EPS

Experimental Psychology Society

LONDON MEETING

3-4 JANUARY 2008

A scientific meeting will be held at the Department of Psychology, University College London on 3/4 January, 2008. The local organiser is Robin Murphy.

EPS Prize Lecture

Thursday 3 January 6.00pm

Decision by sampling
Dr Neil Stewart (Department of Psychology, University of Warwick)

Symposium - To accompany the Prize Lecture

Thursday 3 January 2pm – 5pm

Current trends in decision research
Organiser: Professor David Shanks

Symposium

Friday 4 January 2.30pm – 5.30pm

The correlates of social cognition in typical and atypical development
Organisers: Dr Elisabeth Hill and Dr Chris Jarrold

Poster Session

This will be held in conjunction with the drinks reception on Thursday evening at 7pm in Room 305 (Third Floor Seminar Room). Delegates may put up posters from 5pm and should take them down by the end of the session.

Platform Presentations

Sessions will be held in the Ground Floor and Lower Ground Floor Lecture Theatres of the Psychology Department (26 Bedford Way, WC1). Both theatres have data projectors available for Powerpoint presentations. Presenters may provide their own laptops and connector leads, or bring floppy disks, CDs or USB keys for the on-site computers which run Office XP under Windows NT/2000. Any queries about facilities in the theatres should be sent to the local organiser, Robin Murphy (robin.murphy@ucl.ac.uk)

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

The conference dinner will be at 8.30pm at Pescatori, 57 Charlotte Street, London. W1T 4PD – (020-75803289). A booking form is enclosed.

START OF PARALLEL SESSIONS

Session A

Ground Floor Lecture Theatre

9.30 **Richard Wilkie* and Katherine Robertshaw*** (University of Leeds) (Sponsored by Martin Conway)
Controlling steering when driving requires strategic use of eye-movements to sample useful information from the world

10.00 **Paul M. Bays* and Masud Husain** (University College London)
Limits of visual memory and its allocation across eye movements

10.30 **David Soto*, Glyn W. Humphreys, and Pia Rotshtein*** (University of Birmingham)
Dissociating the neural mechanisms of memory based guidance of visual selection

11.00 COFFEE

11.30 **Giles M. Anderson*, Dietmar Heinke, and Glyn W. Humphreys** (University of Birmingham)
Differential time course of top-down cueing by colour and orientation in visual search

12.00 **Li Zhaoping, Keith A. May* and Ansgar Koene*** (University College London, University of Bradford, and National Taiwan University)
Some fingerprints of the primary visual cortex in bottom-up attentional selection

12.30 **Alastair D. Smith, Bruce M. Hood, and Iain D. Gilchrist** (University of Bristol)
Probabilistic cueing in large-scale search

1-2 LUNCH

START OF PARALLEL SESSIONS

Session B

Lower Ground Floor Lecture Theatre

9.30 **Camilla K. Gilmore* and Matthew Inglis*** (University of Nottingham) (Sponsored by Courtenay Norbury)
Approximate arithmetic in adulthood

10.00 **Ruth S. Ogden* and Luke A. Jones** (University of Manchester)
Models of temporal reference memory function: Has the perturbation model perturbed the rest?

10.30 **Kielan Yarrow and Ian Ley*** (City University, London)
Optimal integration of auditory and vibrotactile information for judgements of temporal order

11.00 COFFEE

11.30 **Matthew H. Davis, Anna Maria Di Betta*, Mark J. E. Macdonald*, and M. Gareth Gaskell** (Cognition and Brain Sciences Unit, Cambridge, University of York, and University of Pennsylvania, Philadelphia, USA)
Learning and consolidation of novel spoken words: Behavioural and neural evidence

12.00 **Chloe Marshall, Franck Ramus*, and Heather van der Lely** (University College London and Laboratoire de Sciences Cognitives et Psycholinguistique, France)
Investigating prosodic cues to syntactic boundaries in children with SLI and/or dyslexia

12.30 **Saleh Shaalan* and Heather van der Lely** (University College London)
Production of clitic pronouns in Gulf-Arabic speaking children with specific language impairment (SLI)

1-2 LUNCH

Session A

Ground Floor Lecture Theatre

Symposium: Current trends in decision research
Organiser: Professor Davis Shanks

2.00 **Ido Erev*** (Technion, Israel Institute of Technology, Israel)
Decisions from experience, sampling, and the economics of small decisions

2.30 **Gordon D. A. Brown*** (University of Warwick)
Adaptive sampling and cognitive efficiency

3.00 **Ralph Hertwig*** (University of Basel, Switzerland)
Decisions based on experienced and described probabilities: From Bernoulli to cognitive heuristics

3.30 TEA

4.00 **David Lagnado*** (University College London)
Causal models in evidential reasoning

4.30 **Nick Chater, Ivo Vlaev*, Ben Seymour*, and Ray Dolan*** (University College London)
The instability of utility

End of Symposium

5.00 Annual General Meeting (Lower Ground Floor Lecture Theatre)
(Members only)

6.00 **EPS Prize Lecture – N. Stewart** (University of Warwick)
Decision by sampling
(Ground Floor Lecture Theatre)

7.00 POSTERS AND DRINKS RECEPTION. Room 305 (Third Floor Seminar Room).

8.30 CONFERENCE DINNER, PESCATORI

Session B

Lower Ground Floor Lecture Theatre

2.00 **Elizabeth Littlewood*, Susan E. Gathercole, and Graham J. Hitch** (University of York)
Hebb learning with word but not nonword sequences: Why?

2.30 **Simon Farrell and Anna Lelievre*** (University of Bristol)
Discrete and relative markers in serial recall

3.00 **Sonia C. Sciama** (University of Oxford)
Memory cycles: An explanation of the recency-primacy shift in latent inhibition

3.30 TEA

4.00 **Anthony Lambert, Kimberly Good*, Gloria Wu*, and Ian Kirk*** (University of Auckland, New Zealand)
Testing the repression hypothesis: Effects of emotional valence and individual differences on memory suppression in the think – no think task

4.30 **Martin A. Conway and Mihály Racsmány*** (University of Leeds and Budapest University of Technology and Economics, Hungary)
ERP Components of the Think/No-think (TNT) task and subsequent recall

5.00 Annual General Meeting (Lower Ground Floor Lecture Theatre)
(Members only)

6.00 **EPS Prize Lecture – N. Stewart** (University of Warwick)
Decision by sampling
(Ground Floor Lecture Theatre)

7.00 POSTERS AND DRINKS RECEPTION. Room 305 (Third Floor Seminar Room).

8.30 CONFERENCE DINNER, PESCATORI

Session A

Ground Floor Lecture Theatre

9.00 **Pascale Marguerite Josiane Engel*, Susan Elizabeth Gathercole, Flávia Heloísa Dos Santos, and Romain Martin*** (University of York, Universidade Estadual Paulista, Brazil, and University of Luxembourg, Luxembourg)
Are working memory measures free of socio-economic and cultural influence?

9.30 **Helen Tam*, Christopher Jarrold, Alan Baddeley, and Maura Sabatos*** (University of Bristol, University of York, and University of Warwick)
Factors that affect memory span in pre-rehearsal and post-rehearsal children

10.00 **Joni Holmes* and Susan E. Gathercole** (University of York)
Training working memory in children with attention deficit hyperactivity disorder ADHD

10.30 **Richard J. Allen* and Susan E. Gathercole** (University of York)
The role of working memory in performing actions

11.00 COFFEE

11.30 **Elias Mouchlianitis* and Rik Henson** (Cognition and Brain Sciences Unit, Cambridge)
Hemispheric asymmetries in priming of faces

12.00 **Luc Boutsen, Peter Praamstra*, Glyn W. Humphreys, and Tracy Warbrick*** (Aston University and University of Birmingham)
Neural correlates of local and global structural face encoding as revealed by event-related potentials

12.30 **Karen Lander, Jillian Vaughan, Nasreen Qayyum, and Rebecca Davies*** (University of Manchester)
Exploring the impact of expression and gaze direction on face attractiveness

1-2 LUNCH

Session B

Lower Ground Floor Lecture Theatre

9.00 **Aureliu Lavric, Heike Elchlepp*, Guy Mizon*, and Stephen Monsell** (University of Exeter)
ERP correlates of task-set interference in cued task switching

9.30 **Aidan Horner* and Rik Henson** (MRC Cognition and Brain Sciences Unit, Cambridge)
Response learning contributions to behavioural priming and repetition suppression

10.00 **Doris Eckstein*, Mara Tiberini*, Walter J Perrig*, and Richard A. Henson** (MRC Cognition and Brain Sciences Unit, Cambridge, and University of Bern, Switzerland)
Long-lag episodic components in subliminal category priming

10.30 **Colin J. Davis*, Stephen J. Lupker*, and Manuel Perea*** (Royal Holloway University of London, University of Western Ontario, Canada, and University of Valencia, Spain) (Sponsored by Marc Brysbaert)
An investigation of the vowel-consonant difference in letter position coding

11.00 COFFEE

11.30 **Caren Antoinette Frosch*, P. N. Johnson-Laird, and M. Cowley*** (University of Reading, Princeton University, USA, and University of Oxford) (Sponsored by Philip Smith)
It's not my fault, Your Honour, I'm only the enabler

12.00 **Nigel Harvey, Matt Twyman*, and Clare Harries** (University College London)
Test of a two-route model of trust in risk communication

12.30 **Erika Nurmsoo* and Elizabeth J. Robinson** (University of Warwick)
Children's inferences about the reliability of informants: When do they excuse past errors?

1-2 LUNCH

Session A

Ground Floor Lecture Theatre

2.00 **David Pitcher*, Vincent Walsh, and Bradley Duchaine*** (University College London) (Sponsored by Lauren Stewart)
TMS studies of the occipital face area

Symposia: The correlates of social cognition in typical and atypical development
Organisers: Dr Elisabeth Hill and Dr Chris Jarrold

2.30 **Helen Tager-Flusberg* and Daniela Plesa Skwerer*** (Boston University School of Medicine, USA)
Social engagement and social cognition in people with Williams Syndrome

3.00 **Brad Duchaine*, Heidi Murray*, Martha Turner*, Sarah White and Lucia Garrido*** (University College London)
Differentiating between developmental prosopagnosia and autism with measures of social cognition

3.30 TEA

4.00 **Liz Pellicano** (University of Bristol and University of Western Australia)
Longitudinal relations between cognitive and socio-communicative skills in autism

4.30 **Sarah White and Elisabeth Hill** (University College London and Goldsmiths, University of London)
Can executive failure explain the social impairments in autism?

5.00 **Claire Hughes and Rosie Ensor*** (University of Cambridge)
Do individual differences in 4-year-olds' social understanding and executive function matter for children's interactions with friends: The good, the bad and the socially busy

End of Symposium

End of meeting

Session B

Lower Ground Floor Lecture Theatre

2.00 **Stephen E. G. Lea, Catriona M. E. Ryan*, Catherine Bryant*, and Andy J. Wills** (University of Exeter)
One reason decision-making in pigeons? Discrimination with multiple valid cues

2.30 **Ben R. Newell and Arndt Broder*** (University of New South Wales, Australia, University of Bonn, Germany. and Max Planck Institute for Research on Collective Goods, Germany)
Learning about cue structures in multiple-cue judgment: The effect of learning regime on acquired representations

3.00 **Matt Twyman*, Nigel Harvey, and David Lagnado*** (University College London)
Online detection of change in a time series

3.30 TEA

4.00 **Stian Reimers* and Nigel Harvey** (University College London)
Explaining trend damping using context and memory

4.30 **Sara Kvidera* and Wilma Koutstaal** (University of Minnesota, USA and University of Reading)
Confidence and decision-type under matched stimulus conditions: Overconfidence in perceptual but not conceptual decisions

4.30 **Tim Rakow, Kali Demes*, and Ben Newell** (University of Essex and University of New South Wales, Australia)
Biased samples not mode of presentation: Re-examining the apparent underweighting of rare events in experience-based choice

End of parallel sessions

End of meeting

1. Linda Bayliss*, Colin J. Davis*, Marc Brysbaert, Stephanie Luyten, and Kathleen Rastle (Royal Holloway, University of London and University of Leuven, Belgium)
How are lexical decisions to word targets influenced by unrelated masked primes?

2. Zillah Boraston*, Ben Corden*, Lynden Miles*, David Skuse*, and Sarah-Jayne Blakemore (University College London, University of Canterbury, New Zealand, and University College London)
Perception of genuine and posed smiles by individuals with autism

3. Joanna Brooks*, Sven Mattys, and Martin Cooke* (University of Bristol and University of Sheffield)
The effect of processing load on speech segmentation

4. Stephanie Burnett*, Geoff Bird, Sarah-Jayne Blakemore, and Chris Frith (University College London)
The neural correlates of social emotion in adolescents and adults

5. Lucia Garrido*, Frank Eisner*, Carolyn McGettigan*, Lauren Stewart, Disa Sauter*, Rick Hanley, Stefan Schweinberger, and Bradley Duchaine* (University College London, Goldsmiths College, London, Birkbeck College, London, University of Essex, and Friedrich-Schiller-University of Jena, Germany) (Sponsored by Robin Murphy)
A case of developmental phonagnosia

6. Flávia Heloísa Dos Santos*, Paulo Adilson Silva*, Bruna Paschoalini*, Ana Luiza Dias*, Michele Frigério*, and Georges Dellatolas* (São Paulo State University, Brazil and Institut National de la Santé et de la Recherche Médicale, France) (Sponsored by Susan Gathercole)
The role of episodic memory and working memory in children with mathematical disorder

7. Joanne Ingram* and Linda M. Moxey (University of Glasgow)
Emotion words and complement set focusing in sentence production

8. Luke A. Jones, Ellen Poliakoff, and Jill Wells* (University of Manchester)
Interval timing in the vibrotactile modality

9. David Lagnado, Shelley Channon, and Sian Fitzpatrick* (University College London)
Judgments of cause and blame: The effects of intentionality and foreseeablity

10. Laura Lee* and Andy Young (University of York)
Neural responses to social attention

11. Rob Massey-Booth*, Dinkar Sharma*, and Dirk P. Janssen* (University of Kent) (Sponsored by Robyn Holliday)
Effects of stress and working memory load in the Stroop task: Evidence for attentional control theory

12. Samantha F. McCormick*, Kathleen Rastle, and Matthew H. Davis (Royal Holloway University of London and MRC Cognition and Brain Sciences Unit, Cambridge)
Lexical and non-lexical influences on morphological combination: The case of the missing e

13. Chris Mitchell*, Susan Wardle*, and Peter Lovibond (University of New South Wales, Australia) (Sponsored by David Shanks)
Is the Perruchet effect evidence for automatic associative learning in humans?

14. Linda Mortensen* and Randi C. Martin* (Rice University, Texas, USA) (Sponsored by James Hampton)
Effects of phonological neighborhood density and biphone frequency on the immediate serial recall of words

15. Monica Munoz*, Martin Chadwick*, Elisabeth Isaacs*, Michelle De Haan*, Torsten Baldeweg*, Aparna Hoskote*, Sachin Khambadkone*, Mortimer Mishkin*, and Faraneh Vargha-Khadem
(University College London)
Incidence of memory impairment after neonatal hypoxia-ischaemia: Congenital heart disease cohort

16. Beth Parkin*, Jack Rogers*, Ferath Kherif*, Matthew Brett*, and Matthew Davis (MRC Cognition and Brain Sciences Unit, Cambridge and University College London)
Inside the phonological and semantic pathways: An fMRI study investigating stimulus and task repetition priming of spoken words

17. Jack C. Rogers*, Matthew H. Davis (MRC Cognition and Brain Sciences Unit, Cambridge)
Categorical and non-categorical perception of speech: Behavioural and neural evidence

18. Catherine Sebastian*, Essi Viding*, Kipling D. Williams*, Tony Charman*, and Sarah-Jayne Blakemore (University College London and Purdue University, USA)
Affect regulation after social exclusion is still developing during adolescence

19. Steven Stagg*, Pam Heaton*, and Karina Linnell* (Goldsmiths College, University of London) (Sponsored by Elizabeth Hill)
Social perception in children with diagnosis of high functioning autism and Asperger syndrome

20. Lesley Uttley*, Paul C. Quinn*, Kang Lee*, Alan M. Slater, and Olivier Pascalis (University of Sheffield, University of Delaware, USA, University of Toronto, Canada and University of Exeter)
An intermodal representation of race and language in six-month-old infants

21. Lise Van der Haegen* and Eva Van Assche* (Ghent University, Belgium) (Sponsored by Marc Brysbaert)
The influence of sentential context on the processing of interlingual homographs

22. Eamonn Walsh* and Patrick Haggard (Institute of Cognitive Neuroscience, University College London)
To feel like stopping and yet still go; an analysis of inhibitory motor control in the stop-signal paradigm using a sensory detection task

23. Ivan Yuen*, Kathy Rastle, and Marc Brysbaert (Royal Holloway, University of London)
Can auditory distractors disrupt speech execution?

24. Olga Zubko*, David T. Wilkinson, and Robert A. Johnston (University of Kent)
Sources of individual differences in face perception

Controlling steering when driving requires strategic use of eye-movements to sample useful information from the world

Richard Wilkie and Katherine Robertshaw
University of Leeds
r.m.wilkie@leeds.ac.uk

Land & Lee (1994) recorded gaze behaviour during driving and observed extensive fixation of the tangent point of upcoming bends. In Wilkie & Wann (2003), however, we observed that gaze exploration of the centre of the road 1-2 seconds ahead was associated with accurate steering. To examine further the relationship between gaze and steering we asked participants to maintain paths down the centre of computer-simulated roadways of varying width and curvature. A fixation cross was placed on the tangent point of the bend, or on the centre of the road (the same distance ahead as the tangent point). We also ran fixation conditions on intermediate parts of the road, including the outside road edge. Throughout trials we recorded steering paths relative to the road centre and gaze behaviour. The results show that steering performance was influenced by both road curvature and width (the largest errors occurring on tight wide roads). The point of fixation also influenced steering, causing systematic biases in the direction of gaze. We conclude that the tangent point of the road does not provide information which is uniquely useful, but rather that looking to the point you wish to pass through contributes to successful steering.

Land, M. F., & Lee, D. N. (1994). Where we look when we steer. Nature, 369(6483), 742-744.
Wilkie, R. M., & Wann, J. P. (2003). Eye-movements aid the control of locomotion. Journal of Vision, 3(11), 677-684.

Limits of visual memory and its allocation across eye movements

Paul M. Bays and Masud Husain
Institute of Cognitive Neuroscience University College London
p.bays@ion.ucl.ac.uk

Visual working memory is a limited resource. Previous attempts to characterise this limit have sought to identify a fixed number of items that can be held simultaneously in memory. Here we investigate the precision with which visual information from multiple items is maintained, both within a single fixation and across eye movements. Testing memory for item locations and orientations, we find no evidence for a fixed item limit, but rather a dynamic allocation of visual memory resources, whereby increasing numbers of items are encoded with decreasing precision. Memory for item locations is not disrupted by an intervening saccade, implying that the entire contents of visual memory are predictively updated to account for the change in gaze position. Although a saccade did not affect overall performance, the item that was the target of the eye movement was recalled with greater precision than non-target items, demonstrating preferential allocation of resources to the saccade target. Crucially, in a sequence of eye movements, this privileged memory was observed only for the most recent saccade target, and not for targets of previous saccades. Thus visual memory resources appear to be reallocated prior to each new saccade, effectively wiping out information stored in earlier fixations.

Dissociating the neural mechanisms of memory based guidance of visual selection

David Soto, Glyn W. Humphreys, and Pia Rotshtein
University of Birmingham
d.soto@bham.ac.uk

Visual selection is influenced both by items in working memory and by priming from implicit memory, when a stimulus is repeated across time. Working memory effects are typically held to be top-down in nature (Soto, D. Heinke, D. Humphreys, G.W. & Blanco), while implicit priming may operate in a bottom-up manner (Theeuwes, J., Reimann, B. & Mortier, K.). However, how working memory and implicit priming effects influence visual selection remains poorly understood. Here we report functional magnetic resonance imaging (fMRI) evidence that dissociates the neural mechanisms involved in these memory-based effects on selection. The re-appearance of a stimulus held in working memory enhanced activity in superior frontal gyrus, mid-temporal and occipital areas known to encode the prior occurrence of stimuli. In contrast, mere stimulus repetition elicited a suppressive response in the same regions. An additional novel finding was that a fronto-thalamic network was uniquely sensitive to the behavioral relevance of a match between the contents of working memory and the visual array, enhancing activity when the contents of working memory matched the critical target of selection. Items held in working memory influence selection using a distinct form of neural coding to effects of mere repetition.

Soto, D. Heinke, D. Humphreys, G.W. & Blanco, M.J. (2005) J. Exp. Psychol. Hum. Percept. Perform. 31, 248-261

Theeuwes, J., Reimann, B. & Mortier, K. (2006). Vis. Cogn. 14, 466-489)

Differential time course of top-down cueing by colour and orientation in visual search

Giles M. Anderson, Dietmar Heinke, and Glyn W. Humphreys
University of Birmingham
gma472@bham.ac.uk

Visual search is influenced by participants' foreknowledge of the target. This study investigated foreknowledge effects by manipulating the presentation time and nature of a cue that specified the target for each trial. Two targets were used, either a blue horizontal or green vertical bar, with blue vertical and green horizontal bars as distractors. The cue was either informative (80% valid) and predicted either the target's colour (a blue or green dot) or orientation (horizontal or vertical white line), or it was non-informative (a white dot). Experiment 1 varied the cue presentation time. An advantage for colour cueing was evident at 100ms and unaffected by increasing presentation time; at shorter presentation times (10ms) only orientation cues affected performance. In Experiment 2 the same cues were used to predict colour or orientation in different sessions. At 10ms performance was still affected by orientation cueing alone, while colour cueing effects emerged with longer cue durations. These effects occurred even when cue colour was non-predictive. In Experiment 3 we demonstrated similar effects with word cues. The results suggest that while a ‘template' for orientation is established rapidly, a template for colour generates stronger top-down modulation of search at longer cue-display intervals.

Some fingerprints of the primary visual cortex in bottom-up attentional selection

Li Zhaoping[1], Keith A. May[2], and Ansgar Koene[3]
1. University College London
2. University of Bradford
3. National Taiwan University
z.li@ucl.ac.uk

A unique vertical bar among horizontal bars is salient and pops out perceptually regardless of the observer's goals. Physiological data have suggested that mechanisms in the primary visual cortex (V1) contribute to the high saliency of such a unique basic feature, but fail to indicate whether V1 plays an essential or peripheral role in input-driven or bottom up saliency. Meanwhile a biologically based V1 model has suggested that V1 mechanisms can also explain bottom up saliencies beyond the pop out of basic features (Li 1999, 2002), under the hypothesis that the bottom up saliency at any location is signalled by the activity of the most active cell responding to it regardless of the cell's preferred features such as color and orientation. Since higher visual areas such as V2 and V4 also contain neurons tuned to the same basic features that can pop out in the bottom up manner, and previous saliency models can capture much of the visual selection behavior using generic rather than V1 specific neural mechanisms, it is important to ascertain V1's role in saliency by identifying selection behavior that bears specific identifying characteristics, i.e., fingerprints, of V1 or others cortical areas. We present such fingerprints in visual search and segmentation tasks in which the reaction times are largely determined by the bottom-up saliency of inputs.

Li Z. (1999) Contextual influences in V1 as a basis for pop out and asymmetry in visual search In Proceedings of National Academy of Science, USA Volume 96, 1999. Page 10530-10535

Li Z. (2002) A saliency map in primary visual cortex Published in Trends in Cognitive Sciences Vol 6. No.1. Jan. 2002, page 9-16

Probabilistic cueing in large-scale search

Alastair D. Smith, Bruce M. Hood, and Iain D. Gilchrist
University of Bristol
alastair.smith@bris.ac.uk

It has been argued that visual search represents a useful model for egocentric foraging behaviour. In the current study we investigate large-scale environmental search to characterise this important behaviour and explore its relationship to visual search. In visual search, participants can modify their search behaviour based on the probability of targets being at a particular set of locations. Here, participants searched an array of locations, on the floor of a room, for a hidden target by pressing switches at each location, and we manipulated the probability of target being at a particular set of locations. Participants explicitly learned target likelihoods when the possible search locations were kept constant throughout the experiment and starting location was fixed. They did not learn when room-based and body-based encoding was dissociated.

However, when this was combined with a more salient perceptual landmark, an allocentric cueing effect was observed. These data suggest that this type of statistical contingency is coded differently than in the visual search paradigm, and that these processes form one of the bases of foraging-like behaviour in the real world.

Approximate arithmetic in adulthood

Camilla K. Gilmore and Matthew Inglis
University of Nottingham
camilla.gilmore@nottingham.ac.uk

An ability to successfully add numerical digits is a key goal of early mathematics. But the mechanisms by which adults and children are able to perform such arithmetical tasks are unclear. There is robust evidence that humans have an inbuilt 'number sense' - or non-symbolic system - which supports approximate numerical operations. Using a variety of paradigms it has been shown that the non-symbolic system plays a role when participants are asked to compare symbolic and non-symbolic numerosities, or to add non-symbolic numerosities. Recently it has been demonstrated that, prior to formal instruction, children can harness the non-symbolic system to perform approximate symbolic arithmetic tasks (Gilmore et al, 2007). Here we report two experiments which demonstrate that the non-symbolic system also exerts an influence on adult participants' performances on approximate symbolic addition tasks. In addition we derive and test a novel prediction from Barth et al.'s (2006) model of the non-symbolic system, by demonstrating that participants' response data show a previously undetected main effect of ratio direction.

Barth, H., La Mont, K., Lipton, J., Dehaene, S., Kanwisher, N., & Spelke, E. (2006). Non-symbolic arithmetic in adults and young children. Cognition, 98, 199-222.

Gilmore, C.K., McCarthy, S. & Spelke, E.S. (2007). Symbolic arithmetic knowledge without instruction. Nature, 447, 589-591.

Models of temporal reference memory function: Has the perturbation model perturbed the rest?

Ruth S. Ogden and Luke A. Jones
University of Manchester
ruth.ogden@postgrad.manchester.ac.uk

Jones and Wearden (2003) discovered that in auditory temporal generalization increased exposure to a standard does not lead to improved performance accuracy. This finding led to the development of the perturbation of model which is an alternative to averaging and sampling models of reference memory function which have been favoured in the past. The current series of experiments tests the ability of the perturbation model to explain performance on tasks other than auditory temporal generalization. Visual timing is known to be more variable than auditory timing (Wearden, Edwards, Fakhri & Percival, 1998). Common sense would therefore suggest that increased opportunity to encode visual stimuli would lead to less variable memory representations and increased performance accuracy.

Performance however is only likely to improve if reference memory averages its contents. According to the perturbation model small changes in the encoded duration would not lead to changes in the memory representation or performance as they would not perturb existing memory entries. Visual temporal generalization results showed no performance improvement with increased exposure to a standard, supporting the perturbation model of reference memory function. This result and those of auditory and visual reproduction tasks will be discussed in relation to the suitability of suggested models of reference memory function.

Jones, L.A., & Wearden, J.H. (2003). More is not necessarily better: Examining the nature of the temporal reference memory component in timing. Quarterly Journal of Experimental Psychology, 56B, 321-343.

Wearden, J. H., Edwards, H., Fakhri, M., & Percival, A. (1998). Why "Sounds are Judged Longer Than Lights": Application of a Model of the Internal Clock in Humans. The Quarterly Journal of Experimental Psychology, 51B, 97-120.

Optimal integration of auditory and vibrotactile information for judgements of temporal order

Kielan Yarrow and Ian Ley
City University, London
kielan.yarrow.1@city.ac.uk

Recent research assessing spatial judgements about redundant multisensory inputs suggests that humans integrate bisensory inputs in a statistically optimal manner, weighting each input by its normalised reciprocal variance. Is integration similarly optimal when humans judge the temporal properties of bimodal stimuli? Twenty four participants judged the temporal order of pairs of stimuli presented to the left and right. Stimuli were auditory, vibrotactile, or both. Properties of the vibrotactile stimuli were manipulated to produce three levels of precision. In bimodal conditions, a further manipulation could introduce a small asynchrony between the two unimodal stimuli that comprised a bimodal stimulus, in order to assess the weight given to vibrotaction in the final judgement. Unimodal data were used to predict bimodal performance on two measures: precision, and vibrotactile weight. Bimodal data comprehensively rejected a model relying exclusively on audition, which is generally considered the dominant sense for temporal judgements. Whilst a second model which selected the best sensory input on each trial could not be rejected based on vibrotactile weights, it did not predict the high level of precision attained in bimodal trials. Only the optimal maximum-likelihood-estimation model predicted both precisions and weights, extending its validity to judgements of temporal order.

Learning and consolidation of novel spoken words: Behavioural and neural evidence

Matthew H. Davis[1], Anna Maria Di Betta[2], Mark J. E. Macdonald[3], and M. Gareth Gaskell[2]
1. Cognition and Brain Sciences Unit, Cambridge
2. University of York
3. University of Pennsylvania, Philadelphia, USA
matt.davis@mrc-cbu.cam.ac.uk

Two experiments explored the neural mechanisms underlying the learning and consolidation of novel spoken words. In Experiment 1, participants learnt two sets of novel words on successive days. A subsequent recognition test revealed high levels of familiarity for both sets. However, a lexical decision task showed that only novel words learnt on the previous day engaged in lexical competition with similar-sounding existing words. Furthermore, only novel words learnt on the previous day exhibited faster repetition latencies relative to unfamiliar controls. This overnight consolidation effect was further examined using fMRI to compare neural responses to existing and novel words learnt on different days prior to scanning (Experiment 2). This revealed an elevated response for novel compared to existing words in left superior temporal gyrus, inferior frontal and premotor regions and right cerebellum. The activation was of equivalent magnitude for unfamiliar novel words and items learnt on the day of scanning, but significantly reduced for novel words learnt on the previous day. These findings, in conjunction with elevated hippocampal responses to unfamiliar novel words, are consistent with accounts proposing a division of labour between medial temporal and neocortical systems involved in the acquisition and consolidation of novel spoken words.

Investigating prosodic cues to syntactic boundaries in children with Specific Language Impairment (SLI) and/or dyslexia

Chloe Marshall[1], Franck Ramus[2], and Heather van der Lely[1]
1. Centre for Developmental Language Disorders and Cognitive Neuroscience, University College London
2. Laboratoire de Sciences Cognitives et Psycholinguistique, France
c.marshall@ucl.ac.uk

We investigated phrase-level phonology in children with SLI+dyslexia, SLI-only and dyslexia-only. Experiment 1 investigated whether children are able to understand and express the differences in meaning signaled by the contrasting prosodic patterns of [RED] [AND GREEN AND BLACK SOCKS] and [RED AND GREEN] [AND BLACK SOCKS]. Additionally, we tested their ability to discriminate low-pass filtered phrases of this type, and to repeat phrases with different prosodic patterns. Experiment 2 investigated how well prosodic phrase boundaries constrain lexical access. In a word-spotting task children listened out for either 'bacon' or 'bay' in sentences such as 'our bay can smell oily in the morning' and 'our bacon smells oily in the morning'. Results from experiment 1 indicate that children with SLI and/or dyslexia can distinguish and imitate different types of prosodic phrasing. However, when prosodic phrasing is linked to the understanding or production of linguistic meaning, many make errors. In experiment 2 children with SLI and/or dyslexia did not differ from controls in the condition where the target was 'bacon' but they heard 'bay can' (i.e. where a prosodic phrase boundary intervened between two syllables). We conclude that prosody itself is not an area of weakness in children with SLI and/or dyslexia, despite impairments in syntax and/or vocabulary.

Production of clitic pronouns in Gulf-Arabic speaking children with specific language impairment (SLI)

Saleh Shaalan and Heather van der Lely
University College London
s.shaalan@ucl.ac.uk

This study of clitic productions in Gulf Arabic can add a new cross-linguistic perspective to the ongoing debate between domain-general and domain-specific accounts of SLI. One domain-general account of SLI known as the surface hypothesis (Leonard 1998) argues that the deficits in children with SLI are caused by poor processing abilities. Leonard (1998) found that children learning Italian have significant problems with clitics because of their non-salient perceptual properties. On other hand, the computational grammatical complexity (CGC) hypothesis (van der Lely, 2005), a domain-specific account, proposes that SLI is caused by deficits in the mechanisms underling the grammatical system. Unlike Italian clitics, Arabic clitics are in a more prominent position; therefore, they can be an excellent testing ground for these two accounts of SLI. In this paper, we use a sentence completion task to compare the performance of six Gulf-Arabic speaking children with SLI on clitic production with a control group of six children matched with the SLI group on age and non-verbal IQ. Results revealed that the children with SLI performed significantly poorer than their age and IQ control group (t (10)=5.36, p=0.01).Thus, this preliminary study supports the predictions of CGC account but not those of the surface hypothothesis.

Leonard, L. (1998) Children with specific language impairment. Cambridge, MA: MIT Press.

Van der Lely, H. K. J. (2005) "Domain-Specific Cognitive Systems: Insight from Grammatical Specific Language Impairment," Trends in Cognitive Sciences 9(2),53-59. esis.

Symposia: Current trends in decision research
Organiser: Professor Davis Shanks

Decisions from experience, sampling, and the economics of small decisions

Ido Erev
Technion, Israel
erev@tx.technion.ac.il

Recent studies of decisions from experience reveal five robust deviations from maximization, and one indication of sophisticated adaptation. The deviations can be described as indications of over-exploration in response to large payoff variability, underweighting of rare events, diminishing sensitivity, insufficient exploration of the riskier alternative, and chasing after forgone payoffs. Sophisticated adaptation is observed in certain dynamic environments. Our analysis suggests that all five phenomena can be captured with a simple contingent sampling model.

The model assumes that the decision making recalls a small sample of experiences with each alternative (under conditions that are similar to the current setting), and selects the alternatives that led to better outcomes in this sample. The paper is concluded with discussion of the implications of these results to the economics of small decisions.

Adaptive sampling and cognitive efficiency

Gordon D. A. Brown
University of Warwick
G.D.A.Brown@warwick.ac.uk

Recent models in economics and psychology suggest that judgement, categorisation, and identification often involve relative judgement. For example, the value of an economic quantity may be determined by multiple ordinal (binary) comparisons ("Decision by Sampling"), and an item may be placed in a category if it is sufficiently different from a recently encountered item from an alternative category ("Memory and Contrast"). Such processes lead to strong context-dependence and apparent departures from rationality. Why then are such strategies used? We describe the Adaptive Sampling and Comparison Hypothesis. Hick's Law is used to quantify the cognitive/informational cost of making ordinal or better-than-ordinal comparisons, and information theory is used to quantify the accuracy of judgement and choice. We show by simulation that cognitive efficiency is maximised sometimes by making multiple (but cognitively easy) binary comparisons, and sometimes by making fewer but more accurate (and cognitively difficult) relative judgements. Human performance on a range of judgement, categorisation, and identification tasks is argued to be adaptively rational.

Decisions based on experienced and described probabilities: From Bernoulli to cognitive heuristics

Ralph Hertwig
University of Basel, Switzerland
ralph.hertwig@unibas.ch

Bernoulli's framework of expected utility serves as a model for myriad psychological processes, including motivation, moral sense, attitudes, and decision making. In decision-making research, deviations between the theory of expected utility and human behavior have led to modifications of the Bernoullian framework. Even the modifications, however, retain the assumption that, in choosing among options, people behave as if they multiply some function of each option's probability by some function of its value and then maximize. We present an alternative view of human choice that forgoes the summing and weighting framework of expected utility theory. Our results suggest that simple heuristics-albeit different ones in decisions from experience than in decisions from description-can compete with more complex models in predicting people's choices. In addition, we propose an adaptive toolbox approach to risky choice according to which people first try to find a no-conflict solution and, only if this fails, resort to conflict-resolving strategies such as the priority heuristic. We briefly discuss the debate about whether a common mechanism underlies both decisions from experience and decisions from description in light of related debates about other psychological processes.

Causal models in evidential reasoning

David Lagnado
University College London
d.lagnado@ucl.ac.uk

How do people reason about legal evidence? Several experiments explore how people assess and combine different items of evidence. Study 1 investigates how people modify their beliefs when previously accepted evidence is discredited. The main findings are that people appropriately explain away discredited evidence, but over-generalize this to unrelated evidence when the discrediting information is presented last. Study 2 develops a formal model that captures the difference between impartial witness and alibi testimony. In the latter case the discovery that an alibi is fabricated should increase the suspect's guilt over-and-above the fact that the alibi is false. Indeed people responded differently to the discredit of witness or alibi evidence; only in the latter case did the presence of deception increase the judged guilt of the suspect. This supports the formal model and suggests that people are sensitive to the different dependency structures implied by typical witness or alibi evidence. In the light of these studies we propose a psychological model that takes into account people's inferential capabilities and limitations. In short, people represent and reason about legal evidence using qualitative networks, and make appropriate inferences so long as the variables are limited in number, and the required computations are simplified.

The instability of utility

Nick Chater, Ivo Vlaev, Ben Seymour, and Ray Dolan
University College London
n.chater@ucl.ac.uk

Microeconomic theory and utilitarian ethics typically assume that experiences can be assigned utilities; and that human behaviour can (in the case of microeconomics) or should (in the case of utilitarian ethics) seek to maximize the expectation over these utilities. But do stable utilities exist? We report two studies which address this question in relation to a particularly concrete and immediate experience: brief sequences of low-voltage electric shocks. On each trial, receive a trial shock, and state the maximum they are willing pay to avoid a train of fifteen identical further shocks. A price is randomly determined, and participants either pay this price, or if it is above their maximum price, they receive the shock. Economic theory indicates that people should rationally reveal their true 'monetary value' of avoiding pain. We find, however, that this value for a particular shock is dramatically altered by (a) the value of other shocks in the same block of trials; (b) the endowment of money on each trial (which determines the maximum participants can pay). Thus, the "exchange rate" between pain and money appears to be highly variable; and the relative utilities of pain and money are therefore unstable. These results provide a challenge for microeconomics and utilitarianism.

End of Symposium

EPS Prize Lecture

Decision by Sampling

Neil Stewart
University of Warwick
neil.stewart@warwick.ac.uk

Decision by sampling (DbS) is a theory about how the environment that we are in shapes the decisions that we make. Here, I apply DbS to risky decision making. According to the dominant theories of risky decision making, people arrive at the subjective value of a risky option by multiplying the psychological value of the potential outcome by the psychological size of the probability of that outcome. DbS offers a quite different account of risky decision making. In DbS, the subjective value of an attribute value is derived from a series of binary, ordinal comparisons with a sample of other attribute values from the decision environment (i.e., from the immediate context and from long-term memory). In this way, the distribution of attribute values in the environment influences subjective valuations. I extend DbS to account for choices between risky prospects by using the binary, ordinal comparisons to increment accumulators for each prospect, with a choice made when the difference between accumulators reaches a threshold. The model correctly predicts preferences in benchmark data sets and correctly predicts the effects of experimentally manipulating the environment in which we make decisions.

Hebb learning with word but not nonword sequences: Why?

Elizabeth Littlewood, Susan E. Gathercole, and Graham J. Hitch
University of York
e.littlewood@psychology.york.ac.uk

Hebb learning - in which serial recall accuracy improves when the lists to be recalled are repeated across trials - is well established for sequences of familiar verbal items, and has been suggested to provide an experimental analogue of natural word learning. If this is the case, it should extend to sequences of novel as well as familiar phonological forms. In two experiments, substantial cumulative learning of sequences in a Hebb paradigm was found when the list items were words, but not for nonwords. A further experiment established that when the syllable sequences were articulated and presented as single nonwords rather than sequences of distinct syllables, cumulative learning was not found for either lexical or nonlexical syllables. Error analysis indicates that learning does take place, but that it is errorful: the same incorrect sequences that were close approximations to the original lists were recalled trial after trial. These findings indicate that the learning of sequences composed of previously unfamiliar syllables is often inaccurate, and is relatively impervious to correction by repeated presentation of the correct model.

Discrete and relative markers in serial recall

Simon Farrell and Anna Lelievre
University of Bristol
Simon.Farrell@bristol.ac.uk

The evidence from serial recall of temporally grouped lists suggests that items are associated with some external positional or timing signal, and that this signal is used to hierarchically organize sequences of items. One particular model of these positional representations, the Start-End Model (Henson, 1998), holds that all items in a group are anchored both to the start and the end of that group: a relative representation. Using a competitive comparison of computational models, we show that the existing evidence, focussing on confusions of terminal group items between groups, does not mandate a model in which all items are anchored to the end of a group (i.e, a continuous end marker), but is instead more consistent with a simpler alternative model in which terminal items are discretely tagged as end items (a discrete end marker). We then present some new data using lists grouped in a 4-4 fashion, which allows inspection of confusions of internal items between groups. These more discriminating data, and model fits, suggest that a continuous end marker does play a role in representing order in short-term memory.

Henson, R. N. A. (1998). Short-term memory for serial order: The Start-End Model. Cognitive Psychology, 36, 73-137.

Memory cycles: An explanation of the recency-primacy shift in latent inhibition

Sonia C. Sciama
University of Oxford
sonia.sciama@virgin.net

An experiment is reported demonstrating a recency-primacy shift in latent inhibition using the visual search paradigm. In the preexposure phase two shapes were presented as distractors; the first shape in all 75 blocks and the second shape in the final 25 blocks. The first shape was thus older than the second shape because its presentions started earlier. At test both shapes were presented as targets amongst a novel set of distractors. There was a recency-primacy shift. Early in testing the second shape showed latent inhibition but not the first shape, and late in testing the first shape showed latent inhibition but not the second shape. This recency-primacy shift is explained in terms of a structure of past events that has a cyclic component. The widespread assumption of a linear time line may be an oversimplification.

Testing the repression hypothesis: Effects of emotional valence and individual differences on memory suppression in the think – no think task

Anthony Lambert, Kimberly Good, Gloria Wu, and Ian Kirk
University of Auckland, New Zealand
a.lambert@auckland.ac.nz

According to the repression hypothesis, memory performance in the think - no think task will be influenced by emotional characteristics of both the material to be remembered, and of the individuals doing the remembering. In our version of this task, participants learned to associate word pairs in which the first item was either emotionally positive (e.g. joy) or emotionally negative (e.g. hatred). The second word was always emotionally neutral (e.g. socks). In Experiments 1 and 2 significant suppression was observed following 'no think' instructions for memories associated with emotionally negative material. No suppression was observed for memories associated with emotionally positive information. Experiment 3 explored effects of individual differences in anxiety and social desirability on memory suppression. In this experiment significant memory suppression was not observed, either in the sample as a whole, or in the sub-group characterised in previous work as displaying a repressive coping style (low anxiety, high defensiveness). However, it was found that the differential effect of 'think' and 'no think' instructions was modulated by anxiety, but not by defensiveness. Implications of these findings for the relationship between performance in the think - no think task and the notion of memory repression are considered.

ERP Components of the Think/No-think (TNT) task and subsequent recall

Martin A. Conway[1] and Mihály Racsmány[2]
1. Institute of Psychological Sciences, University of Leeds
2. Budapest University of Technology and Economics, Hungary
M.A.Conway@Leeds.ac.uk

In a TNT experiment EEG was used to identify event-related brain potential (ERP) components characterizing thinking or not thinking about items from a recently presented word list. ERP components were also examined in a subsequent phase of cued-recall in which previously learned words were recalled to an associated cue. In the TNT phase not thinking about a recently presented word was characterized by bilateral frontal activity. In the cued-recall phase remembering words that had not been thought about in the earlier TNT phase was associated with predominantly left sided activity, especially in the left frontal lobe. These findings run counter to those of Anderson, et al., 2004. This and other differences are considered in detail.

Anderson, M. C., Ochsner, K., Kuhl, B., Cooper, J., Robertson, E., Gabrieli, S.W., Glover, G., & Gabrieli, J. D. E. (2004). Neural systems underlying the suppression of unwanted memories. Science, 303, 232-235.

Are working memory measures free of socio-economic and cultural influence?

Pascale Marguerite Josiane Engel[1], Susan Elizabeth Gathercole[1], Flávia Heloísa Dos Santos[2], and Romain Martin[3]
1. University of York
2. Universidade Estadual Paulista, Brazil
3. University of Luxembourg, Luxembourg
p.engel@psychology.york.ac.uk

This research investigated the hypothesis that working memory skills are independent of environmental factors such as socio-economic status (SES) or cultural background. Twenty Brazilian children aged 6 and 7 years from low SES families were evaluated on measures of working memory (verbal short-term memory and verbal complex span, taken form the AWMA: Automated Working Memory Assessment) and of vocabulary (expressive and receptive). They were compared with typically developing Brazilian children from the same region but from families of higher SES and to a population of Portuguese-speaking, immigrant children growing up in Luxembourg, EU. Children were matched on age, sex, and nonverbal ability. The three groups differed significantly on the vocabulary measures but not on the verbal short-term memory tests. Further, the groups differed on one of the two complex span measures - counting recall - but performed equally well on backwards digit recall. The results indicate that tests of verbal short-term memory and also backwards digit recall provide measures of cognitive abilities that are not biased by the quality of the child's socio-economical or cultural background. As these measures are also highly sensitive to language ability, they may provide useful methods for diagnosing language disorder that are independent of environmental opportunity.

Factors that affect memory span in pre-rehearsal and post-rehearsal children

Helen Tam[1], Christopher Jarrold[1], Alan Baddeley[2], and Maura Sabatos[3]
1. University of Bristol
2. University of York
3. University of Warwick
helen.tam@bristol.ac.uk

Four memory span tasks (simple span, delayed span, Brown-Peterson, complex span) were administered to a group of pre-rehearsal (6 year-old, n=110) and a group of post-rehearsal (8 year-old) children (n=90). In the simple span task, recall was immediate. Recall was delayed in both the delayed span and Brown-Peterson tasks, but the delay in the latter was filled by a processing requirement. Greater switching between storage and processing was required in the complex span (where storage and processing were interleaved) than in the Brown-Peterson task (where they were blocked). Performance in both age groups was impaired by the addition of delay and also by the requirement of processing in the delay interval, but not by the imposition of switching between storage and processing demands. However, the adverse effects of delay on performance were greater in pre-rehearsal than post-rehearsal children. In a similar vein, results from a phonological similarity effect task showed that phonological rehearsal was less efficient in 6- than in 8-year-olds. Finally, contrary to past research on adults, our findings from 8-year-olds demonstrated that delayed span was a better predictor of reading and mathematical abilities than the other memory span tasks used in this study, including the complex span task.

Training working memory in children with attention deficit hyperactivity disorder

Joni Holmes and Susan E. Gathercole
University of York
j.holmes@psychology.york.ac.uk

The primary objective of this study was to evaluate whether a newly-developed training programme could boost working memory in children who receive quick-release stimulant medication for attention deficit hyperactivity disorder (ADHD). Secondary objectives were to investigate the impact of training on IQ, and on teacher assessments of problem behaviours. Twenty-five children aged 8 - 11 years were required to complete 115 trials across eight computerized working memory tasks every day for 20 days. The programme led to substantial gains in all components of working memory across both trained and untrained tasks, and to significant reductions in teacher ratings of problem behaviours. Training had no effect on IQ scores. These results have implications both for our current theoretical understanding of working memory and for educational, and for remedial support for children with memory and attentional problems.

The role of working memory in performing actions

Richard J. Allen and Susan E. Gathercole
University of York
r.allen@psych.york.ac.uk

Recent evidence indicates that children with poor working memory skills have particular difficulties in following instructions to perform sequences of actions, both in the classroom and the laboratory. A series of experiments investigate the specific roles played by working memory in these activities, using a computer-based environment. The experiments employ a dual-task methodology designed to identify which components of working memory, if any, mediate adult participants' abilities to follow instructions to manipulate sequences of objects. These objects were either identified by paired conjunctions of features (colour, shape) or by colour alone. The findings indicate that instructions including two-feature objects not only have a greater memory load than single-feature items, but also require a greater degree of focused attentional resources during encoding, relative to single-feature objects. It is suggested that these findings may reflect a feature binding process in the encoding of instructions that is resource demanding.

Hemispheric asymmetries in priming of faces

Elias Mouchlianitis and Rik Henson
Cognition and Brain Sciences Unit, Cambridge
elias.mouchlianitis@mrc-cbu.cam.ac.uk

Previous research using the divided visual-field methodology has led to the suggestion that dissociable neural systems support view-independent and view-dependent visual object processing in left and right hemispheres respectively (Burgund & Marsolek, 2000). More specifically, stimuli presented to the right hemisphere show greater priming when prime and probe are from the same view than a different view, whereas stimuli presented to the left hemisphere typically show priming that generalises across view. However, previous experiments have tended to use words or nameable objects, suggesting that the well-known left hemisphere dominance for verbalisable stimuli may contribute to these effects. We tested this possibility by comparing priming for famous and non-famous faces across viewpoints as a function of hemifield.

In Experiment 1, using long lag priming and only famous faces, a significant view-by-hemisphere interaction was found, with greater generalisation across different views in the left hemisphere, consistent with previous experiments. In Experiment 2 however, using short-lag priming and both famous and non-famous faces, this interaction was not replicated, nor was it replicated in Experiment 3 that used non-famous faces only. These results suggest that verbal (or semantic) components may explain some of the hemifield effects that have been used to support the dissociable neural systems theory.

Burgund,E.D. & Marsolek, C.J. (2000). Viewpoint-invariant and viewpoint-dependent object recognition in dissociable neural subsystems. Psychonomic Bulletin & Review, 7 (3), 480-489.

Neural correlates of local and global structural face encoding as revealed by event-related potentials

Luc Boutsen[1], Peter Praamstra[2], Glyn W. Humphreys[2], and Tracy Warbrick[2]
1. Aston University, Birmingham
2. University of Birmingham
l.boutsen@aston.ac.uk

The perceptual encoding of face information is known to involve the representation of spatial relations between face features. However, the extent to which this representation contains global, "holistic" information, or rather local configural relations (independent of face context), is a matter of debate. In a high-density EEG study we measured and compared the neural correlates of the encoding of local and global information in faces and non-face objects (houses). Observers performed an oddball detection task while viewing whole faces and houses, or face and house parts. With both whole and part stimuli, we manipulated the spatial relations between features by inverting the features or the whole stimulus. We measured the effect of this configural distortion on the P1, N170 and P2 ERP components. Consistent with previous studies, feature inversion had a larger effect for faces than for non-face objects, particularly for the N170 component. Importantly, the effect of feature inversion on the N170 was similar for whole faces and face parts. Dipole source modelling of the N170 component revealed overlapping bilateral sources in the fusiform cortex for whole faces and face parts. These results suggest that structural face encoding acts on local information and is relatively independent of face context.

Exploring the impact of expression and gaze direction on face attractiveness

Karen Lander, Jillian Vaughan, Nasreen Qayyum, and Rebecca Davies
University of Manchester
karen.lander@manchester.ac.uk

In the reported experiments we investigate the impact of facial expression and eye gaze direction (direct or averted) on the rated attractiveness of real faces, using an absolute or relative judgement task. Results from Experiments 1 and 2 show that for direct gaze, happy faces were rated as more attractive than neutral faces, who were rated as more attractive than angry faces.

However, for averted gaze, happy and neutral faces either did not differ in rated attractiveness (Experiment 1) or happy faces were rated as most attractive (Experiment 2). In both experiments, averted happy and neutral faces were judged more attractive than angry faces. Further work explores more closely the impact of negative expressions on attractiveness judgements. Our findings demonstrate the fluctuations in attractiveness shown for unfamiliar faces, as a function of task, expression and eye gaze direction.

ERP correlates of task-set interference in cued task switching

Aureliu Lavric, Heike Elchlepp, Guy Mizon, and Stephen Monsell
University of Exeter
a.lavric@exeter.ac.uk

Previous electrophysiological studies have identified the ERP correlates of preparatory control associated with anticipating a task switch relative to a task repeat. In contrast, less is known about the potential ERP correlates of task-set interference elicited by the stimulus. We manipulated the stimuli used in switching between colour and shape identification tasks, with task identity cued on every trial. For some subjects, the stimuli were "bivalent", affording responses in both tasks. For other, the stimuli were "univalent", in that the currently-irrelevant dimension was associated with no response in the other task. The greater switch cost observed in the bivalent condition confirmed the contribution of task-set interference to the switch cost. This stimulus-level interference was also reflected in the post-stimulus switch negativity, commonly observed in ERP task switching studies. In addition to being somewhat attenuated in the univalent condition, this component had a broad scalp distribution with a posterior maximum in the bivalent condition and an anterior-central distribution in the univalent condition, confirming the expectation of greater competition at the level of perceptual dimension selection in the bivalent condition. Furthermore, both behavioural and ERP data showed that verbal cues were more conducive to effective preparation for a switch than pictorial cues.

Response learning contributions to behavioural priming and repetition suppression

Aidan Horner and Rik Henson
MRC Cognition and Brain Sciences Unit, Cambridge
aidan.horner@mrc-cbu.cam.ac.uk

Prior exposure to a stimulus can facilitate its subsequent identification and classification, a phenomenon called priming. This behavioural facilitation is usually accompanied by a reduction in neural response within specific cortical regions (Repetition Suppression / RS) (Grill-Spector, Henson, & Martin, 2006). Recent research has suggested both behavioural priming and RS are 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.

Here we present both behavioural and fMRI evidence suggesting that, although response learning mechanisms play a significant role, they cannot explain all priming effects. Furthermore, although response switches between initial and repeated stimulus presentations significantly reduce behavioural priming, RS in perceptual brain regions was found to be relatively robust to changes in both task and response.

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.

Grill-Spector, K., Henson, R., & Martin, A. (2006). Repetition and the brain: neural models of stimulus-specific effects. /Trends in Cognitive Sciences, 10/(1), 14-23.

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.

Long-lag episodic components in subliminal category priming

Doris Eckstein[1], Mara Tiberini[2], Walter J Perrig[2], and Richard A. Henson[1]
1. MRC Cognition and Brain Sciences Unit, Cambridge
2. University of Bern, Switzerland
doris.eckstein@mrc-cbu.cam.ac.uk

Subliminal category priming is one of the most reliable effects of nonconscious perception: The decision whether a probe belongs to one of two categories is facilitated when a subliminal prime preceding the probe belongs to the same category as the probe. It is common practice to use the same stimuli as visible probes and as subliminal primes. In this case, categorical priming may be dominated by episodic influences: Subliminal primes that were previously categorized as visible probes are prone to long-lag priming (called here episodic priming). We present a study that investigated the extent and nature of episodic components in category priming. Words were classified as positive or negative, and episodic priming was controlled (a) by varying the training given before the priming test, which familiarizes participants with the stimuli, and (b) by using a set of primes that were not shown as probes during test. Results suggest that episodic priming is a substantial component in category priming and that it is linked to mental classification of the probes.

An investigation of the vowel-consonant difference in letter position coding

Colin J. Davis[1], Stephen J. Lupker[2], and Manuel Perea[3]
1. Royal Holloway University of London, UK
2. University of Western Ontario, Canada
3. University of Valencia, Spain
c.davis@rhul.ac.uk

The flexibility of letter position coding is illustrated by the well established finding that transposed-letter nonword primes (e.g., jugde-JUDGE) are more effective than replacement-letter nonword primes (e.g., jupte-JUDGE).

However, recent studies (Lupker, Perea, & Davis, 2008; Perea & Lupker, 2004) have demonstrated that this transposed-letter prime advantage exists for transpositions involving two consonants but not for those involving two vowels, suggesting differences in the position coding of consonants and vowels. This talk will present three masked priming experiments that a) replicate the consonant-vowel difference, b) test an account based on letter frequency, and c) investigate the phonological contribution to this difference. Results will be discussed in the light of current models of letter position coding, including the SOLAR model.

Lupker, S.J., Perea, M., & Davis, C.J. (2008). Transposed-letter effects: Consonants, vowels, and letter frequency. Language and Cognitive Processes, 23.

Perea, M., & Lupker, S. J. (2004). Can CANISO activate CASINO? Transposed-letter similarity effects with nonadjacent letter positions. Journal of Memory & Language, 51, 231-246.

It's not my fault, Your Honour, I'm only the enabler

Caren Antoinette Frosch[1], P. N. Johnson-Laird[2], and M. Cowley[3]
1. University of Reading
2. Princeton University, New Jersey, USA
3. University of Oxford
c.frosch@reading.ac.uk

There is no consensus about how causes (events that bring about an outcome) and enabling conditions (events that make it possible for an outcome to occur) can be distinguished. Within the legal domain this may have serious consequences as it is not clear whether a person who enabled an outcome should be considered causally responsible for an outcome. In three studies we examined participants' ability to identify causes and enabling conditions from vignettes describing criminal events. In addition, we investigated whether the punishments they considered to be appropriate differed for an agent identified as the cause from an agent identified as the enabling condition. In Study 1 participants rated either the causing or the enabling agent. In Study 2, participants rated both the causing and the enabling agent. In Study 3, we adjusted the scenarios so that they only described the actions of either the causing or the enabling agent and participants rated both versions separately. In all three studies, causers were rated as more responsible, more a cause than an enabler of the outcome, liable to go to prison longer, and liable to pay greater damages than the enabler. We discuss applications of psychology to law.

Test of a two-route model of trust in risk communication

Nigel Harvey, Matt Twyman, and Clare Harries
University College London
n.harvey@ucl.ac.uk

According to Siegrist, Earle and Gutscher's (2003) two-route model of trust in risk communication, people use history of the source's advice quality to assign their trust in its competence and use their estimate of the similarity of the source's values to their own to assign their trust in its motives. The latter form of trust can influence the former (because people are assumed to treat errors in advice charitably when they trust the source's motives) but the model allows no influence in the opposite direction. The two types of trust merge into a final common pathway to produce trusting behaviours (expressing trust in a source, accepting advice from a source). Because of this convergence, the model predicts that trusting behaviors should vary together. We report four experiments. They confirm that both value similarity and source competence influence trusting behaviours. However, they also reveal some dissociation between different types of trusting behaviour. Furthermore, they indicate that aspects of the past performance of a source (bias, unreliability) influence estimates of value similarity, the primary determinant of trust in motives.

Siegrist, M., Earle, T.C. and Gutscher, H. (2003). Test of a trust and confidence model in the applied context of electromagnetic field (EMF) risks. Risk Analysis, 23, 705-716.

Children's inferences about the reliability of informants: When do they excuse past errors?

Erika Nurmsoo and Elizabeth J. Robinson
Warwick University
e.nurmsoo@warwick.ac.uk

Previous research (e.g. Harris, 2007) shows that 3- and 4-year-olds take into account speakers' past histories of accuracy or inaccuracy when learning new information. Harris and colleagues interpret this as 'selective trust' in reliable informants. We show that children treat informants as unreliable in the longer term only when they see no circumstantial excuse for their inaccuracy. In three experiments (N = 79; 67; 97), children aged 3, 4 and 5 years aimed to identify a hidden toy in collaboration with the Experimenter or a puppet as informant. When their informant was previously inaccurate despite having full information, children tended to ignore what they were told and guess for themselves: They treated the informant as unreliable in the longer term. However children did believe a currently well-informed informant whose past inaccuracies arose from inadequate information access. Furthermore, when children had a prior expectation about a target toy's identity, children who explained their informant's past errors in terms of false beliefs, were more likely to believe her contradicting suggestion about the target's identity than children who did not. Children excused speakers' past inaccuracy when they understood the temporary circumstances that caused it, but treated speakers as unreliable when they did not.

Harris, P.L. (2007). Trust. Developmental Science, 10, 135-138.

TMS studies of the occipital face area

David Pitcher, Vincent Walsh, and Bradley Duchaine
Institute of Cognitive Neuroscience, University College London
d.pitcher@ucl.ac.uk

We report a series of transcranial magnetic stimulation (TMS) studies of the occipital face area (OFA). An area of extrastriate cortex which responds preferentially to faces, the OFA is the first stage of an extended face processing network (Haxby et al., 2000). TMS targeted at the right OFA disrupted accurate discrimination of face component parts but not the spacing between these parts (Pitcher et al., 2007). There was no effect on a matched house discrimination task. A subsequent experiment varying the timing of TMS delivery during a face part discrimination task demonstrated that the right OFA exhibited impairment only at 60-100ms from stimulus onset. Subsequently we tested theories of embodied cognition which propose that facial expression recognition depends upon processing in modality-specific visual areas and also upon a simulation of the somatovisceral and motor responses associated with the perceived emotion. We targeted TMS at the right OFA and right somatosensory cortex while participants discriminated facial expressions. The impairments induced at each site demonstrate the sequential contributions of visual and non-visual areas during facial expression recognition.

Haxby, J. V., Hoffman, E. A., & Gobbini, M. I. (2000). The distributed human neural system for face perception. Trends Cogn Sci., 4, 223-233.

Pitcher, D., Walsh, V., Yovel, G., & Duchaine, B. (2007). TMS Evidence for the Involvement of the Right Occipital Face Area in Early Face Processing. Current Biology, 17.

Symposia: The correlates of social cognition in typical and atypical development
Organisers: Dr Elisabeth Hill and Dr Chris Jarrold

Social engagement and social cognition in people with Williams Syndrome

Helen Tager-Flusberg and Daniela Plesa Skwerer
Boston University School of Medicine, USA
htagerf@bu.edu

Williams syndrome (WS) is a rare genomic disorder that has captured the interest of psychologists because of the unusual behavioral pattern of social engagement, warmth and empathy that characterizes children and adults with this disorder. Paradoxically, however, people with WS have poor social outcomes. Our research focuses on the neurocognitive mechanisms that underlie this contradictory social profile. In this presentation we summarize our findings on impaired theory of mind and explicit measures of social perception in WS, which underlie the lack of social competence in this population. In contrast, our studies investigating implicit measures of social perception, and arousal reveal unique patterns of unusual attention to social stimuli and reduced social arousal that may explain the striking social behavior that is seen, especially in young children with WS. The significance of these findings for research on the biological bases of social cognition will be discussed.

Differentiating between developmental prosopagnosia and autism with measures of social cognition

Brad Duchaine, Heidi Murray, Martha Turner, Sarah White and Lucia Garrido
Insitute of Cognitive Neuroscience, University College London
b.duchaine@ucl.ac.uk

Developmental prosopagnosia (DP) is a condition characterized by high-level deficits with facial identity recognition due to developmental problems. However because autism also often involves high-level difficulties with facial identity, this definition of DP does not differentiate it from autism. To examine whether they are in fact separate conditions, we have assessed DPs with measures of social cognition. The results are also relevant to an etiological theory of autism that proposes that developmental deficits with face processing lead to social cognition deficits (Schultz, 2005). We assessed social cognition in detail in two male DPs with severe facial identity and facial expression deficits in their early 30s using the ADOS (Module 4), the Autism-Spectrum Quotient Questionnaire (ASQQ), the Animations task, and questions about their everyday social interactions. Both showed no signs of impaired social cognition on the measures of social cognition and both enjoy normal social lives. To assess whether their profiles were typical of DPs, ten DPs did the ASQQ and all except one performed normally. These results indicate that DP and autism are distinct developmental deficits and suggest that developmental face processing impairments do not invariably lead to deficits of social cognition.

Schultz, R.T. (2005). Developmental deficits in social perception in autism: The role of the amygdala and fusiform face area. International Journal of Developmental Neuroscience, 23, 125-141.

Longitudinal relations between cognitive and socio-communicative skills in autism

Liz Pellicano
University of Bristol and University of Western Australia
Liz.pellicano@bristol.ac.uk

Previous research has demonstrated that young children with autism display a particular cognitive profile: capabilities in piecemeal processing combined with difficulties in theory of mind and executive control. The aims of this longitudinal study were twofold: (1) to investigate how this specific cognitive profile manifests itself across time, and (2) to examine the early cognitive predictors of later behavioural functioning. Sixty-nine children (38 children with autism and 31 typically developing children) involved in an earlier study on cognitive skills in autism (Pellicano et al., 2006) were followed prospectively and reassessed 3 years later on visuospatial coherence tasks, simple and more advanced tests of false-belief understanding, and tests of executive function (specifically tapping planning ability and cognitive flexibility). Autistic children's cognitive skills improved over time for the majority of tasks; nevertheless, relative to typically developing children, these children with autism displayed a similar cognitive profile to the one shown 3 years earlier.

Furthermore, only early theory of mind ability was a significant predictor of children's current socio-communicative functioning or aspects of current symptomatology. The theoretical implications of these findings will be discussed.

Pellicano, E., Maybery, M., Durkin, K., & Maley, A. (2006). Multiple cognitive capabilities/deficits in children with an autism spectrum disorder: 'Weak' central coherence and its relationship to theory of mind and executive control. *Development and Psychopathology, 18,* 77-98.

Can executive failure explain the social impairments in autism?

Sarah White[1] and Elisabeth Hill[2*]
1. University College London
2. Goldsmiths, University of London
s.white@ucl.ac.uk

While both mentalising and executive impairments have been suggested as causal theories of autism, and both abilities appear to be related in autism, it is still unclear why they are related and how they relate to the social impairments seen in autism. 57 children with ASD were compared to 27 normally developing 7-12 year olds on a battery of tasks assessing intelligence, mentalising abilities and executive dysfunction. A subset of these children also took part in direct and indirect measures of their everyday behavioural symptoms. Group differences were found on all mentalising and some executive tasks; in total approximately half of the children with ASD showed severe impairment in mentalising and a third in executive function. Mentalising and executive function performance were highly associated within the control group; however, an additional surprising association between executive function and verbal ability was also present in the autism group. The behavioural data indicated associations only between mentalising and social skills. There was a tendency for children to display: mentalising and executive impairment, just mentalising impairment, or neither. One possibility is that this may indicate that executive failure is primary to mentalising difficulties. However, an alternative explanation could be that poor executive task performance might emerge from poor mentalising ability. Indeed, an analysis of the errors made in the executive tasks revealed an unusual pattern of idiosyncratic or egocentric performance and suggested that impaired performance on executive tasks may result from difficulties forming an implicit understanding of the experimenter's expectations for the task.

Do individual differences in 4-year-olds' social understanding and executive function matter for children's interactions with friends: The good, the bad and the socially busy

Claire Hughes and Rosie Ensor
Centre for Family Research, University of Cambridge
Ch288@ca,ac.uk

Research into the early origins of behavioural problems highlights both cognitive and family factors (e.g., harsh parenting, maternal education / depression), but little is known about their independence or interplay.

In this study, 120 children (from predominantly disadvantaged families) completed tests of 'theory of mind' (ToM), emotion understanding (EU), executive function (EF) and verbal ability (VA) at ages 2, 3 and 4-years. Individual differences in problem behaviours (PB), indexed by a multi-informant, multi-measure aggregate at each time-point, showed independent associations with age-2 ToM and VA (but not EU or EF). In addition, age-2 ToM attenuated effects of early harsh parenting on later PB. By age 4, EF and EU (but not ToM) showed specific associations with PB and mediated the relationship with low maternal education; age-4 EF also mediated the relationship with maternal depression. Video-footage of each child playing for 20-minutes with a best friend at age 4 was coded for aggressive, unfriendly and prosocial acts. Cluster analysis showed that some 'socially busy/quiet' children showed high/low levels of both antisocial and prosocial behaviours; while others could be characterized as 'aggressive-unfriendly' or prosocial. Supporting the external validity of the cluster solution, aggressive-unfriendly (but not socially busy) children showed high teacher PB ratings and poor EF performance.

End of symposium

One reason decision-making in pigeons? Discrimination with multiple valid cues

Stephen E. G. Lea, Catriona M. E. Ryan, Catherine Bryant, and Andy J. Wills
University of Exeter
s.e.g.lea@exeter.ac.uk

Pigeons were trained in a go-left-go-right conditional discrimination task between stimuli that consisted of four separate elements; all elements gave 100% reliable information. In "Prototype" training sessions, the entire stimulus was revealed at the beginning of each trial. Interspersed among these were "Reveal" training sessions in which, on each trial, stimuli were revealed one element at a time (in pseudorandom order). Left and right choice response key-zones were available throughout the trial, and, during Reveal sessions, no more elements were added to the stimulus once a peck had been made to either choice key-zone. During initial training, a fixed-interval schedule of reinforcement was in force on the correct choice key-zone, so earlier choice responses did not lead to more immediate reinforcement. Pecks on the incorrect choice key had no scheduled consequences. The pigeons discriminated the four dimensions to differing extents, and tended to make a choice response before all information was available. However they did not wait selectively until the information most useful to them was available. Modifications to the procedure, such as allowing early choice responses to lead to earlier reward if correct, did not change this result. Parallel experiments with adult humans will also be discussed.

Learning about cue structures in multiple-cue judgment: The effect of learning regime on acquired representations

Ben R. Newell[1] and Arndt Broder[2,3]
1. University of New South Wales
2. University of Bonn
3. Max Planck Institute for Research on Collective Goods, Bonn
ben.newell@unsw.edu.au

The majority of multiple-cue judgment experiments use clearly defined cues and criteria (e.g., predict the presence of a disease based on a symptom pattern). However, in natural environments we do not encode and store 'weights' of cues to predict criteria; rather we encounter episodes or exemplars consisting of multiple features which we store in memory. Only later, in response to the demands of a decision task do we come to interpret features as either a criterion or a cue. Two experiments examined how the way in which people learn about the cue structure of a probabilistic environment affected their acquired representation of the environment. Participants learned in one of three ways: cue-criterion (predict criterion from cues), cue-cue (predict cue values from other cues) and similarity (rate similarity of current instance to that seen on the previous trial). In both experiments cue-criterion and cue-cue learning resulted in greater predictive accuracy and greater insight into task structure than similarity learning. Analysis of judgment strategies revealed that the majority of participants relied on simple non-compensatory strategies regardless of learning condition. The implications for models of multiple-cue judgment are discussed.

Online detection of change in a time series

Matt Twyman, Nigel Harvey, and David Lagnado
University College London
m.twyman@ucl.ac.uk

Matyas & Greenwood (1990) showed that sequential dependence in a non-trended data series impairs detection of a change in its level. In noisy series, it may be harder to detect upward changes in upward trended series and downward changes in downward trended ones, because the salience of the change is reduced. An experiment investigated the effects of sequential dependence type, judgment frequency and trended data on ability to detect change in the level of a series. Participants were asked to examine twelve graphs, each representing water level over time, and to assess whether there had been a sudden and persistent change in the water level at that location. Sequential dependence type, trend type, and judgment rate all influenced participants' miss and false alarm rates. Sequential dependence influenced detection efficacy, but the pattern of effects of positive and negative dependence on response classification is more complicated than that described by Matyas & Greenwood (1990). Type of sequential dependence, data trends and judgment frequency are influences on the efficacy of change detection in time series.

Matyas, T.A., & Greenwood, K.M. (1990). Visual analysis of single-case time series: Effects of variability, serial dependence, and magnitude of intervention effects. Journal of Applied Behavior Analysis, 23, 341-351.

Explaining trend damping using context and memory

Stian Reimers and Nigel Harvey
University College London
s.reimers@ucl.ac.uk

Forecasting often involves estimating future outcomes using time series data. Participants' estimates exhibit trend damping: people underestimate future values of increasing trends, and overestimate future values of decreasing trends.

However, most experiments have been within-subjects, where participants make predictions for functions of differing gradients or accelerations. Thus, trend damping could be explained by participants adjusting towards a central tendency of the functions they have recently seen. We test this by manipulating the context between-subjects. In Experiment 1, we used positive power-law trends that varied in their acceleration (A1, smallest acceleration - A8, largest acceleration). In the Low condition, participants saw A1, A2, A3, A4, A6; in the High condition, participants saw A4, A5, A6, A7, A8. Although trend damping was found in both conditions, for A4 and A6 it was larger in the Low condition than in the High condition. Similar results were found using linear functions that varied in their gradient (Experiment 2). Finally, we demonstrate that in a 'context-free' one-shot experiment, participants still exhibit trend damping, suggesting it is not merely a context effect (Experiment 3). Results can be explained if participants adjust towards both a sample of recent trials, and an 'ecological' baseline function with shallow gradient.

Confidence and decision-type under matched stimulus conditions: Overconfidence in perceptual but not conceptual decisions

Sara Kvidera[1] and Wilma Koutstaal[1, 2]
1. University of Minnesota, USA
2. University of Reading, UK
kvid0007@umn.edu

Within the domain of metacognition, there is disagreement whether different processes underlie evaluations of confidence in perceptual versus conceptual decisions. The relationship between confidence and accuracy for perceptual and conceptual decisions was compared using newly created stimuli that could be used to elicit either decision type. Based on theories of Brunswikian and Thurstonian uncertainties, significant underconfidence for perceptual decisions and overconfidence for conceptual decisions were predicted. Three within-subjects experiments did not support this hypothesis. Participants showed significant overconfidence for perceptual decisions and no overconfidence for conceptual decisions. In addition, significant hard-easy effects were consistently found for both decision types. Incorporating our findings with past results reveals that both over- and under-confidence are attainable on perceptual tasks. This conclusion, in addition to the common presence of hard-easy effects and significant across-task correlations in over-/under-confidence, suggests that confidence judgments for the two decision types may depend on largely shared processes. Possible contributions to confidence and over-/under-confidence are explored, focusing on response time factors and participants' knowledge bases.

Biased samples not mode of presentation: Re-examining the apparent underweighting of rare events in experience-based choice

Tim Rakow[1], Kali Demes[1], and Ben Newell[2]
1. University of Essex
2. University of New South Wales, Australia
timrakow@essex.ac.uk

Recent data have challenged whether prospect theory can explain choices when risky decisions are based on experience of outcomes rather than descriptions of the payoffs, leading to calls for alternative theories for "decisions from experience". For instance, small probabilities are over-weighted for described choices, but underweighted in experience-based decisions. We re-examined this underweighting of rare events in risky choice when payoffs are learned by experience. 240 paid participants made choices for 12 pairs of simple gambles. In the objective description condition, probabilities and outcomes were specified. In the free sampling condition, participants observed repeated plays of each gamble before choosing. Participants in four yoked conditions received the same information as the free sampling participants - either described or experienced. Differences between objective description and free sampling were consistent with underweighting rare events in experience-based choice. However, consistent with a biased sampling account, patterns of choice in the yoked conditions barely differed from the free sampling condition: given identical information, presentation mode has no effect. Recency effects in choice only occurred when outcomes were actively sampled, and were unaffected by working memory capacity. The absence of recency for passive observation implies actor-observer differences in forming expectations or testing hypotheses.

How are lexical decisions to word targets influenced by unrelated masked primes?

Linda Bayliss[1], Colin J. Davis[1], Marc Brysbaert[1], Stephanie Luyten[2], and Kathleen Rastle[1]
1. Royal Holloway, University of London
2. University of Leuven, Belgium
Linda.Bayliss@rhul.ac.uk

This paper reports two lexical decision experiments that investigated whether masked priming effects for word targets varied for different types of unrelated primes. In Experiment 1, the primes were always unrelated to the target, and were either high frequency words, low frequency words, legal nonwords, or consonant strings. Results showed no differences across these prime conditions. The design of Experiment 2 was identical to Experiment 1, except that the low frequency word primes were replaced by identity primes, and consonant strings were replaced by false-font primes. Results showed a typically large identity priming effect, but once again failed to show any difference between unrelated prime conditions. These findings are problematic for models that assume homogeneous lateral inhibition, including the original interactive activation (IA) model and the dual-route cascaded model, but are in agreement with the modified IA model proposed by Davis and Lupker (2006) or the entry-opening model of Forster (1987).

Davis, C.J., & Lupker, S.J. (2006). Masked inhibitory priming in English: Evidence for lexical inhibition. Journal of Experimental Psychology: Human Perception and Performance, 32, 668-687.

Forster, K. I. (1987). Form-priming with masked primes: The best match hypothesis. In M. Coltheart (Ed.), Attention and performance XII (pp. 201-219). Hillsdale, N J: Edbaum.

Perception of genuine and posed smiles by individuals with autism

Zillah Boraston[1], Ben Corden[1], Lynden Miles[2], David Skuse[1], and Sarah-Jayne Blakemore[3]
1. Institute of Child Health, University College London
2. University of Canterbury, Christchurch, New Zealand
3. Institute of Cognitive Neuroscience, University College London
z.boraston@ich.ucl.ac.uk

Individuals with autism are impaired in the recognition of fear, which may be due to their reduced tendency to look at the eyes. Here we investigated another potential perceptual and social consequence of reduced eye fixation. The eye region of the face is critical for identifying genuine, or sincere, smiles. We therefore investigated this ability in adults with autism. We used eye-tracking to measure gaze behaviour to faces displaying posed and genuine smiles. Adults with autism were impaired on the posed/genuine smile task and looked at the eyes significantly less than did controls. Also, within the autism group, task performance correlated with social interaction ability. We conclude that reduced eye contact in autism leads to reduced ability to discriminate genuine from posed smiles with downstream effects on social interaction.

The effect of processing load on speech segmentation

Joanna Brooks[1], Sven Mattys[1], and Martin Cooke[2]
1. University of Bristol
2. University of Sheffield
Jo.Brooks@bristol.ac.uk

The present research examines the effects of processing load on speech segmentation. Although both lexical and sublexical cues have been shown to support segmentation, these cues have seldom been investigated under ecologically valid conditions. Therefore, the present study examined these cues within the broader context of attention. The test stimuli were two-word phrases with deliberate variation in acoustic realisation of word junctures, yielding a lexically acceptable rendition (e.g., "dull sport"), a lexically unacceptable rendition, which we called 'acoustic' (e.g., "dulls port"), and an ambiguous rendition (e.g., "dullsport"). In the main study, participants were asked to indicate on an 11-point scale whether phrases ended (or started) with one of two words, e.g., "port" vs. "sport". In the load conditions, a secondary task involving lexical-semantic vs. sublexical processing, was designed to burden listeners' attentional resources by forcing them to focus or divide their attention in multiple ways. The results demonstrated that, compared with a no-load condition, an attentional processing load increased listener's reliance on lexical information. The results show that speech-processing mechanisms are penetrable by attentional factors and that this effect is not domain-specific: Reliance on meaning is elevated whenever a processing load is encountered, regardless of the nature of the load.

The neural correlates of social emotion in adolescents and adults

Stephanie Burnett[1], Geoff Bird[1, 2], Sarah-Jayne Blakemore[1],
and Chris Frith[3]
1. Institute of Cognitive Neuroscience, University College London
2. Department of Psychology, University College London
3. Institute of Neurology, University College London
burstephanie@gmail.com

In this fMRI study, we investigated the development during adolescence of the neural network underlying the understanding of social emotions. Social emotions, such as guilt and embarrassment, are emotions that require a representation of others' mental states. In contrast basic emotions, such as disgust and fear, require only an instantaneous somatic state. 19 adolescents (aged 10 to 18 years) and 10 adults (aged 22 to 32 years) were scanned using fMRI. A factorial design was employed with between-subjects factor Group and within-subjects factor Emotion (social or basic). In both adults and adolescents, medial prefrontal cortex (MPFC) was activated when imagining situations in which a social emotion (guilt or embarrassment) would be felt vs. imagining situations in which a basic emotion (disgust or fear) would be felt. In addition, there was a significant interaction between group and task in MPFC: during social relative to basic emotion, adolescents activated part of the medial PFC more than did adults. In contrast, adults activated a region of the left temporal pole more than did adolescents. These results suggest that the neural strategy for social emotion processing changes between adolescence and adulthood. Activity moves from anterior (medial prefrontal) to more posterior (temporal) regions with age.

A case of developmental phonagnosia

Lucia Garrido[1], Frank Eisner[1], Carolyn McGettigan[1], Lauren Stewart[2], Disa Sauter[3], Rick Hanley[4], Stefan Schweinberger[5], and Bradley Duchaine[1]
1. Institute of Cognitive Neuroscience, University College London
2. Goldsmiths College, London
3. Birkbeck College, London
4. University of Essex
5. Friedrich-Schiller-University of Jena, Germany
m.garrido@ucl.ac.uk

The inability to recognize familiar voices is called phonagnosia. Since the term was first proposed by Van Lancker and Canter (1982), several studies have investigated cases of phonagnosia following brain damage, but cases due to developmental problems have not been reported. Here we will describe the case of KH, a 59 year-old active professional woman who reports that she has always experienced severe voice recognition difficulties. KH does not recognize even her closest relatives from their voices, such as when she answers the phone or hears them without seeing them. However, her hearing abilities are normal, and she does not report any brain damage. We tested KH on a number of behavioural tasks looking at voice recognition, recognition of vocal emotions, face recognition, speech perception and processing of other auditory stimuli such as environmental sounds and music. KH was impaired on tasks requiring the recognition of famous voices, and the learning and recognition of new voices. In contrast, she performed well on nearly all other tasks. This is, to our knowledge, the first report of a case of developmental phonagnosia, and its investigation provides a crucial means to test predictions from voice processing models.

Van Lancker, D. R., & Canter, G. J. (1982). Impairment of voice and face recognition in patients with hemispheric damage. Brain and Cognition, 1, 185-195.

The role of episodic memory and working memory in children with mathematical disorder

Flávia Heloísa Dos Santos[1], Paulo Adilson Silva[1], Bruna Paschoalini[1], Ana Luiza Dias[1], Michele Frigério[1], and Georges Dellatolas[2]
1. São Paulo State University, Brazil
2. Institut National de la Santé et de la Recherche Médicale, France
flaviahs@assis.unesp.br

Two studies investigated the association between measures of working memory, episodic memory and mathematical skills in children. In the first study, 164 Brazilian children aged from 5 to 12 years old, raised in different environments: rural (N=73) and urban (N=91), and Portuguese monolingual speakers were assessed in the tasks: Block Span, nonword repetition, semantic and phonological verbal fluency, visual recognition of abstract patterns (VRAP), free recall of words, copy and recall of complex figure and Zareki-R.

Group differences were not found, except for counting backward subtest. Age effect was observed in all memory tasks, which were positively correlated with mathematical skills (Zareki-R), but moderate correlations were found exclusively between Zareki-R and visual memory tasks. In the second study, children with learning disabilities (LD; N=11) aged 9 to 10 years were compared to children with arithmetical disabilities (AD; N=19) in the same instruments. The AD group performed Zareki-R two standard deviations below the LD group, which suggests the presence of Mathematical Disorder. The AD group was also impaired in VRAP and Block Span. In conclusion, the memory tasks used are age-related and culture-free. Visual episodic memory and visuospatial sketchpad are associated with mathematical skills and play a role in mathematical disorder.

Emotion words and Complement Set focusing in sentence production

Joanne Ingram and Linda M. Moxey
University of Glasgow
joanne@psy.gla.ac.uk

The Supposition-Denial Theory (Sanford et. al., 2007) proposes that negative natural language quantifiers (NLQs) create a shortfall between expectation and occurrence which leads the processor to provide a reason-why-not (RWN) and a compset continuation. For example in (1) the compset is those fans who did not go to the match. (1) Few of the fans went to the football match. They watched it in the pub instead. This experiment tests this proposal by substituting different polarity emotion words for NLQs. Participants provided a continuation beginning with They for a sentence such as (2): (2) The director was happy (angry) about the number of the actors who remembered their lines. 288 sentences were complied from 12 emotion words and 24 contexts. Each continuation was completed by a different participant and was then classified by 6 independent judges. Results showed that when the shortfall was increased by using a high desire context and a negative emotion word there was an increase in compset and RWN continuations. These results offer strong support for the supposition-denial theory, providing evidence that compset focusing and the tendency to provide RWNs are dependant on the shortfall rather than the NLQ.

Sanford, A. J., Dawydiak, E. J., & Moxey, L. M. (2007). A unified account of quantifier perspective effects in discourse. Discourse Processes. 44 (1), 1-32

Interval timing in the vibrotactile modality

Luke A. Jones, Ellen Poliakoff, and Jill Wells
University of Manchester
luke.jones@manchester.ac.uk

Three experiments investigated human timing in the vibrotactile modality. In Experiment 1, a stair-case threshold procedure revealed a difference threshold for vibrotactile stimuli which was significantly higher than that for auditory stimuli but not significantly lower than that obtained for visual stimuli. In Experiment 2, verbal estimation revealed a significant slope difference between vibrotactile timing and auditory, but not between vibrotactile and visual timing. That is, both vibrations and lights were judged as longer than sounds.

In Experiment 3, performance in temporal generalization showed scalar timing, with both mean accuracy and superimposition. The results were modelled using the modified Church and Gibbon model which was shown to give a good fit to the data, and the parameter values obtained are compared with those for visual and auditory temporal generalization. The pattern of results suggest that timing in the vibrotactile modality conforms to scalar timing theory (SET) and that the internal clock speed for vibrotactile stimuli is significantly slower than that for auditory stimuli, which is logically consistent with the significant differences in thresholds that were observed.

Judgments of cause and blame: The effects of intentionality and foreseeablity

David Lagnado, Shelley Channon, and Sian Fitzpatrick
University College London
d.lagnado@ucl.ac.uk

What are the factors that influence everyday attributions of cause and blame? This work focused on sequences of events that led to adverse outcomes, and examined people's cause and blame ratings for key events in these sequences. The intentional status and foreseeability of candidate causes were manipulated. Participants rated intentional actions as more causal and more blameworthy than unintentional actions or physical events. There was also a strong influence of foreseeability: actions with highly foreseeable outcomes were also rated as more causal and more blameworthy. These findings are interpreted within current theories of blame.

Neural responses to social attention

Laura Lee and Andy Young
University of York
lcl500@york.ac.uk

By perceiving another individual's focus of attention, one gains information about what is important to that individual in their surrounding environment. Such information is important to inferring the motivations and intentions of the observed individual. The present study used magnetoencephalography (MEG) to investigate neural responses elicited when participants viewed video clips in which actors made a head turn which simulated a shift in attention, as compared to viewing a static face that remained oriented away from the participant throughout stimulus presentation or a scrambled video that retained a sense of directional motion. Beamforming analyses of the MEG responses revealed sources of activation within medial and lateral prefrontal cortex and the temporal pole during the period in which participants viewed the head turn.

Effects of stress and working memory load in the Stroop task: Evidence for attentional control theory

Rob Massey-Booth, Dinkar Sharma, and Dirk P. Janssen
Centre for Cognitive Neuroscience, University of Kent
rwb3@kent.ac.uk

Eysenck, Derakshan, Santos and Calvo's (2007) Attentional Control Theory states that an individual under stress will suffer a working memory load. Since lower available working memory resources have been linked to increased distracter interference in the Stroop task (Kane & Engle, 2003; Long & Prat, 2002), it may be predicted that stressed individuals should show more Stroop interference than non-stressed individuals. Two experiments were carried out to test the effects of a loud noise stressor and working memory load on Stroop interference. As predicted by Attentional Control Theory, increased Stroop interference was found in the high stress condition and, crucially, an equivalent pattern of results was found in the high working memory load condition.

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. Emotion, 7(2), 336-353.

Kane, M. J., & Engle, R. W. (2003). Working-memory capacity and the control of attention: the contributions of goal neglect, response competition, and task set to Stroop interference. Journal of Experimental Psychology: General, 132(1), 47-70.

Long, D. L., & Prat, C. S. (2002). Working memory and Stroop interference: an individual differences investigation. Memory and Cognition, 30(2), 294-301.

Lexical and non-lexical influences on morphological combination: The case of the missing e

Samantha F. McCormick[1], Kathleen Rastle[1], and Matthew H. Davis[1,2]
1. Royal Holloway University of London
2. MRC Cognition and Brain Sciences Unit, Cambridge
samantha.mccormick@rhul.ac.uk

This poster reports four lexical decision experiments which investigated whether morphological masked priming effects using word primes (McCormick, Rastle & Davis, article in press) are also observed using similar morphologically-structured nonword primes. The effect of orthographic change to a target within a morphologically-structured nonword was examined. In Experiment 1, primes were morphologically-structured nonwords constructed with vowel suffixes. There were two conditions using these primes, one using target words which occur frequently with their partial orthography in real morphologically complex forms (e.g., argue) and a second using words which infrequently alter their orthography (e.g., olive). A third condition was used to examine the effects of orthographic overlap in the absence of morphological structure. Experiment 2 used nonvowel suffixes for the same targets. Experiment 3 compared priming effects for partial orthographic matches for all targets used. Experiment 4 used identity primes to explore the possibility of baseline differences between the targets. Results showed morpho-orthographic segmentation in early visual word recognition from nonword primes which cannot be solely attributed to similarities in orthographic form. This decompositional process does not depend on a full orthographic match to the target in the complex word and is insensitive to the lexicality of the prime.

McCormick, S.F., Rastle, K. and Davis, M.H. (2007) Is there a 'fete' in 'fetish'? Effects of orthographic opacity on morpho-orthographic segmentation in visual word recognition. Journal of Memory and Language. (article in press)

Is the Perruchet effect evidence for automatic associative learning in humans?

Chris Mitchell, Susan Wardle, and Peter Lovibond
University of New South Wales, Australia
chris.mitchell@unsw.edu.au

Associative learning is thought by many psychologists to be an automatic process. In fact, there is only limited evidence to support this view. Of the evidence that is available, the "Perruchet effect" is arguably the strongest. One version of the Perruchet effect uses a simple cued reaction time task. In this task, a tone cue is presented on every trial, and is followed by a white square target on a computer screen on 50% of those trials. Participants must press a button as quickly as possible when that white square is presented. Responses are fastest following a run of tone-square pairings. This suggests that a tone-square association has strengthened, allowing the tone to prime the square more effectively. However, participants' conscious expectancy of the outcome shows the opposite pattern. They appear to reason, following the gamblers fallacy, that if the tone was followed by the square on previous trials, it is less likely to be followed by the square on the subsequent trial. This dissociation between cued reaction time and conscious expectancy, it is argued, suggests that the reaction time is controlled by an automatic associative learning mechanism. We present two experiments that test alternative hypotheses.

Effects of phonological neighborhood density and biphone frequency on the immediate serial recall of words

Linda Mortensen and Randi C. Martin
Rice University, Texas, USA
l.mortensen@rice.edu

Immediate serial recall is more accurate for lists composed of non-words with many than with few phonological neighbors and for lists of non-words with high than with low biphone frequency (Thorn & Frankish, 2005). We investigated the independent effects of phonological neighborhood density (Experiments 1 and 2) and biphone frequency (Experiments 3 and 4) on immediate serial recall of high- and low-frequency words. When the lists were sampled from a closed set of words, neighborhood density had no effect. When the lists were from an open set, a facilitatory effect was observed for both high- and low-frequency words. High biphone frequency facilitated recall of both high- and low-frequency words in both closed and open sets. These results suggest that lexical and sub-lexical phonological knowledge have independent effects on short-term memory for words.The origin of these effects and the relation between short-term memory and language production are discussed.

Thorn, A. S. C., & Frankish, C. R. (2005). Long-term knowledge effects on serial recall of nonwords are not exclusively lexical. Journal of Experimental Psychology: Learning, Memory and Cognition, 31, 729-735.

Incidence of memory impairment after neonatal hypoxia-ischaemia: Congenital heart disease cohort

Monica Munoz, Martin Chadwick, Elisabeth Isaacs, Michelle De Haan, Torsten Baldeweg, Aparna Hoskote, Sachin Khambadkone, Mortimer Mishkin, and Faraneh Vargha-Khadem.
Institute of Child Health, University College London
monica.munoz@ich.ucl.ac.uk

Memory difficulties in childhood are often associated with episodes of systemic hypoxia-ischaemia (H/I). In some cases, these difficulties may take the form of developmental amnesia (DA), a syndrome characterised by severe loss of everyday memory and bilateral hippocampal volume reduction. However, the incidence of such memory problems is unknown. To begin examining its incidence, we screened 16 children (mean age 11.2, sd 1.8) with Transposition of the Great Arteries (TGA) and significant hypoxaemia at birth (mean minimum oxygen saturation 54%, sd 19), who underwent corrective surgery and compared them with 16 controls (mean age 11.8, sd 1.8) on standardised tests of memory, intelligence, academic achievements, and verbal fluency. Analysis showed that 3 out of the 16 patients (19%) had memory scores that were far below their general cognitive abilities and fell within the clinically impaired range on both memory tests (i.e. scores of 2 or more sd below the standard normal range). These preliminary results suggest that (i) there is a high incidence of clinically significant memory impairment in this congenital cardiac disorder; and (ii) the patients with this severe and selective memory loss are potential cases of DA, a possibility that calls for examination of the neuropathology by MRI. Funded by MRC.

Inside the Phonological and Semantic pathways: An fMRI study investigating stimulus and task repetition priming of spoken words

Beth Parkin[1], Jack Rogers[1], Ferath Kherif[2], Matthew Brett[1], and Matthew Davis[1]
1. MRC Cognition and Brain Sciences Unit, Cambridge
2. Centre for Neuroimaging, University College London
beth.parkin@mrc-cbu.cam.ac.uk

There is converging evidence that multiple fronto-temporal networks underlie phonological and semantic processing of spoken words. This study uses fMRI to assess the neural architecture for phonological and semantic processing and the influence of stimulus and task repetition on responses. Eighteen participants were scanned using a 3T Siemens scanner while making phonological (one,two syllables), semantic (living,non-living) or auditory (loud,quiet) decisions on spoken words. Test trials were presented in 24 second blocks alternating with a matched non-speech baseline task (amplitude-modulated buzz,noise discrimination). Activation in inferior frontal, anterior and posterior middle temporal and anterior fusiform regions was observed during semantic and phonological decision making. The auditory task also evoked frontal and temporal activity but to a lesser degree. In a second scanning phase, the same tasks were used with words presented previously and novel items. Response times showed significant priming of semantic judgements for words previously presented for a semantic or phonological decision, though not for previous auditory presentation. This behavioural pattern is reminiscent of neural activity in phase 1 which was more similar for semantic and phonological tasks. Univariate and multivariate analysis of fMRI data from this second phase will allow neural correlates of cross-task and same-task repetition priming to be assessed.

Categorical and non-categorical perception of speech: Behavioural and neural evidence

Jack C. Rogers, Matthew H. Davis
MRC Cognition and Brain Sciences Unit, Cambridge
jack.rogers@mrc-cbu.cam.ac.uk

We explore the effect of within and between category variations on the perception of speech using behavioural and neuroimaging methods. Using audio-morphing and the "Straight" channel vocoder (Kawahara, 2004), we produced 320 high-quality phonetic continua varying in place, manner and voicing including word-word (blade-glade), word-pseudo (blouse-glouse), pseudo-word (bown-gown) and pseudo-pseudo (blem-glem) pairs. A 2AFC task confirmed the category boundary shift for word-pseudo and pseudo-word pairs (Ganong, 1980), equivalent for onset (bench-gench) and offset (flad-flag) pairs. This suggests that lexical influences on categorical perception are not produced on-line but rather occur post-perceptually, consistent with top-down effects. Sensitivity to within- and between-category phonological variation was investigated using sparse fMRI in a paired auditory repetition priming paradigm. Minimal pairs (48 across the 4 stimulus groups) were presented to participants who listened in the context of a semantic monitoring task. Between-category pairs with a phonological change produced a greater neural response compared to within-category same pairs with the same magnitude of acoustic difference. This response to phonologically different pairs provides a neural correlate of categorical perception in left middle temporal, inferior frontal and pre-central regions. These responses in inferior frontal regions may contribute towards top-down influences on categorical perception of speech (cf Ganong Effect).

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Ganong, W.F. (1980). Phonetic categorization in auditory word perception. Journal of Experimental Psychology, 6, 110-125

Affect regulation after social exclusion is still developing during adolescence

Catherine Sebastian[1], Essi Viding[1], Kipling D. Williams[2], Tony Charman[1], and Sarah-Jayne Blakemore[1]
1. University College London
2. Purdue University, USA
c.sebastian@ucl.ac.uk

Adolescents are particularly susceptible to peer pressure, and sensitivity to social exclusion may be a contributory factor. This is a powerful social tool; with Williams et al. (2000) showing that sensitivity to social exclusion predicts later conformity levels. Regulation of the pain resulting from social exclusion depends on ventrolateral prefrontal regions (Eisenberger et al., 2003), which are still developing during adolescence (Gogtay et al., 2004). The current study looked at affective and cognitive reactions to an experimental social exclusion manipulation (Cyberball) in two groups of adolescent girls (aged 11-13 and 14-15) and adult women. Exclusion led all groups to feel that key psychological needs were threatened (belonging, control and meaningful existence), relative to baseline.

Despite need threat level being equivalent across groups, the affective consequences were stronger in the adolescents, with greater anxiety, lower self esteem and lower mood reported after exclusion than in adults. The findings suggest that the ability to regulate distress associated with social exclusion develops between adolescence and adulthood. This may depend on the maturation of the relevant neural structures.

Eisenberger NI, Lieberman MD, Williams KD. (2003)Does rejection hurt? An FMRI study of social exclusion. Science. 2003 Oct 10;302(5643):290-2.

Gogtay N, Giedd JN, Lusk L, Hayashi KM, Greenstein D et al. (2004) Dynamic mapping of human cortical development during childhood through early adulthood. Proc Natl Acad Sci USA, 101(21):8174-9

Williams KD, Cheung CK, Choi W. (2000) Cyberostracism: effects of being ignored over the Internet. J Pers Soc Psychol. 79(5):748-62.

Social Perception in children with diagnosis of High Functioning Autism and Asperger syndrome

Steven Stagg, Pam Heaton, and Karina Linnell
Goldsmiths College, University of London
s.stagg@gold.ac.uk

Purpose of the study: One of the major categories used to diagnose Autism is impairment in social functioning manifest in lack of eye-contact and diminished interaction with others. Recent eye-tracking studies have proved inconclusive in confirming this, showing both a preference for human figures over objects (van der Geest, Kemner, Camfferman, Verbaten, & van Engeland, 2002) and abnormal attention to social stimuli (Klin, Jones, Schultz, Volkmar, & Cohen, 2002). The aim of this study was to see if children with ASD, show normal patterns of eye-movement when faced with a complex choice of social stimuli and whether children diagnosed with High Functioning Autism and Asperger Syndrome would show equivalent performance. Participants: 13 children with HFA, 12 children with AS, and 12 neurotypical children. Method: Children were presented with two sets of figures displayed on a monitor for 10 seconds whilst eye-movements were recorded; the figures depicted people in interaction and people standing back to back. Key findings: The AS group displayed similar looking patterns and dwell times as the control group whereas the HFA group showed qualitative rather than quantitative difference to the AS group and both a qualitative and quantitative difference when compared to the control group. These results suggest a difference in AS and HFA in relation the processing of scenes of social interaction.

Klin, A., Jones, W., Schultz, R., Volkmar, F., & Cohen, D. (2002). Visual fixation patterns during viewing of naturalistic social situations as predictors of social competence in individuals with autism. Archives of General Psychiatry, 59(9), 809-816.

van der Geest, J. N., Kemner, C., Camfferman, G., Verbaten, M. N., & van Engeland, H. (2002). Looking at images with human figures: Comparison between autistic and normal children. Journal of Autism & Developmental Disorders, 32(2), 69-75.

An intermodal representation of race and language in six-month-old infants

Lesley Uttley[1], Paul C. Quinn[2], Kang Lee[3], Alan M. Slater[4], and Olivier Pascalis[1]
1. University of Sheffield
2. University of Delaware, USA
3. University of Toronto, Canada
4. University of Exeter
l.uttley@sheffield.ac.uk

Infants are sensitive to events that are bimodally specified. Young infants are able to correctly match sound and vision to identify gender, (Lewkowicz, 1996) age, (Bahrick et al, 1998) and also emotion (Walker-Andrews et al., 1991). Ethnicity and language are examples of naturally occurring categories that differ both in face morphology and speech. Will infants expect an own- race face to speak their native language and an other-race face to speak a non-native language? Six-month-old infants from monolingual, English-speaking, Caucasian families were presented with photographs of Caucasian faces or Chinese faces paired with an English-speaking soundtrack or a Chinese-speaking soundtrack. One group of 18 infants was presented with Caucasian faces and English language and Chinese faces and Chinese language (congruent condition). Another group of 18 infants was presented with Caucasian faces and Chinese language and, Chinese faces with English language (incongruent condition). Infants correctly matched face and voice to race. Infants in the congruent condition looked significantly longer than infants in the incongruent condition for both Caucasian and Chinese faces. These results indicate that 6-month-old infants have a cross-modal representation of their own race and language. Controls are currently being conducted as well studies with younger age groups.

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Bahrick, L. E., Netto, D. & Hernandez-Reif, M. (1998) Intermodal perception of adult and child faces and voices by infants, Child Development, 69 (5), 1263-1275

Walker-Andrews, A. S. & Lennon, E. (1991) Infants' discrimination of vocal expressions: contributions of auditory and visual information, Infant Behavior and Development, 14, 131-142

The influence of sentential context on the processing of interlingual homographs

Lise Van der Haegen and Eva Van Assche
Ghent University, Belgium
Lise.VanderHaegen@UGent.be

In this study on bilingual visual word recognition we investigated the processing of interlingual homographs (words with the same orthographic form but different meanings across languages, e.g. ‘room' is an English-Dutch homograph, meaning ‘cream' in Dutch) in sentence contexts.

This provides us with a test of the language-nonselective activation hypothesis which states that words from both languages become activated when reading in one language. Dutch-English bilinguals were presented English sentences ending in a homograph (e.g. My mother is making soup with ROOM) or an English control word (e.g. My mother is making soup with HOME). The L1 meaning of the homograph fits the meaning of the sentence, while the L2 meaning does not. Subjects performed a semantic decision task in which they decided whether the sentences were meaningful. Filler sentences were added to prevent participants from discovering the goal of the experiment. The results showed that sentences ending in a homograph were rejected significantly more slowly than control sentences. In addition, more errors were made in the homograph condition. These results show an influence of the first language when reading words in the second language and provide support for language-nonselective activation to the bilingual lexicon.

To feel like stopping and yet still go; an analysis of inhibitory motor control in the stop-signal paradigm using a sensory detection task

Eamonn Walsh and Patrick Haggard
Institute of Cognitive Neuroscience, University College London
eamonn.walsh@ucl.ac.uk

An important aspect of everyday behaviour is the ability to stop an ongoing action. Here, we combined a sensory suppression paradigm with the classic "stop-signal" paradigm. Participants moved their right index finger in response to a visual Go signal, or cancelled the movement if a Stop signal occurred. The timing of the Stop signal was adjusted so that subjects were able to successfully inhibit responses on approximately 50% of trials in accordance with the "horse-race" model of action control. Participants had to detect weak shocks which were delivered after the signals on some trials. We found that shock detection on move trials was lower than on non-move trials confirming previous reports of sensory suppression of movement (Williams, Shenasa & Chapman, 1998). Furthermore, we found evidence that the setting of the balance between excitatory and inhibitory processes in the motor system that determines whether an action will be executed or withheld, can differ from the sensory system setting. In particular, shock detection rates just after a Stop signal can show a transient improvement consistent with a release from sensory suppression, even when the stop signal arrives too late for actual movement to be withheld.

Williams, S.R., Shenasa, J. and Chapman, C.E., Time course and magnitude of movement-related gating of tactile detection in Humans. I. Importance of stimulus location. Journal of Neurophysiology 79: 947-963, 1998.

Can auditory distractors disrupt speech execution?

Ivan Yuen, Kathy Rastle, and Marc Brysbaert
Royal Holloway, University of London
ivan.yuen@rhul.ac.uk

Two tempo-naming experiments were conducted in the current study to test whether incongruent auditory distractors would affect or disrupt the execution of planned speech. In both experiments, subjects heard a sequence of five 50ms beeps at regular intervals of 500ms. Participants were presented with a visual target on the fourth beep and were instructed to produce it on the fifth beep. Congruent or incongruent auditory distractors were presented immediately before (Experiment 1) or after (Experiment 2) the target. Several acoustic phonetic dimensions of target production were examined in order to test for an effect of the auditory distractors. Results from both experiments showed no significant differences in these phonetic dimensions between congruent target-distractor pairs and incongruent target-distractor pairs. These data challenge notions of 'cascaded articulation' and are inconsistent with results from similar manipulations in the reaching and grasping literature.

Sources of individual differences in face perception

Olga Zubko, David T. Wilkinson, and Robert A. Johnston
University of Kent
oz5@kent.ac.uk

The ability to process faces is extremely variable among individuals. Some people claim to never forget a face while others consider themselves "terrible" at recognizing even recent acquaintances. The aim of this experiment was to understand the source of this variability. Effects of encoding-strategy (featural vs. configural), memory duration and attentional control were examined in relation to efficiency of face processing. Employing Posner et al.'s (1978) spatial-cuing paradigm a delayed-match-to-sample task was used. Participants saw a sample face, followed by a distracter-mask, after which two target faces appeared. Participants decided which of the two faces was most like the original stimulus. Good and poor performers could not be distinguished on the basis of their coding strategy or STM capacity. However, attention-switching ability accounted for some variability within face processing. Good performers were equally accurate during all 3 cue types (valid, neutral and invalid) suggesting an increased ability to disengage and shift attention around the face. In contrast, poor performers were significantly less accurate during invalid trials suggesting difficulty with the disengagement of previously cued targets. Furthermore, face perception abilities were strongly associated with participants' performance on a face recognition task: good perceivers were also good recognisers.

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