

YORK MEETING 1998

A scientific meeting will be held at The Department of Psychology, University of York on 2/3/4 July, 1998. The Local Secretary is Dr. Simon Killcross. Accommodation will be in James College.

PROGRAMME

Wednesday 1 July, 1998

8.00 p.m. Welcome Reception in The Venables Room, Department of Psychology

Thursday 2 July, 1998

Psychology Lecture Theatre

9.00 Jules Davidoff and Elizabeth K. Warrington (Goldsmiths College, University of London and National Hospital, London)
The bare bones of object recognition: Implications from a case of apperceptive visual agnosia.

9.30 J. R. Hanley, A. D. M. Davies*, A. R. Mayes and J. J. Downes (University of Liverpool and University of Sheffield)
Remembering and knowing in a patient with preserved recognition and impaired recall.

10.00 M. A. Lambon Ralph, K. Patterson, J. L. McClelland* and J. R. Hodges (MRC Cognition and Brain Sciences Unit, Cambridge, Carnegie Mellon University and University of Cambridge)
The relationship between anomia and comprehension impairment: Neuropsychological evidence and a computational model.

10.30 Coffee

11.00 EPS Undergraduate project prize lecture.
Peggy Postma* (City University, London)
Developmental prosopagnosia: should it be taken at face value?

11.30 Elaine Funnell (Royal Holloway, University of London)
Recognising visual objects and actions: A case study of a child with visual agnosia.

12.00 Catherine Hodgson* and Andrew W. Ellis (University of York)
Object naming in the elderly: some experiments and a model.

12.30 Jeremy Tree* (University of Wales, Cardiff. Introduced by Dr. Kathi Hirsh)

Inhibition or facilitation: The effect of prime type on picture naming.

1.00 Lunch

START OF PARALLEL SESSION

Parallel Session A:

Psychology Lecture Theatre

Symposium: Inhibition and developmental disorders
(Organised by Dr. Dorothy Bishop)

2.00 George Houghton* (University College London. Introduced by Dr. Dorothy Bishop)

Mechanistic conceptions of inhibition and its role in cognitive control.

2.20 Claire Hughes* (Institute of Psychiatry, London. Introduced by Dr. Dorothy Bishop)

Inhibitory processing in 'hard to manage' pre-schoolers at risk from ADHD and conduct disorders: Links between cognition and behaviour.

2.40 Hilary Green* (MRC Cognition and Brain Sciences Unit, Cambridge. Introduced by Dr. Dorothy Bishop)

Developmental aspects of negative priming.

3.00 James Russell (University of Cambridge)

Autism: Inhibition problems in relation to a rule.

3.20 Tea

4.00 Tom Manly*, Ian Robertson and Vicki Anderson* (MRC Cognition and Brain Sciences Unit, Cambridge and University of Melbourne)

Inhibition and development of attentional processes in children.

4.20 David H. Skuse* and Nisha Karia* (Institute of Child Health, London. Introduced by Dr. Dorothy Bishop)

Inhibition in Attention Deficit Hyperactivity Disorder: Cognitive subtypes and response to stimulants.

4.40 Michelle Turner* (University of Durham. Introduced by Dr. Dorothy Bishop)

Inhibition in autism: The effects of level of behavioural control and ability.

5.00 General Discussion.

6.15 Business Meeting (Members only).

Test Library, Room PS/A106, First Floor, Psychology Building.

Parallel Session B:

Seminar Room PS/B002

2.00 Geoffrey Underwood and Peter Chapman* (University of Nottingham)

Eye fixation patterns while watching dynamic real-world scenes.

2.30 Peter Chapman* and Geoffrey Underwood (University of Nottingham)

Visual search in hazardous situations: Influences of experience and training.

3.00 David Crundall*, Peter Chapman* and Geoffrey Underwood (University of Nottingham)

Perceptual narrowing while watching dynamic scenes.

3.30 Tea

4.00 Dietmar Heinke* and Glyn W. Humphreys (University of Birmingham)

Modelling emergent attentional processes.

4.30 Chris Olivers*, Derrick Watson* and Glyn Humphreys (University of Birmingham)

Mechanisms of visual marking for static and moving items.

5.00 Elinor McKone*, Paolo Martini* and Ken Nakayama* (Harvard University. Introduced by Professor Mike Burton)

Inversion effects on categorical perception of face identity.

5.30 Charles Spence*, Francesco Pavani* and Jon Driver (University of Oxford and Institute of Cognitive Neuroscience, University College London)

What crossing the hands can reveal about visuotactile links in spatial attention.

6.15 Business Meeting (Members only)

Test Library, Room PS/A106, First Floor, Psychology Building.

Friday 3 July, 1998

Psychology Lecture Theatre

9.00 Jane Oakhill*, Kate Cain* and Peter Bryant* (University of Sussex and University of Oxford)

Factors that contribute to individual differences in children's comprehension skill.

9.30 Kirsten Windfuhr* and Maggie Snowling (University of York)

Paired associate learning, phonological skills and learning to read.

10.00 Graham J. Hitch, John Towse, and Una Hutton* (University of Lancaster and Royal Holloway, London)

Time for a re-think: Explanations for children's working memory span and its relationship to reading and arithmetic skills.

10.30 Coffee

11.00 Patrick Rabbitt, Paul Osman* and Brian Stollery* (University of Manchester Age and Cognitive Performance Research Centre and University of Bristol)

Variety is charming.

11.30 Stephen E. G. Lea, Winand H. Dittrich, Martina Siemann* and Catriona M. E. Ryan* (University of Exeter, Imperial College London, Universitat Konstanz and University of Exeter)

Pigeons and the Michotte launch event: Discrimination but not of causality.

12.00 EPS Prize Lecture

Koen Lamberts (University of Birmingham)

The time course of perceptual categorization.

1.00 Lunch

START OF PARALLEL SESSION

Parallel Session A:

Psychology Lecture Theatre

2.00 Gareth Gaskell and William Marslen-Wilson (MRC Cognition and Brain Sciences Unit, Cambridge)

Sentential and lexical effects on the perception of phonological ambiguity.

2.30 Tom Loucas* and William Marslen-Wilson (Centre for Speech and Language, Birkbeck College and MRC Cognition and Brain Sciences Unit, Cambridge)

Developmental patterns in lexical access and representation.

3.00 Martin J. Pickering and Matthew J. Traxler* (University of Glasgow and Florida State University)

The role of lexical information in syntactic ambiguity resolution.

3.30 Tea

4.00 Billi Randall* and William Marslen-Wilson (Centre for Speech and Language, Birkbeck College, London and MRC Cognition and Brain Sciences Unit, Cambridge)

Morphological structure in sentence processing.

4.30 Judith-Ann Henstra* and Alan Garnham (University of Teesside and University of Sussex)

Length effects in the parsing of coordinate phrases.

5.00 W. J. Fear* and C. Barry* (University of Wales, Cardiff. Introduced by Dr. K. W. Hirsh)

Baselines, blocking and masking: The effect of translation priming in a word naming paradigm.

5.30 J. J. Downes, R. Bowden* and E. J. Davis* (University of Liverpool)
Implicit memory for nonwords - effects of linguistic structure and articulation.

7.30 Dinner at The King's Manor, York.

Parallel Session B:

Seminar Room PS/B002

Symposium: Instrumental learning and contingency judgement.
(Organised by Dr. S. Killcross)

2.00 Bernard W. Balleine (University of California, Los Angeles)

The relationship of associative and incentive learning processes in instrumental outcome-devaluation effects.

2.30 Anthony Dickinson and Bernard W. Balleine (University of Cambridge and University of California, Los Angeles)

Psychological and cortical processes of instrumental action.

3.00 Simon Killcross* (University of York)

The role of the prefrontal cortex, amygdala and nucleus accumbens in instrumental action.

3.30 Tea

4.00 Frédéric Vallée-Tourangeau, Robin A. Murphy* and Susan Drew* (University of Hertfordshire)

The influence of the effect base rate on judgements of causality.

4.30 Robin A. Murphy* (University of Hertfordshire)

Relative contingency learning and Pavlovian conditioning.

5.00 Rick Mehta* and Andy G. Baker* (McGill University. Introduced by Professor G. Hall)

Mental models of cause or associative mechanisms in predictive and diagnostic reasoning?

Saturday 4 July, 1998

Psychology Lecture Theatre

9.00 Emma Laing* and Charles Hulme (University of York)

The role of phonetic and semantic factors in early sight word learning.

9.30 Debi Roberson*, Jules Davidoff and Ian Davies (Goldsmiths College, University of London and University of Surrey)

Rosch Revisited: A preliminary report on the replication of the classic cross-cultural investigation of colour universals.

10.00 C. Philip Beaman* (MRC Cognitive Development Unit. Introduced by Professor J. Morton)

The effects of rhyme on auditory recency and the suffix effect.

10.30 Coffee

11.00 Takatsune Kumada* (University of Birmingham. Introduced by Professor Glyn Humphreys)

Feature-based control of attention: Examination of the within-dimension advantage effect, using a compound search task.

11.30 Elizabeth J. Milwain* and Susan D. Iversen (University of Oxford)

Towards a purer measure of episodic memory.

12.00 Bodo Maass*, Peter McLeod and Kim Plunkett* (University of Oxford)

Learning how to catch a ball without being taught.

12.30 Richard Ralley* and Winand Dittrich (University of Hertfordshire and Imperial College School of Medicine)

Role of structure in the perception of roll.

1.00 Meeting ends

ABSTRACTS

The bare bones of object recognition: Implications from a case of apperceptive visual agnosia.

Jules Davidoff¹ and Elizabeth K. Warrington²

1. Goldsmiths College, University of London

2. National Hospital, London

Three experiments were designed to investigate the performance of a patient (RK) who could name objects when presented in conventional views but showed catastrophic failures in identification from unconventional views; a defining feature of apperceptive visual agnosia. The aim of all three experiments was to assess the properties of the central representations that allow recognition of objects presented in conventional but not unconventional views. All three experiments showed that RK had problems in object identification not apparent from his naming performance. In the first experiment, alterations in colour, shape and parts of objects were undetected in stimuli that he could name. In the second experiment, he was found to be extremely impaired at recognising the parts of objects even though he could name the whole object. In the third experiment, RK showed considerable difficulty with mirror-images and inversion tasks. The explanation for RK's impaired object

recognition could not be attributed to defects to his early visual processing. We argue that RK's recognition is achieved through abstract (object-centred) representations that are global rather than local, and quite independent of their spatial framework. These abstract representations we take to be the essential bare bones for object recognition.

Remembering and knowing in a patient with preserved recognition and impaired recall.

J. R. Hanley¹, A. D. M. Davies¹, A. R. Mayes² and J. J. Downes¹

1. University of Liverpool

2. University of Sheffield

ROB is a patient who has a severe deficit in recalling recently presented verbal material following rupture and repair of an anterior communicating artery aneurysm (Hanley, Davies, Downes & Mayes, 1994, Hanley & Davies, 1997). Despite this, her performance on tests of recognition memory is comfortably within the normal range. In the present series of experiments, we investigated whether or not ROB's performance on tests of recognition memory might be associated with a disproportionately large number of correct decisions made on the basis of familiarity decisions rather than contextual retrieval (eg. Mandler, 1980). Contrary to this hypothesis, the results showed that ROB made a high proportion of remember decisions relative to know decisions (cf Gardiner, 1988) in recognition, and produced a high recollection score when conscious recollection and familiarity were placed in opposition to one another (cf. Jacoby, Woloshyn & Kelley, 1989). Like control subjects, she also performed better in recognition when there was a strong associative link from a target item to the verbal cue that had accompanied it at encoding. ROB's recognition memory performance therefore appears to be qualitatively as well as quantitatively similar to that found in the normal population.

Gardiner, J. M. (1988). Functional aspects of recollective experience. *Memory & Cognition*, 16, 309-313.

Hanley, J. R., Davies, A. D. M, Downes, J. & Mayes, A. (1994). Impaired recall of verbal material following an anterior communicating arteryaneurysm. *Cognitive Neuropsychology*, 11, 543-578.

Hanley, J. R. & Davies, A. D M. (1997). Impaired recall and preserved recognition. In A. Parkin (Ed.) *Case studies in the neuropsychology of memory*. Lawrence Erlbaum (pp 111-126).

Jacoby, L. L., Woloshyn, V. & Kelley, C. (1989). Becoming famous without being recognized. *Journal of Experimental Psychology: General*, 118, 115-125.

Mandler, G. (1980). Recognising: The judgement of previous occurrence. *Psychological Review*, 87, 252-271.

The relationship between anomia and comprehension impairment: Neuropsychological evidence and a computational model.

M. A. Lambon Ralph¹, K. Patterson¹, J. L. McClelland² and J. R. Hodges^{1,3}

1. MRC Cognition and Brain Sciences Unit, Cambridge

2. Carnegie Mellon University, Pittsburgh

3. University of Cambridge

Patients with progressive fluent aphasia typically present with a combination of anomia and poor comprehension as a consequence of circumscribed temporal lobe atrophy (Hodges, Patterson, Oxbury, & Funnell, 1992; Snowden, Goulding, & Neary, 1989). It has been assumed that their anomia is a direct consequence of impairment to the underlying conceptual representations (Hodges, N.Graham, & Patterson, 1995). In one case, however, a severe and worsening anomia over several years was accompanied by only a mild and apparently stable comprehension deficit (K.Graham, Patterson, & Hodges, 1995). At face value, this pattern suggests that an additional post- semantic deficit may be an important feature of anomia in progressive fluent aphasia. Our analyses of 14 patients yield some cases with each of these two patterns of decline: "semantic anomia", with a high correspondence between comprehension and naming, and "progressive anomia", where the naming impairment is disproportionate to the semantic disorder. The laterality of temporal lobe atrophy seems to divide the cases into these two groups: "progressive anomia" is characteristic of patients with more left than right atrophy, while "semantic anomia" occurs where damage is greatest on the right. We describe a connectionist model that is able to account for these two patterns, making a simple assumption of asymmetrical connections between bilateral semantic representations and unilateral left phonological representations for speech output.

Graham, K.S., Patterson, K., & Hodges, J. R. (1995). Progressive pure anomia: Insufficient activation of phonology by meaning. *Neurocase*, 1, 25-38.

Hodges, J. R., Graham, N., & Patterson, K. (1995). Charting the progression of semantic dementia: Implications for the organisation of semantic memory. *Memory*, 3, 463-395.

Hodges, J. R., Patterson, K., Oxbury, S., & Funnell, E. (1992). Semantic dementia: Progressive fluent aphasia with temporal lobe atrophy. *Brain*, 115, 1783- 1806.

Snowden, J. S., Goulding, P. J., & Neary, D. (1989). Semantic dementia: A form of circumscribed cerebral atrophy. *Behavioural Neurology*, 2, 167-182.

Developmental prosopagnosia: should it be taken at face value?

Peggy Postma

City University, London

This study presents the third ever reported case of developmental prosopagnosia. This syndrome is defined as the inability to recognise familiar faces present from birth, which unlike its better known acquired equivalent occurs in the absence of an established neurological disease. By employing Magnetic Resonance Imaging to rule out overt brain damage, this study supplies the strongest evidence so far for a developmental

form of this disorder. The subject was tested on basic visual perception, face perception and face recognition. Neuropsychological investigations indicated that this case presents with a 'pure' (i.e. specific to faces) manifestation of this syndrome. By designing novel tests of face recognition and memory for unfamiliar faces, coping mechanisms employed by prosopagnosics, such as the often reported reliance on external facial features, have been empirically demonstrated for the first time. Furthermore, an excessive reliance on feature-based (presumably left hemispheric) face processing strategies is revealed, which, following from the widely held tenet that face recognition is most effectively achieved by right hemispheric configural processing, is considered to contribute to the face recognition problems in some, and indeed this case, of prosopagnosia.

Recognising visual objects and actions: A case study of a child with visual agnosia.

Elaine Funnell

Royal Holloway University of London

This paper will report the case of a child of 7 years, who suffered an episode of viral encephalitis at the age of 9 weeks. She has a visual agnosia for objects, prosopagnosia, problems with recognising facial expressions, and her naming is delayed. Surprisingly, her ability to name actions in pictures is greatly superior to her ability to name pictures of objects matched for difficulty. Moreover, she does not show the normal advantage for naming transitive verbs (which take objects) that has been observed in young children (Davidoff and Masterson, 1995/6). The results suggest that different systems appear to be involved in processing the wholistic shapes of visual objects and visual configurations that denote actions.

Davidoff, J. and Masterson, J. (1995/6). The developments of picture naming: Differences between verbs and nouns. *Journal of Neurolinguistics*, 9, 69-83.

Object naming in the elderly: some experiments and a model.

Catherine Hodgson and Andrew W. Ellis

University of York

It has been known for some time that older people experience difficulties recalling the names of objects. Experiment 1 confirms this in a comparison of the naming of 230 object drawings in young (22-33 yrs) and older (71-86 yrs) adults. A regression analysis of the accuracy scores of the older group showed that naming success or failure was predicted by the age of acquisition and name agreement of the pictures and names.

A small-scale connectionist model of naming was developed based on Levelt's (1989) theory of speech production. The model uses an Interactive Activation with Competition (IAC) architecture and has 4 layers of units representing semantic features, lemmas, lexemes and

phonemes. An intact ("Young") version of the model was modified by changing parameters affecting activation flow, inhibition and noise to create an "Old" version which provided a good fit to the naming data of the elderly group.

A comparison of the behaviours of the Young and Old models was then used to predict the effects of phonemic cueing on object naming in young and older humans. Experiment 2 reports the effects of advance correct and incorrect phonemic cues on picture naming latency and accuracy in groups of young and older adults. The results are compared with the predictions of the model.

Levelt, W. J. M. (1989). *Speaking: from intention to articulation*. Cambridge, Mass.: MIT Press.

Inhibition or facilitation: The effect of prime type on picture naming.

Jeremy Tree (Introduced by Dr. Kathi Hirsh)

University of Wales, Cardiff

Previous picture naming studies have reported a variety of priming effects, in particular a facilitative effect is typically reported during the naming of a target following an associated prime (e.g. read "Sly" then name FOX). However, this does not appear to be the case for co-ordinate primes where there is a greater degree of semantic overlap between the prime and target (e.g. read "Dog" then name FOX). In this case the prime acts as a competitor to the target item and inhibits the speed with which the target is named (Wheeldon & Monsell, 1994). The work reported here attempts to explore these differing effects by manipulating the degree of association or semantic relatedness between prime and target (e.g. Daisy/Chain. vs Rope/Chain). The lag (or number of intervening items) between prime and target was also manipulated. The facilitative effect was exclusive to associate primes and was limited only to immediate exposure of the target (i.e. no intervening items). The inhibitory competitor effect was limited to related primes and this effect persisted even when two and four intervening items were introduced between prime and target. It is proposed that the differing nature of the semantic association between prime and target may underpin the variety of priming effects reported in the literature.

Mechanistic conceptions of inhibition and its role in cognitive control.

George Houghton (Introduced by Dr. Dorothy Bishop)

University College London.

Formal models of inhibitory processes are reviewed, in particular lateral inhibition and feedback (or self-)inhibition. The contributions of both forms of inhibition to the control of activation in parallel, spreading activation (neural network) models is discussed and contrasted, with the emphasis on the selection and sequencing of task relevant actions and perceptions. The issue of strategic control of inhibitory processes is discussed and "central" and "distributed" inhibitory models contrasted. Some possible consequences of impairment to inhibitory mechanisms

are explored.

Inhibitory processing in 'hard to manage' pre-schoolers at risk from ADHD and conduct disorders: Links between cognition and behaviour.

Claire Hughes (Introduced by Dr. Dorothy Bishop)

Institute of Psychiatry, London.

Although problems of executive function and peer relationships have been well documented in school-aged children with behavioural disturbance, little is known about the early antecedents of these difficulties. The primary aim of the present study was to apply findings from normal developmental psychology concerning young children's early developments in executive control to investigate the processes underlying early behavioural disturbance. Forty preschoolers, rated by parents above the 90th percentile for hyperactivity conduct disorder on the Strength & Difficulties Questionnaire (Goodman, 1994) were compared with 40 controls matched for age, sex, race and social background on a set of executive function tasks adapted for preschoolers. In addition, children were filmed playing with a friend in a room equipped with dressing-up materials and toys. The videos were then transcribed and coded for six categories of anti-social behaviour: not sharing; bullying; violence; rule-breaking; sexual play; swearing. Compared with controls, the 'hard-to-manage' group was significantly impaired in their executive function performance. Antisocial-behaviour within the hard-to-manage group was common, and significantly associated with executive dysfunction. The results of the study suggest a continuity between behavioural disturbance in early and middle childhood, this is currently being examined in a longitudinal follow-up. The findings also emphasise poor peer relations as a central problem for hyperactive / conduct-disordered children, and suggest both delay and deviance in the developmental profiles of this group.

Developmental aspects of negative priming.

Hilary Green (Introduced by Dr. Dorothy Bishop)

MRC Cognition and Brain Sciences Unit, Cambridge.

Negative Priming (NP) - the delay observed in reacting to a previously ignored item - is thought by many to be due to inhibitory action on items in selective attention that are to be ignored. Lower levels of NP have been found in people who suffer from schizophrenia and Alzheimer's disease and healthy adults who show higher scores on Cognitive Failures Tests and Schizotypy Questionnaires. This suggests that inefficient inhibitory mechanisms in selective attention may be a common factor to these groups. The developmental aspects of NP have not yet been charted. In this study, based on Tipper (1989), children between 7 and 10 showed no significant NP, however 75% of nine to ten year olds show some evidence of NP compared to only 50% of the seven to eight year olds. In this sample, the older children showed correlations of NP across

tasks but only the girls showed an increase in the amount of NP with age.

Tipper, S. P., Bourque, T. A., Anderson, S. H., & Brehaut, J. C. (1989). Mechanisms of attention: A developmental study. *Journal of Experimental Child Psychology*, 48, 353-378.

Autism: Inhibition problems in relation to a rule.

James Russell

University of Cambridge

I distinguish between the following three: (1) having inhibition problems across the board (aka: impulsiveness), (2) having inhibition problems when any kind of action- relevant information has to be held in working memory, (3) having inhibition problems when an arbitrary rule has to be held in working memory. Broadly speaking (see papers by Pennington, by Ozonoff, by Russell in Russell, 1997) (1) seems to characterise ADHD children, (2) children with early-treated PKU, and (3) characterises children with autism. I report studies - some of them preliminary - in support of this conclusion. I end with some speculations about the symbolic nature of the processes that support holding rules in mind in the context of prepotency, and discuss its bearing on mentalising problems in autism.

Russell, J. (1997) *Autism as an executive disorder*. Oxford: Oxford University Press.

Inhibition and development of attentional processes in children.

Tom Manly¹, Ian Robertson¹ and Vicki Anderson² (Introduced by Dr. Dorothy Bishop)

1. MRC Cognition and Brain Sciences Unit, Cambridge

2. University of Melbourne

Recent developments in adult experimental, lesion and imaging studies support a view of anatomically and functionally separable attention systems. Such an approach has proved fruitful in informing clinical assessment following adult neurological damage. We present the Test of Everyday Attention for Children (TEACh), a battery of attentional tests derived from adult models and normed on 293 children between the ages of 6 and 16. Developmental patterns in the normal population are described, including on measures which seek to tap verbal and motoric inhibition of response. We consider the evidence for selective deficits in children diagnosed with an attentional deficit disorder and children who have suffered traumatic brain injury.

Inhibition in Attention Deficit Hyperactivity Disorder: Cognitive subtypes and response to stimulants.

David H. Skuse and Nisha Karia (Introduced by Dr. Dorothy Bishop)

Institute of Child Health, London

Attention deficit/hyperactivity disorder is one of the most common psychiatric disorders of childhood and adolescence. Clinical experience and research findings have demonstrated the continuation of symptoms into adulthood. Diagnostic criteria are conventionally considered in terms of two dimensions: inattention and hyperactivity- impulsivity. To date no neuropsychological test has proved sufficiently discriminating in the diagnosis of ADHD to be used routinely for diagnostic purposes. In general such tests suffer from low sensitivity and specificity.

The diagnosis is a clinical one, and as such is poor at predicting children who will respond well to stimulant medication. There is considerable heterogeneity in the aetiology of the clinical phenotype; approximately 25% of samples comprise children with anxiety disorders (phenocopies). These children are likely to experience a worsening of their symptoms on stimulants such as methylphenidate.

We will present data on the use of the Test of Everyday Attention for Children (TEACh) (Manly T, Robertson IH, Anderson V, 1998) with a clinical sample of children meeting conventional criteria for ADHD. Fifty subjects (6-16 years) have been assessed. Scores have been compared with normative data on the TEACh, which we obtained, for measures of the ability to inhibit a prepotent response, speed of visual search and an auditory distraction task. Distinct cognitive phenotypes have been identified. Impairment on the response inhibition task appears to be an excellent predictor of beneficial response to stimulants, better scores correlating closely with clinical improvement.

Inhibition in autism: The effects of level of behavioural control and ability.

Michelle Turner (Introduced by Dr. Dorothy Bishop)

University of Durham

The neuropsychological study of adults with brain injury has shown that impairments in the inhibitory control of behaviour can disrupt cognitive functioning and lead to perseverative responding at a number of distinct and dissociable levels of behavioural control. Whilst several studies have shown evidence of impaired inhibitory control of attention in autism on tasks such as the Wisconsin Card Sort Task (e.g. Ozonoff, Pennington, & Rogers, 1991), few studies have asked whether inhibitory deficits may be found at lower levels of behavioural control. The present paper presents the results of three studies used to explore the inhibitory control of behaviour at the level of (i) repeated actions (as assessed via a simple task of two-choice responding), (ii) perseverative response behaviour (as assessed via a task of spatial working memory), and (iii) attentional set in 22 high-functioning (VIQ>75) and 22 learning disabled children and adults with autism and matched clinical control subjects. Perseverative responding consistent with impaired inhibitory control of behaviour was found to be significantly more prevalent in the autistic, relative to the control, subjects at each level of behavioural control. However, considering the effects of ability on task performance revealed that for each task perseverative responding was particularly characteristic of the learning disabled individuals with autism, and only

rarely observed in the high- functioning autistic individuals.

Ozonoff, S., Pennington, B. F., & Rogers, S. J. (1991). *Journal of Child Psychology and Psychiatry*, 32, 1081-1105.

Eye fixation patterns while watching dynamic real-world scenes.

Geoffrey Underwood and Peter Chapman

University of Nottingham

Patterns of eye fixations have been used very effectively in studies of reading and in studies of scene perception with drawings and photographs, but there is relatively little work on the question of how dynamic scenes are inspected and the events within them perceived. We showed eye-tracked viewers road scenes filmed from a moving car, and gave them the task of making button-press responses whenever they saw an event that would cause the driver to take some avoiding action such as braking or steering. Hazardous events included pedestrians walking in front of the car, a cyclist joining the car's path from a side road, and lead cars that braked. The video films were displayed on a laboratory monitor while fixations were recorded with a dual purkinje image eye-tracker. Analyses will be presented to illustrate the effectiveness of hazardous events in capturing the attention of the viewers, with fixation durations and the objects fixated varying according to the complexity of the scene.

Visual search in hazardous situations: Influences of experience and training.

Peter Chapman and Geoffrey Underwood

University of Nottingham

Much of our knowledge about visual search is based on simple static scenes and artificial manipulations. We know relatively little about group differences in search behaviour, or about the extent to which domain expertise is important. This research attempts to extend basic laboratory findings to realistic situations and explore some variables that may influence search strategies in the real world. Our first study recorded the eye movements of drivers while they watched videos of safe and hazardous driving situations. A dual purkinje image tracker provided overall fixation density plots and measures of fixation durations, saccade lengths, and variance in search locations. We compared a group of experienced drivers with a group of newly qualified drivers soon after passing their driving test and at two later points over their first year of driving. We describe the typical patterns of eye movements shown by these drivers and the way in which such patterns develop as a function of driving experience. A second study then explores methods of training visual search in such situations.

Perceptual narrowing while watching dynamic scenes.

David Crundall, Peter Chapman and Geoffrey Underwood

University of Nottingham

The theory of perceptual narrowing suggests that as the level of demand increases at the fovea, there will be a corresponding decrease in the visual area around the fovea from which peripheral information can be extracted. This theory has important implications for driving as peripheral information is necessary for directing attention to potential hazards, yet it suggests that degradation of the peripheral field occurs when we need it most. A series of video clips taken from the driver's perspective were shown to subjects whose primary task was to actively view the clips as if they were the driver, searching for potential hazards while their eye movements were monitored. A secondary task required them to respond to briefly presented, peripheral targets. Hit ratios were calculated according to the current level of clip demand when each target was presented, and according to onset eccentricity (distance from the current fixation to the target when it appears). It was found that demand did reduce target detections at varying eccentricities. Furthermore, detection rates varied with driver experience, suggesting that the spread of attention given to a driving scene improves with experience. Two models of perceptual narrowing, tunnel vision and general interference, have been proposed to account for the basic effect. A second investigation explored the role of speed stress in determining which of these models best accounts for performance in the driving domain.

Modelling emergent attentional processes

Dietmar Heinke and Glyn W. Humphreys

University of Birmingham

We recently introduced a computational model, SAIM (Selective Attention Identification Model), which is capable of simulating visual disorders in brain lesioned patients including visual neglect and extinction (Humphreys & Heinke 1997). Here, we report that the same model can both simulate known attentional effects in normal subjects and make novel verifiable predictions. SAIM aims to achieve a translation-invariant object recognition by mapping inputs from their location on the retina to a translation invariant "focus of attention". Inputs are competitively identified by matching to stored templates. When there are multiple items in the field, there is also competition between the items to win the mapping process. With these mechanisms, SAIM can reproduce qualitatively the results of (1) the Eriksen "flanker" experiment, where RTs increase when a target is flanked by distractors of the opposite response category; and (2) the Posner spatial cueing paradigm, where RTs increase, when the locations of cues do not match the locations of targets. In the cueing paradigm SAIM also predicts that on invalid trials the target is perceived as being shifted more into the periphery (overshoot effect). We have confirmed this prediction experimentally. In SAIM, attentional effects are emergent properties of the competition for limited resources that is needed to achieve a translation invariant object recognition. In humans, there may be no need to posit an explicit attentional system to account for emergent "attentional" effects on behaviour.

Humphreys, G. W., & Heinke, D., (1997) Selective Attention for Identification Model (SAIM), Paper presented to the Experimental

Psychological Society, Cardiff.

Mechanisms of visual marking for static and moving items.

Chris Olivers, Derrick Watson and Glyn Humphreys

University of Birmingham

Recently, Watson & Humphreys (1997, in press) proposed that the selection of new visual events can be aided by the top-down inhibition of old information, a mechanism they called visual marking (VM). They argued that VM processes differ for static and moving stimuli. Stationary stimuli are marked by location based inhibition, whereas moving stimuli are marked via inhibition applied at the level of whole feature (e.g. colour) maps. In six visual search experiments we tested this "two mechanism" account against two alternatives, one based on object-bound inhibition, the other based on grouping within and between distractor sets. We found that static items can still be marked even when old and new stimuli contain the same features. Moving items, on the other hand, could not be marked unless they possessed a unique colour. Manipulations of within and between set groupings did not alter the basic results. The data are consistent with the proposal that there are two different mechanisms of marking, for static and moving stimuli.

Watson, D.G., & Humphreys, G.W., (1997) Visual marking: Prioritising selection for new objects by top-down attentional inhibition. *Psychological Review*, 104, 90-122.

Watson, D.G., & Humphreys, G.W., (in press) Visual marking of moving objects: A role for top-down feature based inhibition in selection. *Journal of Experimental Psychology: Human Perception and Performance*.

Inversion effects on categorical perception of face identity.

Elinor McKone, Paolo Martini and Ken Nakayama (Introduced by Professor Mike Burton)

Harvard University

Stimuli which vary continuously on physical measures (e.g., wavelength) are often perceived to form distinct categories (e.g., the colours of the rainbow). We investigated perception of identity in images containing different proportions of each of two faces. We found categorical perception for upright human faces, even when the two faces were similar in appearance and initially unfamiliar. Inverted human faces were not perceived categorically even after substantial practice. For cat faces, discrimination was initially non-categorical, but the sharpness of the category boundary increased rapidly with practice, and at the same rate for upright and inverted images. The results suggest that specialised mechanisms for identifying upright human faces inhibit the formation of identity representations of inverted human faces.

What crossing the hands can reveal about visuotactile links in spatial attention.

Charles Spence¹, Francesco Pavani², and Jon Driver²

1. University of Oxford

2. Institute of Cognitive Neuroscience, University College London

We report a series of experiments designed to investigate crossmodal links in endogenous spatial attention between vision and touch using the orthogonal-cuing paradigm developed by Spence and Driver (1996). Experiment 1 demonstrated that when people were informed that targets were more likely on one side, elevation judgements were faster on that side in both vision and touch, even if target modality was uncertain, contrary to previous claims by Posner, Nissen, and Ogden (1978). When participants expected a target on a particular side in just one modality, corresponding shifts of covert attention also took place in the other modality, as evidenced by faster elevation judgements on that side (Experiment 2). However, it was possible to 'split' visual and tactile attention to some extent when targets in the two modalities were expected on constant but opposite sides throughout a block, although attentional effects were significantly larger when targets were expected in the same position in both modalities (Experiment 3). A final study with crossed hands suggests that visuotactile links in spatial attention apply to common external locations, rather than simply being determined by which hemisphere the information initially projects to.

Posner, M. I., Nissen, M. J., & Ogden, W. C., (1978). Attended and unattended processing modes: The role of set for spatial location. In H. I. Pick & I. J. Saltzman (Eds.), *Modes of perceiving and processing information*, (pp. 137-157). Hillsdale, NJ: Erlbaum.

Spence, C., & Driver, J. (1996). Audiovisual links in endogenous covert spatial attention. *Journal of Experimental Psychology: Human Perception and Performance*, 22, 1005-1030.

Factors that contribute to individual differences in children's comprehension skill.

Jane Oakhill¹, Kate Cain¹ and Peter Bryant

1. University of Sussex

2. University of Oxford

In this talk, we consider the difficulties of children who have problems with reading comprehension, even though they are competent at single-word recognition. Although single-word reading and comprehension are, in general, highly correlated, a substantial minority of children develop the former but not the latter skill. Our earlier work has shown that good and poor comprehenders differ in a number of areas, and in this talk we discuss the relative contribution of several theoretically relevant skills and abilities to the prediction of reading comprehension. We present data from the first stage of a longitudinal study, when the children were 7-8 years old. We hypothesised that at least part of the reason for poor comprehenders' difficulties could be traced to their less efficient working memories, which limit the extent to which information from different parts of a text can be successfully compared and integrated. However, the data suggest that, although working memory does contribute significantly to the prediction of comprehension skill (even after various control variables, such as age, IQ, and single-word reading ability

have been taken into account), tests of comprehension subskills (such as inference making and comprehension monitoring) also contribute uniquely to the prediction. The implication of these findings for our understanding of children's problems in text comprehension will be discussed.

Paired associate learning, phonological skills and learning to read.

Kirsten Windfuhr and Maggie Snowling

University of York

It is widely accepted that phonological abilities are good predictors of reading development. However, the precise role of different phonological skills in relation to the processes involved in learning to read remains to be established. The present paper reports the findings of a cross-sectional study of 75 children aged 6-11 years on tests of verbal short term memory, phonological awareness and visual-verbal paired associate learning.

Consistent with previous findings, phonological awareness was a better concurrent predictor of reading ability than measures of verbal short term memory. However, paired associate learning was also a stronger predictor of reading and accounted for independent variance in reading skill even when differences in phonological awareness were controlled. A follow-up experiment comparing groups of dyslexics and younger RA controls on these tasks confirmed that the ability to learn mappings between visual stimuli and novel phonological forms is associated with differences in reading skill. Results are discussed in relation to models of learning to read.

Time for a re-think: Explanations for children's working memory span and its relationship to reading and arithmetic skills.

Graham J. Hitch¹, John Towse², and Una Hutton¹

1. University of Lancaster

2. Royal Holloway, London

We report a further investigation of the widely-held assumption that tests of 'working memory span' measure a central capacity for resource-sharing. Three age groups of children aged between 9 and 11 were assessed on two working memory span tasks, reading span and arithmetic span, a year after a similar initial assessment (Towse, Hitch & Hutton, 1997). There were two versions of each span task. These were equated in terms of the resources required for processing but differed as to how long temporary information had to be held in store. As in the previous study, both reading and arithmetic spans were lower when temporary information had to be stored for longer durations. Both reading and arithmetic speed, and reading and arithmetic span, improved over 12 months. The developmental change in span per unit change in speed was found to be significantly different for reading compared with arithmetic domains. We argue that these results cannot be explained in terms of

resource-sharing, and we suggest instead that working memory span measures forgetting resulting from children's adoption of a 'task-switching' strategy. Multiple regressions showed that reading and arithmetic spans were related to measures of children's reading and arithmetic attainment in different ways, and provided further evidence against the hypothesis that they measure a common central capacity.

Towse, J. N., Hitch, G.J. & Hutton, U., (1997). Last but not least: Exploring the dynamics of event order in working memory tasks. Paper presented to the Experimental Psychology Society, Oxford.

Variety is Charming.

Patrick Rabbitt¹, Paul Osman¹ and Brian Stollery²

1. University of Manchester Age and Cognitive Performance Research Centre
2. University of Bristol

Mean Choice Reaction Times are uninformative measures because they summarise distributions of decision times that have marked variance and skew. Three experiments show that degree of trial-to-trial variability in decision times is a characteristic of individuals that remains stable over periods of at least a year, and is greater in individuals with low scores on intelligence tests, and in the elderly, than in high test scorers and the young. Because of this stability moment-to-moment variability in decision times within any experimental session necessarily leads to increased variability in mean decision times from session to session, day to day, and week to week. We discuss methodological implications for re-interpretation of the classic literature on circadian variability of performance, and suggest a range of models within which individual differences in moment to moment, day-to-day variability and average speed of performance can be discussed.

Pigeons and the Michotte launch event: Discrimination but not of causality.

Stephen E. G. Lea¹, Winand H. Dittrich², Martina Siemann³ and Catriona M. E. Ryan¹

1. University of Exeter
2. Imperial College London
3. Universitat Konstanz

Three experiments investigated pigeons' discrimination of versions of the stimuli used in Michotte's causal perception experiments. All stimuli involved a moving square apparently colliding or nearly colliding with another square, which then started to move. One category of stimuli were readily described by human observers as involving causal motion; in the other, causality was degraded by one or more of a spatial gap or temporal delay at the point of collision, or by a change of direction of motion between the two squares. In the first experiment, we used coloured squares moving in a range of directions against a bright background, and pigeons failed to acquire any discrimination. In the second experiment,

we used bright squares against a dark background and a single direction of movement of the first square, and after extensive training pigeons acquired a discrimination which we showed to be based on the direction of motion of the second square. In the third experiment, we reintroduced additional directions of initial motion; some but not all pigeons maintained discrimination, but its basis shifted to the spatial gap between the stimuli. We conclude that pigeons are able to discriminate the stimulus dimensions that give rise to perceptions of causality in humans, but that the category of causal collisions is of low salience for them at least under the conditions of our experiments.

The time course of perceptual categorization

Koen Lamberts

University of Birmingham

A process model of perceptual categorization is presented, in which it is assumed that the earliest stages of categorization involve gradual accumulation of information about object features. The model provides a joint account of categorization choice proportions and response times, by assuming that the probability that the information accumulation process stops at a given time after stimulus presentation depends on the stimulus information that has been acquired. The model provides an accurate account of categorization RTs for integral- and separable-dimension stimuli. The model also correctly predicts the shape of RT distributions and latency-accuracy curves, and it explains effects of response deadlines and exemplar frequency. The information-accumulation model is compared with Nosofsky and Palmeri's (1997, Psych. Rev.) exemplar-based random walk model of speeded categorization. It is further shown that information-accumulation models can explain RTs in a variety of different tasks, including old-new recognition, perceptual identification and perceptual matching.

Sentential and lexical effects on the perception of phonological ambiguity.

Gareth Gaskell and William Marslen-Wilson

MRC Cognition and Brain Sciences Unit, Cambridge

Variation in the surface form of speech creates serious problems for the perceiver of everyday connected speech. Previous research has shown that a context-dependent "inference" process can compensate for variation that neutralises phonemic distinctions (e.g., assimilation of place of articulation). This inference process evaluates the phonemic identity of a segment by comparison with its following phonological context. In the current study we look at the case where place assimilation creates lexical ambiguity. For example, the underlined word in the spoken sentence "I think a quick rum picks you up" could be interpreted simply as rum or as an assimilated form of run. We use cross-modal priming in three experiments to examine the resolution of this ambiguity in speech perception. The results show that in a neutral-bias context, these words contact only the lexical representation corresponding to the surface form of the speech (rum). However, when sentential context provided a bias

towards the alternative (run) form (e.g., "It's best to start the day with a burst of activity. I think a quick rum picks you up") we again find evidence for a context-dependent inference process, which evaluates the identity of an ambiguous segment in relation to its following context. This interaction of sentential and phonological factors requires us to refine our model of compensation for variation in speech perception.

Developmental patterns in lexical access and representation.

Tom Loucas¹ and William Marslen-Wilson²

1. Birkbeck College, London
2. MRC Cognition and Brain Sciences Unit, Cambridge

Children's spoken word recognition is little understood compared to our knowledge of the adult system. We present here a combined experimental and computational exploration of the development of lexical access. Three accounts of the way children represent lexical form (Full-Specification, Radical Underspecification and Gradual Segmentation) are rejected in favour of one which derives from a connectionist approach. It sheds light on the pattern of results from two experiments investigating the way children, aged 5 to 9 years-old, process regular and irregular variation in the surface form of speech. These experiments suggest that, while children's lexical representations are functionally underspecified from at least 5 years-old, they are only beginning to track the viability of regular phonological variation at 9 years-old. The late acquisition of phonological inference is accounted for in a connectionist model in terms of the sparseness of the information relevant to learning this structural relationship in language.

The role of lexical information in syntactic ambiguity resolution.

Martin J. Pickering¹ and Matthew J. Traxler²

1. University of Glasgow
2. The Florida State University

Four experiments investigated strategies readers use to process locally ambiguous unbounded dependency constructions. Using self-paced reading, Experiments 1 and 2 manipulated subcategorization preferences and plausibility, and found that readers treated a noun-phrase filler as the direct object of a verb, even if the verb preferentially did not take a noun phrase argument. Experiments 3 and 4 used self-paced reading and eye-tracking respectively to investigate the way in which readers form unbounded dependencies when the filler could either be the verb's direct object or form part of its complement. Our results suggested that readers again treated the filler as the verb's direct object, and probably also considered the complement analysis at the same time. We interpret these results in terms of current accounts of parsing.

Morphological structure in sentence processing.

Billi Randall¹ and William Marslen-Wilson

1. Birkbeck College, London
2. MRC Cognition and Brain Sciences Unit, Cambridge

Traditionally, the lexicon and syntax have been treated as separate domains. The internal structure of the word is largely ignored in psychological theories of syntactic processing where the basic unit of analysis is assumed to be the whole word. However, the use of lexically-specified information is essential to the construction of sentential representations, implying that models of syntactic processing should also consider lexical organisation. Given recent research indicating a morphological basis to lexical structure, we investigated the relationship between processes of morphological (derivational and inflectional) and syntactic combination in three self-paced reading experiments. Experiments 1 and 2 examined the processing of derived words. Experiment 1 asked whether effects of morphological complexity can be detected at sentence level by manipulating complexity (derived/happiness v simple words/delight) and frequency (high v low). Experiment 2 investigated the ability of parsing mechanisms to operate on morphemic representations by comparing the processing of established and novel (e.g. deconflict, nursely) words in different sentence contexts (pragmatically v syntactically constrained). Experiment 3 explored the processing of sentences with inflected words, comparing sentences with regular (watched) and irregular (saw) past tenses. Experiments 1 and 3 show that morphological complexity affects processing regardless of the lexical or syntactic locus of the morphological combination. Experiment 2 shows novel morphological combinations interacting with their sentential environment in essentially the same way as established words. We conclude that these results should encourage further questioning of the distinctions between the lexicon and syntax and the nature of the representations that they operate on.

Length effects in the parsing of coordinate phrases.

Judith-Ann Henstra¹ and Alan Garnham²

1. University of Teesside
2. University of Sussex

In sentence production, research has shown a preference to produce short phrases or words before long phrases or words. However, whether these order effects have any influence on a reader's (or listener's) parsing processes has received very little attention. Using sentences with coordinate Noun Phrases (NPs) where a subsequent relative clause ('who ...') can be combined either with both NPs ('were' in example (1)), or just the second NP ('was' in example (2)), the preference of readers with regards to the length of the NPs will be investigated. In (1) a long NP ('a man in a suit') is combined with a short one ('a woman'), whereas in (2), a long NP is combined with an even longer one ('a woman who was

...` (etc.).

(1) Robert saw a man in a suit and a woman who were walking down the street.

(2) Robert saw a man in a suit and a woman who was walking down the street.

Two self-paced reading experiments and an eye-tracking experiment show that there is a preference for the second NP ('a woman (who...') to be at least as long as the first ('a man in a suit').

None of the existing parsing theories can explain this preference satisfactorily. Suggestions are given as to how these theories might incorporate a length effect.

Baselines, blocking and masking: The effect of translation priming in a word naming paradigm.

W. J. Fear and C. Barry (Introduced by Dr. K. W. Hirsh)

University of Wales Cardiff

If the effect of translation priming can be located at the lexical level it has wide reaching implications for the structure and process of the bilingual lexicon. We found such an effect in a word naming task, with proficient Welsh-English/English-Welsh bilingual participants, using a masked priming paradigm. This effect is discussed and consideration is given to the effect of different baselines, the nature of the meta-contrast mask (i.e. prime in capitals, target in lower case vs. prime in lower case, target in capitals), and blocking by language. The conclusion is that the only important consideration, in this particular experimental paradigm, is the baseline. Furthermore, the possibility of a confounding inhibition effect is noted.

Implicit memory for nonwords - effects of linguistic structure and articulation.

J. J. Downes, R. Bowden and E. J. Davis

University of Liverpool

The more usual task for examining implicit memory for nonwords is perceptual identification. More recently we and Dorfman (1994) have developed a preference task in which subjects, after studying lists of nonwords, are given a series of 2 alternative forced-choice trials, each containing a studied (target) nonword and a matched distractor, and are required to select the more word-like the two. Priming is evident as a significant bias towards selecting target nonwords. Work by Dorfman suggests that significant priming will be found only if nonwords are constructed from pre-existing linguistic units such as morphemes and syllables. In two experiments we show that (1) nonwords constructed from pronounceable pseudosyllables do prime if the study episode requires that they be articulated (2) priming of nonwords based on pre-existing linguistic units can be blocked (i.e. rendered non-significant) by a manipulation that interferes with the assignment of phonology, without

affecting recognition memory performance.

The relationship of associative and incentive learning processes in instrumental outcome-devaluation effects.

Bernard W. Balleine

University of California, Los Angeles

When, after training rats to press a lever for sugar, a taste aversion is conditioned to the sugar, the rats' tendency to press the lever is subsequently reduced. Current evidence suggests that this outcome devaluation effect involves the interaction of two learning processes that encode: (i) the sugar-illness association, and (ii) the change in the incentive value of the sugar. In several experiments we assessed the relationship between these learning processes. Rats were trained to perform two lever press actions with one delivering grape flavoured sucrose and the other an orange flavoured sucrose. During the devaluation phase, animals were given a single pairing of unflavoured sucrose with illness and then re-exposed to either the orange or grape flavour before performance on the levers was assessed in a choice extinction test. Exposure to the flavour was found to reduce performance on the lever that delivered that flavour in training but only when reexposure to the sucrose was given after its pairing with illness and prior to exposure to the flavour. This finding suggests that the associative and incentive learning processes are inter-dependent.

Psychological and cortical processes of instrumental action.

Anthony Dickinson¹ and Bernard W. Balleine²

1. University of Cambridge

2. University of California, Los Angeles

Instrumental behaviour is controlled by two systems: a stimulus-response habit mechanism and a goal-directed process that involves two forms of learning. The first is learning about the instrumental contingency between the response and reward, whereas the second consists of the acquisition incentive value by the reward. Evidence for contingency learning comes from studies of reward devaluation and from demonstrations that instrumental performance is sensitive not only to the probability of contiguous reward but also to the probability of unpaired rewards. The process of incentive learning is evident in the acquisition of control over performance by primary motivational states. Preliminary lesion studies of the rat suggest that the prelimbic area of prefrontal cortex plays a role in the contingency learning, whereas the incentive learning for food rewards involves the insular cortex.

The role of the prefrontal cortex, amygdala and nucleus accumbens in instrumental action.

Simon Killcross

University of York

Recent work has demonstrated that the basolateral nucleus of the amygdala is important in acquisition of an instrumental conditioned punishment task (Killcross et al., 1997). Further experiments to be reported will examine the possible role of associated striatal and prefrontal cortical structures in the control of instrumental responding by conditioned fear stimuli. Excitotoxic lesions of the medial prefrontal cortex produce deficits that appear very similar to those found following lesions of the basolateral amygdala. It is suggested that whereas the basolateral amygdala appears to be important in representing the value of the outcomes of different instrumental actions, the prefrontal cortex has a more central role in the detection of specific instrumental contingencies and in the formation of action-outcome associations. In contrast, the ventral striatum, in line with previous studies, does not appear to be directly involved in instrumental action, but rather is implicated in the impact of Pavlovian stimuli on instrumental responding. This work may well speak to recent studies examining the role of interactions between the prefrontal cortex and amygdala in risk assessment tasks in humans.

Killcross, A. S., Everitt, B. J., & Robbins T. W., (1997) Different types of fear-related behaviour mediated by separate nuclei within amygdala. *Nature*, 388, 377-380.

The influence of the effect base rate on judgements of causality.

Frédéric Vallèe-Tourangeau, Robin, A. Murphy and Susan Drew

University of Hertfordshire

In a causal induction task, human subjects are presented contingency information involving a candidate cause (C) and a target effect (E). Causal inferences are generally in line with the actual level of contingency [as indexed by $P(E | C) - P(E | -C)$] but also reflect the overall probability of occurrence of the effect independent of the candidate cause. The influence of the effect base rate on causal judgements was investigated in a series of three experiments that sought to attenuate its impact. Experiment 1 examined the importance of procedural factors such as method of information presentation (on and off line) and treatment order in mediating the phenomenon. Experiments 2 and 3 manipulated motivational factors by making participants accountable for their judgements (Experiment 2), and by using a task scenario that endowed the occurrence of the effect with negative consequences (Experiment 3). In all experiments, judgements were strongly influenced by the effect base rate. Of Cheng's (1997) power PC theory, the Rescorla-Wagner model and the Pearce (1987) model of stimulus generalisation, the last best anticipated this phenomenon.

Relative contingency learning and Pavlovian conditioning.

Robin A. Murphy

University of Hertfordshire

In Pavlovian conditioning with a single CS, rats show excitatory conditioning when trained with a positive CS-US contingency (Rescorla, 1968). One question is whether rats selectively respond to multiple CSs by sensitivity to relative contingency. I will present three appetitive Pavlovian conditioning experiments with rats that test the relative contingency hypothesis. Experiment 1a included four treatments with three CSs (A, B and X). The DP contingencies were defined relative to X; in the four groups the contingency pairs were (DPA/DPB = .5/1, .5/0, 0/1 and 0/0). There were more conditioned tray responses for the CS with a stronger absolute contingency, and the CS with a relatively weaker contingency showed attenuated conditioned responding. Experiment 1b extended this result with a fourth CS, C (A, B, C and X). In both experiments the competing CSs were signals for US presence. In Experiment 2 a signal for US absence (a negatively correlated CS) also reduced responding to a weaker positively correlated stimulus. An associative algorithm can account for these findings. Pavlovian conditioning shares some computational features with human causal reasoning.

Mental models of cause or associative mechanisms in predictive and diagnostic reasoning?

Rick Mehta and Andy G. Baker (Introduced by Professor G. Hall)

McGill University

In animal learning, blocking occurs when the presence of a cue which is highly correlated with reinforcement reduces responding to a less correlated but otherwise predictive cue. Blocking found in human contingency learning tasks modeled after causal reasoning scenarios implies that associative or connectionist models, derived from conditioning studies, can explain much of the information processing in causal reasoning. Contrary to this, Cheng, Holyoake and Waldmann claim that people use mental causal models for even these simple tasks. To support this argument they demonstrated that blocking occurs in predictive reasoning, with two causes and one effect, but not in diagnostic reasoning in which there is one cause and two effects. Alternatively, it could be argued that their empirical demonstration is a consequence of a traditional associative net with its implicit principles of temporal contiguity and order of presentation. Furthermore the demand characteristics of the predictive and diagnostic manipulation during training may influence the emergence of blocking. We report a series of experiments which investigate these variables and, in general, support an associative approach to contingency judgement and causal reasoning.

The role of phonetic and semantic factors in early sight word learning.

Emma Laing and Charles Hulme

University of York

Two studies are reported investigating the role of phonetic and semantic factors in early sight word learning. The first study involved young

readers learning to associate 3 letter written abbreviations with the spoken form of words following the procedures used by Rack, Hulme, Snowling & Wightman (1994). The phonetic quality of the cue was shown to be important for learning (cues whose letters were phonetically close to the target words' spelling were learnt more easily than cues which were phonetically more distant). It was also found that children's semantic knowledge of the spoken words influenced their learning. Furthermore, both the overall rate of learning and sensitivity to the phonetic effect were related to independent measures of phonological skill. In the second study the role of semantics on sight word learning was considered further by investigating the role of imageability on learning to read isolated words. Imageability was found to have a strong effect on learning, even when familiarity and age of acquisition were controlled for.

Rosch Revisited: A preliminary report on the replication of the classic cross-cultural investigation of colour universals.

Debi Roberson¹, Jules Davidoff² and Ian Davies²

1. Goldsmiths College, University of London
2. University of Surrey

Rosch's classic results on colour naming and colour memory (Heider & Olivier, 1972; Rosch, 1972) were largely responsible for discrediting the Whorfian hypothesis of linguistic relativity and have been taken as showing clear support for universalism (biological constraints on conceptual development). Her results are reported to show a cross-linguistic similarity in memory performance that overrides large differences in the linguistic partitioning of colour space, as well as the universal salience of focal colours in memory and paired-associate learning.

A recent series of three experiments sought to replicate and extend the classic work of Rosch on the Dani of New Guinea by comparing a Berinmo speaking population from Papua New Guinea (a language with 5 basic colour terms) to native English speakers. The first experiment derived multi-dimensional scaling solutions for naming and memory of desaturated stimuli. In fact, replicating Rosch's data but not her interpretation, we found that Berinmo memory performance gave a better fit to their own pattern of naming than to the memory performance of English speakers. Also, memory confusions for Berinmo speakers were influenced by their colour naming which was not the case for the Dani. The second experiment replicated Rosch's findings that saturated focal colours were better remembered than non-focals despite the paucity of colour terms in Berinmo although the possibility of methodological artefacts in Rosch's procedures will be discussed. The third experiment attempted to replicate Rosch's (1972) paired-associate learning task in which she found that Dani speakers learned paired associate names more easily for focal than for non-focal stimuli. In its initial form the experiment could not be replicated as Berinmo speakers completely failed to learn the set of 16 verbal paired-associates. Subsequent modifications of the experiment are discussed. Our preliminary data from the three experiments would suggest a more interactive relationship between language and colour cognition than has been inferred from Rosch's classic results.

Heider, E. R., & Olivier, D. C., (1972) The structure of the color space in naming and memory for two languages. *Cognitive Psychology* 3, 337-354.

Rosch, E. H., (1972) Universals in color naming and memory. *Journal of Experimental Psychology*, 93 (1), 10-20.

The effects of rhyme on auditory recency and the suffix effect.

C. Philip Beaman (Introduced by Professor J.Morton)

MRC Cognitive Development Unit

The role of distinctiveness of the final item in immediate serial recall of spoken words was examined. Experiment 1 demonstrated a drop in recall performance for the final item relative to a non-rhyming control if the final and penultimate words rhymed. An increase in recall performance across words presented earlier in the list was also observed. No such changes in the levels of recall performance relative to control were observed when the final and antepenultimate items rhymed. Experiment 2 compared recall performance when the final or penultimate words rhymed with an irrelevant stimulus suffix. A suffix which rhymed with the final word was found to attenuate the suffix effect, in line with Carr and Miles (1997). No such effect was observed when the suffix rhymed with the penultimate item. The results are discussed in terms of differential processing of adjacent rhymes.

Feature-based control of attention: Examination of the within-dimension advantage effect, using a compound search task.

Takatsune Kumada (Introduced by Professor Glyn Humphreys)

University of Birmingham

Three experiments examined whether prior knowledge for a target feature dimension can be useful for directing spatial attention (Found & Muller, 1996; Muller, Heller, & Ziegler, 1995). The employment of attention was controlled by using simple search and compound search tasks (Duncan, 1985). Experiment 1a used a simple search task. RTs in blocks in which a target was defined within a feature dimension were shorter than those in blocks in which a target was defined across dimensions. This within-dimension advantage was eliminated when the same stimuli were used in a compound search task (Experiment 1b). Experiment 2 further examined the elimination of the within-dimension advantage, by varying the probability of presentation of each target-dimension in one block. Again, there was no advantage even for high-probability dimensions in the compound search task, suggesting that subjects could not assign priority to a particular dimension. The results of these experiments suggest some limitations on feature-based modulation as a source for controlling spatial attention. The implications of the results for existing models are discussed.

Duncan, J. (1985). Visual search and visual attention. In *Attention and Performance XI*. (pp. 85-106). M. I. Posner and O. Marin (eds). Hillsdale, N. J., Erlbaum.

Found, A. & Muller, H. J. (1996). Searching for unknown feature targets on more than one dimension: Investigating a "dimension-weighting"

account. *Perception & Psychophysics*, 58, 88-101.

Muller, H. J., Heller, D., & Ziegler, J. (1995). Visual search for singleton feature targets within and across feature dimensions. *Perception & Psychophysics*, 57, 1-17.

Towards a purer measure of episodic memory

Elizabeth J. Milwain and Susan D. Iversen

University of Oxford

Two samples of elderly people (aged 53-87 years) were given a novel episodic memory test called The Placing Test. The test examines the ability to remember the locations of items. The subjects were also given a range of other tests to measure performance in standard tests of episodic memory, expressive language, visuo-spatial function, executive function and cognitive speed. Correlational analyses revealed that The Placing Test correlated with 6 of the 8 memory measures studied but did not correlate with any other type of cognitive variable. By contrast, three standard episodic memory tests (Paired associate learning, free recall and recognition) did correlate with variables outside of the domain of memory. Furthermore, each of these tasks showed a unique pattern of relationships with variables both within and outside of the domain of memory. It cannot, therefore, be assumed that different tests of episodic memory measure the same thing. In particular it seems that The Placing Test measures processes specific to memory, whilst standard episodic memory tests measure an interaction of episodic memory with processes occurring in other cognitive domains. The performance of a group of people with early Alzheimer's disease in The Placing Test was nearly at floor level. This supports the validity of The Placing Test as a measure of episodic memory. The key feature of an episodic memory is that the content is indexed to a specific spatio-temporal context. It could be argued that The Placing Test measures this feature of memory more directly than standard tests of episodic memory. The results can be used in support of models of episodic memory in which the core component is a mechanism which can form rapid associations between the disparate sensory, emotional and informational aspects of experiences to define them as unique events. Further investigations examined memory for (a) the colour of objects and (b) objects in scenes. Contrary to expectations both these tests were found to correlate with variables outside of the domain of memory. Any rapid association model of episodic memory must therefore account for the fact that all associations are not equal. Possible explanations are considered.

Learning how to catch a ball without being taught.

Bodo Maass, Peter McLeod and Kim Plunkett

University of Oxford

A genetic connectionist network was given the changing angle of elevation of gaze that would come from watching balls thrown towards it. It

discovered a simple way to predict whether the ball would land in front of it or behind. Using this prediction to decide whether to run forwards or backwards it could intercept balls before they hit the ground, producing patterns of running like those of human fielders catching balls on the same trajectories. The similarity of the network's learning experiences to those of children and of its eventual performance to that of skilled ball catchers suggests that genetic connectionism is an appropriate way to model untutored learning.

Role of structure in the perception of roll.

Richard Ralley¹ and Winand Dittrich^{1,2}

1. University of Hertfordshire
2. Imperial College School of Medicine

The aim of this study was to compare motion processing at two different hierarchical levels of perception. Interference effects were measured for responses to local and global levels in the perception of roll. Stimuli rotated on their own axis and around the centre of a display to generate rolling motion.

Twenty-six participants attended either a local revolving event, or a global trajectory which described the path of the moving stimuli. The stimuli moved either clockwise or anticlockwise at each level and participants had to respond to the direction of the motion at each of the two levels separately.

A global advantage was found with non-attended local information interfering less with attended global information than non-attended global information interfered with attended local information. Hierarchical processing was found to be modulated by the direction of motion.

Interference was increased when the non-target was both global and moved anticlockwise. The results from these motion displays are interpreted in terms of the role of hierarchical processing in attention which is typically linked only to studies with static stimuli.

In addition, the present study offers a solution to a methodological problem first pointed out by Pomerantz (1983). Our study demonstrates that a "Type N" hierarchical pattern can be implemented with orthogonality between the conditions.

POSTER PRESENTATIONS

Disruption of Pavlovian contingency judgement by nicotine in rats: Implication for cue competition between the conditioned stimulus and the context.

M. J. Angst, ¹, O. Gosselin², and P. Oberling¹ (Introduced by Dr. M. Boucart)

1. INSERM U405, Strasbourg, France.
2. CNRS UMR7521, Strasbourg, France

In its simplest expression, Pavlovian contingency judgement relies on a competition between the conditioned stimulus (CS) and the context

(CX) to predict the unconditioned stimulus (US). Using a lick suppression preparation, we have analysed the pharmacological sensitivity of such a cue competition. Our results showed that unsignaled USs-induced debilitation of the conditioned response was suppressed by nicotine, a cholinergic agent. Neither amphetamine (a dopaminergic agent), nor ketamine (an NMDA antagonist), or LSD (a serotonergic blocker) could disrupt contingency judgement. These results emphasise a specific role for nicotine in the modulation of cue competition. More precisely, this suggests that the cholinergic system may increase "signal-to-noise" ratios by decreasing noise, that is, the processing of contextual stimuli.

The timecourse of syntactic priming.

Holly Branigan, Martin Pickering, Alexandra Cleland and Andrew Stewart

University of Glasgow

Both corpus analysis and experimental studies have demonstrated a strong tendency to repeat syntactic structure across successive sentences in both spoken and written language production (Schenkein, 1980; Levelt & Kelter, 1982; Bock, 1986; Bock & Loebell, 1990; Branigan, Pickering, Liversedge, Stewart & Urbach, 1995). We report three experiments which used a written sentence completion task to examine the time course of such syntactic priming effects. Participants completed booklets of sentence fragments which included embedded prime-target fragment pairs. Our experiments varied the distance between the prime and the target, such that the prime appeared immediately preceding the target, separated from it by a single intervening fragment, or separated from it by four intervening fragments. The results suggest that, at least in written production, syntactic priming effects are relatively short-lived: significant priming occurred when the prime immediately preceded the target, weaker priming (significant by subjects only) when one fragment intervened, and no priming when four fragments intervened.

The many faces of grouping - A multifaceted explanation of the temporal grouping effect with visual and auditory presentation

Vicki Culpin (Introduced by Professor G. J. Hitch)

University of Lancaster

Hitch, Burgess, Towse and Culpin (1996) examined the role of Working Memory in temporal grouping effects and showed that although rehearsal plays some part in temporal grouping, a rehearsal based account of the effect is not sustainable. A number of experiments are reported examining further the role of rehearsal in temporal grouping. Manipulations include both the size and nature of the temporal pause (filled or unfilled) along with the effect of presentation modality. Preliminary results suggest that grouping is a multifaceted phenomenon, with rehearsal, only one facet, playing a greater role with visual presentation.

Hitch, G., Burgess, N., Towse, J. and Culpin, V. (1996) Temporal Grouping Effects in Immediate Recall A Working memory Analysis. Quarterly Journal of Experimental Psychology, 49, 116-139.

Does "only" guide how reduced relative clause sentences are syntactically parsed?

Simon P. Liversedge¹ and Kevin Paterson² (Introduced by Dr. D. C. Mitchell)

1. University of Durham
2. University of Derby

Ni, Crain and Shankweiler (1996) present evidence to suggest that the focus operator only guides initial parsing of reduced relative clause sentences. We raise a number of methodological and theoretical criticisms of the study conducted by Ni et al and report eye tracking results which question their conclusions. We investigated how readers initially parsed a homogeneous set of relative clause sentences with a noun phrase, verb, noun phrase construction. The results showed that the focus operator did not prevent garden path effects.

We will also discuss the results of a second experiment in which we examined whether only influenced initial parsing of relative clause sentences containing a prepositional phrase immediately after the verb. For such sentences the most preferred direct object reading is ruled out, and therefore the focus operator could exert more influence over initial parsing decisions.

Ni, W., Crain, S., & Shankweiler, D. (1996). Sidestepping garden paths: The contribution of syntax, semantics and plausibility in resolving ambiguities. *Language and Cognitive Processes*, 11, 283-334.

The memory-load effect on naming regular and exception words: Some facts and some artifacts.

Eamon Strain¹ and Karalyn Patterson²

1. Anglia Polytechnic University
2. MRC Cognition and Brain Sciences Unit, Cambridge

Using the Paap and Noel (1991) memory load naming paradigm, we examine the criteria proposed by Bernstein and Carr (1996) for identifying readers who show a dual route mental reading architecture. In Experiment 1, we show that the Bernstein and Carr criteria do not identify a stable group of participants when applied to two different, well-matched sets of items, even though the items were named in the same test session under the same task conditions. Furthermore, the criteria when based on one set of items fail to predict performance on the other set of items. In Experiment 2, we show that there is a strong correlation between the participants satisfying the "dual-route" criteria in the memory load task and a straight naming task only when based on the same items. These results indicate that the Bernstein and Carr criteria are selecting on the basis of stimulus factors rather than stable processing characteristics.

Bernstein, S.E., & Carr, T.H. (1996). Dual-route theories of spelling to pronunciation: What can be learned from concurrent task performance? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20, 86-116.

Paap, K.R., & Noel, R.W. (1991). Dual-route models of print to sound: Still a good horse race. *Psychological Research*, 53, 13-24.

Measuring the difficulty of syntactic reanalysis.

Patrick Sturt¹, Martin Pickering² and Matthew Crocker¹

1. University of Edinburgh

2. University of Glasgow

Natural language is extremely ambiguous, and a great deal of effort in psycholinguistics has been directed at the question of what choices people make when initially faced with an ambiguity. This poster examines the complementary question of how people recover (or "reanalyse") when the initial choice has turned out to be wrong.

A number of theories have proposed that the difficulty of reanalysis in sentence processing depends on the type of structural change involved (e.g. Pritchett, 1992; Gorrell, 1995; Sturt & Crocker, 1996). However, these claims have almost never been tested experimentally. This poster demonstrates that the standard technique of self-paced reading can be used to measure and compare reanalysis difficulty. Specifically, we describe two self-paced reading experiments which compare two types of structural change predicted to cause differential processing difficulty; Thus, (1a) is standardly claimed to cause more difficulty than (1b). We also manipulated the head position of the ambiguous phrase; recent head (i) vs. distant head (ii). Head position is often assumed to reflect semantic confirmation, and is known to affect reanalysis in certain tasks, when the type of structural change is kept constant (Ferreira & Henderson, 1991, Konieczny et al, 1997). Plausibility and subcategorization preferences were controlled using a norming pretest and a corpus study respectively.

1a. The foreign traveller | heard (i. the loud clock / ii. the clock which was loud) | had woken everybody up | in the youth hostel.

1b. Before the traveller | packed (i. the loud clock / ii. the clock which was loud) | had woken everybody up | in the youth hostel.

The results show the predicted effect of structural change in the critical third region, with a reliable reading time advantage for 1a over 1b. However, there was no effect of head position or interaction between the two factors.

A baseline experiment comparing the recent head conditions of (1) with unambiguous controls replicated the structural effect, and showed that it was attributable to a large difference in size between two clear garden path effects.

Overall, these results demonstrate that structural change is an important determinant of reanalysis difficulty, and is clearly the dominant factor over head position.