et al. 2003). In the experiments presented here, we had participants observe strength-based actions. In Experiment 1, we report that the observation of grip squeezing intensity modulated the observer's own grip response. In Experiments 2 and 3 we report that observation of restrained ball squeezing, wrist curl and shoulder fly actions compared to observation of visual moving baseline stimuli brought about increased dexterity in a variety of rapid button pressing tasks measured using motion tracking. These findings are consistent with the literature, and furthermore suggest that the effects could be harnessed so that action observation could be used in rehabilitation. For example, observation of the same stimuli by participants with peripheral (muscle and bone) or brain injury should show increases in strength and dexterity that would benefit recovery.

Buccino, G., Binkofski, F., Fink, G. R., Fadiga, L., Fogassi, L., Gallese, V., Seitz, R.J., Zilles, K., Rizzolatti, G., & Freund, H-J. (2001). Action observation activates premotor and parietal areas in a somatotopic manner: an fMRI study. *European Journal of Neuroscience*, 13, 400-404.

Edwards, M.G., Humphreys, G.W. & Castiello, U (2003). Motor facilitation following action observation: a behavioural study in prehensile action. *Brain and Cognition*, 53, 495-502.

Kilner, J.M., Paulignan, Y. & Blakemore, S.J. (2003). An interference effect of observed biological movement on action. *Current Biology*, 13, 522-525

Rizzolatti G, Fadiga L, Gallese V, Fogassi L. 1996. Premotor cortex and the recognition of motor actions. *Brain Research, Cognitive Brain Research*. 3, 131-41

#### Inhibition and individual differences in anxiety

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Anxiety disorders are debilitating and complex and although there are treatments the mechanisms that support such persistent anxieties are poorly understood. One possibility is that the avoidance responses people make when fearful generate conditioned inhibitors ('safety signals') which can suppress the excitatory association. Therefore, the present study compares performance in three tasks that measure aspects of inhibition: (1) conditioned inhibition with 'nice' and 'nasty' outcomes (IAPS images); (2) emotional Go/NoGo; and (3) emotional Stroop. Three questionnaires measuring individual differences in anxiety were also administered. Initial results for the conditioned inhibition task showed that participants successfully learnt the discrimination between excitatory and inhibited trials with nasty outcomes. In both Go/NoGo and Stroop variants there was no overall difference in speed or accuracy to identify and categorise emotionally-toned words, the expected result in a healthy population. The conditioned inhibition task has been simplified to focus on learning about the nasty outcomes and is currently under development to demonstrate conditioned inhibition with the key retardation and summation tests. To date this work has been conducted with healthy participants. These tasks will be further tested in clinical populations of participants with panic disorder and obsessive compulsive disorder.

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Top-down modulation of gaze-cueing by mental state attribution

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When presented with a face stimulus whose gaze is diverted, observers' attention shifts to locations fixated by the face. Such 'gaze-following' has been characterised by some previous studies as a consequence of sophisticated Theory of Mind processes but by others (particularly those employing the 'gaze-cueing' paradigm) as an involuntary response triggered directly and reflexively by the physical features of a face. To address this apparent contradiction, we modified the gaze-cueing paradigm using a deception procedure to convince observers that pre-recorded videos of an experimenter making head-turns and wearing mirrored goggles were a 'live' video-link to an adjacent room. In two experiments, reflexive gaze-cueing was found when observers believed the model was wearing transparent goggles and could see, but significantly reduced when they believed the experimenter wore opaque goggles and could not see. These results indicate that attribution of the mental state 'seeing' to a face plays a role in controlling even reflexive gaze-following.

Empathy in the course of normal aging

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Empathy is a multifaceted construct involving cognitive perspective-taking, affective sharing of another person's emotional state and mechanisms allowing for the maintenance of self-other distinction. Recent studies have suggested a role for executive control function in the regulation of empathic responding. The prefrontal cortex is thought of as an important neuroanatomical substrate of both empathic responding and executive control function. Aging seems to disproportionately affect the prefrontal cortex and executive functioning. However, little is known about potential changes different empathic subcomponents might undergo during normal aging and their relationship with executive dysfunction. In the present study, 60 participants of three consecutive age groups (20-34, 35-50 and 50+) were assessed with a novel scenario-based task designed to distinguish between cognitive and affective components of empathy. The scenarios varied in the degree of the emotional impact on the target person and their interaction partner. Measures of executive functioning and trait empathy were also administered. The results will be discussed in terms of differential changes in component processes depending on the degree of emotional involvement in the context of dyadic social interactions.

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Attentional modulation of semantic processing in speech comprehension: an fMRI study

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A question still unresolved in psychological research is the degree to which speech comprehension depends on attentional processes. A recent fMRI study found that neural responses to semantically ambiguous speech were attenuated when participants were instructed to ignore the speech and to focus their attention on an unrelated visual detection task (Eason et al., 2009). The current fMRI study aimed to determine whether this attentional effect depends on the nature of the distractor task. Listeners heard sentences with and without ambiguous words, (and signal-correlated noise) and were scanned under three attentional conditions: whilst attending to the sentences, whilst performing an auditory discrimination task on non-linguistic sounds, and whilst performing a visual lexical decision task. Behavioural memory test results showed above-chance memory for both sets of unattended sentences, which was significantly poorer than memory for attended sentences. Imaging results suggest that the left inferior frontal gyrus response to high ambiguity sentences also diminishes under both distractors, with visual distraction producing a more robust change. Together, our findings suggest that general speech processing is similarly impaired under visual linguistic and auditory non-linguistic distraction, though ambiguity resolution may be more strongly affected by diverted linguistic attention.

Eason, R.J., Peelle, J. E., Rodd, J.M. & Davis M. H. (2009) Effects of attention on the neural processing of ambiguous speech, *Meeting of the Experimental Psychology Society, York, UK, July 2009*.

What underlies the perception of rhythmic differences in speech?

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Perception of cross-linguistic speech rhythm differences has been related to variation in durational contrast between stressed and unstressed syllables, but differences in speech rate and stress distribution – e.g. the number of unstressed syllables between stresses – may also contribute. We resynthesised utterances into monotone sequences of *sasasa* syllables preserving only the durational values of the original vowels and consonants. In an ABX categorisation task, Experiment 1 showed that English and Spanish *sasasa* utterances could be distinguished. In Experiment 2, we normalized English vs Spanish rate differences: discrimination was reduced but reliable. Experiment 3 eliminated stress distribution differences, using the same sentences uttered in two English accents differing in durational stress contrast: discrimination was further reduced but still reliable. However, in Experiment 4, which compared two English accents with similar durational stress contrast, discrimination was at chance. Thus, even though rate and stress distribution facilitate rhythmic discrimination, durational stress contrast appears sufficient.

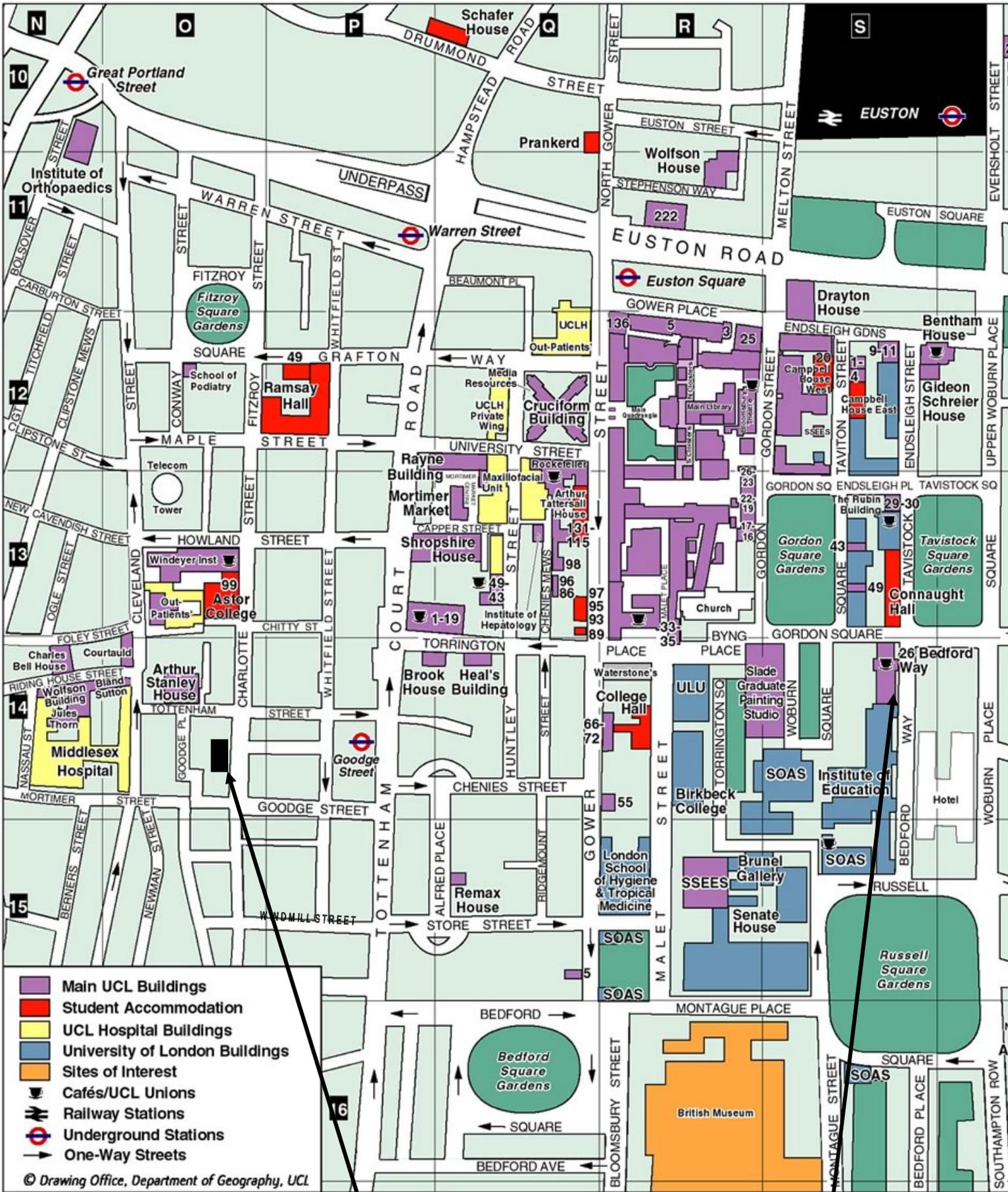
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Imitation and visuomotor integration in Autism Spectrum Disorder

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Imitation is a process which is important in learning how to communicate, and understand others. Social understanding and communication problems are central in autism, and it appears that individuals with autism also have reduced imitation abilities, which may be caused by impaired visuomotor integration. This study took a quantitative approach to investigate the movement kinematics of sixteen autistic adults and a matched control group, during the imitation of goal-directed and goal-less actions. Participants observed movie clips of hand movements which varied in speed, size and trajectory, and then imitated the actions while their movements were recorded using a magnetic motion sensor. In controls, we predicted that movement kinematics would be most similar to the observed movements in the goal-less condition, when more reliance is placed on direct visuomotor mapping of the action. However, we expected the autistic group to show similar imitation ability for both conditions due to impaired visuomotor integration. Results confirmed that the autistic group did not have improved performance in the goal-less condition, providing evidence for a visuomotor integration deficit in people with autism.

## NOTES



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