

2001 - January 4/5 University College London

LONDON MEETING 2001

A scientific meeting will be held at the Department of Psychology, University College London on 4/5 January, 2001. The local organiser will be Dr Jamie Ward.

EPS Prize Lecture

Thursday 4 January 5.30-6.30

Large-scale space and episodic memory

Neil Burgess, Department of Anatomy and Institute of Cognitive Neuroscience, University College London

Symposium:

Friday 5 January 9.00-1.00

Symposium in Honour of Jeffrey Gray

Organisers Robin Morris, Helen Hodges and Helen Cassaday

Presentations

Sessions will be held in the Ground Floor and Lower Ground Floor Lecture Theatres of the Psychology Department (26 Bedford Way, WC1). Both theatres have data projectors available for Powerpoint presentations. Presenters may provide their own laptops and dongles, or bring disks for the on-site computers which run Powerpoint 97 under Windows NT/2000. Any queries about facilities in the theatres should be sent to the local organiser, Dr Jamie Ward (jamie.ward@ucl.ac.uk)

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

There will be a drinks reception on Thursday evening at 6.30 in the third floor common room. The conference dinner will be at 7.30 at Bertorelli's, 19-23 Charlotte Street, London WC1 - (020-7636 4174). A booking form is enclosed.

THURS 4 JANUARY a.m.

START OF PARALLEL SESSION

Session A

Ground Floor Lecture Theatre

9.30 Alan Wing and Martine Gilles* (University of Birmingham.)

Keeping your grip as you get older: age-related changes in manipulation dynamics

10.00 Steffan Kennett*, Marisa Taylor-Clarke* and Patrick Haggard (Institute of Cognitive Neuroscience, University College London)

Non-informative vision enhances tactile acuity

10.30 COFFEE

11.00 Geoff Patching* and Tim Jordan (University of Nottingham)

Hemispheric asymmetry and letter migrations: Orthographic interactions between bilaterally presented words

11.30 Rachel Mycroft*, Marlene Behrmann* and Janice Kay (University of Exeter)

Letter-by-letter reading: A visual processing problem whose effects are most marked with words

12.00 Kate Mayall, Glyn W Humphreys and Adam C G Cooper* (University of Leicester and University of Birmingham)

The PIG in sPrInG: Evidence for the formation of case-based letter groups

12.30 Glyn W Humphreys, Christian Olivers* and Karina Linnell (University of Birmingham)

Visual marking and grouping by common region: Just one of the old gang

1-2 LUNCH

THURS 4 JANUARY a.m.

START OF PARALLEL SESSION

Session B

Lower Ground Floor Lecture Theatre

9.30 Ann Dowker (University of Oxford)

Marked discrepancies between abilities in normal individuals: the case of estimation and calculation.

10.00 Eamonn Ferguson* and Helen Cassaday (University of Nottingham)

A bio-associative account of Gulf War Syndrome.

10.30 COFFEE

11.00 Emma L Whitcombe* and Elizabeth J Robinson (Birmingham University and Keele University)

Children's decisions about what to believe, their reporting of the source of the belief, and how misreporting influences future decisions

11.30 Sarah R Beck* and Elizabeth J Robinson (Birmingham University and Keele University)

Are children's interpretations of ambiguous messages tentative?

12.00 Emily K Farran*, Christopher Jarrold and Susan E Gathercole (University of Bristol)

Block Design performance in Williams syndrome: A problem with mental imagery.

12.30 Michelle de Haan* and Eleni Kotsoni* (Institute of Child Health, University College London) (Introduced by Professor F Vargha-Khadem)

Categorical perception of facial expressions by 7-month-old infants

1-2 LUNCH

THURS 4 JANUARY p.m.

Session A

Ground Floor Lecture Theatre

2.00 Géry d'Ydewalle and Paul M J van Diepen* (University of Leuven, Belgium)

Early peripheral and foveal processing in fixations during scene perception

2.30 Carlo De Lillo (University of Leicester)

Hierarchical organisation by spatial proximity in sequential pointing

3.00 C Norman* and H J Cassaday (University of Nottingham)

Amphetamine increases conditioning to weak predictors in an aversive but not an appetitive trace conditioning procedure.

3.30 TEA

4.00 Paul N Wilson* (University of Leicester) (Introduced by Professor M Joseph)

Primacy effects and orientation-dependent learning.

4.30 Richard G M Morris, Guiquan Chen*, Karen Chen*, Jane Knox*, Jennifer Inglis*, Andrew Bernard*, Stephen J Martin*, Alan Justice*, Dora Games* and Stephen B Freedman* (Department of Neuroscience, University of Edinburgh and Elan Pharmaceuticals, California)

An age- and amyloid plaque-related deficit in spatial learning in an animal model of Alzheimer's Disease revealed through training to multiple locations.

5.05 **Annual General Meeting** (Lower Ground Floor Theatre) (Members only)

5.30-6.30 **EPS Prize lecture** - Neil Burgess (Department of Anatomy and Institute of Cognitive Neuroscience, University College London)

Large-scale space and episodic memory (Ground Floor Theatre)

6.30 DRINKS RECEPTION (Third Floor Common Room)

7.30 CONFERENCE DINNER, BERTORELLI'S

THURS 4 JANUARY p.m.

Session B

Lower Ground Floor Lecture Theatre

2.00 Pia Wennerholm* (Uppsala University, Sweden) (Introduced by Professor J.A. Sloboda)

The role of high-level reasoning processes in the inverse base-rate effect

2.30 Marc J Buehner* and Patricia W Cheng* (University of Sheffield and University of California, Los Angeles) (Introduced by Professor D Shanks)

From covariation to causation: A test of the assumption of causal power.

3.00 Andy Field* (School of Cognitive and Computing Science, University of Sussex) (Introduced by Professor D Shanks)

More mysteries in evaluative conditioning - contingency awareness, associative learning and attention.

3.30 TEA

4.00 Neil Stewart*, Gordon D A Brown* and Nick Chater (University of Warwick)

(Introduced by Professor D Shanks)

Identification and categorization of simple perceptual stimuli

4.30 James N MacGregor, Edward P Chronicle and Thomas C Ormerod (University of Victoria, British Columbia and Lancaster University)

The influence of goal-directedness in insight and non-insight problem-solving

5.05 **Annual General Meeting** (Lower Ground Floor Theatre) (Members only)

5.30-6.30 **EPS Prize lecture** - Neil Burgess (Department of Anatomy and Institute of Cognitive Neuroscience, University College London)

Large-scale space and episodic memory (Ground Floor Theatre)

6.30 DRINKS RECEPTION (Third Floor Common Room)

7.30 CONFERENCE DINNER, BERTORELLI'S

FRI 5 JANUARY a.m.

START OF PARALLEL SESSION

Session A

Ground Floor Lecture Theatre

Symposium in Honour of Jeffrey Gray

(Organisers Robin Morris, Helen Hodges and Helen Cassaday)

9.00 Introduction: Mike J Morgan (City University)

Michael Joseph (University of Leicester)

Gray's neuropsychology

9.30 Neil McNaughton* (Department of Psychology and Neuroscience Centre, University of Otago, New Zealand)

E pluribus unum: the search for the neural basis of Gray's 'Behavioural Inhibition System'

10.00 J Feldon, C Murphy*, M A Pezze* and H Russig* (Laboratory of Behavioural Neurobiology, The Swiss Federal Institute of Technology)

Withdrawal from different schedules of repeated amphetamine administration as animal models of the attentional dysfunctions associated with schizophrenia.

10.30 COFFEE

11.00 Alan Pickering*, Patricia Brady*, James Jeffs* and Luke Jones* (St George's Hospital Medical School)

Personality correlates of responses to associative mismatch, and to stimuli associated with reward or punishment.

11.30 Veena Kumari*, Jeffrey A Gray and Tonmoy Sharma* (Section of Cognitive Psychopharmacology, Division of Psychological Medicine and Department of Psychology, Institute of Psychiatry)

Neural correlates of procedural learning: An fMRI study in normal and schizophrenic subjects

12.00 Robin G Morris, S Abrahams*, Jeffrey A Gray and Alan Pickering* (Institute of Psychiatry and St George's Hospital Medical School)

The Kamin Blocking effect in patients with unilateral hippocampal lesions

12.30 Leonard E Jarrard* and Terry L Davidson* (Washington and Lee University, Lexington, Virginia and Purdue University, West Lafayette, Indiana)

The hippocampus and inhibitory learning: A 'Gray Area.'

1-2 LUNCH

END OF PARALLEL SESSION

FRI 5 JANUARY a.m.

START OF PARALLEL SESSION

Session B

Lower Ground Floor Lecture Theatre

9.00 Alick Elithorn, David Jones and Mary Norrish* (Children's Hope Foundation, Oxford and Birkbeck College, University of London)

Motor Priming and a dyslexic model. Some unexpected experimental findings

9.30 Jean Vroomen*, Paul Bertelson and Beatrice de Gelder (Tilburg University)

The ventriloquist effect does not depend on the direction of automatic visual attention

10.00 Paul Bertelson and Gisa Aschersleben* (Université libre de Bruxelles and Max-Planck Institute of Psychological Research, Munich)

Crossmodal interaction on the time dimension: evidence from auditory- visual time order judgement

10.30 COFFEE

11.00 Sharon M Thomas* and Timothy R Jordan (University of Nottingham)

To extract different meanings from the same extract: The role of visual speech in perception of auditory emphasis.

11.30 Daisy Powell*, David Plaut* and Elaine Funnell (Royal Holloway and Carnegie Mellon University and the Center for the Neural Basis of Cognition)

Does the Plaut, McClelland, Seidenberg and Patterson (1996) connectionist model of single word reading learn to read in the same way as a child?

12.00 Marc Brysbaert, Mandy Ghyselinck*, and Wendy De Moor* (Ghent University)

Age of acquisition and word processing: News from the Dutch speaking front

12.30 Linda M Moxey* (University of Glasgow) (Introduced by Professor M Burton)

Understanding linguistic versus numeric expressions of quantity

1-2 LUNCH

END OF PARALLEL SESSION

FRI 5 JANUARY p.m.

Ground Floor Lecture Theatre

2.00 Leigh M Riby*, Timothy J Perfect and Brian Stollery (University of Bristol and University of Plymouth)

Dual task performance in older adults.

2.30 André Vandierendonck* and Bernie Caessens* (Ghent University) (Introduced by Professor R Logie)

Costs of switching two task intentions in a single trial

3.00 Lia Kvavilashvili* and Diana Kornbrot (University of Hertfordshire)

Effects of age on prospective and retrospective memory

3.30 Martin A Conway, Christopher W Pleydell-Pearce and Helen L Sharpe* (University of Bristol)

Changes in slow cortical potentials during the construction of true and false autobiographical memories.

END OF MEETING

Keeping your grip as you get older: age-related changes in manipulation dynamics Alan Wing and Martine Gilles

Behavioural Brain Science Centre, School of Psychology, The University of Birmingham.

When moving an object held in a precision grip, the level of grip force must be sufficient to prevent the object from slipping from the hand due to inertial load forces. This paper examines whether co-ordination of grip force with load force due to movement changes as a function of age. We investigated whether modulation of grip force with load force during up and down movements was the same in a group of 16 elderly as in a group of 16 young adults. We also examined whether there were similar patterns of adaptation of grip force to changes in coefficient of friction associated with different object surface textures. As reported by others, we found that elderly adults used a higher level of grip force than young adults during static holding of an object. We also observed increased grip force in the elderly during movement. However, the elevated grip force was appropriate in terms of the lower coefficient of friction estimated for the elderly group. In both groups grip force was greater with the surface with lower coefficient of friction. Moreover there was no difference in the co-ordination in terms of timing of grip force modulation with fluctuation in load force during movement. We conclude that changes in organisation of grip force with age are well adapted to change in hand-object interface properties and ageing does not result in any fundamental change in co-ordination of grip force with load force.

Non-informative vision enhances tactile acuity

Steffan Kennett, Marisa Taylor-Clarke and Patrick Haggard

Institute of Cognitive Neuroscience, University College London

Visual and tactile sensory systems show great interdependence. Sight of a body-part can reduce tactile target detection times, and spatial attentional processes for vision and touch are intimately linked. However, no previous work has investigated whether vision affects the spatial detail of tactile signals, and in particular the spatial resolution of the somatosensory map of the body surface. Effects of vision on tactile acuity were therefore studied using tactile two-point discrimination thresholds of the forearm. Vision of the arm was manipulated while gaze direction and the tactile stimulation were held constant. The arm was placed in a box and could be seen through a semi-silvered mirror when lights inside the box were illuminated (see figure). Trivial vision of the tactile stimulators was

prevented, in conditions allowing the arm to be seen, by briefly extinguishing these lights during tactile stimulus (black triangles in figure) delivery. Tactile acuity was better when the arm was visible than with no view of the arm. Acuity was further improved when the view of the arm was magnified. Control conditions rule out improved spatial orienting and residual vision of the tactile stimulation as possible accounts.

Hemispheric asymmetry and letter migrations: Orthographic interactions between bilaterally presented words

Geoff Patching and Tim Jordan
University of Nottingham

Presenting two words bilaterally, one in the LVF and one in the RVF, is a widely used technique in studies of hemispheric asymmetry. However, although it has been known for many years that when two words are shown together on a screen, letters in one word are often perceived as being present in the other (letter migrations), the role of letter migrations in perception of bilaterally presented words has yet to be determined. To investigate this issue, we used brief, bilateral presentations of words and a revised version of the Reicher-Wheeler task to suppress artefactual influences of partial word information. An eye-tracker ensured accurate presentation in each visual hemifield. A clear RVF advantage obtained together with a substantial number of letter migrations, indicated by participants reporting letters actually presented in the opposite hemifield. However, letter migrations were found only for responses made to LVF words, indicating that RVF words influenced the perceived orthography of words presented in the opposite hemifield. Some implications of these findings for perceiving lateralized words are presented.

Letter-by-letter reading: A visual processing problem whose effects are most marked with words

Rachel Mycroft, Marlene Behrmann and Janice Kay
University of Exeter

This paper presents evidence that letter-by-letter reading arises as a result of a visual impairment that affects both linguistic and nonlinguistic stimuli when they are tested in appropriate ways. Furthermore, the slowing for both types of stimuli follows qualitatively

similar patterns - increasing reaction times with string length and serial left-to-right processing - giving strong evidence for a common underlying impairment that is causal for LBL reading. We observe a relatively greater impairment for words and nonwords than for artificial symbols, mirroring the fact that letter-by-letter readers show impaired reading but do not appear to be so impaired on other everyday visual recognition tasks. We attribute this to a reduction in processing speed, and hypothesise that the problem is more marked for words than other types of visual stimuli because rapid visual processing is essential for effective access to top-down information for words.

The PIG in sPrInG: Evidence for the formation of case-based letter groups

Kate Mayall¹, Glyn W. Humphreys² and Adam C. G. Cooper²

1. University of Leicester

2. University of Birmingham

CaSe MiXiNg has consistently been shown to disrupt word recognition, but the cause of this effect is still a matter of debate. Mayall, Humphreys and Olson (1997) suggested that an important contributory factor to the effect may be the inappropriate grouping of letters of the same case and size, e.g., the M, X and N in MiXiNg. In the present set of experiments participants were presented with 6-letter words in alternate red and green letters. The red letters spelt a 3-letter word, e.g., PIG in SPRING. In separate blocks, participants were required to name either the whole word or the word presented in red. An interaction was found between task and case mixing. When naming the whole string, RTs were slower when the string was presented in mixed case relative to lower or uppercase. However, when naming the 'buried word', RTs were faster when the whole string was in mixed case. When size was alternated but case was kept constant, e.g., spring, the advantage for reading buried words in the mixed condition was substantially reduced. The data suggest that letters of the same case are grouped for lexical access, and that this is not based purely on their common size.

Mayall, K. A. Humphreys, G. W., & Olson, A. (1997). Disruption to word or letter processing? The origins of case mixing effects. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **23**, 1275-1286.

Visual marking and grouping by common region: Just one of the old gang

Glyn W Humphreys, Christian Olivers and Karina Linnell

Behavioural Brain Sciences, School of Psychology, University of Birmingham

In colour-form conjunction search, performance can be made highly efficient if the two sets of distractors are separated in their onset by intervals of 600 msec or more. Watson and Humphreys (1997) proposed that this was due in part to suppression of the 'old' distractors - a process they termed visual marking. Here we examined the effects of grouping by common region on marking. We found that grouping old distractors by common region facilitated search, even with sub-optimal temporal separations of distractors. This occurred when grouping was imposed on the old items only, indicating that coding of old items is important for the effect. We suggest that grouping by common region enables a form of object-based suppression to be imposed on old items, so they can subsequently be ignored by the attentional system.

Watson, D.G. & Humphreys, G.W. (1997) Visual marking: Prioritising selection for new

objects by top-down attentional inhibition. *Psychological Review*, **104**, 90-122.

Marked discrepancies between abilities in normal individuals: the case of estimation and calculation.

Ann Dowker
University of Oxford

Two main studies are reported.

1. 70 unselected state primary school children between the ages of 5;2 and 9;10 were given tasks involving (a) exact mental calculation; (b) derived fact strategy use; and (c) arithmetical estimation. There were high overall correlations between these abilities. However, some children showed marked discrepancies, in either direction, between calculation and estimation.

2. 44 adults from the general population with self-reported mild calculation difficulties, and 28 who reported no such difficulties, were given a set of arithmetic-related tasks, including among others Hitch's (1978) Numerical Abilities Tests and an estimation task for multiplication and division. Again, correlations between calculation and estimation were high, but some individuals showed marked discrepancies, in either direction, between these abilities. Such findings support the view that arithmetical ability is not a single entity, but consists of many components. The relevance of these findings to cognitive psychology and neuropsychology; to findings from brain imaging studies; and to education are discussed. In particular, the author's studies with regard to the componential nature of arithmetic have led to a 'Numeracy Recovery' early intervention pilot project for 6-year-olds who have been identified by their teachers as having difficulty with arithmetic. The children are assessed on different components of early numeracy, ranging from counting to solving word problems, and are given individual remedial work relating to the components in which they demonstrate weaknesses. The results of the project so far are summarized.

A bio-associative account of Gulf War Syndrome.

Eamonn Ferguson and Helen Cassaday.
University of Nottingham,

Ferguson & Cassaday (1999) proposed a bio-associative model to account for Gulf War Syndrome (GWS). This account suggests that the number of physiological challenges given to the veterans produced a non-specific sickness response that became associated with smells (e.g., petrol) concomitantly present in the war zone. On returning to the home environment, these same smells would act as associative triggers for the sickness responses. This account was tested by having veterans (N = 21) complete daily symptom diaries and reporting on the duration and intensity of smells and sounds experienced each day. The comparison of smells and sounds constituted a within subjects contrast. Measures of general baseline symptoms and multiple chemical sensitivity (MCS) were also taken. An index of MCS was included as it has been argued that MCS may also underlie GWS. The data were analysed using a mixture of time series analysis and hierarchical linear modelling. Consistent with the theory the results indicated that the intensity of the previous day's smells (but not sounds) positively predicted the subsequent days level of symptoms. This link was reduced by increased

levels of MCS and enhanced by increased level of general baseline symptomatology. This suggests that treatments based on counter-conditioning to smell should now be tested.

Children's decisions about what to believe, their reporting of the source of the belief, and how misreporting influences future decisions

Emma L Whitcombe¹ and Elizabeth J Robinson²

1. Birmingham University

2. Keele University

In two experiments involving 3-5 year olds we examined relationships between decisions about what to believe and explicit reporting of the basis of those beliefs. In Experiment 1, child and experimenter played a game in which one person saw an uninformative part of a picture and the other saw the whole thing, and made conflicting interpretations of what the picture showed. The child then had a final opportunity to repeat her initial interpretation or accept the experimenter's contradicting suggestion. Children revealed a working understanding of the link between information access and belief insofar as they usually made correct decisions about which source to believe, but they often could not report the source of their belief. In Experiment 2 we induced memory errors about the source of the child's initial interpretation to see whether these would influence subsequent decisions about whether or not to believe the experimenter's contradicting suggestion. Three-4-year-olds children who wrongly recalled that they had seen all of a picture were nevertheless ready to believe the well-informed experimenter's contradicting suggestion, in line with their actual information access. In contrast, 4-5-year olds decisions about what to believe were consistent with their source reports. These findings are discussed in relation to work on the implicit/explicit distinction.

Are children's interpretations of ambiguous messages tentative?

Sarah R Beck¹ and Elizabeth J Robinson²

1. Birmingham University

2. Keele University

As adults we often have to respond to ambiguous information, choosing from a range of strategies available to us. In contrast, young children, until the age of about 6, seem relatively insensitive to ambiguity, tending to make interpretations of ambiguous input and evaluating ambiguous messages as adequate. Previously we have found that young children are able to revise their interpretations of such messages. In two experiments we investigated whether children at this age actually make tentative interpretations of ambiguous input or whether they make confident interpretations which they correct with hindsight. In a first experiment we used a procedure in which the child could seek extra disambiguating information before making an interpretation. We found that 5 and 6 year olds were not able to use this strategy appropriately to improve the accuracy of their interpretations of ambiguous messages. However, an older group of children, 7 and 8 year olds, were successful on this task. In a second experiment the child could act to elicit a second message if the first was inadequate. Once again the older children, but not the younger children used this strategy successfully. We conclude that children's failure to employ these strategies suggests their interpretations of ambiguous messages

are not tentative.

Block Design performance in Williams Syndrome: A problem with mental imagery

Emily K Farran, Christopher Jarrold and Susan E Gathercole

University of Bristol

Williams Syndrome (WS) is a genetic disorder in which weak non-verbal cognitive functioning contrasts to relatively strong verbal ability. Particularly poor performance is observed on block construction tasks such as the Block Design subtest of the Wechsler scales (WAIS, WISC: Wechsler, 1981; 1992). Two requirements of block construction tasks were investigated; local or global processing preference; and the ability to use mental imagery. These factors were manipulated in a two-dimensional block construction task (the Squares task), and were also examined independently by employing the Children's Embedded Figures Test (CEFT; Witkin et al., 1971) and a mental rotation task as direct measures of local or global processing style and mental imagery respectively. The study employed 21 individuals with WS and 21 typically developing (TD) controls matched by non-verbal ability. Performance showed that individuals with WS and TD controls did not differ in processing style. However, the ability to use mental imagery was significantly poorer in the WS group than the TD group. This suggests that weak performance on block construction tasks may relate to an inability to use mental imagery.

Categorical perception of facial expressions by 7-month-old infants

Michelle de Haan and Eleni Kotsoni (Introduced by Professor F Vargha-Khadem)

Institute of Child Health, University College London

While an extensive literature documents infants' abilities to recognize facial expressions of emotion, little is known about the nature of these early categories. Adults show categorical perception of emotional expressions - that is, they show a discontinuity in discrimination at the category boundary of a physical continuum between two expressions, with greater difficulty in discriminating members of the same category than members of different categories (Young et al., 1997). This study was designed to investigate whether infants also show categorical perception of facial expressions. Seven-month-olds were shown photographic quality continua of interpolated (morphed) expressions derived from two prototypes of fear and happiness. In the first experiment we used a visual preference technique to identify infants' category boundary by determining the level of happy-fear blend at which their well-documented preference to look at fearful expressions (e.g. Nelson & Dolgin, 1985) emerged. In the second experiment, we used a combined familiarization-visual preference technique to compare infants' discrimination of pairs of expressions that were equally physically different but that either did or did not cross the category boundary. The results indicate that 7-month-olds: a) like adults, show categorical perception of facial expressions, and b) show a persistent interest in looking at fearful expressions.

Nelson, C.A., & Dolgin, K. (1985). The generalised discrimination of facial expressions by 7-month-old infants. *Child Development*, **56**, 58-61.

Young, A.W., Rowland, D., Calder, A. J., Ectoff, N. L., Seth, A., & Perrett, D. I. (1997). Facial expressions megamix: Tests of dimensional and category accounts of emotional

recognition. *Cognition*, **63**, 271-313

Early peripheral and foveal processing in fixations during scene perception

Géry d'Ydewalle and Paul M J van Diepen

University of Leuven, Belgium

To compare early foveal and peripheral information extraction, visual scenes were masked either foveally or peripherally during the initial 20, 70, or 120 ms of fixations, using an eye-movement contingent display-change technique. The sequential attention model of eye-movement control predicts a substantial effect of early foveal masking while early peripheral masking should not affect the ongoing processing. Foveal masking indeed postponed foveal processing as reflected by a considerable increase of average fixation durations with longer masking. However, there was also an effect of peripheral masking, mainly on the saccade target selections with an increased number of fixations in conjunction with smaller saccade amplitudes. Overall, scene perception was more influenced by early foveal masking than by early peripheral masking, and this is partly in agreement with the sequential attention model of eye-movement control.

Hierarchical organisation by spatial proximity in sequential pointing

Carlo De Lillo

University of Leicester

Serial spatial memory span is typically assessed by tasks involving the reproduction of arbitrary sequence of pointing responses to different locations, such as in Corsi's tapping test where the spatial configuration of the test material is often unstructured or ill-specified. A set of experiments is reported showing that hierarchical forms of organisation emerge when sequences of pointing movements are directed to spatially organised material and suggesting chunking by spatial proximity as a data-reducing process within this domain. The paradigm featured the presentation of clusters of identical icons on a touch screen. The icons flashed according to sequences which, after a short delay, had to be reproduced by touching the screen. The experimental manipulations included: 1) the type of sequence, so that some of them were segregated by spatial clusters and conformed to a spatial chunking principle and some did not; 2) the number of spatial clusters and 3) the number of icons within each cluster.

The frequency of correct reproductions of sequences compatible with a chunking principle was higher than for sequences not compatible with a chunking principle. In sequences compatible with a chunking principle longer response times were observed at cluster boundaries. By contrast, a pattern of response times resembling a serial position curve (as normally observed in memory for unstructured lists of material) emerged during the reproduction of sequence not compatible with a spatial chunking principle. Moreover, the latency to start sequence reproduction increased as a function of the number of clusters in which the sequence was segregated and independently from both the total number of icons to be touched and the size of the clusters in which the sequence was segregated. By contrast, the latencies at cluster boundaries increased as a function of clusters' size. These latter results suggest a hierarchical organisation of the sequence with cluster order represented at the super-ordinate level and independently from the representation of the order of responses within each cluster.

On the basis of these results, it is proposed that the use of spatially organised material in tasks requiring sequential pointing reveals organisational principles which are essential for the characterisation of systems responsible for the temporary holding of spatial information and their interconnection with sequence planning.

Amphetamine increases conditioning to weak predictors in an aversive but not an appetitive trace conditioning procedure.

C Norman and H J Cassaday

University of Nottingham

Schizophrenics and hyperdopaminergic rats show deficiencies in various selective learning tasks, including latent inhibition (LI), Kamin blocking and overshadowing. We are investigating selective learning in a trace conditioning procedure that involves the weakening of the predictive value of a CS, by increasing its temporal distance from the UCS, relative to contiguous controls where UCS immediately follows CS. In line with the effects of amphetamine on LI, we have examined the effects of 0.5mg/kg and 1.5mg/kg d-amphetamine, in both aversive and appetitive procedures. In each case, we also provided an alternative background stimulus. It was predicted that under amphetamine trace groups would learn about the CS despite the temporal discontinuity and that 'hyperattention' should also be demonstrated as increased conditioning to the background.

For the aversive procedure, at higher shock levels, we found conditioning across the trace in the 1.5mg/kg trace group in the absence of increased conditioning (compared with controls) in the contiguous group. Additionally, an increase in conditioning to the background stimulus was seen in the trace groups of all drug conditions, but most markedly in the 1.5mg/kg trace group. In the appetitive procedure, amphetamine reduced the expression of conditioning in the contiguous groups in a dose dependent manner and did not produce conditioning to the trace CS or the background stimulus.

Thus amphetamine (at a dose which disrupts LI) produced 'hyperattention' in aversive but not appetitive trace conditioning procedures. These results are comparable to the effects of amphetamine on LI and suggest that LI and trace conditioning may rely on the same neural substrates.

Primacy effects and orientation-dependent learning.

Paul N Wilson (Introduced by Professor M Joseph)

University of Leicester

Wilson, Tlauka & Wildbur (1999) found that when people read a text description of a brief tour through city streets connected at right-angles, they were faster and more accurate at making direction judgements that were aligned with the first part of the route than those that were contraaligned with the first part of the route. This orientation-dependent primacy effect has recently been reported by other authors, and it may reflect a general spatial learning phenomenon. However, the effect is not found consistently: for example, in the experiments of Wilson et al, visuo-perceptual experience of an equivalent street route did not lead to orientation-dependent learning. Experiment 1, reported here, replicated the primacy effect from street route text descriptions, and failed to attenuate the effect by elaborating the amount of detail in the text or the amount of

exposure to the text. Experiment 2 found a similar primacy effect when arrays of everyday objects were described in text from two viewpoints. In Experiment 3, asking participants to describe the positions of the objects in the array after each description abolished the primacy effect. The results will be discussed in terms of internal and external spatial reference systems.

Wilson, P.N., Tlauka, M., & Wildbur, D. (1999). Orientation specificity occurs in both small- and large-scale imagined routes presented as verbal descriptions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. **25**, 3,

An age- and amyloid plaque-related deficit in spatial learning in an animal model of Alzheimer's disease revealed through training to multiple locations.

Richard G M Morris¹, Guiquan Chen¹, Karen Chen², Jane Knox¹, Jennifer Inglis¹, Andrew Bernard¹, Stephen J Martin¹, Alan Justice², Dora Games² and Stephen B Freedman²

1. Department of Neuroscience, University of Edinburgh

2. Elan Pharmaceuticals, California

Transgenic mice offer a way of studying the functional consequences of mimicking selected aspects of human neuropathology. One issue on which they may shed light is the contribution of amyloid b-peptide (Ab) plaques to the cognitive decline in Alzheimer's Disease (AD) - an issue that remains one of the central controversies in the study of the disease. PDAPP transgenic mice harbor a familial AD mutation (V717F) in the gene encoding amyloid precursor protein (APP) that is overexpressed under the control of a platelet-derived growth factor promoter. These mice have previously been shown to exhibit age-related deposition of beta-amyloid plaques, other neuropathological changes and a decline in evoked field-potentials, but they and other mutant APP transgenic mice are known to exhibit learning deficits prior to amyloid plaque deposition. We now report, using a novel watermaze testing paradigm, that not only do PDAPP mice display this age-independent deficit in spatial learning, they also exhibit a separate age-related deficit when required to learn new spatial locations. This deficit correlates with b-amyloid plaque burden and is apparent using both cross-sectional and longitudinal designs. Cued navigation is unaffected indicating normal sensorimotor function; object recognition memory is also normal. These findings indicate that Ab-overexpression and/or Ab plaques are associated with disturbed cognitive function and, importantly, suggest that some but not all forms of learning and memory are suitable behavioural assays of the progressive cognitive deficits associated with AD-type pathologies.

The role of high-level reasoning processes in the inverse base-rate effect

Pia Wennerholm (Introduced by Professor J.A. Sloboda)

Uppsala University, Sweden

This work offers a novel account of the inverse base-rate effect, the categorization and judgment phenomenon whereby participants under certain conditions reverse their use of base rates (D. L. Medin & S. M. Edelson, 1988). This rule-based explanation-the elimination model (ELMO)-challenges previous models, which in one way or the other, have focused on the concept of cue-competition. The theoretical contribution of ELMO is a new inferential mechanism according to which participants sometimes eliminate category options that are inconsistent with well-supported inference rules. In five

experiments and one reanalysis seven qualitative predictions by ELMO are tested, most of which are inconsistent with explanations of the inverse base-rate effect in terms of cue-competition. Data are presented that are expected by ELMO, but are incompatible with ADIT (J. K. Kruschke, 1996), as yet the most successful associationist model of the inverse base-rate effect.

Kruschke, J. K. (1996). Base rates in category learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, **22**, 3-26. Medin, D. L., & Edelson, S.M. (1988). Problem structure and the use of base-rate information from experience. *Journal of Experimental Psychology: General*, **117**, 68-85.

From covariation to causation: A test of the assumption of causal power

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1. University of Sheffield
2. University of California, Los Angeles

The power PC theory (Cheng, 1997) proposes that humans hold the conviction that there are unobservable causal powers in the environment, and that the goal of causal induction is to infer them. We propose that causal power, computed from observable frequencies, provides a normative and descriptive account of human causal reasoning. Previous experiments (Buehner & Cheng, 1997) have demonstrated a substantial and robust influence of power when contingency is held constant and thus refuted most contingency-based and associationist theories. However, these previous studies also seem to have revealed a contingency bias in conditions with constant causal power. Recent reports (e.g., Lober & Shanks, 2000) thus challenged the descriptive accuracy of the power PC theory. We argue that these biases are due to a conflation of reliability and causal strength, despite researchers' efforts to tease them apart. When sufficient measures to disambiguate causal strength from reliability were taken, these biases disappeared. The particular pattern of results we report -- a) an influence of base rate on judgments with identical non-zero contingencies, b) an interaction between the direction of this influence and the type of causal power (generative vs. preventive), c) no contingency bias for conditions with identical causal power, and d) no base rate or outcome density influence for non-contingent conditions -- was uniquely predicted by the power PC theory but contradicts all purely covariation-based accounts, including a benchmark associative learning theory (Rescorla & Wagner, 1972), variants of the DP model, and linear combination models (Schustack and Sternberg, 1981).

More mysteries in evaluative conditioning - contingency awareness, associative learning and attention.

Andy Field (Introduced by Professor D Shanks)

School of Cognitive and Computing Science, University of Sussex

Two studies are described that systematically investigate the role of contingency awareness in evaluative conditioning (EC) in a picture-picture paradigm designed to overcome previously discovered experimental artifacts (e.g. Field & Davey, 1999). Experiment 1 compared conditioned responses for individuals who had contingency awareness enhanced against those for whom awareness was not enhanced using an EC paradigm in which conditioned stimuli (CSs) and unconditioned stimuli (UCSs) were

counterbalanced across subjects. EC effects were obtained in both groups. To investigate the associative nature of these effects, Experiment 2 replicated Experiment 1 but added a non-paired control condition (Field's block/sub-block, or BSB control, 1997). Conditioning effects were observed only in aware individuals compared to control participants. This study is the first to demonstrate true conditioning effects compared to a non-paired control. The implication is that EC is an associative phenomenon, but may not differ from conventional Pavlovian learning. These results are discussed with reference to the confounding effects of attention on awareness.

Identification and categorization of simple perceptual stimuli

Neil Stewart, Gordon D A Brown and Nick Chater (Introduced by Professor D Shanks)
University of Warwick

Categorization research typically assumes that the cognitive system has access to an accurate representation of the absolute magnitudes of the properties of stimuli, and that this information is used in reaching a categorization decision. However, research on identification of simple perceptual stimuli suggests people have very poor representations of absolute magnitude information, and shows that judgments about absolute magnitude are strongly influenced by preceding material. The experiments presented here investigate such sequence effects in categorization tasks. Strong sequence effects were found. Classification of a borderline stimulus was more accurate when preceded by a distant member of the opposite category than by a distant member of the same category (a category contrast effect). It is shown that category contrast cannot be accounted for by modified exemplar or decision bound models of categorization. An alternative memory and contrast model is presented, where categorization is based only on comparison to immediately preceding stimuli. This model is shown to account for the results.

The influence of goal-directedness in insight and non-insight problem-solving

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2. Lancaster University

In a forthcoming article we present findings that the difficulty of the nine-dot problem stems in part from the adoption of rational local strategies that lead to impasse (MacGregor, Ormerod & Chronicle, 2001). Here we extend those findings by comparing the effects of goal directed strategies in two transformation problems, the six-coin and ten-coin problems. The problems are similar in many respects but differ in that the latter is generally regarded as an insight problem, the former not. Nevertheless, the results of two experiments indicated many similarities in responses to the two problems. The hypothesis of goal-directed operator selection successfully predicted (a) subjects' moves, (b) differences in solution rates between the problems, (c) differences in the reproducibility of solutions. The results are discussed in terms of the role of means-ends analysis in insight problem solving, and the factors that cause some problems to be defined as insight problems, others not.

MacGregor, J.N., Ormerod, T.C. & Chronicle, E.P (2001) Information-processing and insight: A process model of performance on the nine-dot and related problems. *Journal*

of Experimental Psychology: LM&C, In press.

EPS Prize Lecture

Large-scale space and episodic memory.

Neil Burgess

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A series of experiments investigated the neural basis of spatial navigation and memory for lifelike events occurring within a virtual town. In these experiments, the right hippocampus was implicated in the representation of large-scale space, while the left hippocampus was implicated in the retrieval of context-dependent episodic information. A computational model of imagery and episodic memory for spatial information is presented, based on the premise that allocentric representations are useful for long term memory while egocentric representations are needed for imagery and action. The extension of such a model of right-hemispheric spatial systems to analogous episodic/verbal systems in the left hemisphere is briefly speculated upon.

Symposium in Honour of Jeffrey Gray

Gray's neuropsychology

Michael Joseph

University of Leicester

Neuropsychology is not what it was. Neuropsychology was the study of brain lesions on symptoms, or, more broadly, on behaviour. After Gray, neuropsychology is the fusion of evidence from every possible neuroscientific approach to provide a unified account of a behaviour, normal or pathological, in terms of brain function. Gray first applied this approach to the study of anxiety. His book, the *Neuropsychology of Anxiety* is a tour de force in many disciplines, as well as being a model of exposition. He brought psychopharmacology and neurochemistry back into the fold of neuropsychology, and extricated them from the brain soup which they previously inhabited.

His next area was the neuropsychology of schizophrenia, and I was the first neurochemist on that team. We studied behaviour in clinical groups, in volunteer subjects, and in animals. We used drugs and brain lesions. We monitored transmitter release during behaviour in freely moving animals. We used SPECT and fMRI scanning in patients and volunteers. We combined these approaches. And we found links between the symptoms of schizophrenia, the dopamine theory, the glutamate theory, and the brain areas showing pathological changes in the disorder. And it helped us to understand the normal functions of these areas and these systems. For light relief we studied the neuropsychology of addiction, again asking 'why?' and 'how?' and not just 'what?'. And other groups which Jeffrey assembled, and in which he played the leading role, studied the neuropsychology of transplantation of brain tissue, and the neuropsychology of consciousness. Neuropsychology is dead. Long live neuropsychology.

E pluribus unum: the search for the neural basis of Gray's 'Behavioural Inhibition System'

Neil McNaughton

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The core of Gray's Neuropsychology of Anxiety is a "Behavioural Inhibition System" (BIS) activated by signals of punishment, non-reward, novelty and innate fear. Its outputs are behavioural inhibition, increased arousal and increased attention. Classical and novel anxiolytic drugs act directly on quite different receptor systems and share, in the clinic, only an action on anxiety. We have shown that they also share actions on noradrenergic input and on hypothalamic inputs to the septo-hippocampal system (SHS). These multiple actions change the functioning of the SHS and so change behavioural inhibition and attention. Davis, Le Doux and others have shown that classical and novel anxiolytic drugs act on the amygdala but not the SHS to affect arousal. Both the BIS and specifically anxiolytic action are thus neurally distributed. The components of the BIS appear to represent a set of "rules of thumb" independently activated by approach to danger. The multiple sites of action of anxiolytic drugs may, then, have evolved to allow modulation of defensive approach by some endogenous anxiolytic or anxiogenic hormone-like compound. The anxiolytic drugs may, then, provide the best way of defining the BIS both neurally and psychologically.

Withdrawal from different schedules of repeated amphetamine administration as animal models of the attentional dysfunctions associated with schizophrenia.

J Feldon, C Murphy, M A Pezze and H Russig

Laboratory of Behavioural Neurobiology, The Swiss Federal Institute of Technology

Jeffrey Gray and colleagues have suggested, based on a common underlying neural mechanism (the mesolimbic dopaminergic system), a potential relationship between the consequences of exposure to drugs of abuse (affecting the 'reward system') and "the cognitive functions that go awry in acute schizophrenia". Based on this assumed relationship, we have recently attempted to determine whether withdrawal from repeated amphetamine (AMPH) administration might also elicit behaviors consistent with animal models of schizophrenia, specifically, disruptions in latent inhibition (LI) of two-way active avoidance and prepulse inhibition (PPI) of startle. Two different schedules of administration were used: either 6 days of escalating (ESC) doses of AMPH (1-5 mg/kg, i.p.) or 5 days of daily intermittent (INT) injections (1.5 mg/kg, i.p.). The ESC schedule disrupted LI, while the INT schedule enhanced LI. PPI did not differ between AMPH and control groups during withdrawal from either schedule of administration. Interestingly, animals withdrawn from either schedule of AMPH administration show evidence of an enhanced conditioned fear response as well as drug sensitization. The implication of the entire set of results for the development of animal models of the positive (ESC) and negative (INT) symptoms of schizophrenia will be discussed

Personality correlates of responses to associative mismatch, and to stimuli associated with reward or punishment

Alan Pickering, Patricia Brady, James Jeffs and Luke Jones

St George's Hospital Medical School

Gray's personality theory equates the major human temperament dimensions of anxiety and impulsivity to interindividual variations in the reactivity of the behavioural inhibition system (BIS) and behavioural activation system (BAS) respectively. Many studies have tested the theory, usually by looking for differential responses to signals of reward and punishment as a function of anxiety and impulsivity. Past results have been mixed. The first experiments in the present research investigated the personality correlates of behavioural responses to a BIS-activating stimulus (associative mismatch) that has not previously been studied with human subjects. In line with predictions, responses to associative mismatch were correlated with anxiety, as were the responses to geometric stimuli previously associated with an ecologically- valid punishment. However, the relationships with anxiety differed in various respects. Extraversion and other measures of impulsivity were associated with responses to geometric stimuli previously associated with reward. This correlation was independent of, and additive to, the effects of associative mismatch. In another study, verbal instructions about a possible impending ecologically-valid punishment produced short-lived behavioural effects that were associated with anxiety. Finally, the methods above formed the basis for exploratory fMRI studies that attempted to identify the activation of the BIS by appropriate stimuli.

Neural correlates of procedural learning: An fMRI study in normal and schizophrenic subjects

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Procedural learning (PL) is a type of rule-based learning in which performance facilitation occurs with practice on task without the need for conscious awareness. Impaired PL is found in patients with Parkinsonism, Huntington's disease, cerebellar degeneration, prefrontal damage, and in schizophrenic patients receiving conventional antipsychotics. We performed functional magnetic resonance imaging (fMRI) during a blocked, periodic sequence learning task to two groups of subjects: (i) healthy subjects, and (ii) schizophrenic patients on conventional antipsychotics. Normal subjects showed significant PL, but patients, as expected, did not. In normal subjects, PL was associated with cerebral responses in the striatum, thalamus, cerebellum, precuneus, medial frontal lobe, and cingulate gyrus. No regions, except the anterior inferior gyrus, were significantly activated in patients. The caudate nucleus, thalamus, precuneus, and sensorimotor regions were activated significantly differently between the two groups. The power of activation in the thalamus, striatum, precuneus, cingulate gyrus and BA 6 was related to the magnitude of PL in normal subjects. Our findings demonstrate: (i) involvement of the striatum, cerebellum, thalamus, cingulate gyrus, precuneus, and sensorimotor regions in PL, and (ii) substantial functional neuroanatomical difference between normal and schizophrenic subjects. Impaired PL in schizophrenia may reflect the effect of conventional antipsychotics via altered striatal activity.

The Kamin Blocking effect in patients with unilateral hippocampal lesions

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1. Institute of Psychiatry, London
2. St George's Hospital Medical School

Attenuation of the Kamin Blocking effect is thought to be caused by selective lesions of the septo-hippocampal system in animals, and is interpreted as being due to an inability to select irrelevant stimuli. To investigate whether this applies to humans, a within-subject version of the Kamin Blocking paradigm was applied to 30 patients with unilateral hippocampal lesions, associated with mesiotemporal lobe sclerosis (16 right and 14 left hemisphere), comparing their performance to 30 matched control subjects. Attenuation was seen in the patients with left hippocampal lesions, but an enhancement of blocking was seen in those with right hippocampal lesions. Limbic damage in the dominant hemisphere may result in attenuation of blocking, in common with schizophrenia, in which blocking attenuation and dominant hemisphere limbic pathology is more likely to be found.

The hippocampus and inhibitory learning: A 'Gray Area.'

Leonard E Jarrard¹ and Terry L Davidson²

1. Washington and Lee University, Lexington, Virginia
2. Purdue University, West Lafayette, Indiana

It is well established that the hippocampus plays an especially important and selective role in the handling of spatial information in the rat. A question of considerable interest is whether a single fundamental process or several different behavioral processes are affected when the hippocampus is removed selectively. An early view was that the hippocampus is involved in inhibition. In 1982 Jeffrey Gray proposed the 'behavioural inhibition system', a model in which the capacity of animals to inhibit ongoing behavior was seen as depending on septo-hippocampal functioning. While there were a number of experiments published that generally agreed with this early formulation, for several reasons investigators in the area turned their attention in other directions. Recent studies from our laboratories (and others) will be reviewed that were designed to investigate the possible involvement of the hippocampus in learned inhibition. Selective neurotoxin lesions of hippocampus were employed in rats, together with a number of nonspatial, appetitive Pavlovian conditioning paradigms that were designed to study inhibitory processes. The results of these studies support the view that the hippocampus is involved in the learning of certain inhibitory associations.

Motor Priming and a dyslexic model. Some unexpected experimental findings

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2. Birkbeck College, University of London

The addition of a Motor Priming procedure as a controlled independent variable to a classic reaction time protocol creates an experimental design which can be productive of novel data. A method of motor priming is briefly described and its application to experimental design illustrated with two protocols. Data from a number of normal subjects with a range of reading skills is presented.

The data is significant statistically and throws light on some current models for intrahemisphere visual computation and the interhemispheric integration of visual data.

The analysis presented provides support for genetic theories postulating a structural basis for gender differences in verbal and non verbal abilities.

The experimental protocol is based on sensory and motor priming techniques developed by the late George Ettlenger and the theoretical interpretation to the theories of biological individual differences developed by Galton Sheldon and to E.T. Hall's Theory of Evolution by Extension.

Fulton, John F. & Keller, Allen D. "The Sign of Babinski: A study of the Evolution of Cortical Dominance in Primates". Springfield, Baltimore, Charles C Thomas 1932.

Hall, E. T. (1977) Beyond culture, New York, Anchor Press.

Ribot TH. Trans Frances Welby (1899) "The Evolution of General Ideas", Kegan Paul.

The ventriloquist effect does not depend on the direction of automatic visual attention

Jean Vroomen, Paul Bertelson and Beatrice de Gelder
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Previously, we showed that the visual bias of auditory sound location, or ventriloquism, does not depend on the direction of deliberate, or endogenous, attention (Bertelson, Vroomen, de Gelder, Driver, P&P, 2000). The present study examined a similar question concerning automatic, or exogenous, attention. The experimental manipulation was based on the fact that exogenous visual attention can be attracted towards a singleton. A display was used which consisted of a row of four bright squares with one square, in either left- or right-most position, smaller than the others, serving as singleton. Subjects made dichotomous left-right judgements concerning sound bursts, whose successive locations were controlled by a psychophysical staircase procedure, and which were presented in synchrony with a display with the singleton either left or right. Results of three experiments showed that the apparent location of the sound was attracted not towards the singleton, but instead towards the big squares at the opposite end of the display, whereas the singleton effectively attracted exogenous attention. Ventriloquism can thus be dissociated from exogenous visual attention, and appears to reflect sensory interactions with little role for the direction of visual spatial attention.

Crossmodal interaction on the time dimension: evidence from auditory- visual time order judgement

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2. Max-Planck Institute of Psychological Research, Munich

A well-known case of crossmodal spatial interaction, the ventriloquist effect, consists of mutual attraction between the apparent locations of auditory and visual events conditional on the degree of synchronization between the events. The question asked in the present study is whether the converse phenomenon, attraction on the time dimension conditional on spatial proximity, also occurs. Subjects judged the order of occurrence of respectively sound bursts and light flashes separated in time by varying stimulus onset asynchronies (SOAs), and delivered either in the same or in different locations. SOAs on successive trials were controlled by two randomly mixed psychophysical staircases, one starting with the sound leading the flash by a long SOA,

the other with the sound lagging by the same long SOA. On each staircase, after a "sound first" judgement, the SOA for the next trial was reduced by one step, and vice-versa after a "sound second" judgement. The first response reversals (responses different from the preceding one on the same staircase) occurred at larger SOAs in the condition with sounds and flashes from a single location than in conditions with sounds and flashes from different locations. Thus, the time interval between the two stimuli appears shorter when their origins are closer together in space. This finding supports a view in which timing and spatial layout of the inputs play to some extent symmetrical roles in bringing about crossmodal interaction.

To extract different meanings from the same extract: The role of visual speech in perception of auditory emphasis.

Sharon M Thomas and Timothy R Jordan
University of Nottingham

Individual spoken words can have different meanings when emphasis is placed on different syllables. For example, the homograph CONTRACT may be pronounced with emphasis on the first or second syllable, changing the meaning of the word. However, in addition to differential auditory emphasis, these contrastive utterances are often accompanied by distinct movements of facial regions. The experiment reported in this paper investigated the influence of this facial motion on perception of emphasis across a range of homographs. The results showed that participants were adept at correctly identifying syllabic emphasis in unimodal visual speech stimuli. Moreover, when monotonic auditory homographs were presented in synchrony with this visual speech, the perceived emphasis of the auditory speech signal shifted to the visual intonation of the articulating face. These findings suggest that encoding the intonation of sub-word elements is facilitated by facial motion cues.

Does the Plaut, McClelland, Seidenberg and Patterson (1996) connectionist model of single word reading learn to read in the same way as a child?

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1. Royal Holloway

2. Carnegie Mellon University and the Center for the Neural Basis of Cognition

The Plaut, McClelland, Seidenberg and Patterson (1996) learning model of reading was evaluated, at two points early in its training, against data from 23 children in the first term (Time 1) and again in the third term (Time 2) of their reception year. Three main findings, relating to the children's performance on a set of words and a set of simple non-words, formed the basis of this evaluation. 1. At Time 1 the children read more words than non-words correctly, but at Time 2 the word advantage disappeared. The network, however, showed a word advantage at both Times 1 and 2. 2. Children made more lexical than non-lexical errors, both in word and non-word reading, whereas the network consistently produced more non-lexical errors. 3. Both the children and, surprisingly, the network showed an initial letter advantage. Two adaptations were made to the training of the network, to bring it closer to the learning environment of a child. An incremental training regime was adopted as was training on grapheme-phoneme correspondences. As a result of these adaptations non-word reading sharply improved relative to word reading,

providing a better fit to the children's data. However, the types of errors made by the network remained very different to the children's, and the initial letter advantage was compromised.

Plaut, D. C., McClelland, J.L., Seidenberg, M.S. & Patterson, K. (1996). Understanding normal and impaired word reading: Computational principles in quasi-regular domains. *Psychological Review*, **103**, 56-115.

Age of acquisition and word processing: News from the Dutch speaking front

Marc Brysbaert, Mandy Ghyselinck, and Wendy De Moor
Ghent University, Belgium

In this talk, a series of studies will be reported that addressed the following questions. (1) Is the AoA effect limited to speech production? (no, it is also found in perceptual identification, masked neighbour priming, and semantic tasks), (2) Is word familiarity an index of cumulative frequency, estimated by the number of years a word is known and the frequency with which the word is encountered? (yes, largely; this explains the fact that more variance in word processing times is accounted for by subjective estimates of word familiarity than by objective word frequency counts) (3) Does imageability still have an effect on word processing times when AoA is controlled for? (no, not in word naming and not in lexical decision), and (4) Is AoA a confound of family size (i.e., the number of derived words and compounds of the target word)? (answer to be given)

Understanding linguistic versus numeric expressions of quantity

Linda M Moxey (Introduced by Professor M Burton)
University of Glasgow

Research has shown that natural language quantifiers are interpreted only vaguely as quantities, in that a group of participants who are asked to give a quantity in response to a quantifier will give a wide range of values. Furthermore, a significant amount of the variance in participants responses can be explained by the context of the quantifier, and, in particular, by the amount previously expected by participants. There is evidence that quantifiers can sometimes function to inform the interpreter about the expectations and assumptions of the producer of the quantified statement, rather than providing new information about the amount per se. This suggests that the difference between quantitative information provided by quantifiers, versus that provided by numbers is not simply a matter of precision. These expression types have different effects on our understanding of what the producer intends to convey, and on how the new quantitative information interacts with our existing knowledge of the situation being described. In the experiments presented here participants are asked to interpret quantities in the context of contraceptive risk and smoking-related health risks. The results suggest that while natural language quantifiers may be less precise, they lead participants to make inferences that are consistent with the producers intention. On the other hand the impact of linguistic expressions may be limited to understanding of the message conveyed and the intention of the messenger. Percentages appear to alter existing beliefs in a more profound way.

Dual task performance in older adults.

Leigh M Riby¹, Timothy J Perfect² and Brian Stollery¹

1. University of Bristol
2. University of Plymouth

Previous research demonstrates that older adults are poor at dual-tasking, but there is less agreement on whether their decrement is worse than predicted from single task performance. A series of experiments using the n - back procedure (Riby, Perfect and Stollery, submitted) investigated whether task domain moderates dual-task costs in old age. In experiment one we used a dual task in which young and older adults were required to generate category members or paired associate responses to cues that had just been presented (no load) or to cues that had been presented on previous trials (load). The proportional costs of dual-tasking were age-invariant for semantic retrieval but were particularly marked for episodic retrieval. The data did not support an account based on task difficulty but provided evidence that the age effect in dual tasking studies may be domain specific. To investigate this further, currently underway are a sentence verification, mental arithmetic and visual spatial version of the n - back task, and will be presented at the conference.

Costs of switching two task intentions in a single trial

André Vandierendonck and Bernie Caessens
Ghent University, Belgium

In settings in which people perform a series of simple tasks continuously, switching costs have been observed each time a task in the sequence requires a switch of task intention. These costs have been attributed to the operation of a control process related to the activation of a new goal-setting. Although several studies have shown that the size of the cost decreases as the interval between the response of the previous task and the stimulus of the current task becomes longer, there is evidence that with response-stimulus intervals of 600 ms or longer, a residual switch cost remains. This residual cost has been explained either by assuming that there is a carry-over from previous processing, resulting in an inhibition of response-related processes on the switch trial, or by assuming that there is an additional control process that is invoked on the switch trial. In an attempt to discriminate between these hypotheses about the origin of the residual switch cost, a series of experiments were conducted in which participants were required to perform two tasks with a common goal-setting in each trial in a design with long response-stimulus intervals and with exogeneous cueing of the switch trial. The results show that there is a switch cost for both tasks in the trial, but that the cost is larger for the first than for the second task. The relevance of these findings with respect to the control and the carry-over hypotheses are discussed.

Effects of age on prospective and retrospective memory

Lia Kvavilashvili and Diana Kornbrot
University of Hertfordshire

Performance on several different prospective and retrospective memory tasks was measured for young participants (18-30 years) and older participants in the four age bands: 61-65, 66-70, 71-75 and 76-80 years. The effect of age on prospective memory tasks depended on context (no age effect outside the laboratory) and on how 'old' an old person was. Although overall prospective memory declined with age when tested in the

laboratory (small to medium size effects), the decline started at a relatively late age, with onset dependent on the specific task. By contrast, large age effects were obtained in all three tests of retrospective memory (recognition, delayed recall and paired associate learning), with a significant decline already present in the 61-65 year old group. There are two important implications. First, prospective memory is apparently much less susceptible to the deleterious effects of increased age than retrospective memory. Second, the results highlight, especially for prospective memory, the importance of grouping old participants into age bands instead of treating them as a homogeneous group.

Changes in slow cortical potentials during the construction of true and false autobiographical memories.

Martin A Conway, Christopher W Pleydell-Pearce and Helen L Sharpe
University of Bristol

Using EEG changes in slow cortical potentials were monitored while participants recalled true memories or fabricated plausible but false memories. Replicating previous work we found that for true memories the retrieval phase was marked by strong activation over the left frontal lobe (especially at electrode F3 over left prefrontal cortex). As retrieval progressed and close to the point where a response was made to indicate a memory had been formed activation began to rise in the right hemisphere. After formation and while a memory was held in mind strong activation was detected at bilateral posterior sites and was especially prominent in the right occipital and posterior temporal lobes. For false memories this latter pattern of activation was reliably weaker. One implication is that although false memories were rated as containing imagery, this imagery is not the same as the sensory-perceptual details present in autobiographical memories and associated with activation in posterior networks: suggesting a way in which true and false memories might be distinguished.