

1998 - April 2/3 University of Cambridge

CAMBRIDGE MEETING 1998

A scientific meeting will be held at the Department of Earth Sciences, University of Cambridge, Cambridge, on 2/3 April, 1998. The Local Secretary is Dr Andy Calder. Accommodation will be in St John's College.

PROGRAMME

Wednesday 1 April, 1998

8.00 p.m. Welcome Reception in St John's College Bar

Thursday 2 April, 1998

Tilley Lecture Theatre, Department of Earth Sciences

9.00 Patrick Haggard and Martin Eimer* (University College London and University of Cambridge)

Brain events related to conscious representations of action.

9.30 Max Roberts* (University of Essex. Introduced by Professor Mike Burton)

Inspection times and the selection task: Are they relevant?

10.00 Bernhard Hommel* (Max Planck Institute for Psychological Research Cognition & Action, Munich. Introduced by Professor D. C. Berry)

Automatic spatial coding in perception and memory.

10.30 Coffee

11.00 Rayna Azuma* and Stephen Monsell (University of Cambridge)

Task switching and compatibility between stimulus attribute and response mode.

11.30 Alan Baddeley, Dino Chincotta* and Christobel Meikle* (University of Bristol)

Is the central executive necessary for switching attention?

12.00 Invited lecture in honour of W. H.R. Rivers (1864-1922)

Anderson Professor J. B. Derogowski (University of Aberdeen)

W. H. R. Rivers and cross-cultural psychology: *l'eminence grise*.

1.00 Lunch

2.00 Gail Robinson*, James Blair and Lisa Cipolotti (National Hospital for Neurology and Neurosurgery, University College London and MRC)

Cognitive Development Unit, London)

Dynamic aphasia: an inability to select between competing verbal responses?

2.30 Naoki Shibahara*, Helen E. Moss, and Lorraine K. Tyler (Birkbeck College, London and University of Cambridge)

Hemispheric differences in the processing of adjectives.

3.00 Evan Heit (University of Warwick)

Influences of background knowledge and category members on categorization.

3.30 Tea

4.00 Robert Goldstone* (Indiana University. Introduced by Professor Mike Burton)

Dimensionalisation during category learning.

4.30 Ian A. Apperly* (University of Birmingham. Introduced by Professor Elizabeth Robinson)

Children's persisting difficulties with the partial nature of representations.

5.00 E. J. Robinson and S. Beck* (University of Birmingham)

What do children treat as "fact" in counterfactual reasoning? The case of the counterfactual.

5.35 Business Meeting (Members only).

6.00 Twenty Sixth Bartlett Lecture.

Emeritus Professor Richard L. Gregory

(University of Bristol)

Truths from Illusions.

7.30 Reception (Old Music Room, St John's College).

8.00 Dinner (Wordsworth Room, St John's College).

Friday 3 April

START OF PARALLEL SESSION

Parallel Session A: Tilley Lecture Theatre, Earth Sciences

9.00 Paul Rodway* and Astrid Schepman* (University of Abertay, Dundee. Introduced by Dr Leona Elder)

Negative priming requires stimulus offsets.

9.30 Jackie Andrade*, Alan Baddeley and Jonathan Kolodny* (University of Sheffield and University of Bristol)

Artificial grammar learning as a model for natural language acquisition: the role of working memory.

10.00 Arlina Import* and Zoltan Dienes (University of Sussex)

The role of element location in implicit learning of simple remote contingencies.

10.30 Coffee

11.00 Elizabeth Bacon* and Jean-Marie Danion* (INSERM, Unit 405, Strasbourg. Introduced by Dr M. Boucart)

The effects of the anxiolytic drug lorazepam on memory and metamemory.

11.30 Luis. J. Fuentes, Linda. K. Langley*, J. Bruce Overmier*, Christine Bastin de Jong* and Margaret M. Prod'Homme* (Universidad de Almeria, Spain and University of Minnesota, U.S.A)

Attention network functioning in younger adults, older adults and adults with Alzheimer's disease.

12.00 Markèta. Caravolas* (University of York. Introduced by Professor M. J. Snowling)

Quèbec French, first graders.. categorization of three classes of vowels.

12.30 Susan E. Gathercole, Susan J. Pickering*, Sarah H. Peaker* and Melanie Hall* (University of Bristol)

A method for estimating the pure capacity of the phonological loop: serial recognition.

1.00 Lunch

Parallel Session B Biffen Lecture Theatre, Department of Genetics

9.00 Nicholas J. Hargaden*, Glyn W. Humphreys and Linda R. Wheeldon (University of Birmingham)

Evidence for lexical priming of phonological encoding in post-cue picture naming.

9.30 R. J. R. Blair, J. S. Morris, C.D. Frith, D. I. Perrett and R. J. Dolan* (University College London, Wellcome Department of Cognitive Neurology and University of St Andrews)

Differential neural responses to sad and angry facial affects: The roles of the amygdala and orbitofrontal cortex.

10.00 Cordelia Fine* and James Blair (University College London)

Discrepancy, somatic markers and autonomic arousal.

10.30 Coffee Symposium:

Social communication and the face. (Organised by Dr Andy Calder)

11.00 Andrew J. Calder, Andrew J. Young and Jill Keane* (MRC Applied Psychology Unit, Cambridge and University of York)

Configural processing of facial expression.

11.30 Stefan R. Schweinberger*, Mike Burton and Stephen W. Kelly* (University of Glasgow)

An asymmetric relationship between identity and emotion perception: Experiments with morphed faces.

12.00 Simon Baron-Cohen (University of Cambridge)

Do the eyes convey information about the mind?

12.30 M. L. Phillips*, A. W. Young, S. K. Scott*, A. J. Calder, C. Andrew*, V. Giampietro*, S.C. R. Williams*, E. T. Bullmore*, M. Brammer* and J. A. Gray (Institute of Psychiatry, Denmark Hill, University of York, MRC Applied Psychology Unit, Cambridge and Institute of Psychiatry, De Crespigny Park)

A differential neural response to stimuli displaying fear and disgust presented in both visual and auditory modalities.

1.00 Lunch

Friday 3 April (afternoon)

Tilley Lecture Theatre, Earth Sciences.

2.00 Alan Johnston and Peter W. McOwan* (University College London and University of Reading)

The role of orientation and direction columns in the perception of sharp motion boundaries.

2.30 Charmaine Bill* and Oliver Braddick (University College London)

Can information about visual motion direction be combined across different speeds?

3.00 Tea Symposium: Implicit and explicit phonological processing in reading acquisition: The role of phoneme and rhyme awareness.
(Organised by Professor Uta Frith)

3.30 Jean Emile Gombert*(Universitat de Haute Bretagne, Rennes. Introduced by Professor Uta Frith)

Epi- and meta-linguistic processes.

4.00 Heinz Wimmer*, Bianca Nicolussi*, Heinz Mayringer* and Karin Landerl* (University of Salzburg. Introduced by Professor Uta Frith)

Sensitivity for word initial sounds and for rhyme and learning to read in a transparent orthography.

4.30 P. H. K. Seymour and L. G. Duncan* (University of Dundee)

Small to large unit progression in reading and linguistic awareness.

5.00 Usha Goswami (University College London)

Analogies in reading development: Implicit or explicit?

5.30 Discussant: Maggie Snowling (University of York)

6.00 Meeting Ends.

ABSTRACTS

Brain events related to conscious representations of action.

Patrick Haggard¹ and Martin Eimer²

1. University College London

2. University of Cambridge

Libet et al. (1983) asked subjects to watch a clock rotating every 2.56 s, to move their hand of their own free will, and to report the clock time when they moved their hand (M awareness) or when they first "felt the urge" to move their hand (W awareness). Libet et al found that the Bereitschaftspotential (BP) of the EEG (a slow negativity over the vertex) occurred some 700 ms before movement onset, while W awareness occurred some 200 ms before movement. Libet et al implied that the Bereitschaftspotential might be the unconscious cause of the subjective conscious experience of willing an action. We have recorded EEG in 8 subjects in a voluntary movement task similar to that used by Libet et al. We applied a median split to each subject's data, and calculated BPs separately for trials with early W awareness and for trials with late W awareness. Contrary to Libet's account, we found that trials with early W awareness had later BP onsets than trials with late W awareness. Since variations in a cause should produce concomitant variations in an effect, our finding rules out the BP as a cause of W awareness. We then computed the lateralised readiness potential (LRP) for early and late W awareness trials. The LRP reflects the increased activity of contralateral motor cortex prior to, and during response execution, and is assumed to be an index of unimanual response activation that follows response selection. We found that trials with early W awareness had significantly earlier LRP onsets than trials with late W awareness and conclude that the processes reflected by the LRP might cause W awareness. Our awareness of action may not be tied to general preparation (as measured by the BP), but rather to representation of the specific action we plan to make.

Libet B., Gleason C. A., Wright E. W. & Pearl D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential). The unconscious initiation of a freely voluntary act. *Brain*, 106, 623-642.

Inspection times and the selection task: Are they relevant?

Max Roberts (Introduced by Professor Mike Burton)

University of Essex

Five studies are reported based upon Evans's (1996) inspection time paradigm in which participants are required to solve computer presented Wason Selection Task problems while simultaneously using a mouse to indicate which card is currently under consideration. It had previously been found that the selected cards were inspected for considerably longer than the non-selected cards, and this was taken as support for the existence of preconscious heuristics which direct attention towards relevant aspects of a problem. The first study fully replicated Evans's original findings. However, further studies showed that by systematically varying the task format, it was possible to reduce the effect, make it vanish, or even reverse it. The possibility that the task alterations modified the actions of the heuristics (and hence the relevances of the cards) is considered but rejected on the grounds that the actual selections made by the participants remained largely unchanged from study to study. It is therefore suggested that these effects are artifactual and that modifications are required to Evans's theory of reasoning in order to account for

them.

Automatic spatial coding in perception and memory.

Bernhard Hommel (Introduced by Professor D. C. Berry)

Max Planck Institute for Psychological Research Cognition & Action, Munich

Task-irrelevant spatial information has been found to decay rapidly after stimulus onset in the Simon task, but to affect behavior over a much longer time range in studies on object-file formation. I will report results from several experiments that aimed at clarifying this apparent contradiction by using a modified Simon task. People responded to the shape of a colored target that appeared as part of a four-object display. Target-color cues preceded or followed the display. With precues, effects of irrelevant spatial target-response correspondence were obtained independent of the cue-stimulus interval, while postcues produced an effect with longer intervals only. Reliable effects were also obtained with cues presented after display offset and if 1 display was followed by 4 cues. Results suggest the existence of two automatic spatial coding processes that follow opposite timecourses and serve different functions.

Task switching and compatibility between stimulus attribute and response mode.

Rayna Azuma and Stephen Monsell

University of Cambridge

We examine the effect of one type of S-R compatibility on the cost to performance of switching between tasks. The stimulus was a rectangle containing "LEFT", "RIGHT" or "XXXX" on its left, right, or in the middle. Subjects switched, every second trial, between responding to the word (LEFT/RIGHT) and indicating which side (left/right) the string was on. Mean RT and interference effects confirmed the intuition that saying "left" to LEFT is more compatible than pressing a left key, while responding to the side with a keypress is more compatible than naming it. We show that (a) switching between the two compatible S-R mappings was less costly than switching between two less compatible mappings; (b) switching between more and less compatible mappings to the same response mode yielded symmetrical switch costs (c) compatibility influenced the costs of switching to the side task from, not the cost of switching from the side task to an unrelated task; (d) results (b) and (c) were not appreciably changed by using only neutral stimuli (XXXX on one side, or a centred LEFT/RIGHT). These results seem problematic for Allport, Styles and Hsieh's (1994) claim that the dominant task is harder to switch to, and for their Task Set Inertia theory. We favour an account of switch cost as time consumed by control operations of enabling and disabling S-R mappings and pathways.

Allport, D. A., Styles, E. A., & Hsieh, S. (1994). Shifting intentional set: Exploring the dynamic control of tasks. In C. Umiltà & M. Moscovitch (Eds.) *Attention and Performance XV* (pp. 421-452). Cambridge, MA: MIT Press.

Is the central executive necessary for switching attention?

Alan Baddeley, Dino Chincotta and Christobel Meikle

University of Bristol

A series of experiments attempted to test the hypothesis that the capacity to switch attention is an important function of the central executive component of working memory. The experiments used a variant of Jersild's (1927) paradigm whereby subjects are timed while completing a series of simple arithmetic operations which involve either repeatedly adding 1 to each of a column of single digits, subtracting 1 from each digit, or alternating addition and subtraction. This was combined with a range of secondary tasks, including articulatory suppression, concurrent digit span and "verbal trails", a demanding task that itself involved repeated switching. The results indicated:

1. A small but consistent cost that was present regardless of whether plus and minus cues were present, and was unaffected by concurrent load, broadly replicating the results of Allport, Styles and Hsieh (1995).
2. When the arithmetic cues were omitted, a much larger effect was found, which did interact with concurrent task. The effect was however no greater for elderly subjects, and little greater for auditory trails than for articulatory suppression, despite the fact that these two had dramatically different effects on overall speed of arithmetic performance.

We propose that this latter effect reflects the task of maintaining set and keeping track, which in the present task appears to rely principally on the phonological loop component of working memory. We have so far obtained no evidence for regarding task switching as reflecting a unitary component of executive processing.

Invited lecture in honour of W.H.R. Rivers (1864-1922):

W. H. R. Rivers and cross-cultural psychology: l.eminence grise.

J. B. Deregowski

University of Aberdeen

The paper examines William Hulse Rivers's contribution to Psychology which, unlike his contribution to Anthropology, is not generally appreciated. He deserves better. Not only was he the first lecturer to be appointed to both of the first two departments of psychology in England, but he was also a tireless researcher, particularly concerned with the problems of visual perception and with influence of culture on cognitive activities.

Dynamic aphasia: an inability to select between competing verbal responses?

Gail Robinson¹, James Blair^{2,3} and Lisa Cipolotti¹

1. National Hospital for Neurology and Neurosurgery
2. University College London
3. MRC Cognitive Development Unit, London

We report a patient (ANG) who, following a malignant left frontal meningioma impinging upon Brodmann's area 45, presented a 'pure' dynamic aphasia. Two experimental series were carried out. The first indicated that ANG had a profound impairment in phrase and sentence generation tasks given verbal stimuli which contrasted with her normal ability to describe pictorial scenes and complex actions. The second tested an

hypothesis that dynamic aphasia is due to an inability to select a verbal response to stimuli which activate many competing verbal responses. The prediction that constraining the number of available response options would dramatically improve ANG's ability to generate verbal responses was confirmed using three different verbal generation tasks. We propose that 'pure' dynamic aphasia may be caused by damage to a 'context' module containing units responsible for selection of verbal response options. Furthermore, we suggest that our findings support the view that Brodmann's area 45 is involved in verbal response generation to stimuli which activate many potential response options.

Hemispheric differences in the processing of adjectives.

Naoki Shibahara¹, Helen E. Moss² and Lorraine K. Tyler¹

1. Birkbeck College, University of London
2. University of Cambridge

A growing number of studies have provided evidence that the right hemisphere (RH) can comprehend word meanings, especially high-imageable and concrete nouns. To date, however, there have been few systematic studies of hemispheric differences in the processing of adjectival meanings. We used a semantic priming paradigm to investigate whether the RH is able to process the meanings of adjectives, and if so, how RH processing differs from LH processing. We manipulated the relationship between prime and target, including (a) antonym pairs (e.g. hot-cold), (b) adjective-concrete noun pairs that were either high (e.g. raw meat) or low (e.g. hot water) in normative association strength, (c) adjective-abstract noun pairs that were high (e.g. tight fit) or low (e.g. hot-issue) in association strength. We also contrasted priming for linguistically marked and unmarked adjectives. The major results were that: (1) robust antonym priming was supported by both hemispheres, (2) priming for noun phrases without strong association showed different patterns over time across the two hemispheres, (3) the markedness of adjectives played an important role in activating adjectival meanings, and (4) the LH was more sensitive to highly associated adjective-noun pairs than the RH. These results are interpreted in the framework of a new model of hemispheric differences in the representation and processing of adjectival meanings.

Influences of background knowledge and category members on categorization.

Evan Heit

University of Warwick

Category learning has a highly interrelated nature, such that what is learned about a new category depends on previous theoretical and background knowledge. A critical goal in categorization research is to identify the cognitive processes involved in integrating prior knowledge with new observations of category members. In the present experiments, subjects learned about categories of persons in a new city, and the joint influences of prior knowledge and observed category members were assessed. These results were analysed with models of categorization that incorporate prior knowledge (Heit, 1994). Two main issues were addressed. First, the pace of learning was varied, in an effort to look at mandatory versus optional influences of prior knowledge. The surprising result was that giving subjects more time during learning led them to make judgements in a non-Bayesian manner. Second, attempts were made to counteract the effects of prior knowledge. It was found that in

some situations, theory and observation could be traded off against one another. Presenting a set of counterexamples could neutralise the effect of prior theories, and presenting a good counterargument was likewise equivalent to some number of observations.

Heit, E. (1994). Models of the effects of prior knowledge on category learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20, 1264 - 1282.

Dimensionalisation during category learning.

Robert Goldstone (Introduced by Professor Mike Burton)

Indiana University

Many models of category learning include an attentional weighting component that emphasises category-relevant dimensions and deemphasises irrelevant dimensions. However, dimensions can only be selectively attended if they have first been isolated by the categoriser. Two experiments explored the possibility that category learning not only directs selective attention to existing dimensions, but can also guide the isolation of dimensions. Arbitrary dimensions were created by generating two morph sequences between photographs of faces. A two-dimensional matrix of faces was then generated by blending values from the two dimensions. Using this matrix of faces, participants were transferred between categorisation tasks that shared relevant and/or irrelevant dimensions. Performance on the final categorisation revealed transfer based on increased attention to relevant dimensions and decreased attention to irrelevant dimensions, but also surprisingly good performance when relevant dimensions became irrelevant and irrelevant dimensions became relevant. In a subsequent experiment, transfer between categorisation tasks was greater when the categorisation rules differed by 90 rather than 45 degrees. Both experiments are consistent with the hypothesis that transfer involving stimuli with novel dimensions is best when categorisations invite the same decomposition of stimuli into dimensions rather than simply similar attention weights.

Children..'s persisting difficulties with the partial nature of representations.

Ian A. Apperly (Introduced by Professor Elizabeth Robinson)

University of Birmingham

The passing of false belief tests at 4-5 years is widely believed to herald a qualitative change in children's understanding of mental representations (e.g., Perner 1991). In Experiment 1 children who passed a false belief test often failed to understand intensional contexts which arose when a puppet got to see but not feel or hear an object. For example, whilst successfully acknowledging that a puppet "doesn't know that the ball is a present", in an intensional context they insist that he does "know that there's a present in the box". This suggests that the common "theory of mind" tasks diagnose an ability that falls well short of full competence in understanding about representations. In experiment 2 we show that the same difference in difficulty extends into children's prediction of another's behaviour on the basis of partial versus absent knowledge. Further, we found children's performance on these tasks to be significantly related to their ability to recognise an ambiguous utterance; a skill that may also require the representation of partial referential relations. We suggest that the inference of full understanding of representations from success on false belief tasks is too strong: It seems that children fail to represent the partial nature of representations.

Perner, S. (1991). *Understanding the representational mind* (1st ed.). Cambridge, MA., MIT Press: A Bradford book

What do children treat as ..'fact..' in counterfactual reasoning? The case of the counternormal.

E. J. Robinson and S. Beck

University of Birmingham

Three and four year olds find it difficult to answer questions about a counterfactual situation (how things would be now if such-and-such had or had not happened), and tend to answer by reporting current reality as they know it. Yet they find it relatively easy to answer a question about a future hypothetical situation (how things will be if such-and-such happens). What if the imaginary future situation runs counter to a strongly established norm? Is a counternormal situation as hard to imagine as a counterfactual one? Eighty 3-4 year olds saw water poured onto a sloping gutter which had a container at each end. Children were asked which container the water would be in had it run the other way (a counterfactual [and counternormal] question), or where the water would be if it ran the other way next time (a future counternormal question). In a control task the water was replaced with a self-powered toy car which could run either up or down the gutter. Performance was good overall, but the future counternormal question was easier than the counterfactuals. We can begin to identify what constitutes the 'facts' which young children find it hard to counter in their reasoning.

Negative priming requires stimulus offsets.

Paul Rodway¹ and Astrid Schepman² (Introduced by Dr Leona Elder).

1. University of Abertay, Dundee
2. University of Edinburgh

Negative priming tasks have traditionally used stimulus offsets between the prime and probe trials. In the natural world, however, selective attention is usually applied to stationary or moving objects which do not abruptly disappear and then reappear. This difference may have important implications for the manner in which inhibitory processes operate in the real world. Four experiments are reported which examined the effects of stimulus offsets on levels of negative priming. In each experiment four stimuli were presented in the centre of a computer screen. During each trial two of the stimuli moved, by different amounts, away from the centre. Subjects were required to respond to the stimulus which moved the furthest and ignore the second stimulus which moved a smaller distance. For each experiment it was found that when stimuli remained on the screen across the prime and probe trials, subjects responded more quickly to targets which were ignored on the previous trial. Thus, a significant facilitation effect rather than a negative priming effect was obtained. Conversely, stimulus offsets between the prime and probe trials resulted in the negative priming effect. Increasing the salience of the boundary between the prime and probe trials did not result in negative priming when an offset between the prime and probe was not present. These findings show that negative priming only occurs when perceptual objects disappear and reappear. The results will be discussed in relation to current theories of negative priming.

Artificial grammar learning as a model for natural language acquisition: the role of working memory.

Jackie Andrade¹, Alan Baddeley² and Jonathan Kolodny³

1. University of Sheffield
2. University of Bristol
3. MRC Applied Psychology Unit, Cambridge

Acquisition of one's native language is unlikely to depend on explicit or deliberate attempts to learn the underlying syntax of the language. In artificial or finite-state grammar learning tasks, participants learn to identify grammatical strings without deliberately trying to identify the grammatical rules during study and without being able to state the rules at test. Artificial grammars may therefore be a useful analogue for studying natural language acquisition by adults in the laboratory. If so, performance on artificial grammar learning tasks should be sensitive to the variables that influence natural language acquisition. Research by Gathercole and Baddeley (e.g. 1990) has demonstrated a possibly causal relationship between children's verbal memory span and their acquisition of the vocabulary and grammar of their native language. Ellis and Sinclair (1996) showed that this is also the case for adults learning a second language. The present paper reports three experiments that investigated the role of verbal working memory in performance on an artificial grammar learning task. Participants in experiment 1 were better at judging the grammaticality of spoken strings made up of phonologically distinct items than phonologically similar items, although performance exceeded chance in both conditions. Experiments 2 and 3 used a dual task manipulation during study of visually and auditorily presented strings respectively. In both cases, concurrent articulation reduced but did not abolish grammar learning. These results indicate that acquisition of artificial grammars, like natural grammars, is enhanced by processing of the grammatical strings in the phonological loop of working memory.

Gathercole, S. E. & Baddeley, A. D. (1990) Phonological memory deficits in language-disordered children: Is there a causal connection? *Journal of Memory and Language*, 29, 336-360.

Ellis, N. C. & Sinclair, S. G. (1996) Working memory in the acquisition of vocabulary and syntax: Putting language in good order. *Quarterly Journal of Experimental Psychology*, 49A (1), 234-250.

The role of element location in implicit learning of simple remote contingencies.

Arlina Import and Zoltan Dienes

University of Sussex

The role of fragment-based knowledge in implicit learning was explored using simple contingency grammars, containing contingent letters separated by random, embedded elements. Performance on contingency grammars is not easily explained by fragment-based accounts because the fragments normally postulated provide insufficient information for accurate classification. Participants exposed to items generated from a contingency grammar accurately classified novel test items when the key contingent elements were separated by uninformative intervening elements. The knowledge acquired was explored using grammars in which letter identity, but not letter order, was governed by rules or in which letter position was invariant. Knowledge of incidence and position of isolated features overshadowed learning of contingencies; in the absence of fragmentary and positional information participants abstracted knowledge of contingencies.

The effects of the anxiolytic drug lorazepam on memory and metamemory.

Elisabeth Bacon and Jean-Marie Danion (Introduced by Dr M. Boucart)

INSERM Unit 405, Strasbourg

The anxiolytic drugs benzodiazepines are known to impair memory. The effects of the benzodiazepine lorazepam (0.026 or 0.038 mg/kg) and of a placebo on metamemory were investigated in healthy volunteers. Accuracy of confidence levels (CL) in the correctness of recalled answers and accuracy of feeling of knowing (FOK) the answers when recall fails were measured using a sentence memory task assessing episodic memory and a task consisting of general information questions and assessing semantic memory. Lorazepam impaired episodic memory. Unexpectedly, it also impaired performance in both the recall and recognition phases of the task assessing semantic memory, suggesting that it decreased the ability to distinguish between correct and incorrect information. In episodic memory, lorazepam 0.038 mg/kg- treated subjects exhibited an impaired CL accuracy, compared to placebo-treated subjects, and their FOK accuracy was at chance. In semantic memory, their overall CL and FOK accuracy was apparently spared. However, these subjects selectively overestimated their CL judgements for incorrect answers; moreover, secondary analyses showed that FOK accuracy for a subset of low-accuracy items was virtually nil. These results suggest that lorazepam impairs metamemory for both episodic and semantic memory.

Attention network functioning in younger adults, older adults and adults with Alzheimer's disease.

Luis. J. Fuentes¹, Linda. K. Langley², J. Bruce Overmier², Christine Bastin de Jong² and Margaret M. Prod'Homme²

1. Universidad de Almeria, Almeria, Spain

2. University of Minnesota, Twin Cities, U.S.A.

Three experiments explored the patterns of attention functioning of younger adults, older adults, and individuals with Alzheimer's disease, using tasks that selectively depend on the anterior or posterior attention networks. To address functioning of the anterior network, in Experiment 1, participants completed a semantic priming task, in which they categorized target words into one of two categories. Prime stimuli preceded the targets, and on most trials, the prime validly indicated the category of the target word. Younger adults demonstrated both benefits in reaction time of a valid prime and costs in reaction time of an invalid prime, while older adults and adults with AD demonstrated benefits only. To address functioning of the posterior network, in Experiment 2, an inhibition of return task was combined with the semantic priming task. Both younger and older adults showed inhibition of return (slower categorization of targets presented at cued locations than at uncued locations), but adults with AD did not. Results from Experiment 3 supported the contention that semantic cueing effects were the result of both automatic and controlled processes. These findings suggest that: (a) functioning of the anterior attention network is impaired with both age and AD, (b) functioning of the posterior attention network is intact with age but shows decline with the progression of AD, and (c) the anterior and posterior attention networks interact.

Québec French first graders.. categorization of three classes of vowels.

Markèta Caravolas (Introduced by Professor M. J. Snowing)

University of York

Vowel awareness and the stability of vowel categories in six year-old, Quèbec French children were examined. Pre-literate children were tested at the outset of first grade and again after six months of formal schooling on a range of vowel categorization tasks, and on literacy tasks at re-test. The impact of phonological variables such as syllable structure, vowel type, and vowel space proximity on vowel categorization performance was assessed. In testing both prior to and after exposure to formal literacy instruction, it was possible to study how children's vowel categories altered over the first months of formal schooling, and, how well vowel awareness predicted later literacy achievement. The results showed that children's categorization skills improved dramatically following reading instruction and their representations became more crystallized. However, factors such as syllable structure and the spectral proximity of certain vowels mediated performance. A predictive relationship obtained between pre-literates' levels of vowel awareness and later reading achievement. These findings add to the existing literature in revealing some important aspects of how children's underlying representations develop prior to and as a consequence of exposure to alphabetic writing systems.

A method for estimating the pure capacity of the phonological loop: Serial recognition.

Susan E. Gathercole, Susan J. Pickering, Sarah H. Peaker, and Melanie Hall

University of Bristol

Recent findings indicate that a significant component of immediate serial recall arises from the reconstructive use of long-term lexical phonological knowledge to complete decayed memory representations. In four experiments using a serial recognition paradigm in which participants have to decide whether or not two sequences are identical or contain an order transposition, the usual substantial benefit to memory sequences containing familiar words over nonwords found in recall procedures is either dramatically reduced or eliminated. It is argued that this task effectively bypasses the reconstructive process applied to memory traces in recall, and hence provides a relatively pure estimate of the capacity of phonological short-term memory.

Evidence for lexical priming of phonological encoding in post-cue picture naming.

Nicholas J. Hargaden, Glyn W. Humphreys and Linda R. Wheeldon

University of Birmingham

Evidence for processes involved in building the sound forms of words for production of speech (phonological encoding) is mixed. In a series of experiments we observed a facilitatory effect on response times of shared phonological information between picture targets and word primes in a post-cue naming task. The effect appeared regardless of the position of the shared information (i.e. word-initial and rhyme pairs), suggesting a lexical locus rather than an effect on sub-lexical phonological encoding. The effect disappeared at a long (1500 msec) post-stimuli delay, but was reinstated when subjects were asked to sub-vocalise a nonsense string, ruling out late articulatory processes. In addition, phonological priming did not occur when subjects were encouraged to use a non-lexical route to production, when written word pairs were used. The results are interpreted in terms of priming facilitating the initial retrieval of word-forms, rather than phonological encoding itself.

Differential neural responses to sad and angry facial affects: The roles of the amygdala and orbitofrontal cortex.

R. J. R. Blair¹, J. S. Morris², C. D. Frith², D. I. Perrett³ and R. J. Dolan²

1. University College London
2. Wellcome Department of Cognitive Neurology, London
3. University of St Andrews

Both the amygdala and orbitofrontal cortex are implicated in regulating emotion. Animal and human studies implicate the amygdala in conditioning to aversive stimuli and orbitofrontal cortex in reversal learning. Both have also been implicated in the processing of the facial expressions of others. Sad facial affect is an aversive stimulus that is crucial for appropriate moral social behaviour while angry facial affect can be considered a cue for behavioural extinction. The cognitive systems subserving the responses to these two facial affects appear to be dissociable. Psychopaths show autonomic responses to anger, but not sad, facial expressions (Blair et al., 1977). The current study used functional neuroimaging to investigate neural activity while subjects processed photographs of sad or angry faces. These faces have been morphed to depict expressions of varying emotional intensity. Increasing the intensity of sad facial expression was associated with increasing activity in the amygdala and cingulate cortex. Increasing the intensity of angry facial expression was associated with increasing activity in orbitofrontal and cingulate cortex. The results provide evidence for dissociable, but interlocking, systems for the processing of negative facial affect. Moreover, and in conjunction with neuropsychological data, they provide some of the first evidence that psychopathy may be a developmental disorder due to amygdala dysfunction.

Discrepancy, somatic markers and autonomic arousal.

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Mandler's discrepancy/arousal model of emotion (e.g. Mandler, 1984) proposes that autonomic nervous system (ANS) arousal follows discrepant events. This model predicts that ANS arousal will follow the discrepant reinforcement of a secondary reinforcer. A discrepant reinforcement can be defined as a reward or punishment that is unexpected in its quantity and/or valence. Two experiments tested the prediction that discrepant reinforcing events would produce an increase in ANS arousal. In the first experiment, an unexpected change in the valence of the reinforcer produced a significant increase in ANS arousal, whereas an unexpected change in the quantity only did not. In the second experiment, it was found that the magnitude of the unexpected change in valence had no effect on the size of the increase in arousal. In contrast to Mandler, Damasio (e.g., Damasio, 1994) proposes that ANS arousal precedes reinforcement, and occurs with the presentation of a secondary reinforcer. This ANS arousal is said to "somatically mark" secondary reinforcers, including those that have previously been associated with discrepant reinforcements. Arousal responses to the presentation of secondary reinforcers were measured in conditions where previously the reinforcement had been expected, unexpected in quantity, or unexpected in valence. No evidence of somatic markers was found in any of the conditions. The implications of these findings for Mandler's and Damasio's models are discussed.

Configural processing of facial expression.

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In Experiment 1 subjects were asked to identify the top (or bottom) half of a facial expression when it was (1) aligned with the bottom half of a different facial expression posed by the same model to create a composite face, and (2) when the same two halves were misaligned to produce a 'noncomposite' face. Results showed that subjects were significantly slower to identify either face half in the composite condition. This result parallels the composite effect for identity shown by Young, Hellawell and Hay (1987). In a second experiment we showed that the same composite effect is found when the two face halves are different models posing different facial expressions, but not when the two models are posing the same facial expression. In a third experiment subjects were presented with composite faces in which expression, identity or both were incongruent across the two face halves. When asked to identify the person shown in the bottom half of these images subjects' RTs were significantly slower when the incongruent attribute was identity. However, when they were asked to identify the expression shown in the same half, RTs were significantly slower if expression was incongruent across the two halves. Furthermore, there was no further significant cost in RTs if the unattended attribute (e.g., expression in the identity task) was also incongruent across both halves. These results have implications for configural processing of identity and expression.

An asymmetric relationship between identity and emotion perception: Experiments with morphed faces.

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In previous experiments (Schweinberger & Soukup, in press), we found an asymmetric relationship between the perception of facial identity and expression, in the sense that identity was perceived independent of, but exerted influence on, expression analysis. Here we investigated whether such an asymmetric relationship may be related to a different perceptual salience of identity and expression information in faces. Stimulus faces were morphed across identities within a given emotional expression, or were morphed across emotions within a given identity. In Experiment 1, consistent classifications of these images were demonstrated across a wide range of morphing, with only a relatively narrow category boundary. At the same time, classification reaction times (RTs) faithfully reflected the increased perceptual difficulty of the morphed images. Experiment 2 investigated the effects of variations in the irrelevant dimension on judgements of faces with respect to a relevant dimension, using a Garner-type speeded classification task. RTs for expression classifications were strongly influenced by irrelevant identity information. In contrast, RTs for identity classifications were unaffected by irrelevant expression information, and this held even for stimuli in which identity was more difficult to discriminate than was expression. This suggests that differences in perceptual salience do not explain the asymmetric relationship between identity and emotion perception.

Schweinberger, S.R., & Soukup, G.R. (in press). Asymmetric relationships among the perception of facial identity, emotion, and facial

speech. *Journal of Experimental Psychology: Human Perception and Performance*.

Do the eyes convey information about the mind?

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Traditional models of face processing consider such aspects of the face as identity, gender, and emotion recognition. Such models tend to overlook the function of inferring a broad set of mental states (beyond just the emotions) from face processing. In this paper, I consider this "mentalizing" function, and ask if viewing the eyes is particularly important for making inferences about another person's mental states. Experiment 1 tests this by presenting different stimuli, either the eyes, mouth, or whole face, with a forced choice mental state judgement. Experiment 2 does the same in relation to normal adults or adults with high-functioning autism or Asperger Syndrome. Experiment 3 looks at cerebral blood flow in such autistic and normal brains whilst the subject is doing the task, using fMRI. Results suggest (1) the eyes do contain sufficient information to make judgements about even complex mental states, (2) normal females may be better at this than normal males, (3) even autistic patients with normal IQ have difficulties in using decoding another's eyes in this way, and (4) when they do, they use a different neural strategy to normal adults.

Key References: *Visual Cognition*, 4, 311-331; *JCPP*, 38, 813-822; *Child Dev.*, 68, 48-57.

A differential neural response to stimuli displaying fear and disgust presented in both visual and auditory modalities

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Recent investigations of the neural substrate for perception of emotive stimuli have highlighted the amygdala in appreciation of fearful stimuli, whilst the anterior insula and components of a cortico-striatal-thalamic circuit, implicated in appreciation of offensive stimuli, have been demonstrated as important in the perception of stimuli displaying disgust. Studies to date have, however, relied primarily on the employment of visual, especially facial, stimuli rather than stimuli presented in other sensory modalities. To our knowledge, there has been no study investigating the neural substrate underlying perception of a specific emotion within the same individual using stimuli from different modalities. We examined the neural response in the same individuals to stimuli displaying fear and disgust presented in both visual and auditory modalities. In two experiments, subjects were presented with black-and-white grey-scale images depicting prototypical facial expressions of either fear or disgust, contrasted with faces displaying a mildly (25%) happy expression. In the other two experiments, subjects heard non-verbal sounds classified as displaying either fear or disgust, contrasted with sounds classified as mildly happy. Subjects were requested to decide the sex of

each face or sound and press one of two buttons accordingly with the right thumb. Fearful stimuli of either modality activated primarily the amygdala. Facial expressions of disgust activated the anterior insula, and both visual and auditory stimuli displaying disgust activated striatal components of the above circuit. These results demonstrate for the first time that the neural response to stimuli displaying a specific emotion is largely independent of the sensory modality in which the stimuli are presented.

The role of orientation and direction columns in the perception of sharp motion boundaries.

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The fact that the visual system computes motion and direction in approximately 24 directions simultaneously appears to contradict requirements for efficient coding of visual information in the brain. In principle we can represent velocity information in a two dimensional image with just two independent components. Typically neurones sensitive to motion integrate information over neighbouring regions of space. This averaging process should have the effect of smoothing out local variation but will also tend to undermine the representation of sharp discontinuities at motion boundaries. Here we describe a model based on the analysis of local measures of image speed, computed as a function of radial direction, which integrates motion information over a local region but which also provides sharp transitions at both sheering and compressive motion boundaries.

Can information about visual motion direction be combined across different speeds?

Charmaine Bill and Oliver Braddick

University College London

The encoding of visual motion must include information about both direction and speed. We have studied the interaction of these differently encoded dimensions, by testing whether information from different speeds can be integrated in a directional judgment. Directional performance was measured from the coherence threshold (% 'signal' dots in noise) required to discriminate two directions of global flow, differing by +/-10 degrees either side of vertical, in a random dot kinematogram. When all signal dots moved at a single speed, coherence threshold was found to be a U-shaped function of the speed of the signal dots between 0.5 and 64 deg/sec. In mixed-speed experiments, signal dots moved in one direction but at two different speeds, 'slow' (0.5 or 1 deg/sec) and 'fast' (8 deg/sec) chosen from either side of the "U" to have a similar threshold. In one experiment, coherence threshold was measured by varying the percentage of dots added to a subthreshold 'base' signal of either the same or different speed in noise. Thresholds were lower when the added dots and the base signal had the same speed than when they were mixed, suggesting little or no integration of directional information across speeds. In a second experiment, the total number of signal dots was varied in a mixed signal equally divided between slow and fast dots. In this case, some observers showed as low a threshold for the mixed speed signal as for a single speed, suggesting effective integration. These results suggest that human vision may be able to operate with alternative strategies, either separating information from different speeds, or combining them. These may reflect alternative segmentations of the motion

display into 'signal' and 'background', which may depend on the relative distribution of speeds.

Epi- and meta-linguistic processes.

Jean Emile Gombert (Introduced by Professor Uta Frith)

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The literature provides contradictory data concerning, on the one hand, the development of phonological awareness, and on the other hand, the relationships between phonological knowledge and reading acquisition. These contradictions can be resolved if a distinction is made between implicit epilinguistic knowledge and explicit metalinguistic control. At an implicit level, there is a precociously developing sensitivity to salient sub-syllabic units, e.g. onset and rime. This sensitivity is used by the cognitive system as soon as it encounters regular print-speech relationships in its environment. At an explicit level, phonemes are learned in relation to graphemes when the child is taught to read, providing they are already organised implicitly in LTM. Some results from experiments will be presented and discussed within this theoretical framework.

Sensitivity for word initial sounds and for rhyme and learning to read in a transparent orthography.

Heinz Wimmer, Bianca Nicolussi, Heinz Mayringer and Karin Landerl (Introduced by Professor Uta Frith)

University of Salzburg, Austria

In comparison to English children, German speaking children have a comparatively easy task in learning to read and to spell. This is due to the consistency of the German orthography and to a synthetic phonics teaching approach. Furthermore, the reading and spelling difficulties of German dyslexic children look quite different from those of English dyslexic children, while they show similar phonological impairments. This provides a window on the relationships between phonological and orthographic representations uncontaminated by orthographic irregularities which can often only be resolved at the whole word level. For the present study we selected from about 500 boys those children with reading scores below percentile 5 at the end of grade 1 and at the end of grade 3. Via discriminant analyses we then examined which of the set of measures taken at the beginning of grade 1 (naming speed, phonological short-term memory, phonological sensitivity, nonverbal skills) discriminated between the learning disabled and control children. Naming speed turned out to be a most potent predictor. However, poor sensitivity for word beginnings was of additional importance for grade 1 disabilities, whereas poor rhyme sensitivity was important for grade 3 disabilities. These results are discussed in relation to different size units in phonological processing and the building up of orthographic word representations.

Small to large unit progression in reading and linguistic awareness.

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University of Dundee

There is much evidence to support the idea that the natural progression in awareness of speech sounds is from large units (syllables, rimes) towards small units (phonemes). It has been suggested that literacy development might beneficially follow the same large-to-small pathway. However, when beginning readers are administered explicit phonological tasks which directly contrast phonemic units and rime units it is found

that phonemes appear to enjoy priority over rimes. One such procedure is the 'common unit' task. Two spoken syllables are presented and the child is asked to articulate the segment they have in common. 5-6 yr old beginning readers report common phonemes much better than common rimes. It is argued that these conflicting outcomes can be interpreted in terms of Gombert's distinction between epilinguistic and metalinguistic awareness and the influence of literacy on metalinguistic development. Analogies in reading development: Implicit or Explicit? Usha Goswami University College London Early research investigating children's use of analogies in learning to read assumed that orthographic analogies were made spontaneously and implicitly. Implicit phonological processing was assumed to underlie the analogy effect, as children's early rhyme awareness was thought to govern their use of analogy. Recently, research by other groups has suggested that the use of rhyme analogies increases as children gain more knowledge about their orthographies, with older children using more analogies. The possibility that two different processes are being studied is discussed in this talk. Early implicit knowledge about rhyme may govern early analogising in particular experimental conditions, but growing explicit awareness of rhyme coupled with increasing orthographic knowledge may be necessary for the strategic (and explicit) application of analogy to reading development.