E|P|S

Experimental
Psychology
Society

CAMBRIDGE MEETING

2-4 APRIL 2008

A scientific meeting will be held at the Department of Physiology and the Department of Experimental Psychology, University of Cambridge on 2-4 April, 2008. The local organisers are Professor Lorraine K. Tyler and Mrs Marie Dixon.

EPS Mid Career Award Lecture
Professor David Perrett (University of St Andrews)

Seeing the future: Natural image sequences produce anticipatory neuronal activity

The Mid-Career Award Lecture will take place at 6.15pm on Thursday 3rd April in Lecture Theatre 1 in the Department of Physiology, University of Cambridge.

Symposia

Thursday 3rd April, 2.30pm – 5.30pm

Perception in the social world
Organiser: Dr Ian Penton-Voak

Friday 4th April, 2.00pm – 5.00pm

Theoretical challenges in cognitive neuroscience
Organisers: Professor Lorraine K Tyler and Professor William D Marslen-Wilson

Poster Session

This will be held in conjunction with the drinks reception on Wednesday evening from 6pm until 8pm in the Ground Floor Teaching Room in the Department of Experimental Psychology. Delegates may put up posters from 10am on the Wednesday and they can be displayed there until the end of the conference. Presenters should be by their posters from 6pm-7pm on Wednesday. Posters should be size A0.

Platform Presentations

Sessions will be held in Lecture Theatre 1 on the ground floor in the Department of Physiology and the Lecture Theatre on the ground floor of the Department of Experimental Psychology. Both Departments are located on the Downing Site of the University and are a short 5 minute walk from each other. Both theatres have data projectors available for Powerpoint presentations. Presenters can bring their talks on CDs or USB sticks or they may use their own laptops but if they do so they must ensure they have all necessary connector leads. The onsite PC has Windows XP and Office. Any queries about facilities in the lecture theatres should be sent to Marie Dixon (csladmin@csl.psychol.cam.ac.uk).

Coffee and tea will be served in the Ground Floor Teaching Room in the Department of Experimental Psychology.

The conference dinner will be held at Christ's College, St Andrew's Street, Cambridge, CB2 3BU on Thursday 3rd April at 7.30pm. A booking form is enclosed.

Further information about the conference is given at the back of the programme.

START OF PARALLEL SESSIONS

Session A

Lecture Theatre 1, Department of Physiology

10.00 **Mario Alfredo Parra*, Sergio Della Sala*, Sharon Abrahams, Robert Logie** (University of Edinburgh)
Memory binding deficits in Alzheimer's disease (AD)

10.30 **Robert Logie, Annelinde Vandenbroucke* and James Brockmole** (University of Edinburgh)
Fragility of bound feature combinations in visual working memory

11.00 **Snehlata Jaswal*, Robert Logie and James Brockmole (**University of Edinburgh)
Inhibition of irrelevant features in binding in visual working memory

11.30 COFFEE

12.00 **Serge Caparos* and Karina J Linnell** (Goldsmiths)
The interacting effect of load and space on visual selective attention

12.30 **Anna L Southall*, Glyn W Humphreys and Antje S Meyer** (University of Birmingham)
Electrophysiological evidence of semantic interference in visual search

1-2 LUNCH

START OF PARALLEL SESSIONS

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

10.00 **Morgan Barense*, Rik Henson and Kim Graham** (MRC Cognition and Brain Sciences Unit, Wales Institute of Cognitive Neuroscience)
Temporal lobe activity during complex discriminations of meaningful and novel objects and faces

10.30 **Ashok Jansari, Scott Miller*, Laura Pearce*, Amanda Taylor*, Joanne Chan* and Jeremy Tree** (University of East London, University of Exeter)
The man who mistook his neuropsychologist for a popstar: When the whole IS the sum of the parts and configural processing fails in prosopagnosia

11.00 **Karen Brandt** (University of Keele)
Investigating manipulations of facial processing on subjective experiences

11.30 COFFEE

12.00 **EPS/BAAS Prize Lecture - Paul M Briley* and A.Q. Summerfield** (University of York)
The ability to use movement for segregating and locating sources of sound

12.30 **Dorothy Cowie* and Oliver Braddick** (University College London University of Oxford)
Stair descent in adults and children: feedforward and feedback control

1-2 LUNCH

Session A

Lecture Theatre 1, Department of Physiology

2.00 **Andrea Krott*, Elena Nicoladis* and Christina Gagn*** (University of Birmingham, University of Alberta)
(Sponsored by Jane Riddoch)
The role of physical contiguity in children's interpretations of novel compound words

2.30 **Barry Devereux* and Fintan Costello*** (University College Dublin, University of Cambridge)
(Sponsored by Lorraine K Tyler)
Representation and retrieval of relations in conceptual combination

3.00 **Kumiko Fukumura*, Roger P.G. van Gompel and Martin J. Pickering (**University of Dundee, University of Edinburgh)
Effects of a visual competitor on the choice of referring expressions in discourse

3.30 TEA

4.00 **Sara T. Baker* and Alan M. Leslie** (University of Bristol, Rutgers University) (Sponsored by Christopher Jarrold)
A new method for developmental research reveals profiles and sources of change in individual preschoolers' theory of mind

4.30 **Teresa McCormack, Christoph Hoerl*, Steven Butterfill* and Patrick Burns*** (Queen's University Belfast, University of Warwick)
The relationship between causal and counterfactual judgments: A developmental study

5.00 **James A. Hampton, Bayo Aina*, J.Mathias Andersson*, Priya Gorasia* and Sejal Parmar*** (City University)
The Rumsfeld Effect: When we reliably know that we don't know.

5.30 **Andrew M Colman and Lindsay Browning*** (University of Leicester)
Evolution of cooperative turn-taking.

6.00 – 8.00 POSTERS AND DRINKS RECEPTION. Ground Floor Teaching Room in the Department of Experimental Psychology.

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

2.00 **Rebecca Lawson** (University of Liverpool)
Comparing the effects of lighting and orientation changes on visual object constancy

2.30 **Yoriko Hirose*, Alan Kennedy* and Ben Tatler** (University of Dundee)
Eye movement control and object memory in moving images

3.00 **Marko Nardini*, Rhiannon Thomas*, Jessie Bullens*, Peter Jones*, Rachael Bedford*, Janette Atkinson and Oliver Braddick** (University College London, University of Oxford, Utrecht University, University of Edinburgh)
Two developmental processes underlying human spatial memory

3.30 TEA

4.00 **Dominic M. Dwyer and Matei Vladeanu*** (Cardiff University, University of Dundee)
Comparison in face familiarization: Evidence from a matching task.

4.30 **Emma Jaquet*, Gillian Rhodes* and William G. Hayward*** (University of Western Australia, University of Hong Kong) (Sponsored by Elizabeth Pellicano)
Perceptual aftereffects reveal dissociable adaptive coding of faces of different races and sexes

5.00 **Timothy J Andrews, Michael Ewbank* and Jodie Davies-Thompson** (University of York, MRC Cognition and Brain Sciences Unit)
Differential sensitivity for viewpoint between familiar and unfamiliar faces in human visual cortex

5.30 **Rebecca P Lawson* and Andrew J Calder** (MRC Cognition and Brain Sciences Unit)
The visual representation of human body orientation revealed by adaptation

6.00-8.00 POSTERS AND DRINKS RECEPTION. Ground Floor Teaching Room in the Department of Experimental Psychology.

Session A

Lecture Theatre 1, Department of Physiology

9.30 **Ines Jentzsch, Carolin Dudschig* and Hartmut Leuthold** (University of St Andrews, University of Glasgow)
Does Alternation-based Interference (ABI) result from response conflict at abstract or effector-specific processing levels?

10.00 **Aidan J. Horner* and Rik Henson** (MRC Cognition and Brain Sciences Unit)
Response learning and priming: Evidence for multiple levels of response representation

10.30 **Ian Dennis, Hassina Carder* and Tim Perfect** (University of Plymouth)
A response congruence effect in cross-task repetition priming

11.00 COFFEE

11.30 **Stephen Butler, Stephanie Rossit*, Casimir Ludwig*, Iain Gilchrist, Bettina Olk*, Ian Reeves*, George Duncan*, Keith Muir*, and Monika Harvey**. (University of Strathclyde, University of Glasgow, University of Bristol, Jacobs University, Southern General Hospital Glasgow)
Impairments in saccadic inhibition in patients with right hemisphere lesions

12.00 **Keiko Kitadono* and Glyn W. Humphreys (**University of Birmingham)
Action programming and attention: Reducing extinction through intention.

12.30 **Monika Harvey, Stephanie Rossit*, Bettina Olk*, Ian Reeves*, George Duncan* and Keith Muir*** (University of Glasgow, Jakobs University, Southern General Hospital Glasgow)
Impaired anti-pointing in patients with hemispatial neglect

1-2 LUNCH

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

9.30 **Mary Jane Spiller* and Ashok S Jansari** (University of East London)
Synaesthesia and visual mental imagery: Measuring a synaesthetic experience from different mental imagery tasks

10.00 **Evelyn M. S. Mohr*, Robert Kentridge* and Charles Heywood***(University of Durham)
(Sponsored by Anthony Atkinson)
Colour facilitates naming of real world objects in healthy and aphasic subjects.

10.30 **Janine Cooper*, Elizabeth Isaacs*, Michelle de Haan, Torsten *, Alan Goldman*, Janet Stocks*, Mortimer Mishkin and Faraneh Vargha-Khadem** (University College London, National Institute of Mental Health)
Incidence of memory impairment after neonatal hypoxia-ischaemia: Heart-lung bypass cohort

11.00 COFFEE

11.30 **Rebecca Ann Charlton*, Thomas R Barrick*, I Nigel Lawes*, Hugh S Markus* and Robin G Morris**. (St George's University of London, Kings College London)
Working memory decline and loss of white matter pathway connectivity in ageing

12.00 **Patrick Rabbitt, Mary Lunn* and Kate Hunter*** (University of Oxford)
Relationships between depression, dysphoria, cardiovascular disease and intelligence in old age.

12.30 **Luca Passamonti*, James Rowe*, Christian Schwarzbauer*, Michael Ewbank*, Elisabeth von dem Hagen* and Andrew Calder** (Cognition and Brain Sciences Unit, Institute of Neurological Sciences, Cambridge University, Behavioural and Clinical Neurosciences Institute)
Visually induced overeating: Identifying the neural mechanisms underlying a risk factor for obesity

1-2 LUNCH

Session A

Lecture Theatre 1, Department of Physiology

2.00 **Elisabeth von dem Hagen*, John D. Beaver*, Andrew D. Lawrence*, Michael P. Ewbank*, Luca Passamonti*, Andrew J. Calder** (MRC Cognition and Brain Sciences Unit)
Two distinct neural substrates for the processing of facial expressions of distaste and human disgust

Symposia: Perception in the social world
Organiser: Dr Ian Penton-Voak

2.30 **Mark H Johnson*** (Birkbeck University)
Developing a social brain

3.00 **Benedict C Jones*, Lisa M DeBruine*, Anthony C Little*, Claire A Conway* and David R Feinberg*** (University of Aberdeen, University of Stirling, McMaster University)
Integrating gaze direction and expression in preferences for attractive faces

3.30 TEA

4.00 **Andrew J. Calder, Luca Passamonti*, John Beaver* and James B. Rowe*** (MRC Cognition and Brain Science Unit, Institute of Neurological Sciences, Imperial College London, University of Cambridge, MRC Behavioural and Clinical Neurosciences Institute)
In the eye of the beholder: Reward-drive affects the neural correlates of viewing facial signals of aggression

4.30 **Professor C. Keysers*** (University of Groningen)
Mirror systems and social cognition

5.00 **Dr Jean Decety*** (University of Chicago)
The contribution of the temporo-parietal junction in social interaction

End of Symposium

5.30 EPS Business Meeting (Ground Floor Lecture Theatre, Department of Experimental Psychology)

6.15 **EPS Mid-Career Award Lecture - David Perrett** (University of St Andrews) (Lecture Theatre 1, Department of Physiology)
Seeing the future: Natural image sequences produce anticipatory neuronal activity.

7.30 CONFERENCE DINNER, CHRIST'S COLLEGE

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

2.00 **Sonia C. Sciama** (University of Oxford)
Memory cycles and subcycles produce the recency-primacy shift in latent inhibition

2.30 **Jonathan Catling and Robert Johnston*** (University of Worcester, University of Kent)
The varying effects of age of acquisition

3.00 **Ilhan Raman** (Middlesex University)
The role of context on age-of-acquisition effects in visual word recognition

3.30 TEA

4.00 **Michael A. Ford*, Billi Randall*, Kirsten I. Taylor*, Barry J. Devereux* and Lorraine K. Tyler** (University of Cambridge, University Hospital Basel)
Do conceptual structure variables affect lexical processing?

4.30 **Markus Damian and Nicolas Dumay** (University of Bristol)
Phonological advance planning in speaking is constrained by language-specific syntactic properties

5.00 **Mirjana Bozic, Lorraine K. Tyler and William Marslen-Wilson** (MRC Cognition and Brain Sciences Unit, University of Cambridge)
Hemispheric laterality and derivational morphology

5.30 EPS Business Meeting **(Ground Floor Lecture Theatre, Department of Experimental Psychology)**

6.15 **EPS Mid-Career Award Lecture - David Perrett** (University of St Andrews) (Lecture Theatre 1, Department of Physiology)
Seeing the future: Natural image sequences produce anticipatory neuronal activity.

7.30 CONFERENCE DINNER, CHRIST'S COLLEGE

Session A

Lecture Theatre 1, Department of Physiology

9.30 **Janek S. Lobmaier* and David I. Perrett** (University of St Andrews)
The self-referential positivity bias when judging where other people are looking

10.00 **Benoit Bediou*, Martin Eimer, Olaf Hauk* and Andrew J. Calder** (MRC Cognition and Brain Sciences Unit, University of London, University of Geneva)
Reduced frontal response to angry faces in individuals at risk for aggressive behaviour.

10.30 **Michael P. Ewbank*, Andrew D. Lawrence*, Luca Passamonti*, Jill Keane* and Andrew J. Calder** (MRC Cognition and Brain Sciences Unit, Wales Institute of Cognitive Neuroscience, Institute of Neurological Sciences)
The influence of attention and anxiety on the neural response to facial signals of fear and aggression.

11.00 COFFEE

11.30 **Andy Ellis, Laura Barca*, Piers Cornelissen*, Michael Simpson*, Uzma Urooj*, and Will Woods*** (University of York, Institute for Cognitive Science and Technologies)
The neural basis of the right visual field advantage for word recognition: An MEG analysis

12.00 **Elias Mouchlianitis* and Rik Henson** (MRC Cognition and Brain Sciences Unit)
Hemispheric differences in face processing: Evidence from divided visual-field priming

12.30 **Sonia C. Sciama and Ann Dowker** (University of Oxford)
Abstraction and asymmetry in repetition priming

1-2 LUNCH

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

9.30 **Luke Jones* and John Wearden (**University of Manchester, Keele University)
Click trains and the rate of information processing: Does speeding up subjective time make other psychological processes run faster?

10.00 **Pavlos Filippopoulos* and John Wearden** (Keele University)
Instability of temporal reference memory.

10.30 **John Wearden** (Keele University)
What people do when they count to measure time?

11.00 COFFEE

11.30 **Martin H Fischer, Richard A Mills* and Michal Pinhas*** (University of Dundee, Ben-Gurion University of the Negev)
The operational momentum effect in symbolic arithmetic

12.00 **Satoru Saito and Ryo Ishibashi*** (Kyoto University)
Action control and verbal working memory: Evidence from a technique to induce action slips

12.30 **Yuki Kamide*** (University of Dundee)
(Sponsored by Martin Fischer)
The dynamic simulation in linking language and space: Evidence from signal detection and eye-tracking

1-2 LUNCH

Session A

Lecture Theatre 1, Department of Physiology

Symposia: Theoretical challenges in cognitive neuroscience
Organisers: Professor Lorraine K Tyler and Professor William D Marslen-Wilson

2.00 **John Duncan** (MRC Cognition and Brain Sciences Unit)
Sequential behaviour and selective attention in the human and monkey brain

2.30 **Zoe Kourtzi*** (University of Birmingham)
Learning for adaptive decisions in humans, brains, and machines

3.00 TEA

3.30 **Lorraine K Tyler** (University of Cambridge)
From perception to conception: Object processing in the ventral stream

4.00 **Kim Graham** (University of Cardiff)
The role of the medial temporal lobes in human episodic memory: New insights and challenges

4.30 Open discussion chaired by **William D Marslen-Wilson** (MRC Cognition and Brain Sciences Unit)

End of Symposium

End of meeting

Session B

Ground Floor Lecture Theatre, Department of Experimental Psychology

2.00 **Max Garagnani*, Yury Shtyrov*, Teja Kujala*, Thomas Wennekers*, and Friedemann Pulvermuller** (MRC Cognition & Brain Sciences Unit, University of Helsinki, University of Plymouth)
Neurocomputational and neurophysiological studies of brain interactions of language and attention

2.30 **Johanna G Barry, Mervyn J Hardiman*, I Yasin* and Dorothy V M Bishop** (University of Oxford, Max Plank Institute, University College London)
A neurophysiological signature of language learning capacity

3.00 TEA

3.30 **Christopher Jarrold, Annabel S. C. Thorn, and Emma Stephens*** (University of Bristol)
The relationships between verbal short-term memory, phonological awareness, and new word learning: Evidence from typical development and Down syndrome

4.00 **Catherine Lowe*, Jackie Masterson and Yvonne Griffiths*** (University of Essex, Institute of Education)
Potential causes of below average spelling ability in able readers

4.30 **Ben Newman Wright and Arnold Wilkins** (University of Essex)
The efficacy of spectral filters in improving the visual performance of patients with multiple sclerosis

End of parallel sessions

End of meeting

15. Alexis Makin*, Ellen Poliakoff and Wael El-Deredy* (University of Manchester)
Using EEG to investigate the tracking of visible and occluded moving targets

16. Tom Mercer* and Denis McKeown (University of Leeds)
Timbre and the effects of pre-trial cues

17. Ellen Migo*, David Weiss*, Ken Norman*, Andrew Mayes and Daniela Montaldi* (University of Manchester, Princeton University)
A new collection of fifty picture sets with standardised familiarity information

18. Karolina Moutsopoulou*, Rhodri Cusack* and Tom Manly (MRC Cognition and Brain Sciences Unit)
Attention modulates activation in the mirror neuron system

19. Alessia Passanisi*, Martin Jonsson* and James A. Hampton (Universita di Catania, Lund University, City University)
The Modifier Effect in generic sentences: Evidence for prototype inheritance

20. Elizabeth L. Prado*, Anuraj Shankar*, The SUMMIT Study Group*, Husni Muadz*, Katherine Alcock and Michael T. Ullman* (Lancaster University, SUMMIT Institute of Development, Johns Hopkins University, University of Mataram, Georgetown University)
Effects of multiple micronutrient supplementation on cognition during and after pregnancy

21. Cristina Ramponi*, Gemma Handelsman* and Philip J. Barnard (MRC Cognition and Brain Sciences Unit, University of Cambridge)
Is remembering emotional information an involuntary-unconscious process?

22. Jakke Tamminen* and Gareth Gaskell (University of York**)**
Novel words entering the mental lexicon: Is meaning necessary for integration?

23. Jason Tipples (University of Hull)
Time flies! An underestimation of time due to emotional arousal

24. Uzma Urooj*, Michael Simpson*, Piers Cornelissen*, Will Woods*, and Andrew W. Ellis (University of York)
Neural correlates of object naming: An MEG study

25. Victoria Williamson*, Alan Baddeley and Graham Hitch (University of York)
The impact of articulatory suppression on memory for tones

26. Jie Zhuang*, William Marslen-Wilson, Billi Randall*, Mike Ford*, Emmanuel Stamatakis* and Lorraine K Tyler (University of Cambridge, MRC Cognition and Brain Sciences Unit, University of Manchester)
Cohort competition in spoken word processing: An fMRI study

27. **Erica Yu*, David A. Lagnado* and Nick Chater (**University College London)
The peak-end rule and underestimation in retrospective evaluations of temporally extended outcomes

Memory binding deficits in Alzheimer's disease (AD)

Mario Alfredo Parra, Sergio Della Sala, Sharon Abrahams, Robert H Logie
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AD selectively impairs mechanisms responsible for forming associations in memory. Whether these associative deficits are accounted for by deficits in binding information in memory remains unexplored. In three experiments we investigated whether the associative memory problems observed in patients with AD result from binding problems and if this impairment develops earlier than other episodic memory deficits. The first experiment investigated the binding of nonverbal information using a recognition task. Twelve AD patients and twelve healthy older adults entered this experiment. The second experiment investigated binding problems within the verbal memory domain in twelve AD patients and twelve controls using a recall task. The third experiment investigated whether memory binding problems develop earlier than non-associative memory deficits. Twelve presymptomatic carriers of a gene mutation (E280A of the gene of the Presenilin-1) leading to early onset AD, twelve symptomatic carriers with mild AD, and twelve controls entered this experiment. The results of the series of experiments suggest that binding deficits account for the associative learning problems observed in AD and in the presymptomatic carriers of the gene mutation. Difficulties in binding information in memory commence well before AD can be clinically diagnosed.

Fragility of bound feature combinations in visual working memory

Robert H Logie, Annelinde Vandenbroucke and James Brockmole
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Three experiments adopted a Hebb-type learning paradigm to investigate whether bindings between features in visual short-term memory experiments are lost from trial to trial or result in learning of feature combinations. In Experiment 1, repeating an array of six coloured shapes, or of colours, or of shapes on every third trial led to no increase or decrease in change detection performance with 200 ms display times and a 2000 ms study-test interval. Experiment 2 found evidence of learning when arrays of the same colour-shape combinations were repeated on every trial, but not when single features were repeated. Experiment 3 examined probe recall performance and showed clear improvements across trials for repetitions on every trial of shape-colour combinations. Results are interpreted as suggesting that both individual features and bound features can be held as representations in a temporary visual memory system, but that these representations are very fragile across trials, and only when the same feature combinations occur on every trial are there clear effects of learning.

Inhibition of irrelevant features in binding in visual working memory

Snehlata Jaswal, Robert H Logie and James Brockmole
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Binding is the process whereby different features such as shape, colour, size, orientation, location, etc. are linked together to form a coherent representation of the object. Does a selection mechanism operate whereby irrelevant features are ignored? In Experiment 1, location was randomized to study the binding of colour and shape. In Experiment 2, shape was randomized to study the binding of location and colour; and in Experiment 3, colour was randomized to study the binding of shape and location. Using a change detection task, equidistant study-test intervals from 0 to 2500 ms were used to track the process of binding. The significant interactions observed in all three experiments confirmed that a process of selection does operate whereby irrelevant features are gradually suppressed or inhibited, though at different rates. Experiment 4 explored when this mechanism came into play by testing the effect of increasing the duration of the study display. Results showed that inhibition of irrelevant features is most likely a post encoding process within visual working memory rather than a perceptual process.

The interacting effect of load and space on visual selective attention

Serge Caparos and Karina J Linnell
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Recently, two theoretical approaches have been used to study visual selective attention. The spatial approach has revealed that distractor interference depends on the spatial separation between distractors and the attended target (Mueller et al., 2005): distractors are better ignored at medium than large separations. The profile of attention is U-shaped, where the bottom of the 'U' denotes an ignored area. The load approach has shown that the efficiency of distractor exclusion is a function of task load (Lavie, 2000): increasing perceptual load improves distractor exclusion; increasing cognitive load impairs it. To test the independence of these two approaches, a flanker paradigm (Eriksen & Hoffman, 1973) was used in which load (perceptual and cognitive) and space (target-distractor separation) were systematically manipulated. An increase in perceptual load shifted the ignored area towards the attentional focus. This effect was reversed when cognitive load increased. These findings imply that: (1) the separation at which distractors are best ignored is variable; (2) the effect of spatial separation is sensitive to both cognitive and perceptual load and the effect of load is sensitive to spatial separation; (3) manipulation of cognitive load affects not only late- but also early-selection mechanisms; (4) load and space manipulations exert interacting effects.

Eriksen, C. W., & Hoffman, J. E. (1973). Extent of Processing of Noise Elements During Selective Encoding from Visual-Displays. Perception & Psychophysics, 14(1), 155-160.

Lavie, N. (2000). Selective attention and cognitive control: Dissociating attentional functions through different types of load. In S. Monsell & J. Driver (Eds.), Control of

cognitive processes: Attention and Performance XVII (pp. 175-194). Cambridge: MA: MIT Press.

Mueller, N. G., Mollenhauer, M., Rosler, A., & Kleinschmidt, A. (2005). The attentional field has a Mexican hat distribution. Vision Research, 45(9), 1129-1137

Electrophysiological Evidence of Semantic Interference in Visual Search

Anna L Southall, Glyn W Humphreys, Antje S Meyer
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Visual evoked responses were monitored whilst participants searched for a target in a four-object display that could include a semantically related distractor. The occurrence of both the target and the semantically related distractor modulated the N2pc response to the search display: The N2pc was more pronounced when the target and distractor appeared in the same visual field, and it was less pronounced when the target and distractor were in opposite fields. The data suggest that semantic distractors can affect relatively early attentional processes. The further implications for theories of attention will be discussed.

Temporal lobe activity during complex discriminations of meaningful and novel objects and faces

Morgan Barense[1], Rik Henson[1], Kim Graham[2]
1. MRC Cognition and Brain Sciences Unit
2. University of Cardiff
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Recent studies indicate that structures in the medial temporal lobe (MTL) support processes beyond long-term declarative memory, including perception. In addition, there appears to be an influence of stimulus meaningfulness on discrimination ability in patients with temporal lobe damage. For example, discrimination performance in patients with focal MTL lesions (e.g., from herpes viral encephalitis) was improved by the use of meaningful stimuli. By contrast, patients with semantic dementia, a neurodegenerative condition characterised by progressive deterioration of conceptual knowledge and atrophy to the anterolateral temporal lobes, showed no benefit from the use of meaningful stimuli. To further investigate these findings, healthy volunteers were scanned while they performed oddity discriminations involving familiar and unfamiliar objects and faces. Across the different conditions, different patterns of temporal lobe activation were observed. Discriminations involving familiar stimuli were associated with activity in the perirhinal cortex, anterior hippocampus, amygdala and temporal pole when compared to oddity judgements for unfamiliar stimuli. When compared to object discriminations, face oddity judgements were associated with activity in anterior temporal lobe structures, including the anterior hippocampus, perirhinal cortex, amygdala and temporal pole. These observations provide further evidence that the MTL is recruited during complex visual discriminations which place minimal demand on memory.

The man who mistook his neuropsychologist for a popstar: When the whole IS the sum of the parts and configural processing fails in prosopagnosia

Ashok Jansari[1], Scott Miller[1], Laura Pearce[1], Amanda Taylor[1], Joanne Chan[1] and Jeremy Tree[2]
1 University of East London
2 University of Exeter
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Empirical evidence suggests that prosopagnosia is due to an impairment in 'configural' visual processing (e.g. Farah, 1994). We report the case of a patient, DY, who, following a cerebral haemorrhage suffers from impaired face-recognition. DY was shown to be normal on a number of aspects of face-processing (e.g. expression analysis) and normal for within-category discrimination of four classes of objects. Additionally, an ability to successfully recognise a small number of faces by identifying specific features was detected. Three experiments were conducted that focused on DY's use of configural processing (naming of Navon figures, Duchaine & Nakayama's (2006) Cambridge Face Memory Test and an adaptation of Moscovitch et al's (1997) face-fracturing paradigm). Compared to age and IQ matched controls results showed significant impairments in DY's configural processing in the context of a preserved ability to recognise some faces by means of individual features and cues, such as the use of George Michael's goatee beard and earring to correctly identify him. The results offer support for the theory that face recognition relies heavily on configural processing. Theoretical and practical implications of these findings are discussed.

Duchaine, B & Nakayama, D (2006) The Cambridge Face Memory Test: Results for neurologically intact individuals and an investigation of its validity using inverted face stimuli and prosopagnosic participants. Neuropsychologia, 44(4), 576-85.

Farah, M. J. (1994) Specialisation within visual object recognition: Clues from prosopagnosia and alexia. In M.J.Farah & G.Ratcliff (Eds), The neuropsychology of high-level vision: Collected tutorial essays. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Investigating manipulations of facial processing on subjective experiences

Karen Brandt
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According to Rajaram's (1996) distinctiveness fluency hypothesis, items that are processed elaborately elicit the subjective experience of remembering whereas items that are processed more fluently give rise to feelings of knowing. Supporting her theory, past research demonstrated that increasing the likelihood that a face will be elaborately encoded increased remember but not know responses (Brandt, Macrae, Schloerscheidt & Milne, 2003). The aim of the present research was to further test Rajaram's hypothesis by investigating whether reducing the propensity to elaborately encode a face would selectively disrupt remember but not know responses. Whilst Exp. 1 explored the effects of configurational disruption (scrambled faces), Exp. 2 investigated featural disruption

(blurred faces). The results demonstrated that in comparison to a control condition, both scrambling and blurring reduced overall recognition memory. In addition, both these types of manipulation selectively disrupted remember but not know responses, thereby providing further support for Rajaram's theory.

EPS/BAAS Prize Lecture

The ability to use movement for segregating and locating sources of sound.

Paul.M. Briley and A.Q. Summerfield,
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paul@ihr.mrc.ac.uk

In vision, movement can group object parts into coherent forms. In hearing, difficulties in stimulus generation have meant that research has mainly focussed on frequency modulation as an analogue of movement. That research shows that coherent modulation of the components of a complex sound is not an independent cue that listeners can use to segregate the target sound from modulated distracter sounds. We asked whether the same limitation applies when sounds are perceived to move in space. Target and distracter sounds were synthetic vowels composed of tones. Sinusoidal movement in the horizontal plane was simulated by modulating a vowel's amplitude envelope across three adjacent loudspeakers in a circular ring of 24 loudspeakers. Listeners sat in the middle of the ring. Some listeners were trained extensively. A group of untrained listeners also completed each experiment. Experiments 1 and 2 demonstrated that listeners could use movement to identify and locate targets amidst stationary distracters. Trained listeners could also use the direction of movement to identify and locate targets in the presence of moving distracters. In Experiment 3, listeners attempted to identify both members of a pair of vowels which either moved incoherently or were stationary at the maximum spatial separation of the moving vowels. Trained listeners identified the moving vowels more accurately than the stationary vowels. These results show that movement can be an independent cue for grouping in hearing, as it is in vision, but that experience of stimuli is necessary for this role to emerge.

Stair descent in adults and children: feedforward and feedback control

Dorothy Cowie[1], Oliver Braddick[2]
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Visual guidance of forwards, sideways, and upwards stepping has been investigated, but there is little knowledge about the visuomotor processes underlying stepping down actions. In this study we investigated the visual control of a single vertical step down. We developed a new kinematic measure, toedrop, whose value scales to the height of the step (set at 8%, 16%, or 24% of each participant's leg length). This dependence on step height must be mediated by visual information since the step is of variable and unpredictable height. With normal vision, visually controlled scaling is found in adults and children (3 and 4 years). In open-loop conditions, scaling is preserved in adults and 4 year olds, but reduced in 3 year olds. In a group of children with Williams

Syndrome, scaling is impaired, and performance depends on mental age rather than lower level visual factors. These results demonstrate a new paradigm for measuring control in steps down. They suggest that in stepping down, young children are dependent on visual feedback to make accurate movements; and feedforward processes in locomotion develop through early childhood. Williams Syndrome results may be accounted for by atypical development of the dorsal stream or cerebellum.

The role of physical contiguity in children's interpretations of novel compound words

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While children become sensitive to the roles of heads and modifiers in unfamiliar compounds (e.g., *mouse hat*) when they are about two years old, they do not understand the relations between heads and modifiers the way adults do until much later. Krott, Gagné, and Nicoladis (2008) found that when four- to five-year-olds interpreted novel noun-noun compounds, they over-used relations in which the referents of the constituents are permanently physically contiguous (e.g., 'a bag with pictures of eggs' for *egg bag*) and underused interpretations in which one constituent serves a function for the other ('a bag for eggs'). The present study further investigates this preference by teaching two- to five-year-olds and adults the names of pairs of novel objects and by presenting them with combinations of the objects, one in which the objects were permanently physically contiguous and one in which one object had a function for the other. We then presented a compound composed of the two object names and asked participants to select its referent from the two object combinations. Only two- to three-year-olds preferred combinations showing permanent physical contiguity of the constituent objects. We discuss possible explanations for this.

Krott, A., Gagné, C., & Nicoladis, E. (2008). How the parts relate to the whole: a usage frequency effects on children's interpretations of novel compounds. Manuscript submitted for publication.

Representation and retrieval of relations in conceptual combination

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Comprehending noun-noun compounds such as volcano science involves generating a relationship between the two constituents, producing a new combined concept that represents the meaning of the compound. Previous work on conceptual combination has often adopted a taxonomic approach to representing the relations instantiated during the interpretation process (e.g. the CARIN model, Gagne & Shoben, 1997, Gagne & Spalding, 2006). In our first experiment, we present evidence against

taxonomic representations of relation meaning. The CARIN model also posits that the speed with which a compound is interpreted depends on the degree of association between the modifier concept and the relations in the taxonomy; however, in our second experiment, we present evidence that the relation selected during the interpretation process depends on both the modifier and head concepts. In light of these findings, we propose a more complex framework for representing relations, in which relations are represented as exemplars in a high-dimensional relation space. A model of conceptual combination using this representation is presented, in which interpretation is based on relation exemplars associated with both concepts in the compound. Finally, we address dynamic aspects of conceptual combination, demonstrating how Gagne & Shoben's (1997) findings can be understood in terms of relation exemplars.

Effects of a visual competitor on the choice of referring expressions in discourse

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Most theories of reference assume that a referent's saliency in the linguistic context determines the choice of referring expression (e.g., Ariel, 1990). However, it is less clear whether the saliency in the visual context has an effect. Using a picture description task, Arnold and Griffin (2007) observed reduced pronoun use when the linguistic context mentioned a competitor, but found no effect of the competitor's visual presence. We investigated the effects of visual context on the choice of referring expressions in a referential communication task. Experiment 1 examined whether participants chose a pronoun or noun-phrase to refer to a pirate following a context sentence mentioning either one or two characters, using visual contexts where the pirate was either alone or with a second character (the prince). Linguistic mention as well as visual presence of the prince resulted in fewer pronouns for the pirate, suggesting that both linguistic and non-linguistic context determined the choice of referring expression. Experiment 2 compared the effects of visual context when the competitor had either the same or a different gender from the referent, showing that people avoided gender ambiguous pronouns more often in the competitor-present than absent condition, indicating that visual context also influenced ambiguity avoidance.

Ariel, M. (1990). Accessing noun-phrase antecedents. London: Routledge.

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.

A new method for developmental research reveals profiles and sources of change in individual preschoolers' theory of mind

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We explored the profiles and sources of developmental change in three- to five-year-olds' theory of mind utilizing a novel statistical method. It is challenging to address developmental questions with cross-sectional designs. How can we translate variability in a group to variability in an individual over time? This obstacle constrains our avenues of investigation, and until now has made it difficult to go beyond a qualitative description of change in individuals. Our new method offers a solution in the form of inferential statistics for individual children's developmental records. The new method requires intensive sampling of behaviour throughout a period of change (often referred to as a micro-genetic design; Siegler, 1996). These data yield a cumulative record of successes over time for each individual child. Borrowing from research in animal learning we applied the Gallistel algorithm to each individual's cumulative records (Gallistel, Fairhurst & Balsam, 2004). This algorithm detects significant changes in the probability of success, thus highlighting significant developmental change in a child's performance. Results reflect strikingly diverse profiles of change in children's theory of mind. Changes in inhibitory processing appear to occur before changes in theory of mind, suggesting a developmental relation between these abilities.

Siegler, R.S. (1996). Emerging minds: The Process of change in children's thinking. New York: Oxford University Press.

Gallistel, C.R., Fairhurst, S, & Balsam, P. (2004). The Learning curve: Implications of a quantitative analysis. Proceedings of the National Academy of Science, 101, 13124-13131.

The relationship between causal and counterfactual judgments: A developmental study

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Sobel, Tenebaum, and Gopnik (2004) claimed to have demonstrated backwards blocking in children as young as 3 years using their "blicket detector" paradigm. The experiments reported in this paper used a modification of their paradigm, in which objects are placed either on their own or in pairs on a novel machine and children must judge which objects have the causal power to set the machine off. Using different control trials, our initial study found no evidence of backwards blocking in 4-year-olds, although both forwards and backwards blocking were clearly demonstrated in 5-6-year-olds. We subsequently examined children's counterfactual judgments by asking them whether or not the machine would have gone off in the absence of one of two objects that had been placed on it as a pair. The findings suggest that children's counterfactual judgments are less accurate than their causal judgments. However, the developmental patterns observed in our first study were also observed when children were asked to make counterfactual rather than causal judgments. Thus, the results provide some support for the idea that, at least under some circumstances, counterfactual and causal judgments may be closely related psychologically.

Sobel, D., Tenenbaum, J. B., & Gopnik, A. Children's causal inferences from indirect evidence: Backwards blocking and Bayesian reasoning in preschoolers. Cognitive Science, 28, 303-333.

The Rumsfeld Effect: when we reliably know that we don't know.

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A new methodology was devised to establish the existence of a stable set of facts that are "known unknowns". Test-retest reliability for forced choice judgments of the truth of different statements was measured over a 2 week interval. Reliability was compared between a 2-alternative True-False response condition, and a 3-alternative True-Unsure-False response condition. Greater reliability for the 3-alternative group was taken to indicate a domain in which we may "know that we don't know", since it implies that people are reliably unsure about the same items on each occasion. A series of studies found that there were known unknowns in general knowledge and in episodic memory for a video. However category judgments, autobiographical facts, moral/religious beliefs and aspirations showed no significant stability for "unsure" responses.

Evolution of Cooperative Turn-taking

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We investigated the evolution of cooperative turn-taking with noisy decision making in three repeated games in which we predicted on theoretical grounds that coordinated cooperative turn-taking would emerge, namely Battle of the Sexes, Hero, and Leader (alternation games), and three in which we expected simultaneous cooperation to emerge, namely Prisoner's Dilemma, Rousseau's Stag Hunt, and Aumann's Stag Hunt (synchronization games). Results, using a genetic algorithm incorporating mutation and crossing-over, from simulations over 2,000 generations revealed the evolution of cooperative turn-taking and double turn-taking in the alternation games only and of joint cooperation in the synchronization games. We propose a mechanism to explain how cooperative turn-taking can evolve, without communication or insight, among players using only pure strategies. These findings are discussed in the light of earlier, preliminary research by Browning and Colman (2004).

Browning, L., & Colman, A. M. (2004). Evolution of coordinated alternating reciprocity in repeated dyadic games. Journal of Theoretical Biology, 229, 549-557.

Comparing the effects of lighting and orientation changes on visual object constancy

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Lighting changes can dramatically alter object appearance yet the limited evidence available suggests that this has little effect on recognition. Familiar objects were photographed on a complex background illuminated by late-afternoon sunshine that produced strong shadows. The direction of lighting with respect to the object and the orientation of the object with respect to the observer's viewpoint were both varied. These images were presented in priming studies with a speeded naming task or identification from brief, masked presentations. In the latter task, stimulus duration was increased until the object was identified correctly; the dependent measure was the final stimulus duration. Changes in lighting had little effect on priming whereas changes in object orientation produced substantial, reliable effects on priming. Furthermore, explicit awareness of changes to the orientation of objects was high, unlike the detection of lighting changes. These results suggest that there is typically little cost to compensating for the range of variation in lighting that occurs under normal viewing conditions for familiar objects. In contrast, performance is usually disrupted if constancy must be achieved across view changes of the same objects.

Eye movement control and object memory in moving images

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Research on scene perception has demonstrated that higher level visual information is abstracted from fixations and survives eye movements and that different object properties are accumulated to different degrees. Our current understanding of scene perception, however, derives almost exclusively from experiments using static scenes and psychological understanding of how moving images are processed is under-developed. The present study addressed the question of dynamic scene perception and examined the nature of eye movement strategies using short films involving a change in viewpoint (a cut). Further, we examined what type of object information is extracted by changing different types of scene properties (e.g. colour and position of objects) in some trials while recording observers' eye movements. The results showed that object information can be extracted and integrated across a cut in moving images. When scene properties changed across a cut object memory was generally biased towards information present after the cut, suggesting an overwriting of previous object properties. However, the post-cut fixation duration on the target object was longer when the object property was changed across a cut, suggesting some preserved representation of object information from both pre and post cut scenes.

Two developmental processes underlying human spatial memory

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Humans possess several parallel, complementary representations of space (e.g. body-referenced, landmark-referenced). How do these, and the ability to combine them, emerge in development? Experiment 1 dissociated developmental trajectories for "scene recognition" and "spatial updating" from a further, viewpoint-independent process. While the first two were highly reliable even in early childhood, the latter was not seen until 7 years. Experiment 2 studied localisation relative to arena boundaries vs. landmarks within the local environment. Adults and 5-7-year olds used both in parallel; however only adults maintained direction (as well as distance) to boundaries and landmarks using distal cues. Experiment 3 examined development of the use for localisation of (a) tracking of self-motion and (b) landmarks, separately, together consistently, or in conflict., to assess how these are weighted and combined. While adults improved accuracy by "Bayes-optimal" integration of these information sources, 4-8 year olds were no better with both than with either alone. We conclude that two main developmental processes underpin human spatial memory. First, late-developing, abstract (e.g. viewpoint-independent) representations supplement earlier-developing representations more closely tied to the sensory input. Second, ability to combine these different representations optimally to guide behaviour depends on a further developmental process, about which little is yet known.

Comparison in face familiarization: Evidence from a matching task.

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Prior analyses of perceptual learning suggest that comparison between similar stimuli aids subsequent discrimination between them. We examined whether the opportunity to compare a target face to other similar faces during a pre-exposure phase facilitated familiarization of that target face using a matching task to assess familiarity. Performance was better when the target face had been presented in alternation with similar comparator faces than if it had not been exposed. Target exposure alone, or exposure alternating with dissimilar faces, improved performance to a lesser extent. The effects of exposure were not influenced by image changes between exposure and test. It is suggested that exposure to a face in comparison to similar stimuli focuses the central representation of a face on its unique features. In practical terms these results suggest that reliable identification of an individual from their photograph would be improved by viewing that photograph in comparison with photographs of similar people.

Perceptual aftereffects reveal dissociable adaptive coding of faces of different races and sexes

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The coding of information in faces involves adaptive processes. Faces that appear initially 'normal' to an observer, can appear distorted or 'unusual' after exposure (adaptation) to highly distorted faces. These aftereffects reflect changes in the underlying neural responses to faces and can affect the perception of face normality and attractiveness. Recent adaptation studies have reported findings consistent with the suggestion that distinct neural populations code male and female faces (Little et al., 2005) and upright and inverted faces (Rhodes et al., 2004). For example, aftereffects were induced selectively in male faces, without affecting the perception of female faces (Little et al., 2005). In a series of adaptation studies, we examined the coding of faces of different races and sexes. Our results suggest that Chinese and Caucasian faces, and male and female faces, are coded by both common and race- or sex-selective neural mechanisms. In other words, our findings suggest that the neural coding of faces of different races or sexes is dissociable, rather than distinct. We will discuss the implications of these results for the representation of faces in face space.

Little, A. C., DeBruine, L. M., & Jones, B. C. (2005). Sex-contingent face aftereffects suggest distinct neural populations code male and female faces. Proceedings of the Royal Society of London, Series B, 272, 2283-2287.

Rhodes, G., Jeffery, L., Watson, T., Jaquet, E., Winkler, C., Clifford, C. W. G. (2004). Orientation-contingent face aftereffects and implications for face coding mechanisms. Current Biology, 14, 2119-2123.

Differential Sensitivity for viewpoint between familiar and unfamiliar faces in human visual cortex

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People are extremely proficient at recognizing familiar faces, but are poor at identifying unfamiliar faces. We used fMR-adaptation to ask whether this difference in recognition might be reflected in the relative viewpoint-dependence of face-selective regions in the brain. Differences in the response to faces and non-face objects were used to define face-selective regions. A reduced response (adaptation) to repeated images of unfamiliar or familiar faces was found in the fusiform face area (FFA), but not in the superior temporal sulcus (STS) face-selective region. To establish if the neural representation of faces was invariant to changes in viewpoint, we varied the viewing angle of unfamiliar and familiar faces. There was a release from adaptation when unfamiliar faces were viewed at increasing viewing angles. In contrast, adaptation to

familiar faces in the FFA was more view invariant. A whole-brain analysis showed a distributed pattern of adaptation to faces that extended beyond the face-selective areas, including other regions of the ventral visual stream and the right frontal lobe. These results provide a neural basis for differences in the recognition of familiar and unfamiliar faces, but also suggest that structural information about faces is represented in more distributed network.

The Visual Representation of Human Body Orientation Revealed by Adaptation

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Electrophysiological research in macaques has revealed cells in the superior temporal sulcus (STS) that respond selectively to different seen body orientations and poses (Perrett *et al.*, 1992; Jellema *et al.*, 2003). We used visual adaptation to investigate the functional organization of body orientation perception in humans. Experiment 1 showed that adaptation to left (or right) facing bodies increased participants' tendency to perceive subsequently viewed left (or right) bodies as facing directly towards them – evidence for direction selective coding of seen body orientation in humans. Experiment 2 investigated whether the visual representation of body orientation is coded by an opponent-coding system, implicated in facial identity perception (Rhodes *et al.*, 2005) or a multichannel system, which has been shown underlie the visual representation of seen gaze (Calder *et al.*, in press). Consistent with multichannel coding, simultaneous adaptation to left *and* right facing bodies resulted in an increased tendency to perceive subsequently seen left and right oriented bodies as direct. Also consistent with a multichannel system, adapting to direct facing bodies produced an increased tendency to perceive subsequently seen left and right body directions as averted. Our findings provide the first evidence for distinct representations of different body directions within the context of a multichannel system.

Calder, A. J., Jenkins, R., Cassel, A., and Clifford, C.W.G. (in press). "Visual Representation of Eye Gaze is Coded by a Non-Opponent Multichannel System". Journal of Experimental Psychology: General.

Jellema, T., & Perrett, D. I. (2003). Cells in monkey STS responsive to articulated body motions and consequent static posture: a case of implied motion? *Neuropsychologia, 41*(13), 1728-1737.

Perrett, D. I., Hietanen, J. K., Oram, M. W., & Benson, P. J. (1992). Organization and functions of cells responsive to faces in the temporal cortex. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, B335*, 23-30.

Rhodes, G., Robbins, R., Jaquet, E., McKone, E., Jeffery, L., & Clifford, C. W. G. (2005). Adaptation and face perception: how aftereffects implicate norm-based coding of faces. In C. W. G. Clifford & G. Rhodes (Eds.), *Fitting the Mind to the World*. Oxford: Oxford University Press.

Does Alternation-based Interference (ABI) result from response conflict at abstract or effector-specific processing levels?

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Previous research has shown that response alternations can produce conflict between competing response activations. More specifically, when the interval between subsequent events is very short (< 500 ms), participants are usually slower in trial N when the response changes from trial N-2 to trial N-1 (Jentzsch & Leuthold, 2005). However, although the response-related nature of this conflict is well established it is not clear whether this conflict arises at levels of abstract (left, right) or effector-specific (left hand, right hand) response code representation. To address this issue, participants were asked to perform to each presented stimulus a double keypress response with the same key (effector repetition: key1-key1) or with two keys, (effector alternation: key1-key2) using the left and right hand (Experiments 1 and 2). Experiment 3 demanded single responses, executed either manually or vocally. We found a reduced ABI effect when a double keypress involved effector repetitions rather than effector alternations. Also, the ABI effect of similar size for manual and vocal responses. Together, these findings strengthen the view that alternation-based response conflict arises at the level of abstract rather than effector-specific response representations.

Jentzsch, I., Leuthold, H. (2005). Response conflict determines sequential effects in serial response time tasks with short response-stimulus intervals. Journal of Experimental Psychology: Human Perception and Performance, 31, 731-748.

Response learning and priming: evidence for multiple levels of response representation

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Repetition priming refers to a change in reaction time, or response accuracy, to a previously encountered stimulus. Recent research has suggested repetition priming is largely driven by previously learnt stimulus-response pairings (Dobbins, Schnyer, Verfaellie, & Schacter, 2004; Schnyer, Dobbins, Nicholls, Schacter, & Verfaellie, 2006). On first presentation, a direct association forms between the stimulus presented and the response given; on a subsequent encounter with the stimulus, this association automatically cues the response, bypassing the processing stages required during its first presentation. Previous research, however, has been unable to accurately characterise the level of response representation within such S-R associations. For example, the response may be encoded at a specific motor-output level (Dobbins, Schnyer, Verfaellie, & Schacter, 2004), or at a more abstract "decision" level (Logan, 1990). Here we present a series of experiments which demonstrate response encoding at multiple levels of representation, with each representational level having a measurable effect on repetition priming. These results have clear implications for experimental paradigms which aim to control for the effects of response-repetition.

Dobbins, I. G., Schnyer, D. M., Verfaellie, M., & Schacter, D. L. (2004). Cortical activity reductions during repetition priming can result from rapid response learning. Nature, 428(6980), 316-319.

Logan, G. D. (1990). Repetition priming and automaticity: common underlying mechanisms? Cognitive Psychology, 22, 1-35.

Schnyer, D. M., Dobbins, I. G., Nicholls, L., Schacter, D. L., & Verfaellie, M. (2006). Rapid response learning in amnesia: Delineating associative learning components in repetition priming. Neuropsychologia, 44(1), 140-149.

A response congruence effect in cross-task repetition priming

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Associative accounts of repetition priming are supported by demonstrations of response congruence effects (faster or more accurate responding if the required response to the current trial matches the required response for the previous occurrence of the stimuli). Such effects have been found in within-task repetition priming but not in cross-task repetition priming (e.g. Waszak & Hommel, 2007) suggesting that, when there is a stable task set, associations formed on the previous task are no-longer active. This idea was tested in two studies where the task alternated between blocks of trials. In alternate blocks participants decided whether the presented object was bigger than a football or was made by people. Some items were repeated only for one task whereas others were repeated in both. Items with congruent responses on the two tasks produced better performance than items with incongruent responses particularly for items appearing in both tasks, thus demonstrating a cross-task response congruence effect. Response congruence effects were observed irrespective of whether the two tasks used the same response labels (yes/no) or different response labels (smaller/larger vs natural/made by people). The results indicate that stimuli can activate associations formed on a previous task and clarify the nature of these associations.

Waszak, F, & Hommel, B. (2007) The costs and benefits of cross-task priming. Memory and Cognition, 35, 1175-1186.

Impairments in saccadic inhibition in patients with right hemisphere lesions

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The antisaccade task has been widely demonstrated to be extremely sensitive to brain injury. Whilst there is good evidence that the dorsolateral prefrontal cortex provides a vital inhibitory component of the task, there is also clear evidence that other frontal structures and indeed posterior structures are involved in the task's successful completion. Here we report on the performance of 13 right hemisphere lesioned patients undertaking an antisaccade and an inhibit-saccade task (where the participant ignores all stimuli and maintains central fixation). Our evidence shows that, relative to age matched controls, right hemisphere lesioned patients display significant impairments in both tasks. Furthermore, the observation of impairments in patients whose lesions spare the frontal lobe indicates a role for posterior brain structures in this type of inhibition. Of particular interest is the finding that such impairments in patients with cortical lesions were observed when both left and right antisaccades were required. We will relate these findings to current work examining the use of probability information in saccadic inhibition.

Action programming and attention: Reducing extinction through intention.

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We examined the effects of action programming on visual extinction. A patient with a left temporo-parietal lesion was examined under conditions in which he had to make a pointing action to locations where briefly presented targets could appear. Though the stimuli disappeared long before the actions were initiated, programming an action to the ipsilesional side increased extinction (on 2 item trials) and tended to induce neglect (on 1 item trials); this was ameliorated when the action was programmed to the contralesional side. Separable effects of using the contralesional hand and pointing to the contralesional side were apparent. These effects were sustained even when sequential pointing actions were made, when an action to the contralesional side was only made following an action to the ipsilesional location. The data demonstrate that action programming can enhance perception in such cases, and that actions can be programmed to more than one location at a time.

Impaired anti-pointing in patients with hemispatial neglect

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It has been widely shown that hemispatial neglect manifests itself in a rightward bias, yet the presence of this bias in goal-directed movements remains a matter of debate. Here we analysed the ability of 8 patients with hemispatial neglect to perform pro and anti-pointing movements in response to left and rightwardly presented targets. A group of 10 age-matched healthy controls and 6 patients with right-hemisphere lesions but no neglect served as controls. In the pro-pointing condition, subjects were asked to point directly to the target, whereas in the anti-pointing condition they had to move in the opposite direction of the target (i.e., if the target was illuminated on the right subjects had to point to the equivalent target position on the left and vice-versa). For the pro-pointing reaches, no specific impairments were found. However for anti-pointing, patients with hemispatial neglect showed higher proportions of directional errors (i.e., anti-pointing movements in the wrong direction for both sides of space) and were also severely disrupted in the end-point accuracy of their movements. We relate these findings to the presence of impairments in movements that require specific location mapping and cannot be performed on-line.

Synaesthesia and visual mental imagery: measuring a synaesthetic experience from different mental imagery tasks

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Many studies provide empirical support for the reported colour experience in grapheme-colour synaesthesia by measuring the effect of externally presented graphemes. The current study explored the synaesthetic experience resulting from a visual mental image of a grapheme. Grapheme-colour synaesthetes (and matched controls) completed two different imagery tasks, "image inspection" and "image rotation". In both tasks the background colour was manipulated so that it was congruent or incongruent with the synaesthetic colour for the grapheme being visualised. Compared to matched controls, an effect of colour condition was found for the synaesthetes for image inspection but not rotation; additionally, the direction of the effect differed between synaesthetes. The study concluded that there is some support for subjective reports of imagery-induced synaesthesia but there are important task differences and also between-synaesthete differences which adds to a growing literature on the heterogeneity of the condition. These findings are discussed in relation to both visual imagery and synaesthesia literature.

Colour facilitates naming of real world objects in healthy and aphasic subjects.

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Adding chromatic information to pictures of objects shows only a small effect in verification and categorisation tasks. However, when observers are required to name

objects, colour speeds performance and enhances accuracy. The present study contrasts two different theories as to why colour may benefit object naming. The first is that colour simply aids the segmentation of the object from its background. For example, cherries pop out amongst the leaves of a cherry tree by their redness when presented as a coloured photograph, but not on a grey-scaled picture, where they must be segmented by differences in brightness and form. The second is that colour may help to elicit a wider range of associations with the object, thereby enhancing lexical access. To distinguish between these processes an equal number of pictures containing high and low colour diagnostic objects were presented against either fractal noise or uniform backgrounds in a naming task to aphasic subjects with anomia and to healthy controls. Performance for chromatic stimuli was compared with that for monochrome stimuli equated in luminance. Results show that colour facilitates naming significantly. Object segmentation and the lexical access seem to occur in parallel processes, rather than in an additive way.

Incidence of Memory Impairment after Neonatal Hypoxia-Ischaemia; Heart-Lung Bypass Cohort

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Neonates requiring treatment with extracorporeal membrane oxygenation (ECMO, a type of heart-lung bypass) may experience hypoxic-ischaemic episodes resulting in hippocampal damage and hence are at risk of developing memory problems, which in some cases can take the form of developmental amnesia (DA). DA is characterized by a severe impairment in episodic memory with relative preservation of semantic memory, intellectual abilities, and academic attainments. To determine the incidence of selective memory problems in an ECMO cohort, we compared 23 such children with 27 age-matched controls (each groups' mean age, 11.1 years, SD 1.8) on standardised tests of memory (RBMT and CMS), academic attainments (WIAT) and intelligence (WISC IV). An ANCOVA performed to control for group differences in IQ indicated that the patient group was significantly impaired on all measures of the CMS and the RBMT ($p < 0.05$). Further screening to identify patients who scored >3 SDs below the control mean on both memory tests revealed a subgroup of nine patients with clinically significant memory disorders despite relatively normal intellectual functions and academic attainments. These nine patients are therefore potential cases of developmental amnesia and will be evaluated with MRI for evidence of bilateral hippocampal pathology.

Working Memory Decline and Loss of White matter Pathway Connectivity in Ageing

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There is no unified neurobiological theory explaining cognitive ageing. Recent interest has focused on white matter change using diffusion tensor imaging (DTI) to quantify white matter integrity. We have explored the hypothesis that working memory (WM) is susceptible to white matter integrity loss because: (a) the brain areas supporting WM are distributed between major cortical regions connected by white matter pathways that tend to show damage in older adults; and (b) working memory involves reiterative information transfer during tasks performance making it more vulnerable to relatively small amounts of white matter integrity change. For 106 adults (aged 50-90) DTI maps were computed for large regions of interest and for whole brain (white matter) histograms. Voxel-based analysis identified clusters in the white matter where integrity was associated with WM performance; tractography then identified white matter tracts passing through these clusters. Clusters associated with WM were small and located in temporal, parietal and frontal lobes. Tracts through these clusters included the fronto-parietal fasciculus, the medial pathway, the superior parietal lobule pathway, the cingulum and portions of the arcuate fasciculus. Such tracts connect brain regions known to be activated by WM tasks (using functional imaging), and mirror results from WM connectivity analyses

Relationships between depression, dysphoria, cardiovascular disease and intelligence in old age.

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Cardiovascular disease is the main cause of mortality in old age. Many studies find that cardiovascular disease is often accompanied by a clinically significant level of depression that is an additional risk factor for heart-attacks, poor outcome and early mortality. It is therefore of concern that our analyses of longitudinal data from the University of Manchester Study find that both depression and cardio-vascular disease are associated with reduced cognitive ability and accelerated age-related cognitive decline, and particularly that these relationships maintain even within samples of 1429 individuals whose scores on the Beck and Yesavage geriatric depression inventories are below the median for an atypically cheerful population sample. Further analyses revealed differences in the aetiology of the cognitive effects of depression between sub-sets of individuals experiencing reduced cheerfulness, mild discontent, moderate depression and severe depression. In less cheerful and mildly discontented groups the relationship between depression inventory scores intelligence and mortality appears to relate to differences in levels of social support and quality of life in quality of life that affect thriving. Higher levels of scores depression scores appear to have a different aetiology and a more pronounced effect on cognitive ability.

Visually induced overeating: identifying the neural mechanisms underlying a risk factor for obesity

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Eating is not only triggered by hunger, but also by foods' taste, smell, and sight. Viewing appetizing foods alone can evoke a desire to eat and it is referred as "external-food sensitivity" according with Van Strien, Frijters, Bergers, and Defares (1986). Furthermore, Burton, Smit, and Lightowler (2007) have found that individuals with higher "external-food sensitivity" are at increased risk for developing obesity. Identifying the neurobiological mechanisms underlying this tendency is fundamental to understanding obesity. In a recent review, Kelly, Baldo, Pratt, and Will (2005) implicated a broad neural network mediating feeding behaviour in rats, including ventral striatum (VS), amygdala, and prefrontal cortex. However, it is unclear whether the same circuit is involved in humans. To address this issue, we used fMRI to investigate how "external-food sensitivity" influences the neural correlates of viewing appetizing vs. bland foods. Effective connectivity analyses revealed highly significant differences in brain couplings in subjects with increased vs. reduced external-food sensitivity. Individuals with higher scores presented increased coupling between VS and amygdala and between VS and premotor cortex. They also displayed reduced coupling between VS and anterior cingulate cortex (ACC), and between amygdala and ACC. Our results demonstrate how a risk factor for overeating modulates neural networks implicated in eating behaviour and have major implications for understanding obesity.

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Two distinct neural substrates for the processing of facial expressions of distaste and human disgust

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Functional imaging studies have identified the insula as playing a disproportionate role in the processing of disgust facial expressions (Calder et al, 2000; Phillips et al, 1997). However, psychological research has identified different facial expressions of disgust and these convey different meanings (Rozin et al, 1994). The mouth gape and tongue protrusion is a distaste reaction found throughout mammalian species, whereas the upper lip retraction is a 'human' disgust response which includes reactions to the violation of socially acceptable norms, beliefs and behaviour (Rozin et al, 1994). In this study, we used fMRI to investigate the neural substrates for the processing of these two forms of disgust expression. We found significantly increased activation in anterior insula/frontal operculum for human disgust vs distaste faces and for human disgust vs neutral faces. Human disgust expressions also engaged a number of areas important in social-cognitive networks, including medial prefrontal cortex (mPFC), tempoparietal junction, and superior temporal sulcus (STS). Furthermore, functional connectivity analyses revealed significant coupling between mPFC and STS for human disgust as a function of individual disgust sensitivity. By contrast, facial expressions of distaste produced only an increased response in visual cortex. These results indicate that human disgust expressions activate social-cognitive networks in the brain, consistent with the idea that human disgust is a more empathic, socially relevant stimulus, whereas distaste reflects a sensation that is relevant to the individual alone.

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Phillips, ML, Young, AW, Senior, C, Brammer, M, Andrew, C, Calder, AJ, Bullmore, ET, Perrett, DI, Rowland, D, Williams, SC, Gray, JA, David, AS (1997) A specific neural substrate for perceiving facial expressions of disgust. Nature 389:495-8.

Rozin, P, Lowery, L, Ebert, R (1994). Varieties of disgust faces and the structure of disgust. J Pers Soc Psychol 66(5):870-81.

Symposia : Perception in the social world
Organiser: Dr Ian Penton-Voak

Developing a social brain

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As adults, we are able to recognise the identity, actions and intentions of other humans. Several brain regions are known to be active during such tasks in adults, and together this network has been termed the "social brain". I will address how this specialised network arises during development. Specifically, I will consider and contrast three viewpoints on human functional brain development: the maturational view, the skill-learning view, and "interactive specialisation. To assess these different views of human functional brain development, I will review cognitive and brain studies of the development of face processing over the first days, months, and years after birth. Several lines of evidence support predictions of the interactive specialisation view in which

postnatal functional brain development involves the increasing specialisation (response tuning) of areas of the cerebral cortex (Johnson 2001). This encourages the view that the social brain emerges from other cortical networks through interactions between different brain regions, and interactions between the whole brain and its external environment (Johnson 2005). Finally, I will turn to implications for atypical development, and argue that, at least in the early years, autism can be viewed as a failure of specialisation of the social brain network.

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Integrating gaze direction and expression in preferences for attractive faces

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Many researchers regard attractiveness as a simple physical property of faces. There are, however, several social cues from faces, such as expression and direction of attention, that impact on preferences. Few studies have investigated how different facial cues, physical and social, are integrated when forming face preferences. Here we show that effects of gaze direction and expression on preferences for attractive faces interact to determine face preferences. For example, expression differentially qualified the strength of attractiveness preferences for faces with direct and averted gaze. For judgments of faces with direct gaze, attractiveness preferences were stronger for smiling faces than faces with neutral expressions. By contrast, for judgments of faces with averted gaze, attractiveness preferences were stronger for faces with neutral expressions than smiling faces. Because expressions can differ in meaning when directed at you, rather than away from you, it is only by integrating gaze direction, facial expression and physical attractiveness that we can unambiguously identify the most attractive individuals to engage with who are likely to reciprocate our own social interest.

In the eye of the beholder: Reward-drive affects the neural correlates of viewing facial signals of aggression

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For some people facial expressions of aggression are intimidating, for others they are perceived as provocative, evoking an aggressive response. Identifying the key neurobiological factors that underlie this variation is fundamental to our understanding of aggressive behaviour. The amygdala and the ventral anterior cingulate cortex (ACC) have been implicated in aggression. Using functional magnetic resonance imaging (fMRI), a first experiment demonstrated that activity in these regions to viewing facial signals of anger is influenced by the drive to obtain reward (reward-drive), a personality trait associated with aggression. Experiment 2 showed that the connectivity between the ventral ACC and the amygdala was strongly correlated with personality, with high reward-drive participants displaying reduced negative coupling. Furthermore, the direction of this effect was confined to the ventral ACC to the amygdala but not vice versa. The personality-mediated variation in this pathway provides an account of why displays of aggression provoke a corresponding aggressive reaction in some individuals but not others.

Mirror systems and social cognition

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We often effortlessly understand what goes on in other people despite the fact that their goals and feelings are hidden from sight, inside of their brains. How do we do that? I will present evidence that suggests that while we view the actions of other people, we activate our premotor, parietal and somatosensory cortex as if we were executing similar actions. While we view the tactile sensations of other individuals, our somatosensory areas are activated as if we felt similar sensations. While viewing the emotions of other individuals finally, we activate our premotor and parietal areas as if executing similar facial expressions and our insula as if experiencing similar emotions. Overall, the stronger these mirror activations, the more empathic individuals appear on self report questionnaires of empathy. Together, this suggests that we may in part understand other individuals by simulating their actions, sensations and emotions.

The contribution of the temporo-parietal junction in social interaction

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Accumulating evidence from cognitive neuroscience indicates that the right inferior parietal cortex, at the junction with the posterior temporal cortex (TPJ), plays a critical role in various aspects of social cognition such as theory of mind and empathy. A new quantitative meta-analysis of 70 functional neuroimaging studies will demonstrate that this area is also engaged in lower-level (bottom-up) computational processes associated with the sense of agency and reorienting attention to salient stimuli. A parsimonious interpretation of this overlap across different tasks suggests that activation in the TPJ during social cognition may rely on a lower-level computational mechanism

involved in generating, testing and correcting internal predictions about external sensory events. Such an interpretation is consistent with an evolutionary view that higher levels operate on previous levels of organization, and should not be seen as independent of, or conflicting with one another.

End of Symposium

EPS Mid-Career Award Lecture

Seeing the future: natural image sequences produce anticipatory neuronal activity.

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Sensory experience allows anticipation, yet one sensory stimulus also 'masks' perception and neural processing of subsequent stimuli. To understand this paradox we compared cell responses in monkey temporal cortex to body images presented individually, in pairs and in action sequences. Responses to one image suppressed responses to similar images for ~ 500ms. This suppression led to responses peaking 100ms earlier to image sequences than to isolated images (e.g., during head rotation, face-selective activity peaks before the face confronts the observer). Thus masking has unrecognized benefits for perception because it can transform neuronal activity to make it predictive during natural change.

Memory cycles and subcycles produce the recency-primacy shift in latent inhibition

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An experiment is reported investigating an inhibitory measure of implicit memory for events that overlap in time. The visual search paradigm of latent inhibition revealed a recency-primacy shift. In the preexposure phase, four shapes were presented as distractors on different trials; the first pair in all 75 blocks (PE75) and the second pair in the final 25 blocks (PE25). The first pair were thus older than the second pair because their presentions started earlier. At test all four shapes were presented as targets (on different trials) amongst a novel set of distractors. There was a recency-primacy shift. In the first half of the test phase PE25 showed latent inhibition but not PE75, and in the second half of the test phase PE75 showed latent inhibition but not PE25. This shift is explained in terms of cyclic patterns. Dividing the test phase into smaller blocks reveals subcycles for each pair of shapes with different frequencies (measured per test block) and equal amplitudes.

The Varying effects of Age of Acquisition

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There are a number of theories that suggest that Age of Acquisition (AoA) effects are not uniform across different tasks. Catling and Johnston (2006) found greater AoA effects within an object naming task when compared to a semantic classification task. They explained these findings by suggesting that AoA effects might accumulate according to how many levels of representation a task necessitates access to. Brysbaert and Ghyselinck (2006) explain the difference in AoA effects by proposing two distinct types of AoA (frequency-dependent and frequency-independent) the first accounted for by a connectionist type mechanism while the latter situated at the interface between semantics and word production. Moreover, Moore, Smith-Spark and Valentine (2004) and Holmes and Ellis (2006) have suggested that there are two loci of AoA effects; at the phonological level and somewhere within the perceptual level of representation. Again, this could account for the varying degrees of AoA effects. This study sets about testing these ideas by assessing the effect size of AoA across a series of different tasks that necessitate access to various levels of representation. We demonstrate significant effects of AoA in a novel picture-picture verification task, an object classification task, a picture verification task and an object naming task. The implication of the varying AoA effect sizes in relation to explanations of AoA are discussed.

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Holmes, S.J. and Ellis, A.W. (2006). Age of Acquisition and typicality effects in picture naming, object decision and category verification. Visual Cognition, 13, 884-911.

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The Role of Context on Age-of-Acquisition Effects in Visual Word Recognition

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The role of Age of Acquisition (AoA) as a psycholinguistic variable on visual word recognition and other lexical tasks has been the topic of much recent research with evidence showing how early acquired items, such as words and pictures, are processed faster and more accurately in comparison to late acquired items. For example an early acquired word, such as doll, will be named faster and more accurately than a late

acquired word, such as dole. Several key questions have been raised with regards to understanding this phenomenon, specifically the locus of the AoA effects and its organisation within the lexical system. In a series of five single-word naming experiments, the locus of AoA effects are explored from a higher level of representation. Specifically the focus is on how context may influence the emergence of AoA during visual word recognition. Overall, results suggest that context has indeed a role on AoA which will be discussed within the current theoretical frameworks.

Do conceptual structure variables affect lexical processing?

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Distributed feature-based models of semantic memory claim that variation in the distributional properties of features structures semantic space and determines conceptual processing. (McRae et al, 1997; Tyler et al, 2000). Living concepts have many shared intercorrelated features (<has_wings>, <has_feathers>) and few distinctive uncorrelated features (<has_red_breast>). Non-living concepts have fewer features but more correlated distinctive features. Through mutual activation, shared correlated features are activated rapidly and provide category information whereas distinctive features are activated more slowly and aid concept identification. Semantic priming tasks have dominated studies of semantic feature effects (McRae et al, 1997; Randall et al, 2004). Here we asked whether the same effects of conceptual variables are seen in single-word tasks which manipulate the depth and speed of processing: lexical decision with different task demands and semantic decision. In unspeeded lexical decision, both shared and distinctive features facilitated responses, whereas in speeded lexical decision only shared features facilitated responses. In semantic decision, despite requiring concept identification, only shared features facilitated responses. Significantly, domain always interacted with shared features, with stronger effects for living concepts. These results support distributed accounts, suggesting that the correlated feature-based structure of concepts affects lexical processing and provide insights into domain effects in on-line conceptual processing.

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Phonological advance planning in speaking is constrained by language-specific syntactic properties

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The degree of phonological advance planning in spoken production is currently under debate. In recent research we (Damian & Dumay, 2007) had speakers name coloured objects for which the colour and the object name either overlap in sound ("green goat") or not ("red goat"). Phonological overlap induced substantial facilitation, thereby indicating that speakers planned both the adjective and the noun before initiating their response. Here we capitalised on this effect to compare planning in languages with prenominal (English) or postnominal (French, Spanish) adjectives. The results show that phonological overlap facilitates responses when the adjective precedes the noun, whereas it has no impact in the reverse case. This suggests that before initiating their response, speakers construct one full noun phrase, encompassing the adjective in the prenominal case, but not in the postnominal one, and is in line with the idea that syntax constrains planning at the phonological level.

Damian, M. F., & Dumay, N. (2007). Time pressure and phonological advance planning in spoken production. Journal of Memory and Language, 57, 195-209.

Hemispheric laterality and derivational morphology

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Lexical complexity plays a prominent role in modulating the activity of the fronto-temporal language network. Studies with regularly inflected words show that processing morpho-phonological complexity (e.g. stem + inflectional affix) activates left-lateralised areas, while lexical-semantic complexity (e.g. competition due to presence of embedded stems, e.g., clay/claim) engages bilateral frontal regions. The current efMRI experiment asked whether similar left-lateralised decomposition and bilateral competition processes hold for derivationally complex words, where the stem-affix relationship is strongly lexicalised and less semantically predictable. In a set of single spoken words we manipulated the presence of embedded stems and derivational suffixes with varying degrees of productivity, forming a gradient in the extent they are predicted to trigger competition and decomposition processes. Words were contrasted with a complex auditory baseline that does not trigger a speech percept ('musical rain', Uppenkamp et al, 2006). We found that stem competition generated by derivational complexity engages bilateral fronto-temporal language regions, but with no hemispheric dissociation comparable to that observed for inflections. This is arguably because derivational affixes do not trigger decompositional processes in the same way as inflectional affixes. We suggest a neuro-cognitive account of the representation and processing of derivationally complex forms in English.

The self-referential positivity bias when judging where other people are looking

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Various factors influence the interpretation of gaze perception. Here we explore how emotional expression and attractiveness influence perceived gaze direction. In Experiment 1 we investigated the influence of emotional expression on perceived gaze direction. Eight faces expressing four different emotional expressions (angry, fearful, happy, neutral) were presented in 11 different viewing angles. In a forced-choice yes or no task participants judged whether a presented face was looking at them or not. Happy faces were most likely and angry faces least likely perceived as looking at the observer. This is in contrast with the hypothesis of approach-avoidance orientation of emotions (e.g., Adams and Kleck, 2003, 2005). The finding can be better explained with the positive bias that seeing a happy face is associated with the self. Experiment 2 further assessed this self-referential positivity explanation. Here we tested whether attractive faces are more likely to be perceived as looking at the observer than unattractive faces. We presented 32 faces with neutral expression, using the same forced-choice paradigm as in Experiment 1. We correlated the rated attractiveness of these faces with the proportion yes-answers. The findings of both experiments are discussed on the background of the self-referential positivity bias.

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Reduced frontal response to angry faces in individuals at risk for aggressive behaviour.

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Animal and human research suggests that aggression arises from a dysfunction in the neural circuitry of emotion regulation, with particular emphasis on prefrontal cortex and amygdala. Studies in clinically aggressive individuals and healthy volunteers with elevated risk for aggression have reported increased amygdala and decreased prefrontal responses to facial signals of aggression. We addressed the temporal properties of the interaction between an aggression-related personality trait ("reward-drive" the drive to gain reward) and the frontal response to angry faces using event-related brain potential (ERP) recordings in subjects scoring high (N=12) and low (N=12) on the reward-drive scale while they viewed angry, sad and neutral faces. Enhanced frontal and frontocentral ERPs were found in response to angry and sad faces compared with neutral faces within 130-200ms, consistent with previous findings. Crucially, reward-drive selectively modulated the midline frontocentral response to angry compared to neutral and sad faces within 200-300ms; low reward-drive subjects showed increased frontal positive ERPs for angry relative to neutral and sad faces whereas no such difference was found in high

reward-drive subjects. Results are consistent with a reduced ventromedial prefrontal response to angry faces in subjects with increased risk for aggression and provide the first information regarding the temporal properties of this modulation.

The influence of attention and anxiety on the neural response to facial signals of fear and aggression.

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Fearful faces signal the presence of a significant, yet undetermined source of danger within the environment (Whalen, 1998). By contrast, angry facial expressions signal a qualitatively different, more direct form of threat, often used in face-to-face encounters to ward off challengers (Ohman, 1986). Individual differences in anxiety have been shown to modulate the amygdala response to unattended, but not attended fearful faces (Bishop, Duncan & Lawrence, 2004). Given the inherent difference between these two expressions, we hypothesised that, in contrast to fearful faces, angry faces would modulate the amygdala response when attended. To investigate this issue, we used fMRI to examine the effects of anxiety and attention on the response to angry and fearful faces. Participants with higher anxiety levels showed an increased right amygdala response to angry faces for the attended condition only. By contrast, fearful faces produced a greater left amygdala response when unattended. Our findings demonstrate dissociable effects of attention on the amygdala responses to facial signals of fear and aggression; furthermore these effects are only apparent when anxiety is taken into account. These findings support the theory that the amygdala is part of a neural system involved in the detection of danger.

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Ohman, A. (1986) Face the Beast and Fear the Face - Animal and Social Fears As Prototypes For Evolutionary Analyses of Emotion. Psychophysiology 23:123-145.

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The neural basis of the right visual field advantage for word recognition: an MEG analysis

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Word presented briefly to the right of a central fixation point (right visual field, RVF) are recognised more quickly and more accurately by right-handed participants than words presented briefly to the left of a central fixation point (left visual field, LVF). We employed magnetoencephalography (MEG) in an effort to better understand the neural basis of this effect. Fourteen right-handed participant seated in a 4D Neuroimaging Magnes 3600 Whole Head 248-channel MEG scanner viewed 20 common 5-letter English words 6 times in the LVF or RVF. Participants were familiarised with the 20 word stimuli before the start of the experiment. Scrambled versions of words were also presented as a comparison condition, randomly interleaved. A 500 ms fixation point was followed by a stimulus (word or scrambled word in LVF or RVF) presented for 150 ms. The fixation point remained on the screen for 550 ms, after which the screen went blank. The participant's task was to read the real word silently and to say "pattern" silently in response to scrambled words. Each participant's head shape was digitized using a 3-D Polhemus digitizer to allow co-registration of the MEG data to the structural MRI scan which was also obtained for each participant. A Van Veen beamformer was used to create statistical maps of changes in oscillatory activity in different brain regions in the 0-10 and 10-20 Hz frequency bands for moving windows of 200 ms duration. Virtual electrode analysis plotted the strength of the evoked response over time in regions of interest selected on the basis of the beamformer results, focussing on the middle occipital, mid fusiform and inferior frontal gyri in the left and right cerebral hemispheres. The middle occipital sites showed hemifield-dependent responses to words and scrambled words. The left mid fusiform and IFG sites responded more strongly to RVF than to LVF words. The implications of these results for our understanding of the neural basis of the RVF advantage is discussed.

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Hemispheric differences in face processing: evidence from divided visual-field priming

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Our previous studies on repetition priming of faces (Mouchlianitis & Henson, in prep) found larger priming effects when a central prime was followed by a probe lateralised to the right visual-field (left-hemisphere, LH) than a probe lateralised to the left visual-field (right-hemisphere, RH). Bourne & Hole (2006), however, found greater priming for the RH than LH when using lateralised primes followed by a central probe. We proposed that both these findings can be explained by the RH advantage in face-processing, which causes the RH advantage at encoding found by Bourne & Hall, but a LH advantage following (central) face encoding, owing to the LH benefiting from priming to a greater extent than the RH, in which face processing may already be close to optimal. This proposal was supported by priming effects in a number of behavioural experiments that explicitly crossed the lateralisation of the prime and the lateralisation of the probe. These experiments were extended in fMRI, with the addition of non-face control stimuli., Despite main effects of visual-field and of stimulus-type (face vs house), there was no evidence for an interaction, in either left or right FFA (and despite overall

greater activity in the right than left FFA). This lack of reliable modulation of face-processing by visual hemifield may reflect the limited temporal resolution of fMRI, which has prompted subsequent MEG versions of the experiments.

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Abstraction and asymmetry in repetition priming

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What are the conditions that lead to abstraction in repetition priming? According to one view, the left hemisphere produces abstraction and the right hemisphere produces individuation (Marsolek, 2004). However, this claim is problematic because, in divided-visual-field studies, aysmmetry is demonstrated by some tasks, such as word-stem completion, but symmetry is demonstrated by others, such as word identification (Sciama & Dowker, 2007). In the case of hemispheric symmetry, both hemispheres produce abstraction or both hemispheres produce individuation. In the case of hemispheric asymmetry, the left hemisphere produces abstraction and the right hemisphere produces individuation, rather than the reverse pattern. Thus both hemispheres can produce both types of priming effects, but the possible combinations are constrained. An explanation in terms of complementarity between hemispheres is considered.

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Sciama, S. C., & Dowker, A. (2007). Abstraction and perceptual individuation in primed word identification are modulated by distortion and repetition: A dissociation. Memory, 15, 899-911.

Click trains and the rate of information processing: Does speeding up subjective time make other psychological processes run faster?

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Four experiments investigated the effect of preceding cognitive tasks with click trains. Click trains had previously shown a strong and stable behavioural effect compatible with the "speeding-up" of an internal clock (Penton-Voak, Edwards, Percival & Wearden,1996). This study investigated whether click trains might also speed up information processing rate. We investigated the effect of click trains on a one, two, four

reaction time task (Experiment 1), and a mental arithmetic reaction time task (Experiment 2). Experiments 1 and 2 showed that click trains made response times faster, implying a speeding up of information processing. Experiments 3 and 4 sought to demonstrate this speeding up in a different manner by investigating whether it is possible to encode more information in some objective time period t when the internal clock is running faster, and hence subjective the actually time elapsed is >t. Experiments 3 and 4 addressed this question by using variants of two classic experiments of cognitive psychology; Sperling's iconic memory task (1960), and Loftus, Johnson and Shimamura's (1985) iconic masking task. In both Experiments 3 and 4 participants were able to recall and recognise significantly more information from stimuli preceded by clicks than those preceded by silence.

Sperling, G. (1960). The information available in brief visual presentations. Psychological monograph. 74, 1-29.

Loftus, G. R., Johnson, C. A. & Shimamura, A. P. (1985). How much is an icon worth? Journal of Experimental Psychology: Human Perception and Performance, 11, 1-13.

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Instability of temporal reference memory

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In the commonly-used task of temporal generalization, people initially receive a standard duration (e.g. a tone 400 ms long), then decide whether subsequent comparison stimuli have the same duration as the standard. A quantitative model (the MCG model) fits performance well. The model assumes that the representation of the standard remains stable across comparisons, but a "commonsense" view implies instability over trials. For example, if people judge that a 450 ms stimulus is the 400-ms standard (as they commonly do), do they then replace the 400-ms standard with 450 ms? That is, does the standard shift from one trial to another depending on the decision made? 4 experiments investigated this by initially presenting "biased" sequences of comparison stimuli, which might shift the standard representation. Subsequent performance with an "unbiased" comparison set revealed that (a) reference memory could be biased appropriately, (b) the effect was more marked if only "confident" decisions were used, but applied to all decisions, (c) the effect was attenuated by providing performance-related feedback, but reinstated by false feedback. In general, then, it appears that temporal reference memory is unstable from one trial to another, in spite of the goodness of fit of a model assuming stability.

What people do when they count to measure time

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When people time durations of more than a second or two, it is very common for them to employ chronometric counting. In spite of the near-ubiquity of this behaviour, the literature on chronometric counting comprises just a handful of studies, hardly any of which attempts to measure and/or model the counting process itself. This paper reports an experiment using a stimulus timing task, temporal generalization. Participants receive standard tones lasting either 4 or 8 s, then had to judge whether subsequent comparison tones had the same duration as the standard, making a YES or NO response. Counting during stimulus presentation was required, and measured using spacebar presses. It was found that (a) counting-based performance could be extremely accurate, (b) scalar timing was violated when people count, (c) both within-trial and between-trial count measures had extremely low standard deviations, often less than 5% of the mean, and (d) counting-based decisions on this task were apparently based on subtle disjunctive rules, with complex relations between the count value arrived at and the YES or NO judgement made.

The Operational Momentum Effect in Symbolic Arithmetic

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Single numbers activate spatial representations, such that small numbers are represented to the left of larger numbers (SNARC effect). Recently, McCrink and colleagues (P&P, 2007) documented spatial biases in non-symbolic (dot pattern) arithmetic: They discovered overestimation of addition outcomes and underestimation of subtraction outcomes - the "Operational Momentum" (OM) effect. We investigated whether OM also occurs for arithmetic tasks with Arabic numbers. A first study presented addition and subtraction problems in a column format for verification. Right-side responses were faster in addition tasks, but there was no left-side advantage for subtraction. A second study required pointing to a visual number line on a touch screen to indicate addition or subtraction results. For a given result, participants pointed significantly further leftward after subtracting and rightward after adding, in line with OM. Furthermore, movement times decreased and endpoint variability increased with number magnitude, supporting a linear scaling of the mental number line.

McCrink, K., Dehaene, S., & Dehaene-Lambertz, G. (2007). Moving along the numberline: Operational momentum in nonsymbolic arithmetic. Perception and Psychophysics, 69(8), 1324-1333.

Action control and verbal working memory: Evidence from a technique to induce action slips

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In order to investigate the role of verbal working memory in supporting action control, we examined the effects of concurrent tasks on the frequency of experimentally-induced action spoonerisms. Using the action slip induction procedure (Mattson and Baars, 1992), we presented participants with video-recordings of two simple actions on a computer display, each accompanied by a tone. The participants imitated these actions in either presented or reversed order in time to two differing tones. This technique produced numerous action spoonerisms and other types of action slips, and the former increased dramatically when either articulatory suppression or body movement suppression was performed concurrently. Moreover, the movement suppression condition generated the greatest number of 'other slips', compared to the articulatory suppression and silent control conditions. Data suggest that articulatory suppression can induce action slips by either weakening action binding or interfering with serial order control for action sequences, but not by disrupting memory of the action components.

Mattson, M. E., & Baars, B. J. (1992). Laboratory induction of nonspeech action errors. In B. J. Baars (Ed.), Experimental slips and human errors: Exploring the architecture of volition (pp. 151-193). New York: Plenum.

The dynamic simulation in linking language and space: evidence from signal detection and eye-tracking

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Several theoretical accounts propose that people simulate a motion event mentally in processing language describing an event (Glenberg, 1997). Within this framework, a growing body of experimental research has recently demonstrated the simulation processes (Zwaan et al., 2004). The present study investigates the use of verb information regarding the trajectory of motion. For example, people might pay more attention to an upper area of mental space when the denoted action involves "throwing" compared to "rolling" a ball. In a series of experiment, participants were presented a picture containing two objects (e.g., a ball, a bin) and a spoken sentence (e.g., 'The ball will be thrown/rolled into the bin') concurrently. Our signal-detection study revealed that detection of a flashing signal that appeared at verb offset was faster when the position of the signal coincides with a typical trajectory of the motion. However, eye-tracking data indicated that overt-attention shifts (eye movements) may reflect the velocity of the motion. The findings will be further discussed in lights of recent theoretical accounts and data.

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Symposia: Theoretical challenges in cognitive neuroscience
Organisers: Professor Lorraine K Tyler and Professor William D Marslen-Wilson

Sequential behaviour and selective attention in the human and monkey brain

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In specific regions of frontal and parietal cortex, neuroimaging shows a pattern of multiple-demand (MD) activity - increased activation associated with many different cognitive demands. In the frontal lobe, MD activity is seen in and around the inferior frontal sulcus, in the frontal operculum/anterior insula, and in the anterior cingulate/supplementary motor area. Similar activity is also seen along the intraparietal sulcus. Neurophysiological data from behaving monkeys suggest that MD regions constitute a flexible working memory, constructing and holding together the facts, rules and requirements bearing on current behaviour; analysis of multivoxel activity patterns in fMRI data suggests similar properties in human MD regions. A primary purpose of working memory should be to guide processing through the successive steps of a mental program, maintaining and attending to just that information that each step requires. Using single cell electrophysiology, we examine the role of prefrontal cortex in construction and control of mental programs. The data show rapid re-tuning of frontal neurons as the animal moves from one phase to the next of sequential activity. Transitions between task phases are mirrored by corresponding, sequential transitions between states of frontal activity. At each stage, there is selective representation of task-relevant stimulus distinctions. The results match classical views of frontal guidance of sequential behaviour.

Learning for adaptive decisions in humans, brains, and machines

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In our everyday interactions we encounter a plethora of novel experiences in different social contexts that require prompt decisions for successful actions. Extracting the key features from our sensory experiences, assigning them to meaningful categories and deciding how to interpret them is a computationally challenging task that is far from understood. Recent work in cognitive psychology has provided evidence that experience and learning shape our ability for adaptive and optimal decisions. But what are the neural

signatures of learning in the adult human brain? Does experience and learning shape brain structures and functions that mediate adaptive behaviours and facilitate complex perceptual decisions? I will discuss how recent advances in brain imaging in combination with behavioural studies can be used to study the mechanisms that mediate experience-dependent plasticity in the human brain across the lifespan. I will present findings demonstrating that the adult human brain employs a flexible neural code for translating sensory experiences to perceptual decisions that is shaped through experience and mediates successful interactions in the complex environments we inhabit.

From perception to conception: object processing in the ventral stream

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Concepts lie at the heart of our mental life, supporting cognitive functions from language comprehension and production to reasoning, remembering and recognising objects. In this talk I will discuss our attempts to understand how the brain represents and processes concepts by combining a cognitive theory of conceptual representation with neurobiologically plausible models of neural function, and testing this integrated neurocognitive account in behavioural, fMRI and neuropsychological studies. More specifically, the cognitive model generates detailed hypotheses about the structure of the conceptual structure of concrete objects which we integrate with a hierarchical model of object processing in the ventral stream, developed in non-human primates, to develop an account which explains specific patterns of semantic impairment in brain-damaged patients

The role of the medial temporal lobes in human episodic memory: new insights and challenges

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Recent neuropsychological and neuroimaging studies are challenging long-standing views about the organisation of episodic memory, in particular that medial temporal lobe (MTL) regions comprise a homogenous system exclusively specialised for long-term memory. Via a series of studies I will demonstrate (a) functional specialisation in MTL regions, but not necessarily along the lines of recollection and familiarity, and (b) evidence of involvement of these structures in tasks that do not require long-term memory. I will propose that the hippocampus plays a key role in creating and processing complex spatial representations, while perirhinal cortex is essential for binding together features within individual objects. These studies imply that sharp cognitive distinctions between perception, short-term memory and long-term memory may not map onto neatly segregated modules in the brain.

End of Symposium

Neurocomputational and neurophysiological studies of brain interactions of lanugage and attention

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Recent EEG and MEG studies have revealed that brain responses to the same speech sounds differ if the stimuli are presented in different task contexts: when subjects are not paying attention to the auditory input, their early mismatch negativity (MMN) brain response is greater for words than for matched meaningless pseudowords (Pulvermüller & Shtyrov, 2006; Pulvermüller *et al.*, 2004), whereas greater late N400 responses to pseudowords than to words emerge in tasks where subjects have to attend to the stimuli (Sinai & Pratt, 2002). We built a neuroanatomically-grounded neural-network model of the left-perisylvian cortex and used it to simulate early word-acquisition processes by means of synaptic-weight adaptation based on neurobiologically-realistic learning. The variation of two model parameters replicated and explained the divergence between MMN and N400 results, providing the first unifying account, at the cortical-circuit level, of these neurophysiological data. Furthermore, we recorded neurophysiological brain responses to words and pseudowords when subjects were asked to attend to the spoken input or to ignore it. The results showed a robust activation of word-specific memory traces which was not significantly influenced by attention level, confirming the model's predictions. These data provide further evidence supporting earlier suggestions that initial stages of lexical processing are not affected by attentional demands and may thus be automatic.

Pulvermüller, F. & Shtyrov, Y. (2006) Language outside the focus of attention: the mismatch negativity as a tool for studying higher cognitive processes. *Progress in Neurobiology*, **79**:49-71.

Pulvermüller, F., Shtyrov, Y., Kujala, T. & Näätänen, R. (2004) Word-specific cortical activity as revealed by the mismatch negativity. *Psychophysiology*, 41:106-12.

Sinai, A. & Pratt, H. (2002) Electrophysiological evidence for priming in response to words and pseudowords in first and second language. *Brain and Language*, 80:240-52.

A neurophysiological signature of language learning capacity

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People vary in their language learning abilities. This variability has been linked to differences in the capacity of a "phonological loop" memory system, whose functioning can be indexed using tasks that require people to repeat nonsense words such as "blonterstaping". We used electrophysiological techniques to probe for individual differences in nonword repetition ability by measuring mismatch responses in the brain to changes in consonant onset in one of four possible positions along a four-syllable CV-syllable string. We predicted a decrease in mismatch amplitude for consonant changes occurring in later syllables of the CV-string which would be most marked for speakers with poor nonword repetition skills. Such a difference was observed in the late mismatch negativity (LDN) window (260-540 ms post-syllable onset). The relationship of the LDN with nonword repetition ability suggests it provides a biological window on processes required for successful language learning.

The relationships between verbal short-term memory, phonological awareness, and new word learning: Evidence from typical development and Down syndrome

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This study examined the correlates of new word learning in a sample of 64 typically developing children aged between 5 and 8 years and a group of 22 teenagers and young adults with Down syndrome. Verbal short-term memory and phonological awareness skills were assessed to determine whether learning new words involved accurately representing phonological information in memory. Results showed a relationship between these measures and typically developing individuals' ability to learn the phonological form of novel words, but not their ability to learn the physical referent of new words. Similarly, individuals with Down syndrome showed impaired verbal short-term memory and phonological awareness performance, and impaired form but not referent learning. These individuals had similar levels of receptive vocabulary to the comparison group, suggesting that their form learning deficit was not related to impoverished language knowledge. Together these findings specify the circumstances in which an accurate phonological representation is required for new word learning.

Potential causes of below average spelling ability in able readers

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Potential causes of below-average spelling ability in able readers (Type B spellers) were investigated in the study. Bruck and Waters (1988) and Burden (1992) reported that the spelling errors of Type B spellers are phonologically implausible, possibly indicating poor phonological skills. Frith (1985)'s seminal study, using an e-cancellation task, revealed that Type B spellers missed more silent es than controls, suggesting that Type B spellers may rely on a strategy of reading by partial cues. Bosse,

Tainturier and Valdois (2007) reported a deficit in visual attention span in dyslexic children, which, they argued, limits the number of elements that can be processed in parallel in reading. Such a deficit might also be expected to lead to a difficulty with spelling. In the present study, the performance of 12-15 year old able readers/able spellers, able readers/weak spellers, and weak readers/weak spellers was assessed in a phonological task (Spoonerisms), an e-cancellation task, and a visual attention span task. Two sets of analyses were carried out: one where the children were grouped according to reading comprehension and one where they were grouped according to single word reading ability. Type B spellers were differentiated by their performance in the spoonerism and visual attention tasks.

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Bruck,M and Waters, G. (1988). An analysis of the spelling errors of children who differ in their reading and spelling skills. Applied Psycholinguistics, 9. 77-92

Burden,V., Why are some 'normal' readers such poor spellers? In C.M.Sterling & C.Robson (eds) (1992). Psychology, Spelling and Education. Clevedon: Multilingual Matters 200-213

The efficacy of spectral filters in improving the visual performance of patients with multiple sclerosis

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Newman Wright, Wilkins and Zoukos (in press) discovered improvements in reading speed and visual search accuracy in 25 of 26 (96%) patients with #definite' multiple sclerosis when using spectral filters in the form of Intuitive Overlays. In this study we repeated the tests with 11 of the 26 patients and included a further 13 patients who had not previously been tested. 16/24 patients read at least 5% more quickly on the Rate of Reading Test and omitted at least 25% fewer targets on a visual search task (Circles Search Test) when using their individually selected coloured overlays. Sixteen patients were examined with a Mark 2 Intuitive Colorimeter and were tested with and without Precision Tints. Tints improved reading speed by at least 5% in 11/16 patients. 9/11 patients also showed improved performance with the overlays. Contrast sensitivity deficits (Cambridge Gratings) and colour vision deficits (Farnsworth-Munsell 100-hue Test) were negatively correlated with reading performance. The benefit from tints was removed when the tints were worn and the patient read text from a computer LCD screen having a colour complementary to that of the lenses.

Inhibition and the validity of the Stroop task in children with autism

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Components of executive function are known to be impaired in autism. However, when children with autism are tested using the classic Stroop task, they have shown intact inhibition. This study explored the possibility that the Stroop task may not be a valid test of inhibition in autism because it involves reading words for meaning. Thirty children with autism and 24 typically developing children were given two Stroop tests. On the classic Stroop, participants were asked to ignore the word and name the colour in which it was printed. In a reverse condition participants were required to read the word and ignore the colour. Although the groups found the first condition equally difficult, children with autism were impaired on the second. Participants were also asked to complete a picture Stroop task which utilised chimeric animals, in which they had to ignore the bodies of the animals and name the heads or vice versa. Both groups showed comparable interference effects on this task. These findings confirm that individuals with autism do not extract meaning when reading words as readily as do typically developing individuals, but show that autism is not associated with particular difficulties in inhibition within selective attention tasks.

Modulation of gaze cueing by facial expression critically depends on target context

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Observing averted gaze results in a spontaneous shift of attention in the direction of the social cue. A major role of joint attention is to alert members of a group to important objects or events in the environment. Therefore, it is likely that the facial expression of the gazing face should affect the strength of the attention shift evoked by the averted gaze cue. We hypothesised that the emotional content of the looked-at object should be just as critical to the joint attention episode. Experiment 1 employed a target localisation task with target valence (pleasant vs. unpleasant), facial expression (happy vs. disgusted) and cue validity (valid vs. invalid) as factors. Only the disgusted face produced gaze cueing, for both target valences. In Experiment 2, only the pleasant pictures were used as targets. Now, the happy face produced gaze-cueing, while the disgusted face did not. The striking interaction between the findings of Experiment 1 and 2, which used identical attentional cues, is attributed to the shift towards generally positive content in Experiment 2. Hence, the strength of gaze-cueing potentiated by a particular emotional expression can vary markedly depending on the valence of the objects appearing as targets.

Can children and adults bet on the reliability of their sensory information?

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Recent research suggests that adults, but not 8-year-olds, implicitly represent the reliabilities of different sensory cues, allowing them to be optimally weighted. This study examined whether adults and children show explicit awareness of sensory cue reliabilities. 41 children aged 5-8 years and 13 adults judged which of two blocks was longer using vision or touch only, and had to bet either 1 or 2 units on whether their answer was correct. 8-year-olds and adults (i) bet meaningfully based on their own ability within both modalities, showing awareness of which trials were likely to be correct, and (ii) bet higher overall for vision, showing awareness that visual information was more reliable than haptic for the judgment. Younger children did not reliably show either effect. Experiment 2, investigated whether vision constitutes a "special case" due to increased experience or whether confidence is dependent on the perceived difficulty of the task by adding a condition in which vision was degraded. Results indicated that adults' judgments are driven by task difficulty, rather than a generic bias for vision. These results support the idea that children's failure to weight sensory cues optimally may be explained by lack of information about their reliabilities.

Are shadows ignored in the eyes of object based attention?

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Object based attention provides a valuable tool to investigate the structure of visual representations. Findings from visual search have suggested that shadows are to some extent ignored by the visual system. This work sought to establish whether or not shadows are ignored by the mechanisms of object based attention. The results show that when tested using the Egly et al (1994) object based cueing paradigm participants show an equally substantial object based attention effect whether or not the stimuli can be interpreted as shadows. These findings could be interpreted in two ways. On the one hand they could be taken as evidence that shadows are not ignored by the visual attention system. On the other hand the data could suggest that object based attention is being influenced by levels of visual representation that occur before the interpretation "is this contrast boundary indicative of a shadow or not?" is made. Indeed this conclusion would be consistent with Driver and colleagues' (2001) argument that 'object based attention' does not in fact reflect the influence of objects upon attention, but rather results from the influence of more basic image segmentation heuristics.

Driver, J., Davis, G., Russell, C., Turatto, M., & Freeman, E. (2001). Segmentation, attention and phenomenal visual objects. Cognition, 80(1-2), 61-95.

Egly, R., Driver, J., & Rafal, R. D. (1994). Shifting Visual-Attention between Objects and Locations - Evidence from Normal and Parietal Lesion Subjects. Journal of Experimental Psychology-General, 123(2), 161-177.

Behavioral and neural evidence for preserved holistic face detection in acquired prosopagnosia

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It has been claimed that a deficit in integrating facial features, i.e. holistic-configural processing, underlies prosopagnosia (Levine & Calvanio, 1989; Sergent & Signoret, 1992; Barton et al., 2002). Here we tested a pure case of acquired prosopagnosia following a dominant lesion in the right inferior occipital cortex sparing the right fusiform face area (rFFA, Rossion et al., 2003). First, we show that the patient PS can categorize a stimulus as a face even when it requires holistic processing: her detection of faces in Arcimboldo's paintings or Mooney faces is accurate and fast. Second, fMRI data acquired during these tasks indicates that holistic face detection is subtended primarily by the patient's rFFA, (34-50-14, q(False Discovery Rate) < 0.05), as in normals, rather than by low-level visual areas. These results indicate that PS is able to integrate facial and non-facial features into a global/holistic generic face representation. This preserved ability contrasts with her inability to integrate facial features into a global individual representation (Ramon & Rossion, 2007). This suggests two dissociable forms of holistic processing: one allowing basic-level categorization of the stimulus, common for faces and objects and the other being crucial for individual encoding of faces.

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Post-conflict adjustment after alternation-based interference

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Human behaviour is remarkably flexible and adjustable in response to previous events and performance. In serial reaction time (RT) tasks with rapidly unfolding events, RTs in trial N are slower after a response change than after a response repetition from trial N-2 to trial N-1 (Jentzsch & Leuthold, 2005), the so called alternation-based interference (ABI) effect. Response changes are associated with overlapping response activity, which causes conflict. Conflict subsequently leads to cognitive control adjustments. This study investigates the mechanisms underlying post-conflict adjustments, contrasting the ideas of (a) a hard bottleneck, postponing all subsequent processing, with (b) selective prolonging of postperceptual stages. We analysed the lateralized readiness potential (LRP), and peak latencies of P1, N1 and P300 components in a choice RT task mapping four stimuli to two responses. Alternation-based interference affected the S-LRP interval but neither the LRP-R interval nor the latency of P1, N1 and P300. Even though alternation-based conflict originates at response-related stages, these results clearly suggest that post-conflict slowing selectively affects mainly central, premotoric processing stages.

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Naming of multiple objects and advance planning in spoken production

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Recent investigations of how far speakers plan ahead have capitalized on multiple object naming paradigms. In our experiments, speakers named two line drawings of familiar objects, which were either semantically related (face-leg), phonologically related (cat-cake), or unrelated. When the two objects were presented statically, side-by-side, and named using utterances of the type "the X and the Y", semantic facilitation, but no phonological influence, was found on response latencies. In a subsequent study, one object moved towards the other, while participants described the scene using an action verb. Utterances of the type "the X bumps the Y", induced semantic interference, but no phonological influence; in contrast, utterances of the type "the X attracts the Y", which force participants to name the objects in the reverse order compared to the scene, induced phonological facilitation, but no semantic effect. The variations observed in the pattern of priming across experiments, likely attributable to both utterance format and spatial separability, emphasize the difficulties in using such paradigms to quantify how much of an utterance has been planned before articulation. But in any case, the time course dissociation between semantic interference and phonological facilitation strongly indicates a certain degree of seriality in the encoding process.

Involvement of prefrontal cortex in learning and executing multiple task rules

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Learning the multiple rules of a new task is closely related to general intelligence (Duncan et al. in press). Both monkey and fMRI studies suggest that new task rules may be coded in part in the prefrontal cortex (PFC) (e.g. Freedman et al. 2001; Braver et al. 2003). An fMRI study was designed to investigate learning and execution of multi-rule tasks. In the scanner, subjects learned and carried out 12 different tasks in turn. Between tasks we manipulated the number of rules specified in task instructions, and within tasks the number of rules operative in each trial block. Data were analyzed both during presentation of instructions (task learning) and during later task execution. A sustained increase in BOLD signal for blocks with more operative rules was found in lateral rostral PFC (similarly to Braver et al. 2003), along with dorsolateral PFC, the intraparietal sulci, premotor cortex and pre-supplementary motor area. Except for anterior PFC, these same regions showed event-related activity for trials within blocks. During the instructions, BOLD signal changes were consistent with those observed during task execution. The results show that new learning of task rules recruits frontal and parietal regions similar to those found during subsequent task execution.

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Perceptual differences between living and nonliving objects: Evidence from magnetoencephalography

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Most research into category-specific differences between living and nonliving objects has focused on their semantic representations. However, behavioural (e.g., Shapiro & Olson, 2005) and ERP studies (e.g., VanRullen & Thorpe, 2001) suggest that there are perceptual processing differences between these categories. We therefore used magnetoencephalography (MEG) to study early perceptual differences in object processing. Using a superordinate-level categorisation task, participants (N=10) were shown a category name followed by a target object. Participants decided whether the

target object was a member of the previously presented category and responded via button-press. Target objects included 78 exemplars drawn from 3 living and 3 nonliving categories. Behaviourally, performance was equal across categories. Imaging data were recorded using a CTF 275 channel whole-head MEG system. Source localisation was conducted using synthetic aperture magnetometry (SAM). Consistent with previous ERP studies, a wide-band (1-80Hz) SAM analysis comparing living to nonliving objects surrounding the N1 (120-220ms post target-onset) identified a region in occipito-temporal cortex showing greater power for living compared to nonliving objects. Further analyses explored the influence of this N1 difference on later, semantic representations.

Shapiro, L. R. & Olson, A. C. (2005). Does normal processing provide evidence of specialised semantic subsystems? Language and Cognitive Processes, 20(6), 697-724.

VanRullen, R. & Thorpe, S. J. (2001). The time course of visual processing: from early perception to decision-making. Journal of Cognitive Neuroscience, 13(4), 454-461.

Previous obstacle avoidance affects subsequent hand trajectories

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Previous research has demonstrated that motor actions carried out either by the individual or observed in others can influence subsequent actions (Jax & Rosenbaum, 2007; Edwards, Humphreys, & Castiello, 2003). This series of experiments investigated the influence of obstacle avoidance on reach actions on subsequent reaches where no obstacle was present. Participants made reaches using actual objects in real space. An individuals' previous obstacle avoidance was found to affect the trajectories of their subsequent reaches, both in horizontal and vertical reaching tasks; reaches in non-obstacle trials showed significantly more deviation when they follow an obstacle trial, than when they followed a non-obstacle trial. This priming effect was also found when the previous reach had involved a different end goal, touching a target rather than grasping a target. This study also investigated whether the observation of obstacle avoidance in another person could influence individuals' reaches. Both allocentric and egocentric perspectives were investigated. The data indicate a robust within person effect, however, results from subjects observing another's reach showed no priming.

Jax, S.A., & Rosenbaum, D. A. (2007)Hand Path Priming in Manual Obstacle Avoidance: Evidence that the Dorsal Stream Does Not Only Control Visually Guided Actions in Real Time. Journal of Experimental Psychology Human Perception and Performance, 33: 425-441

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

Crossmodal influences in emotion recognition

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Congruence between auditory and visual channels in a video stimulus has been shown to be an important factor for eliciting benefits in recognition, including bimodal advantages. However, different forms of audio-visual congruence might underlie such effects. This study examined the individual and joint contributions of congruence in speaker identity or in emotional meaning to crossmodal effects for emotion recognition. Two tasks were presented to participants using face and voice stimuli which were unimodal (face or voice only) or bimodal (face and voice). Participants were asked to respond as quickly and accurately as possible and judge the emotion in the voice in Task 1 and judge the emotion in the face in Task 2. Unimodal auditory and visual stimuli served as a baseline measure of emotion classification task performance and were compared to bimodal stimuli in which the speaker identity or expressed emotion were congruent or incongruent across modalities. Results showed no effect of identity congruence but a clear impact of emotion congruence which was more marked in the voice classification condition. Overall, incongruous emotional faces disrupted the speed and accuracy with which emotional voices were classified more than incongruous emotional voices disrupted the classification of emotional faces.

Nicotine, personality and hemispheric asymmetry

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This study examines the effect of nicotine on hemispheric asymmetry as a function of personality. Nicotine can increase dopamine release, and hyper-dopaminergia is assumed to underlie schizophrenia pathology. Since individuals scoring high on schizotypy reveal a similar reduction in hemispheric asymmetry to that seen in schizophrenia, the current study predicted that smokers would show reduced hemispheric asymmetry as a function of schizotypy. Forty participants (20 smokers and 20 non-smokers) were tested on nicotine dependence, handedness and a schizotypy questionnaire (O-LIFE) and performed a lexical and a facial decision task. Results for performance on the lexical decision task revealed that cognitive disorganisation correlated positively with right visual field reaction times in smokers, but not in non smokers. Additionally, in smokers, higher nicotine dependence seemed to reduce accuracy in the right visual field. These results support the notion that nicotine might act as a triggering factor for the development of schizophrenia in schizotypal individuals.

Representation of 3D face shape and 2D surface reflectance in the ventral temporal cortex

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Recent behavioral studies have shown that in addition to 3D shape, 2D surface reflectance information is important for perception of facial identity. However, it is unclear how shape and surface reflectance of faces are processed in the human brain. We used a long-term event-related fMRI adaptation paradigm to identify brain regions that encode these two types of facial information. Following 3-second adaptation to an adapting face, participants were asked to match the identity of a briefly presented (500 ms) test face and the adapting face. We manipulated the shape and surface reflectance properties of the test face with respect to the adapting face. Four conditions were included: (1) repetition of the same adapting face; (2) variation in 3D shape only; (3) variation in 2D surface reflectance only; (4) variation in both. We found that repetition of the same face induced significant activation suppression in the functionally localized right and less significantly in the left fusiform face areas (FFA). Changes in 3D shape caused stronger adaptation release than changes in 2D reflectance, but changes in both properties produced the strongest adaptation release. Combined, our results indicate that both face shape and reflectance information are coded for face identification in face-sensitive areas.

Rising falling: Perceptual effects on verb processing

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Recent approaches in embodied cognitive science have demonstrated an interaction between language processing and perception, with suggestions that the processing of lexical semantics gives rise to perceptual processing. The present work describes two experiments that show how perceptual processing can interact with language comprehension. Both studies used single verbs associated with upwards or downwards motion, employing a reverse spatial Stroop procedure. In Experiment 1, pattern masks of "X" characters moved up or down the screen, and then transformed into words such as "rising" or "falling". Experiment 1 demonstrated that this task irrelevant upwards or downwards motion could interact with lexical processing in a lexical decision task, leading to faster reaction times when the direction of motion matched the word's meaning. This interaction occurred when motion was observed both before and during when participants engaged in a lexical decision judgement. In Experiment 2, this effect did not occur when participants only saw motion before and not during the lexical decision judgement, demonstrating that it was the concurrent activation of visuospatial

perceptual information and visuospatial activation in lexical access that led to an effect on lexical processing. Implications for theories of lexical semantics will be discussed.

Using EEG to investigate the tracking of visible and occluded moving targets

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People can track moving objects, even if the object disappears behind an occluder. Previous research on pursuit eye movements and psychophysical performance suggests that additional, memory guided systems are required to track occluded targets, and that these are recruited at around 200 ms post occlusion. We measured EEG activity during attentive tracking of visible and occluded moving targets. Participants fixated while they mentally tracked rightward target motion at velocities of 12 or 20 degrees per second. In Experiment 1, the targets were continuously visible, whereas in Experiment 2 they became occluded. Positive deflections were recorded over the right occipitoparietal region in both experiments. When the target was visible, the development of this positivity was linked to the spatial location of the target, peaking earlier in the 20 degrees per second condition. This component was thus termed the 'Location-related positivity'. When targets became occluded in Experiment 2, an additional positive deflection began around 200 ms after the onset of occlusion. The 'Occlusion-related positivity' was not modulated by target velocity or location. It seems that the Occlusion-related positivity is constrained by stimulus parameters in the same way as performance and eye movement profiles. We therefore propose it to be a manifestation of memory-guided tracking systems.

Timbre and the effects of pre-trial cues

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Auditory attention may be directed to the frequency of a spectral component of a complex sound by way of a pre-trial cue tone matching that component in frequency. In this way discrimination of changes in the intensity of a spectral component of a complex sound, equivalent to changes in the timbre of that sound, may be aided. But recently, hearing scientists have discovered that one tone may actually reduce the perceived loudness of a second tone following it after a brief interval (so-called induced loudness reduction or ILR). Thus, although a pre-trial cue may direct attention, it may also affect the perceived intensity of a following spectral component. And a recent account of timbre perception (McKeown & Wellsted, 2008) provides some support for the latter suggestion. The present study aimed to further test these possibilities by creating two different conditions, one of which created the preferable circumstances for ILR to occur, and one in which it could not occur. As such, the present study has important implications for

explaining the cueing effect phenomena as well as addressing the broader debate about the role of auditory attention in timbre perception.

McKeown, D., & Wellsted, D. (2008). Auditory context effects (ACEs) acting on timbre memories. Journal of Experimental Psychology: Human Perception and Performance. Under review.

A new collection of fifty picture sets with standardised familiarity information

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The use of highly similar visual stimuli can be helpful in a variety of paradigms in psychology. Often, pictures are categorised as either ' similar' or ' dissimilar' based on pairwise ratings or reaction time data. The number of pictures is also often limited. We have created a large standardised set of greyscale pictures of everyday objects, where similarity ratings between pictures were obtained using a spatial sorting method (Goldstone, 1994). Fifty groups of pictures (13 to 32 pictures per group) have been generated and similarity information within each group has been collected and converted to a common scale. Each of the groups of pictures is different from the others, e.g. onions, holly leaves, strawberries and plugs. The common scale has been validated with a yes/no recognition memory test where target-foil similarity was systematically varied by choosing pictures based on the ratings. As target-foil similarity increased, so did the false alarm levels, indicating that the common scale is appropriate. These stimuli and their similarity ratings provide a measure of ' psychological' similarity and have potential applications in a variety of areas of psychology research, particularly explicit memory and priming.

Goldstone, R. L. (1994). An efficient method for obtaining similarity data. Behavior Research Methods, Instruments, & Computers, 26, 381-386.

Attention modulates activation in the mirror neuron system

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The mirror neuron (MN) system is activated during action execution and observation. Although studies have investigated many of its properties, it has not been established whether parts of the MN response are automatic or modulated by attention. There may be benefits in preventing irrelevant stimuli from influencing processing of attended actions. This fMRI study investigated modulatory effects of attention on MN function. Videos of biological actions (arm/leg) and non-biological equivalents (spatially

and temporally matched) were used. Trials consisted of two overlaid clips (either both biological, both non-biological, or one of each), and subjects attended to one clip while performing a target detection task (observation). Hand/foot movement execution trials were included for localization of the MN system. Relative to control stimuli, observation of arm actions activated the superior temporal sulcus, STS (commonly implicated in processing biological motion) and MN regions in motor and parietal cortex, which were also active during execution. Leg stimuli yielded less reliable activity. Crucially, the response was modulated by attention in MN regions (motor cortex, left parietal lobe) and in bilateral STS. However, right STS and a right superior parietal region remained activated even in the unattended condition. The results indicate differential effects of attention within the MN network.

The Modifier Effect in generic sentences: Evidence for prototype inheritance

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The Modifier Effect is the decrease in judged likelihood of a generic sentence (e.g. cats like milk) when the subject noun is modified with one or more atypical modifiers (elderly Burmese cats like milk). The effect has been used to argue that conceptual combination does not involve concept prototypes, since it implies that default features are not automatically inherited by the modified concept (Connolly et al., 2007). In previous work (Jonsson & Hampton, 2008) we showed that there are 3 primary sources of the effect - pragmatic, knowledge based, and familiarity based. We further showed that when likelihood is reduced by a modifier, the relative likelihood of different prototype features is preserved. Here we present an investigation of the interaction of feature mutability/centrality with the modifier effect. We argue on the basis of our results that modified concepts do in fact inherit conceptual contents from the noun prototype in a systematic fashion.

Connolly A.C., Fodor, J.A., Gleitman, L.R., & Gleitman, H. (2007). Why stereotypes don't even make good defaults. Cognition, 103, 1-22.

Jonsson M.L., & Hampton, J.A. (2008) On prototypes as defaults (Comment on Connolly, Fodor, Gleitman and Gleitman, 2007). Cognition. 106, 913-923.

Effects of multiple micronutrient supplementation on cognition during and after pregnancy

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4. University of Mataram
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Micronutrients (vitamins and minerals) are essential for the normal maintenance and function of the brain. Very few studies have examined the hypothesis that that micronutrient supplementation improves cognition in adults. The current study was undertaken in conjunction with the Supplementation with Multiple Micronutrients Intervention Trial (SUMMIT), which was a double-blind cluster-randomized trial in Indonesia comparing the effects of a pre-natal supplement containing 15 micronutrients to a supplement containing only iron and folic acid. A battery of cognitive tests assessing vision, hearing, motor dexterity, declarative memory, working memory, executive function, language, reading, and mood was administered to 639 SUMMIT participants after an average of 25 weeks of supplementation. The group who received multiple micronutrients scored significantly higher in a one-tailed test on 6 out of 19 scores derived from the 11 tests: near vision, distance vision, speeded picture naming, speeded real word reading, mental rotation, and the delayed recognition trial of the word list memory test. The two groups were balanced on a large number of variables, including education and age, suggesting that none of these variables accounted for the differences in scores. Results suggest that, at least during pregnancy when nutritional requirements increase, supplementation with multiple micronutrients as compared to supplementation with iron and folic acid can improve certain cognitive functions.

Is remembering emotional information an involuntary-unconscious process?

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Memory for emotional material (events, pictures and words) has been shown to be superior than memory for neutral material in explicit memory tests of recall and recognition. If the memory advantage for emotional stimuli is an automatic, involuntary-unconscious process, this effect should be present in tests of implicit memory. We compared results from two tests of memory identical in all respects apart from the retrieval instructions. After studying emotional and neutral paired associates, participants were shown the first member of the pair; intentional retrieval participants were instructed to recall explicitly the associated word, whilst incidental retrieval participants were instructed to generate the first word that came to mind associated to the word. Depth of study processing had an effect on the intentional test, but not the incidental test, showing a dissociation that confirmed the incidental test was not contaminated by an intentional retrieval strategy. In the intentional test emotional pairs were better recalled than neutral pairs, but this was not found in the incidental test. The absence of an emotion effect on implicit memory, strongly suggests that emotional material devoid of its contextual

episode does not have a preferential mnemonic status; voluntary-conscious remembering is required for observing a memory advantage for emotional material.

Novel words entering the mental lexicon: Is meaning necessary for integration?

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If newly learnt words become part of the mental lexicon, they should interact with other lexical and sublexical representations. Novel words do in fact engage in lexical competition with existing words (e.g., Gaskell & Dumay, 2003), and can modify sublexical phoneme category boundaries through perceptual learning (Leach & Samuel, 2007). Importantly, the latter effect was only observed when novel words were provided with a meaning, while meaning appeared unnecessary for the lexical competition effects to emerge. To reconcile these findings, we conducted a perceptual learning experiment using "neighbour" novel words (e.g., napket, sharing its onset with phonologically neighbouring word napkin) and "non-neighbour" novel words (e.g., rebket, diverging early from existing words). Neighbours were used in previous lexical competition studies, while Leach and Samuel used non-neighbours. We found that, when no meaning is provided by the experiment, only the neighbours demonstrated lexical retuning of phoneme category boundaries, suggesting that only these items do not rely on a given meaning to become lexicalised. We argue that in these circumstances novel neighbours inherit the semantic properties of their closest real word neighbour. Furthermore, this result requires a re-evaluation of the role of semantics in lexical competition studies of word learning.

Gaskell, M. G., & Dumay, N. (2003). Lexical competition and the acquisition of novel words. Cognition, 89, 105-132.

Leach, L., & Samuel, A. G. (2007). Lexical configuration and lexical engagement: When adults learn new words. Cognitive Psychology, 55, 306-353.

Time flies! An underestimation of time due to emotional arousal

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The goal of the research was to test the hypothesis that high arousal is necessary to trigger an attentional response to emotional stimuli. A temporal bisection task was used in an attempt to dissociate arousal from attentional processes (for a similar approach see Burle & Cassini, 2001). In Experiment 1, participants judged the duration of neutral, low-arousal pleasant and high arousal pleasant words. The data support the high-arousal hypothesis - the duration of high-arousal word stimuli was underestimated and the bisection point was moved to the left for high arousal word stimuli relative to neutral and

low-arousal words. Furthermore, temporal sensitivity was higher for high-arousal stimuli compared to low-arousal and neutral stimuli. In support of the operation of an arousal-based response, the duration of low-arousal pleasant words was overestimated relative to neutral and high-arousal words. The results of Experiment 2 showed that the effects generalize to unpleasant words. Overall, the findings strengthen the conclusion that high-arousal is necessary to trigger an attentional response to affective stimuli.

Burle, B. & Casini, L. (2001). Dissociation between activation and attention in time estimation: implications for internal clock models. Journal of Experimental Psychology: Human Perception and Performance, 27, 195-205.

Neural correlates of object naming: A magnetoencephalography study

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We present the temporal and spatial characteristics of neural processes involved in object naming within the first half second, using magnetoencephalography (MEG), a non invasive imaging technique with good spatial and temporal resolution. Objects and scrambled images were centrally presented for 200ms, followed by a 1800ms blank screen. Participants were asked to covertly name the objects or say the word 'pattern' (for scrambled images) as quickly and accurately as possible. Brain responses were recorded with MEG. Changes in cortical oscillatory power (event-related synchronization, ERS) or desynchronization, ERD) were analysed for 200 ms time windows up until 500 ms, for five frequency bands of 10Hz each (0-50Hz) using a minimum variance beamformer (Van Veen, van Drongelen, Yuchtman, & Suzuki, 1997). Virtual electrodes were employed to analyze the temporal characteristics of responses in regions of interest. Results showed that object naming task recruits a bilateral network of occipito-temporal regions (e.g. occipital complex, fusiform gyrus, middle occipital gyrus) followed by lateralized recruitment of left anterior temporal complex and right superior temporal gyrus. Temporally, activation started from posterior occipital regions, spreading ventrally and anteriorally to temporal and frontal areas. Scrambled images, in contrast, did not show changes in cortical power within the temporal regions. Activation patterns are similar to those obtained in word naming.

Van Veen, B. D., van Drongelen, W., Yuchtman, M., & Suzuki, A. (1997) Localization of brain electrical activity via linearly constrained minimum variance spatial filtering. IEEE transactions on bio-medical engineering 44, 867-880.

The impact of articulatory suppression on memory for tones

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The working memory model (Baddeley & Hitch 1974; Baddeley, 2000) provides an account of how verbal materials are rehearsed for recall (letters, words & nonwords). We investigated whether working memory may also be capable of rehearsing novel tone sequences using the articulatory suppression paradigm as our empirical methodology. Articulatory suppression is thought to occupy the subvocal rehearsal system of phonological working memory. As a result memory for verbal material is poorer in conditions where participants are required to manipulate their articulators (e.gwhispering), compared to control conditions of manual tapping or silence. Two serial recall experiments were carried out using sequences of letters and tones. We tested musicians and nonmusicians. Musicians were at a comparable level of performance in the language task, but were significantly better than the nonmusicians at tone recall. Despite the differences in performance level, articulatory suppression was found to be detrimental to the recall of letters and tones for both groups compared to performance in silence. As predicted the effect of suppression was greater than that of concurrent manual tapping. The findings are discussed in terms of how the processing of language and tones may occur in short-term memory, within the framework of the working memory model.

Baddeley, A. D. (2000). The episodic buffer: a new component of working memory? Trends in Cognitive Sciences, 4, 417-423.

Baddeley, A. D., & Hitch, G. (1974). Working memory. In G. A. Bower (Ed.), The psychology of learning and motivation, vol.8. New York: Academic Press.

The Peak-End Rule and underestimation in retrospective evaluations of temporally extended outcomes

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This study explored retrospective evaluations of temporally extended outcomes. Participants, primarily non-gamblers or recreational gamblers, played a fruit machine that presented sequences of payouts and then retrospectively evaluated their experiences. Experiments 1 and 2 replicated a robust “peak-end” effect on estimation judgments and choices, with participants exhibiting biases in favour of sessions with high peak-end values. Experiment 3 used modified stimuli that reduced the payout structure to wins and non-wins (no extreme values) and reversed the effect; we suggest this may arise from the influence of sensitivity to affect. Analysis across conditions found a consistent underestimation of total winnings and frequency of wins, in support of memory-based evaluation strategies. In the context of gambling judgments and decisions, these findings depict a dangerous picture for gamblers.

Cohort competition in spoken word processing: An fMRI study

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Spoken word recognition involves the activation of multiple word candidates based on the initial speech input - the "cohort" - and selection amongst these competitors. Selection may be purely a sensory process or facilitated by other aspects of lexical representation, such as a word's meaning (Marslen-Wilson, 1987). We tested this latter hypothesis in an fMRI study by manipulating (a) cohort size (large/small cohorts where there is high/low competition amongst candidates), and (b) the word's meaning (high/low imageability). In a behavioural study (Tyler et al, 2000), we found that imageability only facilitated the recognition of words with large cohorts. In the imaging study, we found greater activity in left inferior parietal lobule (IPL) with increased cohort competition, an imageability effect in right IPL and Superior Temporal Gyrus/Middle Temporal Gyrus, and a significant interaction between imageability and cohort size in left Superior Temporal Gyrus/Middle Temporal Gyrus including Wernicke's area. In words with large cohorts, highly imageable words generated stronger activity than low imageable words, whereas for words with small cohorts, there was no activity difference between high and low imageable words. These results support the behavioural data in showing that selection processes rely not solely on the sensory input but rather the meaning of candidate words facilitates discrimination between competitors.

Accommodation

Accommodation has been reserved for the nights of 2nd and 3rd April at Robinson College, where en-suite rooms are £63. Robinson is the newest Cambridge College and is located on Grange Road, a 20 minute walk from the conference venue (see map on the back of the programme). Rooms will be available from 12noon and keys should be collected from the Porters' Lodge at the College on arrival.

EPS Members can make reservations for accommodation and/or the conference dinner with the enclosed booking form, which should be returned to Mrs Marie Dixon, before 17th March 2008. Cheques must be made payable to "University of Cambridge" and sent to Mrs Marie Dixon, Centre for Speech, Language & the Brain, Department of Experimental Psychology, University of Cambridge, Downing Street, Cambridge, CB2 3EB.

Hotels and Guest Houses close to campus

There are many hotels and guest houses in Cambridge. With Visit Cambridge (http://www.visitcambridge.org) you can search for accommodation and book online, or contact the Advanced Booking Service who can source and book hotels, guest houses and bed and breakfast - call 01223 457581.

Hotels particularly close to the conference venue include The Cambridge Garden House (www.cambridgegardenhouse.com), Royal Cambridge Hotel (www.forestdale.com/royal-cambridge-hotel.htm) or Best Western Gonville Hotel (www.bw-gonvillehotel.co.uk).

Travel

For information on directions and maps you are invited to consult the Cambridge University website at http://www.cam.ac.uk/cambuniv/visitors/. The conference will be taking place in the Departments of Physiology and Experimental Psychology which are on the Downing Site of the University on Downing Street.

By Rail

Cambridge railway station is in Station Road. The National Rail telephone enquiry number is 08457 484950.

By Coach

National Express (http://www.nationalexpress.com/destinations) operate regular daily services from Cambridge to all over the UK and most airports. See their website for full details.

For all further information on local bus timetables and other public transport, call Traveline on + 44 871 200 22 33 or visit their website at http://www.traveline.org.uk

By Car

The main routes into Cambridge and locations of University and College buildings are marked on the University map (http://www.cam.ac.uk/map/). Cambridge is a very busy city with poor parking facilities. Please bear this in mind when planning your journey. There is no parking available at the University. If you are staying overnight, your hotel may be able to offer you parking facilities. If you wish to use your car and are not staying overnight, we recommend you use the Park & Ride sites instead of bringing your car into the city centre.

Local Taxis

There is a taxi rank at Cambridge train station. The journey to the conference venue normally takes about fifteen minutes outside rush hour. If you wish to call a taxi during your stay, we recommend you use Panther Taxis (01223 715715).

Eating and Drinking

Lunch

There are a variety of sandwich shops close to the conference venue, including Blue (24 Regent Street), Annabelles (44 Hills Road) and Savino's (3 Emmanuel Street, 01223 566186). In the city centre (a 5-10 minute walk from the site down Corn Exchange Street) there are the usual shops selling food – Marks & Spencers Food, Pret A Manger, Eat, Sainsbury's etc. as well as some cafés around the Market Square/Kings Parade area.

Evening meal: Restaurants in Cambridge

There are a number of restaurants close by. Peking Restaurant (21 Burleigh Street, 01223 354755) serves Chinese food and for noodles there is Wagamama (36a St Andrews Street, 01223 462354). Midsummer House is recommended as a Michelin starred restaurant (Midsummer Common, 01223 369299). Greek food can be found at Varsity (35 St Andrews Street, 01223 356060). For British/Mediterranean food try Fitzbillies (51 Trumpington Street, 01223 352500) or Browns (23 Trumpington Street, 01223 461655). La Margherita serves Italian food (15 Magdalene Street, 01223 315232) and for fish go to Loch Fyne (37 Trumpington Street, 01223 362433).

Conference Dinner

The conference dinner will be held at Christ's College, St Andrew's Street on Thursday 3rd April at 7.30pm. The cost will be £36 for three courses including wine and coffee. Please book and indicate any dietary requirements on the enclosed form which should be returned together with a cheque for £36 (made out to "University of Cambridge" to Mrs Marie Dixon, Centre for Speech, Language & the Brain, Department of Experimental Psychology, University of Cambridge, Downing Street, Cambridge, CB2 3EB) before 17th March 2008.

Places of Interest

Cambridge is a beautiful, historical city with much to offer. The Tourist Information Office website is a useful place for information on what's on in Cambridge - http://www.visitcambridge.org/visitors/. Here are some ideas of activities you may wish to enjoy during your stay.

Gardens - Cambridge University Botanic Gardens, entry by either the Bateman Street gate (every day) or Station Road gate (weekdays only). Open 10am – 6pm, £4 per person. Tel: 01223 336265. http://www.botanic.cam.ac.uk/

Punting –You can either punt yourself (a lot harder than it looks!) or you can hire a chauffeur who will manoeuvre your craft and tell you about Cambridge and the Colleges. http://www.punting-in-cambridge.co.uk/, http://www.scudamores.co.uk/

Walking tour - Guided walking tours of Cambridge depart daily from the Tourist Information Centre, Wheeler Street, CB2 3QB (01223 457574), and last approximately two hours. Tour times: 11.30am and 1.30pm.
Alternatively, download a podcast or themed walking maps from the interactive walking guide to Cambridge at www.stridedesign.net/shapewalks/home.aspx.

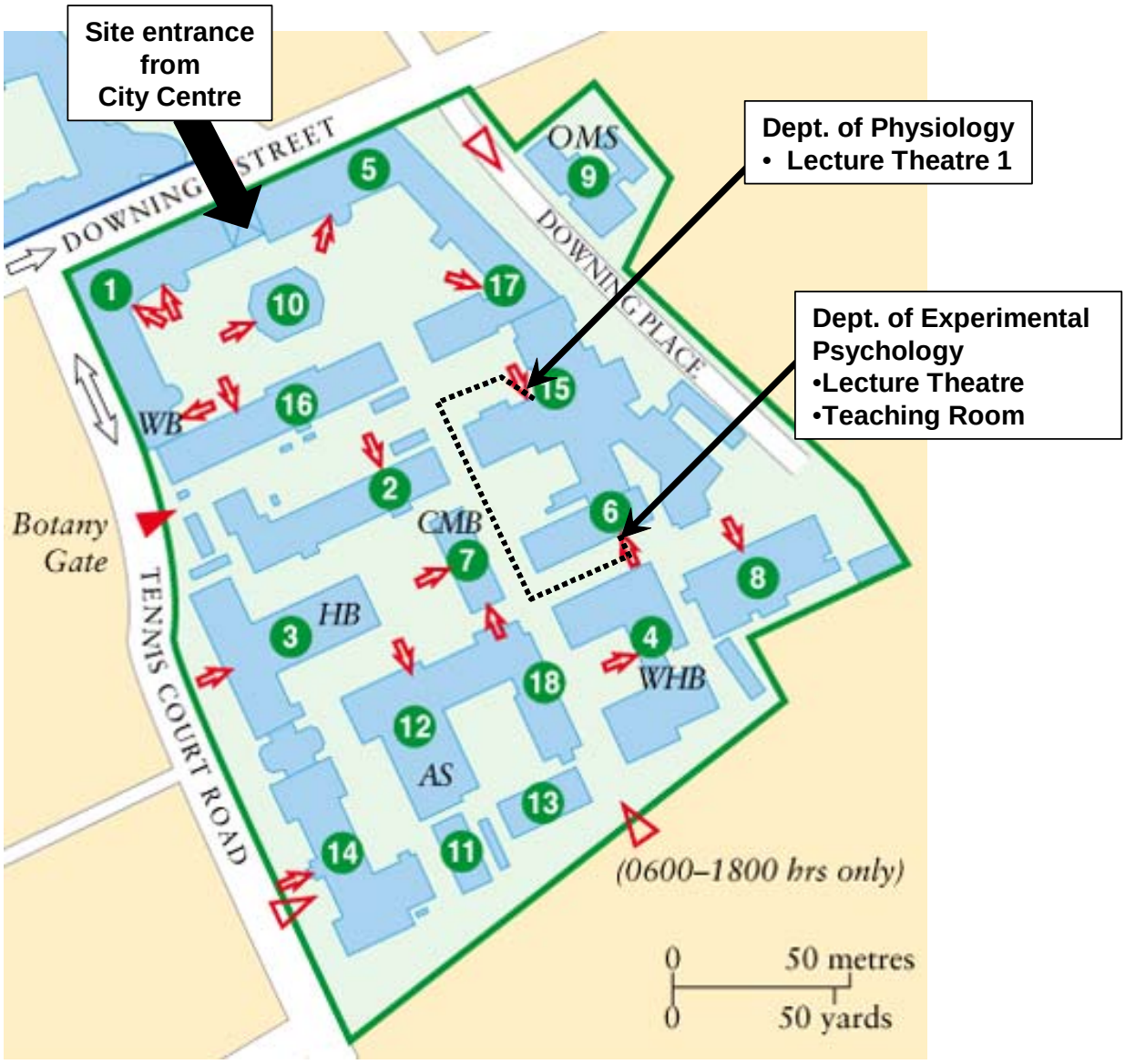
Open top bus tour - First departure from Silver Street at 10.10am and then every 40 minutes after that until the last tour at 3.30pm. The bus can be caught at many locations in the City and the circuit takes approximately 100 minutes. The tour takes in many of the Cambridge Colleges, the American Cemetery and the 'Backs'. Tickets can be purchased on the bus or from the Tourist Information Centre.

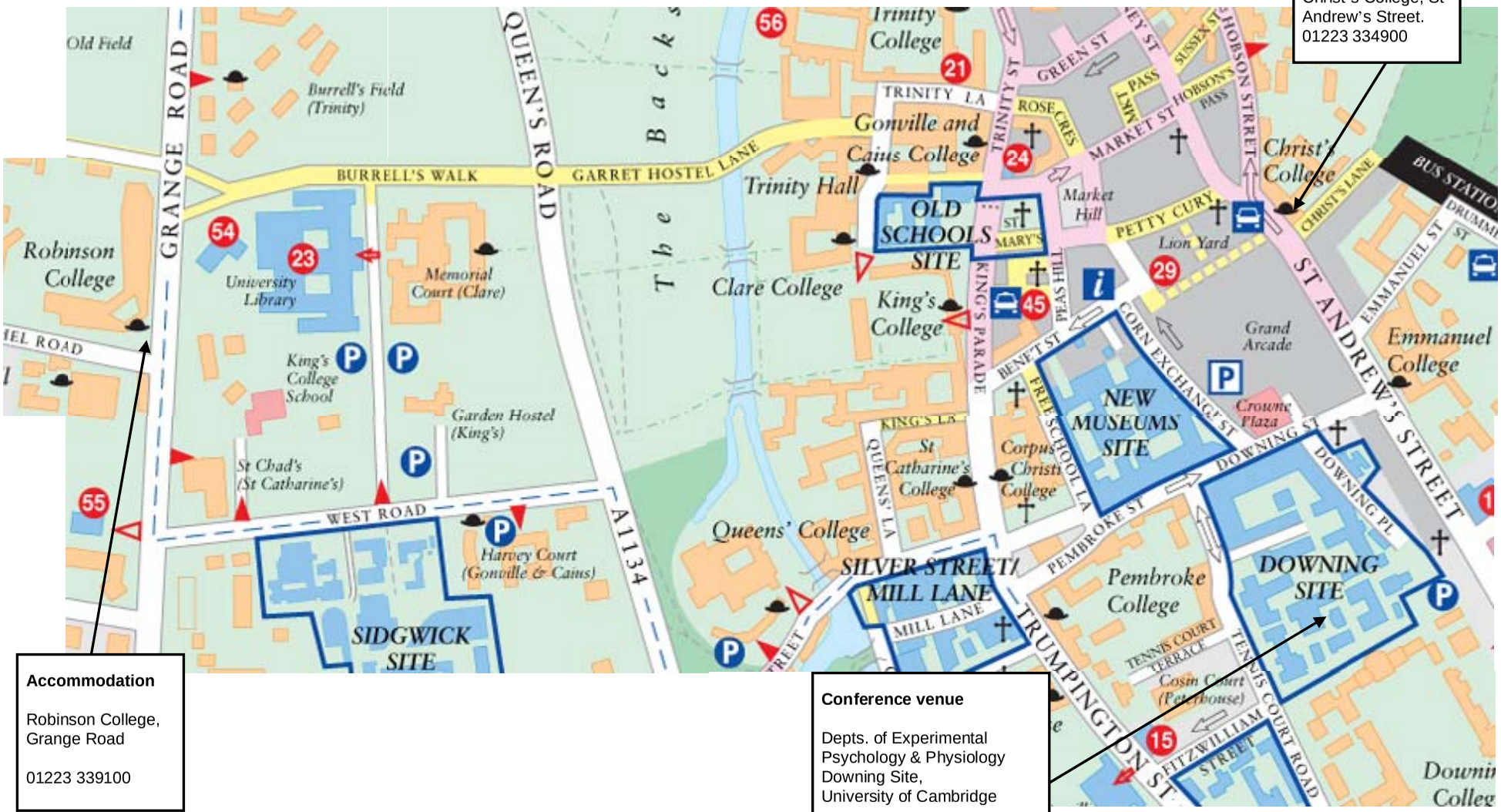
Museums -

- Fitzwilliam Museum (University art collection), Trumpington Street, CB2 1RD, Tel: 01223 332900, http://www.fitzmuseum.cam.ac.uk/
- Kettle's Yard Museum & Gallery (contemporary and modern art), Castle Street, CB2 0AQ, Tel: 01223 352124, http://www.kettlesyard.co.uk/
- Scott Polar Research Institute Museum, Lensfield Road, CB2 1ER, Tel: 01223 336540, http://www.spri.cam.ac.uk/museum/
- Sedgwick Museum of Earth Sciences, Downing Street, CB2 3EQ, Tel: 01223 333456, http://www.sedgwickmuseum.org/
- University Museum of Zoology, New Museums Site, Downing Street, CB2 3EJ, Tel: 01223 336650, http://www.zoo.cam.ac.uk/museum/
- Whipple Museum of the History of Science, Free School Lane, CB2 3RH, Tel: 01223 330906, http://www.hps.cam.ac.uk/whipple/index.html
- Museum of Archaeology & Anthropology, Downing Street, CB2 3DZ, Tel: 01223 333516, http://museum.archanth.cam.ac.uk/

UNIVERSITY OF CAMBRIDGE

EPS April 2008
University of Cambridge, Downing Site





Conference dinner
Christ's College, St Andrew's Street.
01223 334900

Accommodation

Robinson College,
Grange Road

01223 339100

Conference venue

Depts. of Experimental Psychology & Physiology
Downing Site,
University of Cambridge

01223 766458