BIRMINGHAM MEETING

10 – 12 APRIL 2006

Joint with

Nederlandse Vereniging voor Psychonomie

60th Anniversary of The Experimental Psychology Group
1946-2006
A scientific meeting will be held jointly with the Dutch Psychonomics Society at the Manor House, University of Birmingham on 10 - 12 April, 2006. The local organiser is Professor Jane Riddoch.

Thirty-fourth Bartlett Lecture
Professor A. Cutler (Max-Planck Institute for Psycholinguistics, The Netherlands)
Levels of Processing Speech

The Bartlett Lecture will take place at 6pm Tuesday, 11th April 2006 in the New JCR Room at the Manor House, University of Birmingham.

Symposia:

Monday 10th April, 9.30am - 1.00pm

Touch for perception and action
Organisers: Professor A. Kappers and Professor A. Wing

Tuesday 11th April, 2pm – 5.30pm

The shock of the new: Functional and neural mechanisms of selection over time as well as space
Organisers: Professor G. Humphreys and Dr. C. Olivers

Wednesday 12th April, 2pm – 5.00pm

Episodes and abstractions in language processing
Organisers: Dr. J. M. McQueen and Professor A. Meyer

Reception with Poster Session and Conference Dinner
The School of Psychology, University of Birmingham, welcomes delegates to a drinks reception from 6-8pm on Monday 10th April in the Manor House. The conference dinner will be on Tuesday 11th April at 8.15pm at the Birmingham Botanical Gardens, Westbourne Road, Edgbaston, Birmingham, B15 3TR. A coach will be available to transport delegates to the Botanical Gardens. The cost will be £30, for three courses (excluding transport to and from the University). A booking form for EPS members is enclosed.

Poster Session
This will be held in the Manor House. Delegates must put up posters between 2.00pm and 4.00pm on Monday10th April and take them down between 11.00am and 12.00 noon on Tuesday 11th April. Posters should be landscape and a maximum size of A0. First authors should be present by their posters for the first hour of the formal poster session (6-7pm) which will be held in conjunction with the drink reception (6-8pm). Any queries regarding posters should be sent to Debbie Bowes (D.Bowes@psych.york.ac.uk).

Oral Presentations
Sessions will be held in two lecture theatres. Both theatres have OHPs and data projectors for PowerPoint presentations. Presenters are encouraged to email their presentations ahead of time, or bring them on CD ROM or USB, but may provide their own laptops (and connector leads if Mac users). The on-site computers run PowerPoint under Windows NT/2000. Any queries about facilities in the theatres should be sent to Professor Jane Riddoch (m.j.riddoch@bham.ac.uk 0121 414 4912).
START OF PARALLEL SESSIONS

Session A

New JCR Room

9.00  Wouter M. Bergmann Tiest, Myrthe A. Plaisier, and Astrid M. L. Kappers* (Helmholtz Institute, Physics of Man, Universiteit Utrecht, the Netherlands)
Different cues for the perception of 'coldness' of materials

Symposium:  Touch for perception and action
Organisers: Astrid Kappers and Alan Wing

9.30  Jan B. F. van Erp (TNO Human Factors, the Netherlands)
Tactile body displays for perception and action

10.00  Marc O. Ernst, Johannes Burge, and Martin S. Banks (Max Planck Institute for Biological Cybernetics, Germany, Vision Science Program, University of California, USA, and Wills Neuroscience Institute, University of California, USA)
Using a Kalman Filter to predict visuomotor adaptation behavior

10.30  COFFEE

11.00  H. C. Dijkerman, H. A. Anema, and M. P. M. Kammers (Helmholtz Research Institute, Utrecht University, the Netherlands)
Task dependent effects of somatosensory illusions

11.30  Robert Martyn Bracewell, Marius Peelen, Jack Rogers, Alan Wing, and Paul Downing (University of Wales, Bangor and University of Birmingham)
Unitary perception: Integrating moving tactile inputs from two digits

12.00  S. R. Jackson and Sally Pears (University of Nottingham)
Effects of motor intention on tactile sensitivity

12.30  Philip Servos (Wilfrid Laurier University, Ontario)
Searching for Somatosensory Somatotopy

End of Symposium

1-2  LUNCH
START OF PARALLEL SESSIONS

Session B

Library

9.00  **L. Zhaoping* and L. Guyader*** (University College London)  
(Sponsored by Glyn Humphreys)  
The longer one looks, the less one sees --- catching the features before they merge into objects

9.30  **David Soto*, Glyn Humphreys, and Dietmar Heinke*** (University of Birmingham)  
Dividing the mind: The necessary role of the frontal lobes in separating memory from search

10.00 **James R. Brockmole*, Monica S. Castelhano*, and John M. Henderson*** (University of Edinburgh, University of Massachusetts-Amherst, and Michigan State University) (Sponsored by Robert H. Logie, University of Edinburgh)  
The roles of local objects and scene identity in contextual cueing in scenes

10.30  COFFEE

11.00  **Rebecca Lawson and Heinrich H. Bülthoff*** (University of Liverpool and Max Planck Institut für biologische Kybernetik, Tübingen, Germany)  
Separating the sheep from the goats: Discriminating shape changes across morphs of familiar objects whilst ignoring task-irrelevant view changes

11.30  **A. Giersch** (Department of Psychiatry, University Hospital of Strasbourg, France)  
Stability or flexibility of grouping by proximity?

12.00  **Marco Bertamini and Tracy Farrant*** (University of Liverpool)  
The perceived structural shape of thin (wire-like) objects is different from that of silhouettes

12.30  **Timothy R. Jordan, Kevin Paterson, Marcin Stachurski*, and David Omtzigt*** (University of Leicester)  
Re-Evaluating a split-fovea theory of word perception

1- 2  LUNCH
Session A

New JCR Room

2.00  Daniel Sanabria*, Georgina Lyons*, Argiro Vatakis*, and Charles Spence (University of Oxford)
Perceptual grouping and hand posture effects on crossmodal interactions

2.30  Malika Auvray*, Alberto Gallace*, and Charles Spence (Oxford University, C.O.S.T.E.C.H, Université de Technologie de Compiègne, France, and Universita’ degli Studi di Milano Bicocca, Milano, Italy)
Crossmodal change blindness

3.00  José van Velzen*, Alison F. Eardley*, Bettina Forster*, and Martin Eimer (Birkbeck College, University of London, Goldsmiths College, University of London, and City University, University of London)
Shifts of attention in the early blind: An ERP study of attentional control processes in the absence of visual spatial information

3.30  TEA

4.00  S. Moresi, J. J. Adam, and P. van Gerven (Dept. of Movement Sciences, Universiteit Maastricht, the Netherlands and Faculty of Psychology, Universiteit Maastricht, the Netherlands)
Pupil responses in motor preparation

4.30  S. C. Mueller*, R. Swainson, and G. M. Jackson (School of Psychology, University of Nottingham and Division of Psychiatry, University of Nottingham)
Neurophysiological correlates of asymmetrical switch costs in a saccadic set-shifting task

5.00  Carmel Mevorach*, Glyn W. Humphreys, and Lilach Shalev* (Behavioural Brain Sciences Centre, University of Birmingham and Department for Education & Psychology, Open University Israel)
Pushing to and pulling away from salience: Evidence from rTMS for opposite biases in selection for the left and right posterior parietal cortex (PPC)

5.30  Ángel Correa*, Juan Lupiáñez*, and Pío Tudela* (University of Oxford and Universidad de Granada, Spain) (Sponsored by Charles Spence)
Attending to time enhances perceptual processing. (Converging evidence from Psychophysics and Electrophysiology)

6.00 – 8.00  Posters and drinks reception
Session B

Library

2.00  Pirita Pyykkönen*, Roger P. G. van Gompel, and Jukka Hyönä  (University of Turku, Finland and University of Dundee)  
Comparing anaphor resolution and inferencing during spoken language comprehension

2.30  Paul Allum* and Linda Wheeldon  (University of Birmingham)  
Planning spoken sentences in Japanese: The role of grammatical units

3.00  Jessie Ricketts*, Kate Nation, and Dorothy Bishop  (University of Oxford)  
Poor reading comprehension and exception word reading: Could use of context provide a link?

3.30  TEA

4.00  Martin Groen  (University of Bristol)  
Marking relevant parts in dialogue

4.30  Liory Fern-Pollak* and Taeko N. Wydell  (Brunel University)  
Word frequency, string-length and lexicality in reading Spanish, English and Hebrew: Effects of different levels of orthographic transparency on bilingual reading strategy in the native (L1) and the second language (L2)

5.00  Taeko N. Wydell, Akira Uno*, Motoichiro Kato*, Kanae Itoh*, and Fumihiro Yoshino*  (Brunel University, University of Tsukuba, Japan, Keio University Medical School, Tokyo, Japan, National Institute of Mental Health, Chiba, Japan, and Tokyo Dental College, Chiba, Japan)  
A case study of a Japanese-English bilingual girl with specific language impairment

5.30  Johanna Barry*, Mervyn Hardiman*, Ifat Yasin*, and Dorothy Bishop  (University of Oxford)  
Language and literacy skills of parents of children with SLI or dyslexia

6.00 – 8.00  Posters and drinks reception
Session A

New JCR Room

9.00  Brad Wyble, Howard Bowman, and Patrick Craston (University of Kent, Canterbury)
The attentional blink reflects the time course of token binding, modeling and experimental work

9.30  Andreas Backhaus* and Dietmar Heinke* (University of Birmingham) (Sponsored by Glyn Humphreys)
Simulating asymmetries and similarity effects in visual search with SAIM (Selective Attention for Identification model)

10.00 Howard Bowman*, Brad Wyble*, and Patrick Craston* (University of Kent) (Sponsored by Glyn Humphreys)
The simultaneous typeserial token model of temporal attention and working memory encoding and maintenance

10.30 COFFEE

11.00 Karina J. Linnell and Glyn W. Humphreys (Goldsmiths College, University of London)
Top-down-driven grouping over-rules the central attentional bias

11.30 Carol Walthew* and Iain D. Gilchrist (University of Bristol)
Target location probability effects in visual search: Sequential dependencies or implicit learning of spatial probabilities?

12.00 Derrick G. Watson, Glyn W. Humphreys and Jason Braithwaite* (University of Warwick and University of Birmingham)
Time-based visual selection: Effects of luminance changes to old stimuli

12.30 Jason J. Braithwaite* and Glyn W. Humphreys (University of Birmingham)
Negative impacts from the successful filtering of irrelevant items: The necessary role of top-down processes for inhibitory carry-over effects in search

1 – 2 LUNCH
Session B

Library

9.00  R. S. Schaefer and P. Desain (Music, Mind, Machine Group, NICI, Radboud Universiteit, Nijmegen, the Netherlands)
Detecting dynamic attending: An ERP investigation

9.30  J. H. Wearden (Keele University)
Mission (almost) Impossible: Modelling the verbal estimation of duration

10.00  Ruth S. Ogden* and Luke A. Jones (University of Manchester)
Interference in temporal reference memory

10.30  COFFEE

11.00  Matthew Inglis*, Adrian Simpson*, and Derrick Watson (University of Warwick and University of Durham)
Group differences in the Wason selection task: Mathematicians and eye-movements

11.30  Gordon Fernie* and Richard J. Tunney (University of Nottingham)
Somatic markers, conscious knowledge and decision making on the Iowa Gambling Task

12.00  Dana Samson*, Ian A. Apperly, and G.W. Humphreys (University of Birmingham)
A 3-option false belief task gives a window on the social mind and brain

12.30  E. J. Robinson and S. N. Haigh* (Warwick University)
Children's confidence in knowledge gained from testimony: Working understanding of knowledge sources

1 - 2  LUNCH
Session A

New JCR Room

**Symposium:**  
The shock of the new: Functional and neural mechanisms of selection over time as well as space  
Organisers: Glyn Humphreys and Chris Olivers

2.00 **Steven Yantis and John T. Serences** (Johns Hopkins University, Baltimore)  
Abrupt visual onsets and the cortical representation of attentional priority

2.30 **Anna Christina Nobre** (University of Oxford)  
The flexibility of attentional orienting in the human brain

3.00 **Geoff G. Cole and Gustav Kuhn** (University of Durham)  
New objects, visual transients and attentional capture

3.30 **TEA**

4.00 **Ryota Kanai and Frans Verstraten** (Universiteit Utrecht, the Netherlands)  
Changing the view with visual transients

4.30 **Glyn W. Humphreys, Maria Funes, Eun Young Yoon, and Chris N. L. Olivers** (Behavioural Brain Sciences, University of Birmingham and Cognitive Psychology, Vrije University, Amsterdam)  
The role of the posterior parietal lobe in spatio-temporal segmentation and selection

5.00 **Jos J. Adam** (Maastricht University, the Netherlands)  
Preparing for perception and action: Automatic and effortful processes in response-cuing

End of Symposium

5.30 **EPS Business Meeting**

6.00 **Thirty-fourth Bartlett Lecture**  
Anne Cutler (Max-Planck Institute for Psycholinguistics, the Netherlands)  
Levels of Processing Speech (New JCR Room)

8.15 **CONFERENCE DINNER, The Birmingham Botanical Gardens**
Session B

Library

2.00  Arnold Wilkins and Dominic Fernandez* (University of Essex)
Aversion to natural and artistic images

2.30  Camilla J. Croucher*, Andrew J. Calder, and Philip J. Barnard
(MRC Cognition and Brain Sciences Unit, Cambridge)
Impact, arousal and the recollection of emotional pictures

3.00  Eun Young Yoon* and Glyn W. Humphreys (Behavioural Brain
Sciences, University of Birmingham)
The paired-object affordance effect

3.30  TEA

4.00  Alastair D. Smith, Iain D. Gilchrist, Stephen Butler, and Monika
Harvey
(University of Bristol and University of Glasgow)
Around the clock surveillance: Simple graphic disturbance in patients
with hemispatial neglect carries implications for the clock-drawing task

4.30  Claudia Chiavarino*, Ian A. Apperly, and Glyn W. Humphreys
(University of Birmingham)
The role of the frontal lobes in mirror-image and anatomical imitation:
A neuropsychological study

5.00  Anthony P. Atkinson*, Mary L. Tunstall*, and Winand H. Dittrich*
(Durham University and University of Hertfordshire) (Introduced by
Simon Liversedge)
Expressing emotions with body movement: It is what you do, as well as
how you do it

5.30  EPS Business Meeting

6.00  Thirty-fourth Bartlett Lecture
Anne Cutler (Max-Planck Institute for Psycholinguistics, the
Netherlands)
Levels of Processing Speech (New JCR Room)

8.15  CONFERENCE DINNER, The Birmingham Botanical Gardens
## Session A

### New JCR Room

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<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>9.00</td>
<td>Karen Lander, Harold Hill*, Miyuki Kamachi*, and Eric Vatikiotis-Bateson*</td>
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<td>(School of Psychological Sciences, University of Manchester, ATR International. 2-2-2 Hikaridai, Kyoto 619-0288, Japan, and Department of Linguistics, University of British Columbia, Canada)</td>
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<td>It’s not what you say but the way you say it: Matching faces and voices</td>
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<td>9.30</td>
<td>Mike Burton, Rob Jenkins, and David White*</td>
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<td>(University of Glasgow and MRC Cognition Brain Sciences Unit, Cambridge)</td>
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<td>No primacy effect for familiar faces: a rare advantage for unfamiliar people</td>
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<td>10.00</td>
<td>Anat Elhalal*, Eddy J. Davelaar*, and Marius Usher*</td>
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<td>(Birkbeck, University of London)</td>
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<td>Modelling the role of the PFC in episodic memory</td>
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<td>10.30</td>
<td>COFFEE</td>
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<td>11.00</td>
<td>Carlo De Lillo and Valerie Lesk*</td>
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<td>(University of Leicester)</td>
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<td>Executive functions and hierarchical organisation in the spatial working memory for clustered sequences</td>
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<td>11.30</td>
<td>Simon Farrell*</td>
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<td>University of Bristol (Sponsored by Alastair Smith)</td>
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<td>Short-term memory for time and serial order</td>
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<td>12.00</td>
<td>Bill Macken*, Fiona Phelps* and Dylan Jones</td>
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<td>(Cardiff University)</td>
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<td>What causes auditory distraction?</td>
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<td>12.30</td>
<td>Gary Jones</td>
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<td>(University of Derby)</td>
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<td>Linking working memory and long-term memory: A computational model of the long-term learning of novel sound patterns</td>
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<td>1-2</td>
<td>LUNCH</td>
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Session B

Library

9.00  Ute Leonards*, Alessia Correani*, and Nicholas E. Scott-Samuel*  
(Unciversity of Bristol) (Sponsored by Iain Gilchrist)  
Luminosity - a perceptual "feature" of light-emitting objects?

9.30  Gustavo Deco* (ICREA and Universitat Pompeu Fabra, Barcelona, Spain) (Sponsored by Glyn Humphreys)  
A Neurophysiological model of decision-making and Weber's law

10.00  Astrid M. L. Kappers and J. J. Koenderink  (Helmholtz Institute, Universiteit Utrecht, the Netherlands)  
Haptic adjustment of radius

10.30  COFFEE

11.00  R. Volcic and Astrid M. L. Kappers  (Helmholtz Institute, Universiteit Utrecht, the Netherlands)  
Intermediate frames of reference in the 3-D haptic perception of space

11.30  Robert D. McIntosh*, James R. Tresilian*, and Mark Mon-Williams*  (University of Edinburgh, School of Human Movement Science, University of Queensland, Australia and, University of Aberdeen) (Sponsored by Martin Edwards)

12.00  Abram F. J. Sanders and Astrid M. L. Kappers  (Helmholtz Institute, Universiteit Utrecht, the Netherlands)  
Haptically 'straight' lines

12.30  Oliver Lindemann, Juan M. Abolafia, Giovanna Girardi, and Harold Bekkering  (Radboud Universiteit, Nijmegen, the Netherlands)  
Common magnitude representation for number processing and grasping

1-2  LUNCH
Session A

New JCR Room

**Symposium:**  Episodes and abstractions in language processing  
Organisers: James M. McQueen and Antje S. Meyer

2.00  **Gareth Gaskell** (University of York)  
Episodes and abstractions in novel word learning

2.30  **Mike Page, Alexandra Jesse, and James M. McQueen** (University of Hertfordshire and Max Planck Institute for Psycholinguistics, the Netherlands)  
Exemplars: Lexical or sublexical?

3.00  **Núria Sebastián-Gallés, Begoña Díaz and Jordi Costa** (University of Barcelona)  
Episodes of a bilingual’s lexicon

3.30  TEA

4.00  **Richard Shillcock** (University of Edinburgh)  
Learning and generalization in lexical processing; the interaction of the information structure of words, LH coarse coding, sex differences, and the split fovea

4.30  **Harald Baayen** (Radboud University Nijmegen & Max Planck Institute for Psycholinguistics, the Netherlands)  
Exemplars in morphological processing

End of Symposium

5.00  **Frank Eisner* and James M. McQueen** (Institute of Cognitive Neuroscience, University College London and Max Planck Institute for Psycholinguistics, The Netherlands)  
Stability over time in lexically-guided auditory perceptual learning

END OF MEETING
Session B

Library

2.00  Alon Avisar*, Lilach Shaley*, and Yehoshua Tsal* (Tel-Aviv University, Israel and The Open University of Israel) (Introduced by Glyn Humphreys)
Do ADHD symptoms and its personality characteristics in adults are simply a result of a sustained attention deficit?

2.30  Martijn Lamers and Ardi Roelofs (Nijmegen Institute for Cognition and Information, Nijmegen, the Netherlands, F. C. Donders Centre for Cognitive Neuroimaging, Nijmegen, the Netherlands, and Max Planck Institute for Psycholinguistics, Nijmegen, the Netherlands)
Interplay of Gestalt grouping principles, attention for action, and eye movements

3.00  Verity J. Brown* and David Mark Thomson* (University of St Andrews) (Introduced by Uta Frith)
Failure of response inhibition under conditions of high prior-probability of a target following lesions of the subthalamic nucleus in the rat

3.30  TEA

4.00  Ines Jentzsch*, Hartmut Leuthold*, and Rolf Ulrich* (University of St Andrews, University of Glasgow, and University Tuebingen) (Introduced by Gerry Quinn)
Decomposing sources of response slowing in the PRP paradigm

4.30  Chris Olivers, Stefan Van der Stigchel, and Johan Hulleman (Vrije Universiteit Amsterdam, the Netherlands and Hull University)
Spreading the sparing: Against a limited-capacity account of the attentional blink

5.00  Markus Bindemann*, A. Mike Burton, and Stefan R. Schweinberger (University of Glasgow and Institut für Psychologie, Universität Jena, Germany)
Attention to faces in a visual cueing task

END OF MEETING
1. Mike Adams* and Simon Johnson* (Centre for Formulation Engineering, University of Birmingham and Unilever R&D Port Sunlight) (Sponsored by Alan Wing)
The friction of human skin

2. Lars Akkermans and Eric Soetens (COBI, Vrije Universiteit Brussel, Belgium)
Attention for changes in task-relevant flanker features

3. Elisabetta Ambron*, Robert D. McIntosh*, and Sergio Della Sala* (Human Cognitive Neuroscience, Psychology, University of Edinburgh) (Sponsored by Martin Edwards)
Evidence for an attentional hypothesis of ‘closing-in’ behaviour in Alzheimer’s disease: A single-case study

4. Giles M. Anderson* and Deitmar Heinke* (University of Birmingham) (Sponsored by Glyn Humphreys)
Top-down modulation in inefficient search: Evidence of differences between orientation and colour cuing

5. H. A. Anema, V. W. J. Wolswijk, and H. C. Dijkerman (Helmholtz Research Institute, Utrecht University, The Netherlands and Department of Neurology, University Medical Centre, Utrecht, The Netherlands)
Task dependent effects of Weber's illusion

6. Sarah Baillie*, Stephen Brewster*, Dominic Mellor*, and Stuart Reid* (Department of Computing Science, University of Glasgow) (Sponsored by Alan Wing)
Differences between the hands when veterinary students perform the component tasks of bovine pregnancy diagnosis in a simulated environment

7. Daniela Balslev* and R. Chris Miall* (University of Birmingham) (Sponsored by Alan Wing)
Proprioception contributes to the recognition of visual feedback of finger movement

8. Eva Belke* (Department of Linguistics, University of Bielefeld) (Sponsored by Antje Meyer)
Effects of working memory load on lemma selection

9. Svetlana Bialkova and Herbert Schriefers (NICI, Radboud Universiteit, Nijmegen, The Netherlands)
Stimulus-driven control in task switching and restarting

Reading disappearing text: Effects on adults' and children's oculomotor control

11. Lorna M. Brown, Stephen A. Brewster, and Helen C. Purchase (Department of Computing Science, University of Glasgow) (Sponsored by Alan Wing)
A Preliminary investigation into the design of multi-dimensional vibrotactile messages
12. Ángel Correa* and Anna C. Nobre* (University of Oxford) (Sponsored by Charles Spence)
Does attention improve spatial and temporal visual acuity?

13. Jane Cownie*, Sara Congiu*, Elizabeth D. Ray*, and Anne Schlottmann* (University College London and University of Siena, Italy) (Sponsored by Robin Murphy)
The role of the spatial and temporal configuration in perceptual causality

14. Matthew Coxon* and Dennis Hay* (Lancaster University) (Sponsored by K Brandt)
Do imagery and memory share a common short-term store?

15. Patrick Craston, Brad Wyble*, and Howard Bowman (Centre for Cognitive Neuroscience and Cognitive Systems, University of Kent)
An EEG study of masking effects in RSVP

16. Felix de Beaumont* and Jules Davidoff (Goldsmiths University of London)
Colour discrimination and memory: Dissociable skills

Looking to social information in complex scenes: A preferential-looking task

18. Kumiko Fukumura* and Roger P. G. van Gompel (University of Dundee)
How do we choose anaphoric expressions? The role of syntax and semantics

19. Elaine Funnell and Michael Kopelman (Royal Holloway University of London and Kings College London)
Crossing the divide: Interaction and accommodation between past-tense verbs in a case of progressive fluent aphasia

20. Adam Galpin*, Ellen Poliakoff, and Steven Tipper (School of Psychological Sciences, University of Manchester and University of Bangor)
Is implicit action activation affected by Parkinson’s disease?

The role of spatial integration in the perception of surface orientation with active touch

22. Nathalia Gjersoe* and Bruce Hood (University of Bristol)
The development of dynamic object individuation

23. Jelena Havelka*, Dejan Lalović*, and Roberto Gutierrez* (University of Kent in Canterbury and University of Belgrade, Serbia and Montenegro) (Sponsored by J Bowers)
Effects of AoA, familiarity and word length on word and picture naming in Serbian

24. Benjamin Holmes* and Carlo De Lillo (University of Leicester)
Executive functions and cross-modality binding in serial temporary memory
25. Robert W. Hughes*, Francois Vachon*, and Dylan M. Jones (Cardiff University)
Attentional capture and competition-for-action: Two forms of auditory distraction?

26. C. V. Jansson* and P. Haggard (Department of Psychology, Anglia Ruskin University and Institute of Cognitive Neuroscience and Department of Psychology, University College London)
Visual and tactile influences upon aesthetic preference

27. L. Johannsen*, A. Wing, O. Gurry*, and V. Hatzitaki* (University of Birmingham and Aristotle University of Thessaloniki, Greece)
Light touch contribution to reflex and voluntary standing postural adjustments

28. Michael H. Joseph, Sarah J. Holden*, Edmund F. N. Hockley*, and Samuel R. H. Joseph* (University of Leicester, Department of Computer Science, University of Hawaii, USA and Cerego, Tokyo, Japan)
Vocabulary learning in a second language: The effect of multiple choice versus text entry on learning and memory

29. John Marsh*, Robert Hughes*, and Dylan Jones (Cardiff University)
Distraction in semantic memory from irrelevant auditory stimuli: Inhibition, activation and failure to source monitor

30. Liam Maxwell*, Andrew Walker* and Gareth Gaskell (University of York)
What do we do with words while we're deciding what to do with them?

31. Jennifer McBride*, Ute Leonards*, and Iain D. Gilchrist (University of Bristol)
New insights into repetition priming in visual search

32. Carolyn McGettigan* and Sophie Scott (Institute of Cognitive Neuroscience, University College London)
Adaptation to noise-vocoded speech: Exploring inter-individual variability

33. S. C. Mueller* and H. Ruge* (School of Psychology, University of Nottingham) (Introduced by Georgina Jackson)
Attention to response effects alleviates between-task interference

34. Sam Otero*, Brendan Weekes, and Sam Hutton* (University of Sussex)
False recognition to structurally similar items for pictures and words in young and old adults

35. Kevin B. Paterson, Simon P. Liversedge, and Ruth Filik* (University of Leicester and University of Durham)
Context effects on focus identification in reading

36. David Prytherch* and Christos Giacritis* (BIAD User-Lab, University of Central England) (Sponsored by Alan Wing)
Human vibrotactile sensitivity to different pencil types
37. Richard Ramsey*, Jennifer Cumming*, and Martin Gareth Edwards (School of Sport and Exercise Sciences, University of Birmingham)
   Improved performance following action imagery

38. Kevin J. Riggs* and Ludovic Ferrand (London Metropolitan University and CNRS and René Descartes University, Paris V, France)
   Subitizing in tactile perception

39. Roberta D. Roberts* and Glyn W. Humphreys (Behavioural Brain Sciences Centre, University of Birmingham)
   Spatial and Frequency judgments of tactile temporal order

40. Andrew Simpson*, Kevin J. Riggs* and Ludovic Ferrand (London Metropolitan University and Universite Rene Descartes, Laboratoire Cognition et Comportement, France)
   Are imitative responses activated automatically?

41. Neil Stewart (University of Warwick)
   Information integration in decision under risk and delay

42. Jason Tipples (University of Hull)
   The effects of facial expression intensity on time perception

43. Jan Van Erp*, Ian Andrew*, and Jim Carter* (TNO Defence, the Netherlands, ISO Consultant, Stratford-upon-Avon, and University of Saskatchewan)
   (Sponsored by Alan Wing)
   ISO's new work on guidelines on tactile and haptic interaction

44. A. E. Welchman* (University of Birmingham) (Sponsored by Alan Wing)
   Bias in three-dimensional motion estimation reflects the combination of differentially reliable motion signals

45. Andrew Wimperis* and Alan M. Wing (University of Birmingham)
   An action-perception dissociation; the reactive grip force response in a case of somatosensory impairment and tactile extinction, following cortical stroke

46. Andrew Wimperis* and Alan. M. Wing (University of Birmingham)
   Directional reaching errors in proprioceptively defined space, following cortical stroke

47. Alan Wing and Lawrence Taylor* (University of Birmingham)
   Losing your grip (on purpose)
Different cues for the perception of 'coldness' of materials

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How 'cold' an object at room temperature feels, is determined by its geometry and thermal properties. These thermal properties include heat capacity, thermal conductivity and thermal contact resistance. We present research into the roles of these properties as cues for the perception of 'coldness' of objects. Subjects were able to use different cues to assess coldness. In the presence of conflicting cues, differences between subjects were visible. For further study of these effects, we try to quantify subjects' ability to perceive these cues. Using artificial heat extraction, we have measured the discrimination threshold of heat extraction rate. This was a constant fraction of around 30%. In addition, the role of geometry and ambient temperature is studied.

Symposium: Touch for perception and action
Organisers: Astrid Kappers and Alan Wing

Tactile body displays for perception and action

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Until recently, only visual displays were used in steering and control tasks such as driving and flying. Mainly driven by the threat of sensory overload, tactile displays have found their way into this domain. The small time constants in steering tasks put specific demands on the perception - action loop, and important issues are if and how tactile information can be applied in these tasks. In an overview, I will present data that indicate the suitability of tactile body displays for perception and action. The first step is to show that using different locations on the body is an adequate way to present the spatial information required in these tasks. The second step is to show that the information can be used in dynamic settings such as tracking tasks. And the third step is to show that the user is able to perform the tasks in a real world setting. I will illustrate these three steps with experimental work done at TNO in the recent years.

Using a Kalman Filter to predict visuomotor adaptation behavior

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It is well known that the sensorimotor system is recalibrating itself when the visual and motor maps are in conflict, bringing the maps back into correspondence. We
here investigated the rate at which this recalibration occurs. The Kalman-Filter may be a reasonable statistical model for describing visuomotor adaptation behavior. The Kalman-Filter predicts that the rate of adaptation is dependent on the reliability of the feedback signal. Furthermore, the Kalman-Filter predicts that random-walk perturbation of the feedback signal should have the effect to increase the adaptation rate. Experimentally we confirmed both these predictions using a pointing task in which subjects pointed with an unseen hand to a brief visual target. In order to test whether the reliability of the feedback signal has an effect on the rate of adaptation we blurred the visual feedback thereby reducing its localizability. In good agreement with the Kalman-Filter we found that the rate of adaptation decreased when the blur in the feedback signal was increased. Furthermore, we find a good agreement with the prediction of the Kalman-Filter when the degree of random-walk perturbation was manipulated: the adaptation rate increased with more perturbation. Taken together, these results provide evidence that human visuomotor adaptation behavior can be modeled using a Kalman-Filter.

Task dependent effects of somatosensory illusions

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In recent years, several studies of visual illusions have suggested that the strength of the illusion depends on the type of response given. We assessed whether task dependent effects are also present for somatosensory illusions. In the first experiment the vibrotactile illusion was used. The biceps tendon of the dominant arm was stimulated at 75Hz creating an illusory extension of the forearm. Participants were asked to either match the felt position of the stimulated hand with the unstimulated hand, or to point towards the index finger of the stimulated hand. We observed that the matching response was more influenced by the illusion than the pointing response. In a second study rectangular objects were placed either on the hand or the forearm. Participants were asked to grasp the objects or to indicate their size by varying the index finger-thumb distance. The size estimations were consistent with Weber’s illusion with larger estimates when the object was placed on the hand compared to the forearm. In contrast, maximum grip aperture was smaller when grasping objects on the hand. The findings of both experiments are consistent with the idea that tactile illusions influence action related responses differently compared to perceptual responses.

Unitary perception: Integrating moving tactile inputs from two digits

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How do we achieve unitary perception of an object when it touches two parts of the sensory epithelium which are not contiguous? We investigated this problem with a simple psychophysical task, which we then used with subjects during fMRI scanning.
Two wooden rods were moved over two digits positioned to be spatially adjacent. The digits were either on the left foot (or hand), or one digit was from either foot (or hand). When the rods were moving in phase, one object was reliably perceived. When moving out of phase, two objects were reliably perceived. FMRI revealed that several regions were more activated during in than out of phase tactile stimulation, in at least one of the four conditions (left hand, both hands, left foot, both feet). As a ‘strict’ test of the hypothesis that there are brain regions specifically associated with unitary perception, regardless of the anatomical configuration of the stimulated sensory epithelia, we determined those regions reliably more activated for in phase stimulation in all four conditions. These were right inferior parietal lobule, left fusiform gyrus, and left middle frontal gyrus. Three regions along the left intraparietal sulcus were activated, but only when integration across the midline was required. Two cerebellar regions were activated, more clearly in the hands than feet conditions.

**Effects of motor intention on tactile sensitivity**

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The notion that our intention to execute a movement may influence our perception of sensory events is not new. For instance, Helmholtz, in trying to understand how we locate visual objects suggested that the brain, rather than sensing the current position of the eye, might instead predict the direction of gaze based upon a copy of the motor signal sent to the ocular muscles -- an efference copy. Furthermore, psychophysical studies extending over a thirty-year period have repeatedly demonstrated that visual stimuli presented close to the onset of a saccadic eye movement are mislocalised spatially and temporally, and Rorden et al. (2002) has shown that the programming of an eye movement improves the detection of tactile stimuli located in the region of space near the destination of the upcoming saccade. The studies reported in this paper investigated whether the intention to make a reaching movement produced similar changes in the perception of tactile events. Using several psychophysical paradigms we clearly show that the temporal perception of tactile events is influenced by the intention to execute a limb movement.


**Searching for Somatosensory Somatotopy**

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The idea of a somatotopic map of the body in the human cerebral cortex is intuitively appealing. Single-cell recording studies by Kaas in the 1970’s provided support for somatotopy in primate primary somatosensory cortex (SI). However, upon closer examination, not only was there a multiplicity of cortical maps, but they were quite
Complicated and rather fragmented. The search for somatosensory somatotopy is paralleled in the motor domain in which earlier concepts of motor somatotopy in the primary motor cortex slowly gave way, in the 1980’s, to a more distributed and functional framework. At present, in the somatosensory domain, we seem to be at a crossroads. Much work suggests that, at some level, somatotopy exists in human somatosensory cortex. However, much like the state of affairs in the motor field in the 1980’s, we need to move beyond a strictly somatotopic approach. In this talk I will discuss our experiences of imaging somatosensory function in SI (primarily the human fingers but other examples will also be used) using high field fMRI (4T). Work in our lab suggests that fMRI may allow us to observe large scale patterns of somatosensory organization that are not possible using more circumscribed techniques such as single-cell recording in monkeys. Nevertheless, until field strengths beyond 4T are readily available for human work, it is likely that we will miss the subtleties of cortical somatosensory maps that have been uncovered by monkey unit work.

End of Symposium

The longer one looks, the less one sees --- catching the features before they merge into objects

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We report findings that perceiving an object as a whole, rather than only as a collection of primitive features, can impair behavioral tasks. In a display of many differently oriented but otherwise identical objects, each made of two identical bars intersecting each other at 45 degrees, subjects searched for an uniquely oriented target object. The target was thus a rotated version of any distractors, and had an uniquely oriented bar attracting attention in a bottom-up manner. The subjects reported by button press whether the target was in the left or right half of the display, and their eye positions were tracked. After the subjects moved their eyes to the target, they often hesitated or even looked away to search elsewhere, delaying the button responses by typically more than one second. It was as if the realization that the attended object was shaped identically to the distractors, and the knowledge of rotational invariance of objects, interfered with the task. If the search display was terminated at time T after the first saccade to the target, and the subjects responded by forced choice, their performance became worse with longer T up to 1-2 seconds. Control experiments using uniquely shaped targets eliminated such interference.

Dividing the mind: The necessary role of the frontal lobes in separating memory from search

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Working memory plays a crucial role in the control of visual selection. Previous research has shown that attentional deployment can be biased to objects in an array matching the contents of working memory. Here, we examined the role of the frontal cortex in determining the interaction between working memory and attention. At the start of each trial, participants memorized an object cue that could contain either the target or a distracter, when the object reappeared in the subsequent search array. Relative to age-matched controls, patients suffering from damage to the frontal lobes showed a stronger effect of the memory stimulus on search. The results suggest that frontal lobe structures are involved in separating relevant target from irrelevant (object cue) information, when both are held in memory.

The roles of local objects and scene identity in contextual cueing in scenes

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In contextual cueing, the position of a target is learned over repeated exposures to a visual display. What information guides attention to these known targets when scenes are used as the learning context? We investigated whether targets are associated with local objects or the scene’s overall identity. In Experiment 1, following a learning phase, studied scenes were altered. Either local objects surrounding the target were changed while preserving the identity of the original scene, or the identity of the learned scene was changed while maintaining local aspects near the target. Changes in local scene information had no impact on search, while changes to scene identity eliminated the benefits of contextual cueing even though the local information around the target was preserved. Experiment 2 divorced local object information and overall scene identity information during learning. Critical trials either repeated a single set of local objects in different scenes, or different local objects in the same scene. Context-target covariation was learned slower when local information was repeated. These results indicate that in scenes, observers have a strong bias to associate targets with scene identity and only when such information is non-predictive are local objects used to encode a consistently located target.

Separating the sheep from the goats: Discriminating shape changes across morphs of familiar objects whilst ignoring task-irrelevant view changes

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Twenty series of morphs were created across which shape changed systematically from one familiar object to another (e.g., chair to bed; dog to pig; car to van; bath to sink). These stimuli were presented in three picture-picture matching studies which examined the effects of a view change on our ability to detect shape changes
both within and between morph series. In each study, view changes and shape changes both influenced performance. The pervasive, disruptive effect of task-irrelevant view changes replicates and extends the findings from similar studies presenting unfamiliar objects (Lawson & Bülthoff, in press). Neither set of results support Stankiewicz's (2002) claim that information about viewpoint and about shape can be estimated independently by human observers. Instead, viewpoint influenced performance even in an easy shape categorisation task. However, the deleterious effects of view changes were exacerbated when shape discrimination was more difficult.


Stability or flexibility of grouping by proximity?

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Extracting detailed information from an object might involve complex modulations of grouping if this extraction requires to separate information that is usually grouped. We used a paradigm derived from Beck and Palmer (JEP, 2002) in 30 patients with schizophrenia and 30 matched controls. Subjects decided whether series of seven stimuli with geometrical features included, or not, two consecutive identical stimuli. The manipulation of proximity defined three groups of two figures and a singleton. We compared performance when the two identical stimuli belonged to the same group or to different groups of figures. Three experimental blocks were defined by the percent of target-present trials where the targets belonged to the same pair (within-group trials) or to different pairs (between-group trials): 25-75%, 50-50%; 75-25%. Patients, like controls, benefited from grouping by proximity. However patients had difficulties prioritizing between-group regions. Recordings of ocular movements in a sub-group of subjects showed that healthy volunteers control the exploration of between-group regions independently from within-group regions, whereas patients cannot. Focusing on between-group figures means separating figures that are grouped by proximity. Since grouping is always spared, the results suggest that a fragmented representation of a stimulus can be appended to its grouped representation.

The perceived structural shape of thin (wire-like) objects is different from that of silhouettes

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The fact that contours are informative about solid shape relies on the assumption that visible contours tend to be the rims of self-occluding opaque surfaces (Koenderink, 1984). We compared surfaces (figures) to their complements (holes) and to thin (wire-like) objects (similar to those that one can create by bending a paper clip, but constrained to a single depth plane). Our stimuli are random-dot stereograms. This is important because it insures that the thin objects are perceived as such and not simply as the outside boundaries of an opaque surface. It is known that observers are faster in judging the position of convex vertices compared to concave vertices. Strong evidence comes from comparing the same contours perceived as figures or as holes: a pure figure-ground reversal (Bertamini & Mosca, 2004). Specifically, an interaction is present between type of object (figure or hole) and type of vertices (inwards or outwards). We predicted that a different pattern should be found for thin (wire-like) objects compared to both figures (silhouettes) and holes. We confirm this difference in three experiments. We argue that this is due to the perceived parts when contours can be interpreted as self-occlusion rims.


Re-Evaluating a split-fovea theory of word perception

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For many years, an interesting question in visual perception has been whether the fovea is split at the midline. In more recent years, numerous studies using various procedures have attempted to demonstrate the existence of split-foveal processing in word perception. In particular, a key argument developed during this period has been that words or parts of words presented to either side of the foveal midline are projected to different cerebral hemispheres and are therefore subjected to different processes. Here we report the findings of a series of experiments in which previous standard demonstrations of split-foveal processing in word perception were revisited, often by improving the methodology involved. The findings from these studies provide little support for the claim that perception of words is subserved by split-foveal processing. Some implications of these findings for revealing the processes actually involved in word perception are discussed.

Perceptual grouping and hand posture effects on crossmodal interactions

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We investigated the role of perceptual grouping processes and hand posture on crossmodal interactions. In Experiment 1, participants had to respond to the direction of a
tactile apparent motion (AM) stream consisting on the sequential presentation of two vibrations, one delivered to each of the index fingers, while trying to ignore the direction of a visual AM stream consisting on the sequential presentation of either 2 or 6 light flashes. The participants adopted either a crossed or an uncrossed hand posture. The results showed that the influence of visual AM on the perception of tactile AM was significantly weaker in the 6-lights conditions than in the 2-lights condition, revealing the influence of perceptual grouping on visuotactile interactions. However, this result was unaffected by hand posture. Significant crossmodal interactions were also reported in a second experiment in which auditory AM distractors (consisting of either 2 or 6 sounds) were used instead of visual distractors. We discuss these results in terms of the influence of unimodal Gestalt principles of perceptual grouping on crossmodal interactions and the flexibility of crossmodal processing.

Crossmodal change blindness

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Change detection studies have revealed a striking failure by people to detect changes between two consecutively presented scenes, when they are separated by a distractor that masks the transients typically associated with change. This failure, known as ‘change blindness’, has been reported to occur within vision, audition and touch, but has never been demonstrated across different sensory modalities. In a set of studies, we investigated change detection performance when the two to-be-compared stimulus patterns belonged to the same sensory modality (i.e., both visual or both tactile) and when one of the stimulus pattern was tactile while the other was presented visually or vice versa. We show that change blindness is elicited when a mask (either tactile or visual) is inserted between the two consecutively-presented patterns. The magnitude of this change blindness effect was similar no matter whether both patterns were tactile or when one of the pattern was tactile and the other visual. These findings suggest that change detection may be related to a multisensory mechanism; they also provide support for the view that spatial attention is crossmodal in nature.

Shifts of attention in the early blind: An ERP study of attentional control processes in the absence of visual spatial information

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Previous research has shown similar lateralised ERP components in response to a centrally presented (endogenous) cue summoning visual, auditory and somatosensory
spatial attention shifts. This led to the conclusion that supramodal mechanisms are involved in the control of spatial attention (Eimer, Van Velzen, and Driver, 2002). An alternative interpretation would be that shifts of spatial attention in audition and touch are guided by available visual spatial information. I will present the results of a study into the role of visual-spatial information in the control of spatial attention. We recorded ERPs recorded during a tactile attention task for a group of blind participants, and for an age-matched sighted control group who performed the task in the dark. The results show that the capacity to selectively process tactile information from one hand versus the other does not differ systematically between the blind and sighted participants. The cue-related ERPs suggest that both groups employed similar preparatory mechanisms in anticipation of a peripheral tactile stimulus, which differed from those employed by sighted participants performing the task under illuminated conditions. The results suggest that in sighted participants, shifts of spatial attention in vision, audition and touch are guided by visual spatial information, when available.


Pupil responses in motor preparation

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Pupillary responses and reaction times were obtained in a finger precuing task, which uses precues to prepare a subset of responses. Previous research has shown that cues specifying two fingers on one hand are most effective in generating reaction time precuing benefits, whereas cues specifying different fingers on two hands are least effective. According to the Grouping model (Adam, Hommel & Umilta, 2003, 2005), this is so because cues indicating two fingers one hand represent a strong perceptual and corresponding response group causing a fast, automatic selection of the cued responses. In contrast, for cues indicating (different) fingers on two hands require; a slower, more effortful process is needed to select the cued responses. Results showed that the most difficult preparation condition (different fingers on different hands), was associated with the largest mean pupil dilation. These results, together with preliminary data of studies in which either cue-validity or stimulus probability is manipulated, will be discussed in terms of theories of pupillometry and action planning.

Neurophysiological correlates of asymmetrical switch costs in a saccadic set-shifting task

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Task dominance has been shown to have an influence on the relative performance cost of switching tasks. Behavioural investigations of saccadic task-switching have demonstrated switch costs when switching from the weaker antisaccade task to the prepotent prosaccade task but reduced or absent switch costs when switching from prosaccades to antisaccades. Here, we recorded dense-sensor event-related potentials (ERPs) while participants switched between prosaccades and antisaccades to a peripheral target depending on a centrally presented coloured cue. There were two cue-target intervals (CTIs), which changed on a trial-by-trial basis: a 300 ms and a 1000 ms CTI. In line with previous studies, the behavioural data showed significant switch costs in RT when switching to prosaccades at the short CTI but not when switching to antisaccades. However, there were no residual costs at the long CTI. The significant switch costs for prosaccades were mirrored by an increase in positivity for switch relative to repetition over frontal scalp in the cue-locked epoch and parietal positivities in the target-locked and response-locked epochs. The findings will be discussed within current models of task switching.

Pushing to and pulling away from salience: Evidence from rTMS for opposite biases in selection for the left and right posterior parietal cortex (PPC)

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When the visual scene contains both the target of the current behavioural goal and competing distractors, visual attention must be engaged to resolve the emerging conflict by focusing on the target and suppressing the distractors. Here we examined the neural structures involved in these selective processes by applying offline repetitive Transcranial Magnetic Stimulation (rTMS) over right and left posterior parietal cortex (PPC) immediately before participants were asked to perform a Global-Local task using compound letters. The saliency of the information available at each level of the stimulus was varied orthogonally with whether local or global information had to be selected for the task. There was a double dissociation between the effects of rTMS to right and left PPC. When the more salient aspect of the stimulus had to be ignored, rTMS over the left PPC had a detrimental effect on performance. Conversely, rTMS over the right PPC made it more difficult to select the more salient aspect of the compound figure when it was relevant for the task. The data suggest critical roles for the left and right PPC in biasing attention away from and towards salient aspects of stimuli.
Attending to time enhances perceptual processing. (Converging evidence from Psychophysics and Electrophysiology)

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The temporal orienting of attention involves the ability to focus attention on a relevant point in time. In a typical temporal-orienting procedure, participants are cued to expect the target stimuli either after a short (400 ms) or long (1400 ms) cue-target interval. The typical results have suggested a late motor locus for the effect of temporal orienting (Nobre, 2001). However, we present three lines of evidence supporting that the processing of stimuli appearing at the attended time interval can also be enhanced at an early perceptual level.

1. The use of a rapid serial visual presentation procedure showed that perceptual sensitivity ($d'$) was enhanced for attended targets.
2. A temporal order judgment task showed an enhancement of temporal resolution (i.e., lower just noticeable differences, JNDS) for attended targets.
3. A discrimination task showed an attentional enhancement of early visual electrophysiological activity (P1).

These three tasks have in common the maximization of demands of perceptual processing, in contrast to previous research in which speeded-RT detection tasks were used. We conclude that temporal orienting is a mechanism analogous to spatial attention in that processing can be flexibly modulated according to task demands.

Comparing anaphor resolution and inferencing during spoken language comprehension

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When people read or hear language, they try to produce a coherent meaningful interpretation of the discourse. Research on how people establish coherence has studied both anaphors and inferences. The current visual-world eye-movement study integrates these two strands by investigating whether people use similar sources of information and strategies when they make inferences as when they process anaphors. More precisely, we studied 1) how discourse information structure and semantic information about gender stereotypes affect anaphor resolution and bridging inferences, 2) whether people use information structure and semantics in the same way during anaphor resolution and inferencing and 3) whether the linguistic cue provided by an anaphor results in stronger coherence than the coherence established during inferencing. The results showed that discourse information structure and gender stereotype information are used during both anaphor resolution and inferencing: People used these sources of information in the same way for anaphors and inferences during early processing. However, during later processing, people relied more on semantics during anaphor resolution than during inferencing, whereas they relied more on information structure during inferencing. In addition, the results showed that anaphors do not provide a better cue for establishing coherence than implicit information used during inference making.

Planning spoken sentences in Japanese: The role of grammatical units

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Three experiments investigate the scope of grammatical planning during spoken sentence production in Japanese. Participants described colored pictures of sets of objects (e.g., “the desk and the house are red” “tsukue to ie wa aka desu” or “the desk above the house is red” “ie no ue no tsukue wa aka desu”). Experiment 1, exploits Japanese word order (SOV) to show that sentence latencies are a function of the complexity of the sentence initial subject phrase, irrespective of verb influence. Experiments 2 and 3, exploit the head final property of Japanese, which places a modifying prepositional phrase before the head. In these experiments, sentence latency is shown to be a function of the complexity of the sentence initial phrase rather that the complexity of either the whole subject phrase or its head phrase. These data demonstrate that the effect occurs at the level of grammatical encoding and suggest that planning scope varies according to the hierarchical relation between the two syntactic phrases comprising the first structural phrase, in this case the subject phrase. These data challenge purely incremental, whole subject phrase and clausal accounts of higher level processing scope.
Poor reading comprehension and exception word reading: Could use of context provide a link?

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Children with reading comprehension difficulties have relative difficulty reading exception words, and are less skilled at using context to read and understand words. Textual context may present a particularly useful strategy for reading unknown exception words. A study was conducted to investigate 1) whether reading comprehension level is related to sensitivity to context and 2) whether context is particularly useful for reading exception words. Children with and without comprehension difficulties were presented with nonwords embedded in stories. Children encountered nonwords in ambiguous and constraining contexts. Inference of target word meaning was assessed using a picture-word matching task. Poor comprehenders showed less contextual facilitation than skilled comprehenders. The orthographic legality of nonwords was also manipulated to approximate the difference between regular and exception words. However, there was no main effect of nonword legality, and context was not particularly important for learning novel exception words. Although poor comprehenders showed reduced sensitivity to contextual constraint, this may not be implicated in the difficulty they have with reading exception or irregular words.

Marking relevant parts in dialogue

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The actual performance of humans engaged in search and detect of information is usually embedded in the execution of tasks. Consequently, humans consult the information to determine whether there is relevant information available in order to assist them in realising the task objectives. It is suggested that searchers orient on relevant information embedded in a collection of information with the assistance of relevancy markers. A relevancy marker indicates that the part of the information which follows the marker is relevant according to the originator of the information. Therefore, a first step in this work is to determine which lexical relevancy markers people use to orient on relevant information. We have conducted an experiment to investigate this. We found positive evidence that people use the words, "well" and "but" to orient on identifying relevant parts of the information. This finding replicated the results of a number of similar experiments with the Dutch language conducted in the Netherlands. Currently, we are preparing an experiment to test whether the same relevancy markers are used to identify relevant parts in real-time spoken dialogue. Additionally, we are preparing to replicate the previous experiment with Chinese language speakers.
Word frequency, string-length and lexicality in reading Spanish, English and Hebrew: Effects of different levels of orthographic transparency on bilingual reading strategy in the native (L1) and the second language (L2)

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The study addresses (1) how does orthographic transparency affect word frequency, string-length and lexicality in reading Spanish, English and Hebrew by L1 readers? And (2) can L1 reading strategy influence frequency, length and lexicality in reading English (L2)? 60 Spanish-English and Hebrew-English bilinguals, and 30 English monolinguals participated in a word/nonword naming task. Word stimuli comprised high/low word-frequency and short/long letter-strings, while nonword stimuli comprised short/long letter-strings. Significant effects of word-frequency, string-length and lexicality were observed in all languages. However, Spanish readers showed a length effect, which was modulated by frequency and lexicality, suggestive of reliance on grapheme-to-phoneme conversion. English readers showed a length effect with word stimuli which was not modulated by word frequency, although non-word naming pattern resembled that seen in Spanish. Hebrew (L1) readers showed that the length effect was inversely related to word frequency and was not present for nonwords, reflecting the low level of phonemic information conveyed by Hebrew orthography, suggesting a heavy reliance on lexical/semantic information. Each bilingual group’s naming pattern in English was similar to that observed for reading in L1, suggesting that the reading strategy of L1 influences bilinguals’ reading strategy in L2.

A case study of a Japanese-English bilingual girl with specific language impairment

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A 14-year-old Japanese-English bilingual girl, EM was born in the UK to Japanese parents with no other siblings. At primary school in the UK, a delay in her English language development was identified, which was attributed to her bilingualism. However, the deficient language skills in both English and Japanese languages, more than adequate educational opportunities (including additional language support) persisted into her adolescence. Her mother suspected EM being dyslexic. EM’s language development in both languages including reading/writing was assessed. The results revealed a normal IQ coupled with comprehension deficit as well as a below average vocabulary development when compared to same age peers. There was no indication of dyslexia in her results. The results in both languages thus presented a typical SLI profile as defined by other researchers (Bishop, 2001) rather than the normal range of developmental language delay often expected for bilingual children (Hoff-Ginisberg, 1997). We thus
conclude that EM’s language deficits were not attributable to her language environment but to her SLI.


**Language and literacy skills of parents of children with SLI or dyslexia**

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There is a strong genetic contribution to children’s language and literacy impairments. The aim of this study was to determine which aspects of the phenotype are familial by comparing 34 parents of children with specific language/literacy impairments and 33 control parents. The parents responded to questionnaires regarding previous history for language/reading impairment and participated in psychometric testing. The psychometric test battery consisted of tests assessing non-verbal IQ, short-term memory, articulation, receptive grammar, reading abilities, and spelling. Self-report measures demonstrated a higher prevalence of language and literacy impairments (32%) in parents of children with language/literacy problems, compared with control parents (6%). The parents of the two groups of probands differed significantly in their performance on the nonword repetition, oromotor, and digit span tasks. Nonword repetition gave the best discrimination between affected and unaffected parents and patterns of performance on the task indicated that family risk for language impairment varies continuously rather than being an all or none phenomenon. The pattern of impairment shows some differences between parents who self-report reading difficulties and those who report oral language problems. We hypothesise that both dyslexia and specific language impairment (SLI) are multi-componential and share some form of ‘verbal trait deficit’ but differ in the degree to which a verbal memory deficit is implicated.

**The attentional blink reflects the time course of token binding, modeling and experimental work**

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A previously published computational model (Wyble and Bowman, 2005) of the attentional blink (AB) predicts that the blink results from limitations in the binding of working memory tokens to types. In our model, lag-1 sparing results from a temporal window approximately 150 msec in length during which multiple items are bound to the same token. Recovery of the blink occurs when a second token becomes available for binding. In testing our model, we have performed two AB experiments. The first compared AB curves for RSVP at either 10 or 20 items/sec. In support of our temporal account of the AB, we observed lag-2 sparing, a blink at lag 6 and recovery by lag 12 for 20item/sec RSVP. Our second experiment presented subjects with letter pairs for each of T1 and T2. If sparing involves binding T1 and T2 into one token, there should be binding
errors at lag 1. This prediction was confirmed in that subjects were at chance levels in separating the letter pairs at lag-1. This work details our efforts to use the AB paradigm to explore the temporal structure of working memory and supports our position that the AB stems from limitations in working memory consolidation.


Simulating asymmetries and similarity effects in visual search with SAIM (Selective Attention for Identification model)

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We have recently published SAIM (Selective Attention for Identification Model; Heinke & Humphreys, 2003) which uses competitive processes and interactions between top-down and bottom-up processes to achieve translation-invariant object recognition. We have shown that SAIM can account for large amounts of empirical data on normal and impaired human attention, including data on visual search (Heinke, Humphreys & Tweed, in press). Here we will present an extension of SAIM that is capable of simulating a broad range of visual search asymmetries (Wolfe, 2001, Percept. & Psycho., for a review). For instance, SAIM can reproduce the experimental finding that search for a tilted line amongst vertical lines is more efficient than search for a vertical line amongst titled lines. On the other hand pairings like L – T do not show the same asymmetry, matching experimental data. SAIM also mimics experimental evidence usually attributed to target/distractor similarities (e.g. Duncan & Humphreys, 1989). Here search for L amongst upright Ts is more efficient (low similarity condition) than search for L amongst upside down Ts (high similarity condition). We will present a new explanation for asymmetries and similarity effects in visual search which emerges from the mechanisms implemented in SAIM.

The simultaneous typeserial token model of temporal attention and working memory encoding and maintenance

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The Simultaneous Type Serial Token model (STST) is a connectionist model of how attention is allocated through time. Four principles underlie the STST model. 1) The model is consistent with Chun and Potter's two-stage theory, whereby an initial parallel stage of processing is followed by a sequential second stage, which is closely tied to working memory encoding. 2) A filter is imposed in stage 1, which emphasizes salient and de-emphasizes non-salient items. 3) The STST process of working memory encoding is best viewed according to the types-tokens distinction. Types are semantically detailed representations of the features that comprise an item, while tokens are compact episodic representations of the occurrence of an item. In the STST model, working memory encoding is the process of successfully associating a token with an active type. 4) Finally, the STST model postulates that a transient attentional enhancement is initiated by target detection, which sustains fleeting type representations in order to enable encoding into working memory. I will explain the basic workings of the model and then illustrate how it reproduces a spectrum of data from the attentional blink phenomenon, including a basic blink curve with lag 1 sparing, blink attenuation with unmasking and priming effects.

Top-down-driven grouping over-rules the central attentional bias

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A central bias in spatial selection has been proposed to explain the decreasing search efficiency with increasing target eccentricity when distractors can occur closer to fixation than the target (Wolfe et al., 1998, Perception & Psychophysics, 60, 140-156). We found evidence for such a bias using an odd-man-out variant of conjunction search. However, the bias was absent for the same displays when the identity of the odd-man-out target was known in advance. We propose that (1) top-down knowledge of a target feature supports grouping on this feature; (2) grouping links a peripheral target to central distractors expressing the same feature, increasing the attentional weighting afforded to the target and, consequently, facilitating its detection. The effects are independent of bottom-up priming effects occurring across trials. Thus feature-based grouping can be driven top-down, and can over-rule the central bias in spatial selection.

Target location probability effects in visual search: Sequential dependencies or implicit learning of spatial probabilities?

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Target location probabilities were manipulated in a visual search task in order to investigate the processes underpinning the associated performance benefits for higher probability targets. For each trial, the latency and landing position of the first saccade was analysed. In Experiment 1 the target occurred more frequently in either the left or right visual field. The first saccade was directed to the target more often when it occurred in the more frequent locations. This could be a result of sequential dependencies (e.g., Rabbitt, Cumming & Vyas, 1977, 1979) or implicit learning of the spatial probabilities (e.g., Geng & Behrmann, 2002). Experiment 2 demonstrated that there were sequential dependencies in this task. When the target appeared with equal probability at each location, performance on the current trial improved when the target had appeared at the same location on either of the two preceding trials. In Experiment 3, when the trial sequence was constrained so that target location could not repeat within a series of four trials, there was no longer an advantage for more frequent locations. These results suggest that the benefits for more frequently occurring locations result from short-term target location repetitions rather than implicit learning of the spatial probabilities.


Time-based visual selection: Effects of luminance changes to old stimuli

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Visual search efficiency is improved if half of the distractors are previewed before a second set (which contains the target) is added (Watson & Humphreys, 1997). According to the inhibitory visual marking account this is the result of observers actively inhibiting the previewed items. Previous research has shown that the preview benefit is abolished if the old items change their shape or identity when the new are added but not if they change their luminance or colour. This suggests that the mechanisms responsible for the preview benefit might be sensitive to potentially behaviorally important changes to the old items. Here we report a series of experiments that examined a much greater range of luminance change in the old items. Overall the results showed that the preview
benefit is remarkably resistant to relatively large luminance changes that would typically compete strongly for attention. This was especially true when there was a colour difference between the old and the new items. The data are discussed with respect to the possible mechanisms underlying the preview benefit and their sensitivity to ecologically relevant changes.


Negative impacts from the successful filtering of irrelevant items: The necessary role of top-down processes for inhibitory carry-over effects in search

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Recent evidence suggests that observers can show an increased degree of inattentional-blindness to important new information if it carries critical feature attributes of other items being ignored in a top-down manner: an example is the ‘negative colour carry-over’ effect under preview search conditions (Braithwaite & Humphreys, 2003; Braithwaite, Humphreys, Hodsoll, 2003). However, this form of blindness to new stimuli has typically been investigated when top-down biases follow the time-line of events (e.g., ignore the old items & prepare for the new). We assess whether the top-down bias against the irrelevant items is necessary for the effect. We presented participants with preview search conditions where we varied whether the old preview display was irrelevant (and thus had to be ignored) or relevant (and thus had to be prioritised). Inhibitory carry-over effects to new information emerged primarily when observers were set to ignore the initial preview display, confirming the necessary role of top-down biases in the effects. The results are consistent with preview search being dependent on inhibitory filtering directed towards the properties of irrelevant information, and go against onset-capture and temporal segmentation accounts of performance.

Braithwaite, J.J., Humphreys, G.W., & Hodsoll, J. (2003) Color grouping in space and time:
Detecting dynamic attending: An ERP investigation

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In the so-called clock illusion, isochronous stimulus trains are subjectively grouped into a binary percept (tick-tock-tick-tock instead of tick-tick-tick-tick). To use the manifestation of subjective accenting in EEG for realisation of a Brain-Computer Interface, we measured EEG after instructing participants to imagine different groupings superimposed on an isochronous train of stimuli, thus producing accented and nonaccented beats in identical metronome ticks. Both a binary a ternary metric pattern were used. For perception, results were comparable over participants and showed differing EEG signatures for strong and weak beats. For imagery, 64% of participants showed highly significant within-subjects results, but these cancelled out in a grand average. In the frequency domain, increased beta-activity was seen for accented beats. Though interpersonal variability prevents us from seeing general effects of imagined accents, two types of responses were observed, most likely to be produced by different cognitive strategies in task performance. The frequency results may indicate a possible coupling of rhythmic accenting with motor imagery as well as a link with auditory hallucinations. These data support the feasability of using subjective accenting to drive a BCI-device.

Mission (almost) Impossible: Modelling the verbal estimation of duration

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The verbal estimation of duration, where people assign verbal labels (in conventional time units such as milliseconds) is one of the most useful methods for assessing the perception of time, as an up to 20-fold ratio of time values can be used without the involvement of counting. However, we have little or no idea how people perform on this task. A computer model assumed that “raw” estimates of duration obeyed the scalar properties of time (i.e. had an accurate mean and Weberian variance), but that the output was controlled by an “attractor set” with competition between “strong attractors” generating the output values that occur. Such a model can reconcile underlying scalar representations of time with general aspects of data from verbal estimation studies, and was also sensitive to small changes in raw time representations (such as might result from “speeding up the clock” manipulations). However, when its predictions were compared in detail with data from 4 participants, who made hundreds of estimates of tone durations, the data had features that were difficult to reconcile with the simple model.
Interference in temporal reference memory

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Previous research in our lab (Jones & Wearden, 2004) has revealed degradation in temporal acuity when more than one standard duration is encoded in temporal reference memory. This current work sought to investigate any systematic effect of the relationship between the two encoded standards on temporal performance. All experiments used a modified version of the temporal generalisation task. Participants were presented and tested with the “first” standard (A), and then presented and tested with a “second” standard (B). Finally, participants were retested on A without it being represented. The delay between the testing of B and the retest of A varied (e.g. 15 seconds or 45 seconds). Differences in duration of A and B were manipulated, i.e. A<B, A=B, A>B. After a delay of 45 seconds peak responding shifted, occurring at the shortest of the comparisons in A<B, and the longest of the comparisons in A>B. This suggests a systematic shift in peak responding towards the length of B. It is proposed that after a long delay interval, the memory of A becomes so degraded that participants use their memory of A compared with B to complete the task. In A>B therefore, the rule employed is; “A was longer than B so I’ll respond ‘yes’ at durations that are significantly longer than B”. Delay alone was not sufficient to cause a shift in peak responding. The effects of different delay intervals and A-B differences will be discussed.


Group differences in the Wason selection task: Mathematicians and eye-movements

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Several different accounts of performance on the Wason selection task have been proposed. We report two experiments that examine two of the main competing accounts of the task. Experiment 1 demonstrates that mathematics undergraduates respond to the selection task in different ways to the general well educated population, both in terms of the proportion selecting the normatively correct answer, and in terms of the typical mistakes that they make. In Experiment 2 this result is explored further using an eye-tracking inspection time methodology. From Evans's (1996) heuristic-analytic dual process account of selection task performance we derive and test the prediction that mathematicians will spend longer rejecting the matching cards than they spend rejecting the mismatching cards, as they will have been preconsciously biased towards these cards; but that this will not be the case for the non-mathematical group, as they also tend to select the cards they are biased towards. While the results provide strong support for the heuristic-analytic dual process account, we argue that the mental models theory of reasoning cannot account for these data.

Somatic markers, conscious knowledge and decision making on the Iowa Gambling Task

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Damasio’s somatic marker hypothesis maintains that decision making is biased by emotional and visceral representations acquired through past encounters with similar choice situations. Using their Iowa Gambling Task, Bechara et al. (1997) claimed that somatic markers, as indexed by skin conductance responses, influenced decision making before knowledge about the decision environment could be consciously expressed. However, Maia and McClelland (2004) challenged this finding claiming the earlier methods used to assess participants’ knowledge were inadequate. More detailed questioning revealed that participants have knowledge of the choice environment much earlier than claimed by Bechara et al., challenging their account that somatic markers operate as nonconscious biases on behaviour. However, Maia and McClelland’s (2004) study included no physiological data leaving open the possibility that changes in somatic activity still emerge before knowledge can be expressed. To address these issues this study replicated Maia and McClelland but included physiological recording. Like Maia and McClelland, we found no differences in gambling task performance between question groups; and participants’ knowledge of the task contingencies was revealed earlier when probed using detailed questions. However, different anticipatory skin conductance activity was found between groups. The possibility that somatic markers do not inform decision making will be discussed.


A 3-option false belief task gives a window on the social mind and brain

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In our previous studies, we highlighted two perspective taking components that can be selectively affected in the case of acquired brain lesions. The first component relates to our ability to inhibit our own perspective, helping us consider that other people might feel, want or think different things to us. The second component relates to our ability to infer someone else’s perspective per se, allowing us to use all the relevant information to infer accurately the content of other people’s mind. In this study, we devised a new nonverbal false belief task that was aimed at investigating how two brain-damaged patients with selective damage to one or the other component infer the content
of someone else belief. We found that the patient (WBA) with self-perspective inhibition deficit almost always transposed his own perspective to the other person; in contrast, the patient (PF) with other-perspective taking deficit tended to “simplify” the content of other people’s beliefs. Furthermore, the profile of response of PF indicated that her difficulties arose because of difficulties in accessing and/or using social semantic knowledge to monitor someone else’s mental state. We discuss these results in relation to an information processing model of belief reasoning.

Children's confidence in knowledge gained from testimony: Working understanding of knowledge sources

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Ideally we should believe what others tell us only when it is true. In previous work children aged 3- to 4-years correctly believed a speaker who was better informed than they were but disbelieved one who was equally poorly informed. Here we examine whether, having made the correct decision to believe what is likely to be true, children retained source-specifying information. Children found out which one of a pair of toys was hidden in a tunnel, either (i) from their own direct experience, or (ii) from the Experimenter who appeared to be well informed. Children were subsequently asked "Could it be the other toy?" Under condition (i), children responded "No." Under condition (ii), older children (4 samples, mean ages 4;2 to 5;2), but not 3-year-olds (mean age 3;7), responded "No" less frequently, especially when the Experimenter prefaced the question with doubt that he had seen or felt the toy properly, and even if they could not report explicitly how they knew the toy's identity. Although all children initially believed the Experimenter only when he was apparently well-informed, older children also utilised source-specifying information leading to appropriate uncertainty in the knowledge so gained.

Symposium: The shock of the new: Functional and neural mechanisms of selection over time as well as space
Organisers: Glyn Humphreys and Chris Olivers

Abrupt visual onsets and the cortical representation of attentional priority

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When multiple objects are present in a visual scene, they compete for representation in the brain. Selective attention resolves this competition in favor of behaviorally relevant stimuli (voluntary orienting) or in favor of salient stimuli (stimulus-driven orienting). Salient new objects with abrupt onsets exhibit high attentional priority, even when attention is voluntarily focused elsewhere. The moment-to-moment
distribution of attentional priority, which depends on both voluntary and stimulus-driven factors, is reflected in activity within retinotopically organized regions of occipital cortex.

The flexibility of attentional orienting in the human brain

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Attentional orienting involves deploying neural resources selectively toward specific attributes of events on the basis of changing motivation, expectation or volition in order to optimise perception and action. To date, the vast majority of research has investigated the nature of the neural systems and mechanisms involved in orienting attention to spatial locations and objects. The emerging view is that of a large-scale neural network built around a critical parietal-frontal axis, which modulates information-processing from early stages of perceptual analysis through top-down influences. Over the last few years, we have tested the ubiquity of this attentional orienting system in the human brain by probing the ability to orient attention selectively to the contents of mental representations, and the ability to orient attention to non-spatial attributes of perceptual events. We have used hemodynamic and electrophysiological measures of brain activity to reveal the neural systems and mechanisms involved. The central question is whether one ubiquitous attentional orienting system is involved in all cases, modulating similar stages of information processing; or whether the brain areas and mechanisms involved in attentional orienting are determined by the domain in which orienting operates or the type of expectancies that can be formed. The results suggest a flexible view, in which brain areas with relevant functional specialisations participate in the networks involved; and multiple alternative mechanisms exist for the optimisation of perception and action.

New objects, visual transients and attentional capture

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Everyday experience suggests that the appearance of a novel object automatically attracts attention. The low-level explanation of attentional capture posits that because new objects are usually associated with changes in luminance attention is simply directed towards the location of the luminance transient. The alternative view suggests that object-onset is represented at a higher level and hence new objects capture attention independently of any accompanying low-level transient. Franconeri, Hollingworth, and Simons (2005) recently provided a decisive test of this alternative hypothesis. In a variation of a standard visual search task, one new item appeared amongst a number of old items. Crucially, the new object was created as a result of an occluder moving across the display uncovering the new item. Hence, the new object was not associated with a visual transient. Results showed that the new item did not capture attention. Rather than using a search type paradigm, we employed the occluder procedure together with Posner’s precuing technique. Results showed that RT was shorter for targets occurring at the location of a new object relative to RT for targets occurring at the location of an old
object. We conclude that new onsets do not rely on low-level luminance processing in order to capture attention.


Changing the view with visual transients

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The effects of transients on visual perception have been widely studied in the context of attentional orienting. In a series of experiments, we show that, in addition to the role in exogenous attention, visual transients trigger drastic perceptual changes for a constant stimulus – including making an object disappear or a percept alternate (in the case of a multistable or ambiguous stimulus). Moreover, a visual transient is directly connected to the percept of change. Our experiments show that a visual transient induces a subjective sensation that something has just changed at that location, even when there is no actual change. We suggest that visual transients reset and discard the perceptual representations created before, and initiate the processing for a new stimulus. In the natural world, sudden changes (e.g. appearance or disappearance) of an object are uncommon. The most common situation for the visual system to receive visual transients is our own eye movements. We discuss the possibility that the cycle of resetting and restarting repeats itself and constitutes fundamental dynamics in natural vision.

The role of the posterior parietal lobe in spatio-temporal segmentation and selection

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The ‘preview’ benefit reflects the prioritisation of selection to new over old objects in search, when participants receive a preview of half of the distractor items. We have examined the neural structures subserving this benefit through neuropsychological studies of patients with parietal lesions. Patients with posterior parietal lesions are typically poor at preview search, often showing no benefit when compared with full-set baseline conditions. Nevertheless, such patients can continue to show an onset-advantage when onsets and compared with offsets, suggesting that the problem is not simply due to loss of ‘onset capture’. Moreover, the patients manifest abnormally large benefits when the temporal and spatial properties of targets and distractors are separated. The data cannot be explained simply in terms of impaired spatial disengagement and indicate instead that the posterior parietal lobe is important for spatio-temporal parsing of the visual world.
Preparing for perception and action: Automatic and effortful processes in response-cuing

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Forewarning people about upcoming events and impending actions generally improves performance. The preparatory processes underlying this performance enhancement have been studied in response-cuing paradigms, with precues providing advance information about the location of the upcoming stimulus and its associated response. A robust finding from this paradigm is an advantage of unilateral left-right cues over bilateral inner-outer cues. According to a recent account of this left-right advantage, the Grouping model, left-right cues are pull cues and inner-outer cues are push cues, evoking exogenous and endogenous control, respectively. In a series of experiments we manipulated the characteristics of the cues: onset vs. no-onset cues, spatial vs. symbolic cues, valid vs. invalid cues, and visual vs. tactual cues. The results consistently showed a dissociation between left-right and inner-outer cues, providing converging evidence for the notion that left-right cues induce a fast, automatic selection of the cued responses, whereas inner-outer cues need slower, effortful processes to establish a selective preparatory set.

End of Symposium

Aversion to natural and artistic images

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Contemporary art is often judged aversive to the extent that people complain of headaches. We have asked people to judge the visual discomfort of a wide range of images including not only those from contemporary non-representational art, but photographs of rural and urban scenes and pages of text. The judgments are consistent. The images judged to be uncomfortable show a different Fourier power spectrum from those judged to be relatively comfortable. The latter show the linear decrease in log luminance contrast energy with increasing log spatial frequency expected in natural images. The aversive images show greater power at spatial frequencies close to 4 cycles per degree relative to that at other spatial frequencies. Using a weighted sum of spectral energy with no free parameters we have derived an aversion index that can account for more than 40% of the variance in judgments of visual discomfort from contemporary art and 7% of the variance in photographs of natural scenes. Text consisting of words with letters that give a high horizontal periodicity (measured using the autocorrelation of the image) is read more slowly than other text. Such text has a higher aversion index.
Impact, arousal and the recollection of emotional pictures

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Memory for emotional material is generally better than memory for neutral material; with increased arousal and negative valence being associated most with improved memory. Experiment 1 compared memory for disgusting and frightening images that were matched for valence and several other factors except arousal (a distinguishing feature of these emotions). Disgusting images were remembered more often, despite being rated as significantly less arousing and of equivalent negative valence to the frightening images. Analysis of the image set showed that the disgusting images were generally more compelling and had a greater subjective ‘impact’ than frightening images, and rated impact provided the best predictor of recognition memory in relation to 13 other variables. Additional experiments compared memory for (i) high and low impact images that were matched for arousal, and (ii) high and low arousal images matched for impact. Again, impact provided the best predictor of memory performance, even when other variables were taken into account. We conclude that arousal is not the all-important emotional memory dimension suggested by previous research. Impact has considerable currency in photojournalism and other media. The challenge now is to develop a more precise theoretical specification of how cognitive and affective attributes give rise to these effects.

The paired-object affordance effect

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We report the evidence that affordances can arise from pairs of objects being placed in familiar co-locations for action. In Experiment 1, participants viewed pairs of objects that were placed in either their normal co-locations for action (fork – knife) or in the opposite co-locations (knife – fork). Participants had to decide whether the objects were used together (an action decision) or whether they would both typically be located in the kitchen (a semantic decision). In Experiment 1, positive action decisions were faster to objects in correct co-locations for action than in the opposite co-locations. There was no effect of position on semantic decisions. In Experiment 2 the stimuli were shown with hands correctly gripping each object. Now both action and semantic decisions were affected by whether the objects fell in the appropriate co-locations for action. In Experiment 3 word stimuli were presented, with the words presented where the objects were in the correct and incorrect co-locations for action. There was no effect of word position on either action or semantic decisions. The results suggest that placing objects in appropriate locations for action can offer an affordance to action, which influences action decisions and (in some case) semantic decisions about objects.
Around the clock surveillance: Simple graphic disturbance in patients with hemispatial neglect carries implications for the clock-drawing task

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Drawing is widely used as a diagnostic tool in the study of unilateral visual neglect, and the clock-drawing task in particular can yield useful indices of behaviour. It is generally believed that aberrant graphic production, such as the misplacement of numbers, reflects a visuo-spatial deficit, and that drawing itself (i.e. the circle) is unaffected by the syndrome. Here we show that neglect is closely associated with a drawing disturbance that affects the production of simple circles. Sixteen right-hemisphere stroke patients copied circles of various sizes and their drawings were measured for size accuracy. We found that patients with more severe neglect produced greater scaling errors, consistently drawing the circle smaller than its veridical size. Errors were not in the horizontal axis alone: shrinkage occurred equally in both height and width axes. This suggests that neglect can co-occur with non-unilateral constructional difficulties that serve to exacerbate the symptoms presented. We argue that this be taken into account in the administration of drawing tasks in order to facilitate a more quantitative approach to neuropsychological testing.

The role of the frontal lobes in mirror-image and anatomical imitation: A neuropsychological study

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How is imitation accomplished and which areas of the brain are directly involved in different kinds of imitation? At the functional level, Bekkering, Wohlschläger and Gattis (2000) have proposed that imitation entails representing observed behaviours as a set of hierarchically organized goals. At the anatomical level, neuropsychological and imaging findings point to the involvement of the frontal lobes in imitative behaviour. Two experiments assessed if and how healthy participants and individuals with frontal and non-frontal lesions hierarchically represent the various goals of observed actions during mirror-image and anatomical imitation. Experiment 1 confirmed that imitation is based on the identification of action goals and on their organization into hierarchies. Brain-damaged individuals were more impaired than controls in the imitation of multi-component actions, but they followed the same goal hierarchy. Moreover, Experiment 1 demonstrated that frontal patients were selectively impaired in performing anatomical imitation. Experiment 2 provided evidence that anatomical imitation is more cognitively demanding than mirror-image imitation because, in addition to the identification and reproduction of the hierarchy of goals, it requires the imitator to map his responses in a spatially incompatible way relative to the observed stimuli. The frontal lobes are crucially involved in the spatial coupling of the observed stimuli with the executed imitative responses.

Expressing emotions with body movement: It is what you do, as well as how you do it

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Evidence highlights the importance of kinematics in emotion perception from body movement (Pollick, Paterson, Bruderlin, & Sanford, 2001; Sawada, Suda, & Ishii, 2003; Wallbott, 1998). Yet what people do with their bodies can also provide important cues to others’ emotional states, cues that are carried primarily by information about spatial and spatiotemporal form. On the assumption that stimulus inversion disrupts the processing of configural information related to static form, and motion reversal disrupts the processing of configural information related to changes in form over time, this study investigated the effects of inversion and motion reversal on the identification of basic emotions from body gestures. Inverting the gesture movies or playing them backwards significantly impaired emotion classification accuracy, but did so more in patch-light than in fully illuminated displays, indicating a greater disruption to the processing of form-related than kinematic cues. Nevertheless, even in combination these stimulus manipulations did not abolish above chance recognition of any of the emotions, suggesting that kinematics help distinguish emotions even in conventional and symbolic gestures. Fear recognition accuracy was disproportionately impaired both by inversion and by reversal, suggesting a greater role for form-related cues in fear perception.


Thirty-fourth Bartlett Lecture

Levels of Processing Speech

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Evidence from a series of experiments in which listeners were induced to adjust the boundaries of their speech sound categories motivates the claim that spoken language recognition necessarily involves abstract prelexical representations, separate from the representations of words. Evidence from a series of experiments contrasting priming of semantically associated words with priming of phonological form motivates the further
claim that separate phonological and conceptual representations are involved in the recognition of spoken words. The relationships between these levels of processing (prelexical and lexical, phonological and conceptual) are addressed by yet further evidence: in brief, prelexical processing does not necessarily fully constrain lexical processing, lexical processing does not directly constrain prelexical processing, and activation of phonological representations does not necessarily entail activation of conceptual representations. Together this body of evidence provides a fuller picture than previously available of the processing involved in one of humankind's favourite cognitive operations: listening to speech.

It’s not what you say but the way you say it: Matching faces and voices

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Recent studies have shown that the face and voice of an unfamiliar person can be matched for identity (Kamachi, Hill, Lander, & Vatikiotis-Bateson, 2003; Lachs & Pisoni, 2004; Rosenblum et al., in press). Here we investigate the effects of paralinguistic changes on face-voice and voice-face matching. A change between speaking a sentence as a statement and a question disrupted performance, whereas changing the sentence itself did not (Experiment 1). Altering manner between conversational and clear speech (Experiment 2), or between conversational and casual speech (Experiment 3), was also disruptive. However, artificially slowing (Experiment 4) or speeding (Experiment 5) speech did not affect matching performance. The results show that bi-modal cues to identity are closely linked to manner, but that content (what’s said) and absolute tempo are not critical. Instead prosodic variations in rhythmic structure and/or expressiveness may provide a bi-modal, dynamic identity signature.


No primacy effect for familiar faces: a rare advantage for unfamiliar people

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In almost all face recognition tasks, there is a profound advantage for familiar
over unfamiliar faces. We have argued that this can be explained by the fact that face familiarisation delivers flexible representations which can generalise to new instances, whereas unfamiliar faces are treated in an image-based fashion. In a series of experiments we examine subjects' recognition memory for specific photographs. Subjects see a sequence of different images, all depicting the same person. They are shown a final image of the same person, and asked whether it occurred earlier in the sequence. This task shows a recency effect for both familiar and unfamiliar faces, with performance on each being similar. However, a primacy effect exists only for unfamiliar faces: performance for images early in the sequence is reliably better for unfamiliar than for familiar faces. We argue that these results give further support to the notion that unfamiliar faces do not recruit processes involved in familiar face recognition (i.e. "face expertise"), but rely on a more superficial coding.

Modelling the role of the PFC in episodic memory

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When encoding a list of words in episodic memory, features that are shared by few words are encoded at a stronger level, forming a list-gist. Learning the gist may prevent encoding of distinctive features of list items, resulting in a high level of false positives. Patients with Prefrontal Cortex lesions show such a high level of false positives in recognition memory, consistent with the idea that PFC patients encode the gist, but not the distinctive features of the words in a list. We present a neurocomputational model, in which during encoding, PFC units bind to common features of list items and inhibit them, allowing more distinctive features to be encoded. At recall, the PFC activates the common features, whereas the context activates the distinctive features. This mechanism enables the model to encode both gist and distinctive information and to reduce the level of false positives. We examine the model’s ability to reduce false positives in lists in which the words belong to a single category or are related to a different non-presented word (such as in the Deese-Roediger-McDermott false memory paradigm). We also examine the effect of category information (related/unrelated; blocked/unblocked) on the performance of the model.

Executive functions and hierarchical organisation in the spatial working memory for clustered sequences

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The results of a previous study (De Lillo, 2004) indicate that, in structured versions of the Corsi test, sequences consistent with hierarchical principles are reproduced more accurately than unstructured sequences. Here we report the results of three experiments investigating the effects of sequence length and structure in relation to the executive requirements of the task. In the first experiment, we compared serial recall for sequences either consistent or non-consistent with a hierarchical representation at
different sequence lengths. The results showed that the benefits of hierarchical structure start to emerge in sequences with five items or more. In a second experiment we varied size and number of spatial clusters in which the sequences were segregated. In conformity with the predictions of a hierarchical model, we found that response times at cluster boundaries were proportional to cluster size. Finally, a third experiment showed that executive loading during sequence encoding selectively reduced the benefits of clustering. These results support our hypothesis that executive functions are deployed to pick-up spatial structure and form spatial chunks when spatial memory is at risk of overloading.


Short-term memory for time and serial order

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Recent research exploring the adequacy of time-based models in explaining the short-term ordered recall of a sequence of items has pointed to a lack of temporal isolation effects as evidence against such models (e.g., S. Lewandowsky & G. D. A. Brown, 2005). I will consider more general possibilities of overlap between memory for order and memory for time, and present the results of an experiment in which short-term memory for order and time were examined in the same experimental paradigm in a within-subjects design. The results suggest that there is some common basis underlying memory for order and memory for timing over short periods, but that the temporal schedule of presentation is unlikely to be represented veridically in short-term memory, and cannot form the sole basis of representation of serial order.


What causes auditory distraction?

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Task-irrelevant background sound substantially interferes with short-term memory. This distraction does not fit well with accounts of auditory attention. For example, the particular content of the sound does not affect how distracting it is. Neither is degree of distraction related to factors such as working memory capacity, executive function, or habituation. A critical characteristic of distracting sounds is acoustic change over time between segmented entities, and short-term memory tasks that involve order processing are those that are susceptible to disruption. We tested the hypothesis that the automatic sequence processing in unattended auditory input predicts degree of disruption. We compared the relationship between two types of auditory sequence matching tasks
and distractibility. Performance on a sequence-matching task that could be accomplished on an automatic, holistic basis predicted how distractible participants would be when presented with task-irrelevant background sound during serial recall. Sequence-perception tasks that required recoding of the auditory input (e.g. labelling, transposition) predicted actual level of performance in the short-term memory task, but did not predict disruptability. We argue that the facility with which auditory sequences are automatically processed determines the extent to which such auditory information will distract, while processes related to recoding or synthesising auditory input do not.

**Linking working memory and long-term memory: A computational model of the long-term learning of novel sound patterns**

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The nonword repetition (NWR) test has been shown to be a good predictor of children's vocabulary size up until the age of around five years. NWR performance has been explained via the working memory model and specifically the phonological loop component which is seen as being critical in the learning of sound patterns. However, no detailed link between long-term memory and incoming sound patterns has been proposed. A computational model (EPAM-VOC) of children's vocabulary learning that explains how long-term sound patterns are learned is presented, and it is shown that EPAM-VOC can account reasonably well for the current NWR findings. However, existing studies of NWR performance used different stimuli across ages. A new study to examine performance using the same nonword stimuli across ages showed that NWR performance declines as nonword length increases, but performance improves with age. By using the same model but testing at different points of the input, and implementing a component within EPAM-VOC that allows incorrect articulation of a nonword, EPAM-VOC is able to provide a very good account of both 2-3 year old and 4-5 year old NWR performance. EPAM-VOC represents a good approximation of the learning of novel sound patterns that needs to incorporate segmentation before proper word learning can take place.

**Luminosity - a perceptual "feature" of light-emitting objects?**

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Luminous (glowing) objects are perceived as qualitatively different from reflecting objects, and this qualitative difference seems to be linked to differential cortical activity even though perceptual differences don't match physical stimulus differences (Leonards et al., 2005). However, it is still unclear whether object luminosity is treated as an independent feature of pre-attentive visual processing comparable to orientation, motion, or colour. Objects are thought to have feature status, if they pop out from surrounding objects because of a visual attribute - the feature. In a series of visual search tasks, we found that glowing targets led to pop-out (efficient) search when presented with
non-glowing distractors of similar luminance, but that this search efficiency was induced by the presence of luminance gradients producing the percept of luminosity rather than by luminosity itself. We therefore conclude that the perceptual quality of glow does not reach feature status, indicating that cortical activation differences between glowing and reflection objects cannot be based on bottom-up sensory mechanisms allowing the detection of glow.


**A Neurophysiological model of decision-making and Weber's law**

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We describe an integrate-and-fire attractor model of the decision-related activity of ventral premotor cortex (VPC) neurons during a vibrotactile frequency comparison task (Romo et al., 2004). Populations of neurons for each decision in a biased competition attractor network receive a bias input that depends on the firing rates of VPC neurons that code for the two vibrotactile frequencies. The firing rate of the neurons in whichever attractor wins reflects the sign of the difference in the frequencies (Δf) being compared but not the absolute frequencies. However the probability of transition from the initial spontaneous firing state to one of the two possible attractor states depends probabilistically due to finite size noise effects on the difference of the vibrotactile frequencies scaled by the base frequency. Thus the encoding scheme for a psychophysical effect, Weber's Law, is not neuronal firing rate, but instead is based on network synaptic connectivity and statistical fluctuations.


**Haptic adjustment of radius**

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Haptic curvature discrimination experiments have typically been done with relatively small stimuli (at most hand-sized) placed on a table. However, in daily life we often handle large curved objects (think of basket balls), but usually we hold them with two hands. In this study, we wanted to investigate how well we are able to estimate an object property like shape or size when handling large curved objects in a more natural setting. More specifically, we asked subjects to adjust the distance between two large cylindrical shells in such a way that the two shells together would seem to form a circular cylinder. Stimuli consisted of a series of pairs of cylindrical shells of different curvatures. All subjects were able to perform this task in a consistent manner, but they were often far
from veridical. There was found to be a monotonous (but not necessarily linear) relationship between adjusted radius and actual radius. Evidently, this finding has important implications for our understanding of haptic shape perception.

Intermediate frames of reference in the 3-D haptic perception of space

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The representation of space perceived through the haptic modality is subjected to systematic distortions. What people perceive as parallel often largely and systematically deviates from what is physically parallel. The current hypothesis based on studies conducted in 2-D presupposes an involvement of different reference frames. In particular, the use of an intermediate reference frame is presumed that can be interpreted as a weighted average of contributions of an allocentric and an egocentric reference frame (fixed to the hand). In the present research, the reference frame-model was tested in 3-D space. Blindfolded participants had to construct 3-D fields of bars that were felt as being parallel to each other. Moreover, hand orientations were measured for each position in space. If the intermediate reference frame-hypothesis holds, the settings should lie in the plane defined by what is physically parallel and what is parallel defined in a reference frame fixed to the hand. It was observed that deviations in the plane were systematic and larger than out of plane deviations. Additionally, the weighting factors of the two reference frames were computed for each participant. The results convincingly support the use of an intermediate reference frame also in the 3-D haptic space perception.

Grasping at laws: Speed-accuracy trade-offs in manual prehension

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Fitts’ Law captures the speed-accuracy trade-off for one-dimensional aiming movements. It seems probable that similar laws apply to manual prehension (reach-to-grasp) movements, but these relationships have not been investigated systematically. A series of prehension experiments was conducted in which the three dimensions of a cuboidal graspable target object were manipulated independently. The data show that the duration of prehension is related lawfully to the accuracy constraint imposed by each of the target object’s dimensions, and that the movements are extended in response to increased accuracy demands primarily via prolongation of the deceleration phase. Lawful effects of required accuracy were also observed upon maximum grip aperture, which can be explained by assuming that grip aperture is increased to allow tolerance for the increased spatial variability of shorter-duration movements. These observations formalise the core speed-accuracy trade-offs that apply to prehension movements, and emphasise the interdependence of the reach and the grasp components.
Haptically 'straight' lines

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In this research, we set out to investigate haptically perceived space. Large deviations with respect to physical space have already been shown to exist. This study continues research on haptic space by investigating the shape of straight line segments constructed by touch. Subjects were asked to produce straight lines between two reference markers by arranging magnets on a horizontally placed magnetic board. Straight line segments were approximately parallel to the front part of the body. Subjects used both hands; manipulation was unrestricted. We compared four different tasks: Interpolation-5, Interpolation-1, Intersection and Pointing. Although we found quite some differences between observers, the overall pattern of results showed that haptically straight lines were generally curved away from the observer. However, in Interpolation-1 they corresponded to physically straight. In addition, Pointing generally produced larger deviations than the other three tasks. Taken together, the results show that there exists no unique definition of the straight line, questioning the viability of the concept of haptic space.

Common magnitude representation for number processing and grasping

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It has been proposed that quantity and space are represented by a common generalized magnitude system for action (Walsh, 2003). To investigate this idea we required participants to grasp an object with two different grips (precision or power grip) depending on the parity of a small or large digit. Interestingly, we observed an enlarged grip aperture in presence of large digits. Furthermore, an interaction between the grasping actions and the number magnitude was found in the latencies of the reach-to-grasp movements. That is, participants were relatively faster to initiate precision grip actions in response to small digits, and power grips to large digits. This effect was also present when participants grasped the object with only thumb and index finger (Experiment 3), which controls for the amount of fingers involved in the two actions. However, when pointing toward the object (Experiment 2), number magnitude had no impact on the movement initiation times suggesting that the intention to grasp is crucial for presents of this interference effect. In sum, our data demonstrate an interaction between the representation of number magnitude and the processing of size information required for grasping actions and provides new evidence for a common generalized magnitude system for action.
There is broad agreement between many theories that spoken word recognition is a parallel process of competition between multiple lexical candidates. The ability to take part in this competition can be thought of as the defining characteristic of a lexical representation. Here, I will discuss the acquisition of novel spoken words, as measured by their ability to enter into lexical competition. In a typical experiment, participants would learn a set of nonsense words that diverged from real words in the final segments (e.g., “cathedruke”, derived from “cathedral”). Subsequent tests would then examine the degree to which the novel items had been encoded, either explicitly (e.g., recognition, or recall) or implicitly (e.g., engagement in lexical competition). Experiments in our lab suggest that multiple time-courses of learning apply in situations like this. Explicit effects of novel word learning are normally immediate, whereas implicit effects typically emerge the next day, and appear to be associated with sleep. These findings suggest that words are initially encoded in a short-term, possibly episodic, memory system. Over an extended period of time the representations of these words change, and competition effects only emerge once the items have been fully integrated into the mental lexicon.

Exemplars: Lexical or sublexical?

Goldinger (1998) reviewed evidence that lexical representations are based on memory for individual exemplars. Luce & Lyons (1998) noted, however, that much of this evidence did not specifically address processes of lexical access. They showed that auditory lexical decisions were numerically but not reliably speeded for same-voice relative to different-voice repetitions. A new experiment examined the reliability and locus of voice-specific effects. Block 1 contained words and nonwords, half of each presented in a male voice, half female, with stimuli varying across 4 subject-groups. Block 2 was identical across groups and included a set of words which were: same-voice repetitions; switched-voice repetitions; new words comprising re-orderings of phonemes used in the same voice in Block 1; or new words comprising previously unused phonemes. We predicted that, if voice-specificity influences lexical access, lexical decisions to same-voice repetitions should be faster than to switched-voice repetitions, and that, if such a benefit exists and reflects storage of sublexical rather than lexical exemplars, the same-voice benefit for repeated phonemes in new words should be as large as that in word repetitions. Results will be discussed. Understanding exemplar effects will depend on establishing what idiosyncratic properties of speech are stored, and the locus of storage.

Episodes of a bilingual’s lexicon

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Previous studies in second-language (L2) lexical access have indicated stronger influences of episodic traces, when compared with first-language lexical access (Trofimovich, 2005). This conclusion contrasts with other studies challenging the role of episodic traces in lexical access both for first and second language (Pallier et al. 2001). However, both studies differ in many aspects, so direct comparison is not without problems. To further explore this controversy, highly proficient Spanish-Catalan bilinguals have been studied in an auditory lexical decision task. Stimuli were pronounced by different speakers and (episodic) repetition effects were assessed. Half of the stimuli were cognates and half of the stimuli non-cognates. Participants were tested in their two languages. The results showed equivalent repetition effects for both populations when the same voice pronounced both instances of the word. However, larger repetition effects were observed for L2 stimuli when different speakers were pronouncing both exemplars. These results are discussed in terms of theories of lexical representation and first and second-language word learning.


Learning and generalization in lexical processing; the interaction of the information structure of words, LH coarse coding, sex differences, and the split fovea

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Language behaviours reflect the processing and representational propensities of the brain; where there are differences in these propensities, we should find processing differences. Such differences are at the heart of the issue of how the brain learns from instances and stores generalizations. I will review the claims regarding RH coarse coding versus LH fine coding; a coarse-coded representational unit mediates more individual mappings than does a fine-coded one. This difference can be simulated in connectionist models of language processing by making fewer computational resources (i.e. fewer hidden units) available to the side of the model dealing with the LVF, forcing each unit to represent broader categories. I will discuss several simulations of orthographic
processing, in which the split fovea projects the left and right parts of words contralaterally to the RH and LH, and interacts with the information structure of the word and the effects of differential lateralization of language processing. The simulations show that specific laterality differences and sex differences in lexical processing behaviours can be understood in terms of the statistics of the problem interacting with low-level functional and anatomical distinctions in the cerebral cortex.

**Exemplars in morphological processing**

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In machine learning, two families of algorithms are distinguished. Greedy learning attempts to extract, as quickly as possible, generalizations from exemplars, after which the exemplars themselves are discarded. Lazy learning, by contrast, generalizes over large instance bases of stored exemplars. Most models of the lexicon developed in generative linguistics, as well as the Words and Rules model of Pinker (1999) can be characterized as based on greedy learning. However, lazy learning approaches to morphological processing offer many advantages compared to theories using greedy learning. In my presentation, I will first review these advantages, and then focus on recent findings pertaining to the role of exemplars in morphological processing. First, memory traces for complex words seem to develop even after a single instance of use. Second, memory traces for complex words may come into existence because their subphonemic properties already distinguish them from their base words right from word onset. Third, a word's inflectional entropy can be understood as a paradigmatic characteristic of the accuracy of exemplar-driven classification. Finally, I will argue that data compression, which forms part of any functional lazy learning algorithm in machine learning, should likewise be part of lazy learning theories of morphological processing.


End of Symposium

**Stability over time in lexically-guided auditory perceptual learning**

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Perceptual representations of phonemes are flexible and adapt rapidly to accommodate idiosyncratic articulation in the speech of a particular talker. Previous research has shown that the boundary between two phonetic categories can be modulated when ambiguous speech input is repeatedly disambiguated by the stored lexical knowledge of a listener (Norris, McQueen & Cutler, 2003). Further, such perceptual
adjustments have been shown, at least for certain phonemic contrasts, to be specific to the exposure talker (Eisner & McQueen, 2005; Kraljic & Samuel, 2005). Here, we address the question of whether such adjustments remain stable over time and under exposure to other talkers. During passive listening to a story, participants learned to interpret an ambiguous sound as [f] or [s]. Perceptual adjustments measured after 12 hours were as robust as those measured immediately after learning. Equivalent effects were found when listeners heard speech from other talkers in the 12-hour interval, and when they had the opportunity to consolidate learning during sleep. Results suggest that rapid lexically-guided perceptual learning remains stable both under exposure to novel talkers and over time.


Do ADHD symptoms and its personality characteristics in adults are simply a result of a sustained attention deficit?

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Attention deficit hyperactivity disorder (ADHD) is associated with lack of organization and planning, forgetfulness, impulsivity, and oppositional-defiant disorder (ODD). These behavioral characteristics have led recent theorists to view ADHD as a response inhibition disorder resulting primarily from a deficit in executive functions (Barkley, 1997) rather than a deficit in sustained attention (Douglas 1972; Douglas & Peters 1979). The present study examined the relation of a variety of ADHD symptoms and personality traits to sustained attention and executive attention among adults with (n=30) and without ADHD (n=60). Difficulties in sustained attention were correlated with attention problems in school, ODD symptoms, impulsivity, math problems, lack of planning and organization and high sensation-seeking. The response inhibition measure was correlated only with lack of planning and organization and high sensation seeking. Moreover, response inhibition was highly correlated with sustained attention rather than with executive attention. These findings suggest that deficits in sustained attention are a major factor mediating symptoms of ADHD.

Interplay of Gestalt grouping principles, attention for action, and eye movements

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Attention for action has perhaps been most intensively studied using the Stroop task. Evidence suggests that Stroop interference in color naming arises partly because of early visual attention sharing between color and word: Removing the color after 100 ms reduces interference (Neumann, 1986). Removing the whole color-word stimulus reduces interference less than removing the color only (La Heij et al., 2001), suggesting a role for the Gestalt principle of common fate. We further investigated this in four experiments by measuring eye movements and naming latencies in the Stroop task. In Experiment 1, removing the ink color after 100 ms reduced Stroop interference and facilitation effects on naming latencies. However, the gaze durations to the stimuli only reflected the reduced interference. This suggests that Stroop interference and facilitation may arise at different moments during color name planning. In Experiment 2, the reduction of interference was replicated for color patches. In Experiment 3, the interference was reduced when the color patch was not removed but spatially repositioned after 100 ms. In Experiment 4, the word rather than the color patch was repositioned, resulting again in reduced interference. These findings suggest that Gestalt grouping principles play a major role in attention for action.


Failure of response inhibition under conditions of high prior-probability of a target following lesions of the subthalamic nucleus in the rat

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The subthalamic nucleus (STN) occupies a significant position in the circuitry of the basal ganglia and plays a key role in inhibitory control. We examined the effect of lesions of the STN in motor preparation and timing using a reaction time task. Rats were trained to maintain a nosepoke (for up to 0.6sec) before responding to a target presented to the right or left side. The probability of a right/left target was 50% overall, but the probability varied through the foreperiod, with left targets most probable at early foreperiods and right targets increasingly probable with increasing foreperiod. Reaction times and the pattern of incorrect responses reflected the spatiotemporal probability and
this remained the case following lesion of the subthalamic nucleus. The lesion resulted in an increase in anticipatory responses and in incorrect responses, but other measures of performance (in particular, reaction time) were unchanged. The pattern of increase in incorrect responses suggests that although the STN is not involved in the computation of spatiotemporal probability per se, the failure of response inhibition following the lesion is augmented under conditions of high spatial and temporal prior probability.

Decomposing sources of response slowing in the PRP paradigm

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Reaction time (RT2) to the second of two successively presented stimuli increases drastically when the interval between both stimuli decreases. Current models of this dual-task interference neglect processing limitations arising in situations where the response to the first stimulus occurs before the arrival of the second stimulus. Here we aimed at investigating PRP effects in these situations and introduced behavioural and electrophysiological measures to distinguish between the predictions of three prominent accounts. In two experiments (16 participants each) we varied the stimulus onset synchrony (SOA) between the two stimuli, manipulated stimulus contrast (Experiment 1) and stimulus-response (S-R) compatibility (Experiment 2) of the second stimulus, and focused our analysis on trials with RT1 < SOA. A clear decrease in RT2 with increasing SOA was found in these trials. This effect was underadditive with contrast manipulation, but additive with manipulation of S-R compatibility. Analysis of onsets of the Lateralized Readiness Potential and latencies of early visual components revealed an exclusively premotoric, but postperceptual locus of this effect. Together, these findings support the idea that a central bottleneck stage might be occupied for a period longer than needed for the actual selection, most likely even for some time after response execution.

Spreading the sparing: Against a limited-capacity account of the attentional blink

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The identification of the second of two targets presented in close succession is often impaired - a phenomenon referred to as the attentional blink. Extending earlier work (Di Lollo, Kawahara, Ghorashi, & Enns, 2005), the present study shows that increasing the number of targets in the stream can lead to remarkable improvements as long as there are no intervening distractors. In addition, items may even recover from an already induced blink whenever they are preceded by another target. It is shown that limited memory resources contribute to overall performance, but independent of the attentional blink. The findings argue against a limited-capacity account of the blink and suggest a strong role for attentional control processes that may be overzealously applied.

Attention to faces in a visual cueing task

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Several reports suggest an advantage for faces in attracting attention, but the mechanisms of any face bias remain unresolved. We examined whether attention is oriented automatically to faces or can be modulated by observers’ intentions. In a visual cueing paradigm, observers responded faster to a target probe appearing in the location of a face, than when it appeared in the location of a competing non-face cue (Experiment 1). This effect was present at very short cue-target SOAs, and was uninfluenced by stimulus inversion (Experiments 2 and 3). Moreover, a face bias did not simply reflect the spatial frequency composition of the stimulus set (Experiment 4). However, the cueing advantage was reversed when faces were negatively predictive of the likely target location, thus making it beneficial to attend to the competing non-face cues instead (Experiment 5). Furthermore, observers were able to orient towards upright faces or competing inverted faces, depending on the predictiveness of these different cues (Experiment 6). Together these results suggest a fast attentional preference for faces, operating on relatively early detection processes, but that is regulated by top-down control.
1. The friction of human skin

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The tribological properties of skin play a key role in the in- and out-of-plane deformation of the fingertips and hence in the activation of the mechanoreceptors. The presentation will focus on some of the unresolved issues associated with these tribological properties and the relationship with those of synthetic polymers. For example, there is conflicting evidence about whether or not the coefficient of friction decreases with the applied normal load when a spherical probe is employed on dry skin. There is little corresponding data reported for wet skin and also on the influence of the probe material. However, the published work suggests that the friction of skin increases in the wet state and it also increases to some maximum value while drying. Moreover, under certain circumstances the motion is intermittent for wet skin; the example of sliding a wet fingerpad over the rim of a drinking glass is well known.

2. Attention for changes in task-relevant flanker features

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When subjects have to respond to the identity of a central stimulus, reaction times are faster when they are flanked by congruent compared to incongruent flankers. Previous research using non-coloured, oriented stimuli (arrows) showed that the flanker effect disappeared when flankers were repeated over successive trials using short response-stimulus intervals. A possible explanation involves attention for changes in task-relevant flanker-stimulus dimensions. Further research using coloured, non-oriented stimuli tested this explanation while eliminating the alternative hypothesis involving orientation mechanisms caused by the arrows. Although a flanker effect was found, it did not disappear when coloured flankers were repeated, offering no support for the attention hypothesis. However, restrictions inherent to the flanker-task could be responsible for this. The repeated central presentation of coloured stimuli allows for the broadening of the attentional field and the processing of the coloured flankers in the periphery. In two new experiments the stimuli were presented at peripheral locations while manipulating location cueing (0 or 100\%). Preliminary results indicate that an interaction between the congruency effect and flanker repetition can be found in the no cueing condition, but not in the 100\% cueing condition. These findings support the hypothesis regarding the influence of attention.
3. Evidence for an attentional hypothesis of ‘closing-in’ behaviour in Alzheimer’s disease: A single-case study

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‘Closing-in’ behaviour (CIB) is a common feature of Alzheimer’s disease. It describes the tendency, in copying tasks, for the subject to copy inappropriately close to or on top of the model. We tested the hypothesis that CIB may arise because patients have difficulty uncoupling their motor behaviour from the spatial focus of attention. We studied a 62 year-old woman with moderate Alzheimer’s disease who showed CIB in figure copying and gesture imitation. We presented her with a simple drawing task in conjunction with a secondary letter-reading task. In each trial, the patient’s drawing veered markedly towards the location of the letters attended, mimicking her CIB in figure copying. These data imply that a bias to respond towards the point of attention is sufficient for CIB in Alzheimer’s disease, and demonstrate that this phenomenon is not specific to copying tasks, although it is most commonly elicited by them.

4. Top-down modulation in inefficient search: Evidence of differences between orientation and colour cuing

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In this study we examine effects of dimension-specific priming in visual search tasks. The study utilised a conjunction search with two targets, either a blue horizontal or green vertical bar, amongst blue vertical and green horizontal bars as distractors. In pilot studies we found search slopes of around 30 ms/item for these search displays, making this search task highly inefficient. To study the effect of dimension-specific cuing, search displays were preceded by an informative cue (80% valid) predicting either target colour (a blue or green dot), target orientation (a horizontal or vertical white line) or non-informative stimulus (a white dot). The display size was either seven or 15. In Experiment 1, colour cuing led to an increased reaction time cost-benefit compared to orientation cuing. However, this dimensional effect could be attributed to a higher saliency for colour compared to orientation. For Experiment 2 we controlled for this factor by reducing the colour saturation of the stimuli but the effect remained. These results are consistent with cuing effects found in Müller, Reiman and Krummenacher’s 2003 study for efficient search. Overall, these studies suggest stronger cue-induced, top-down modulation of visual search by colour than by orientation.

5. Task dependent effects of Weber’s illusion

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Weber (1834) found that an equal distance between two stimuli is estimated differently when applied to various skin areas (Weber's illusion). Distances between tactile stimuli on a high receptor density area are perceived as being larger as compared to an identical distance on a low receptor density area. Previous studies of visual illusions suggest that illusion effects vary with the type of response given (Aglioti et al., 1995; Brenner & Smeets, 1996). Here we tested a modified version of Weber's illusion in which a solid object was placed on the forearm or hand. Blindfolded subjects were required to give either a size estimation or a grasping response. The results showed that Weber's illusion significantly affected size estimation of solid objects (e.g. larger size estimates for objects placed on the hand compared to the forearm). However, hand opening (MGA) during grasp movements showed a pattern opposite to Weber's illusion: larger MGA when grasping to the object placed on the forearm. We suggest that task dependent differences in sensory processing resulted in the opposite patterns of behaviour. While the perceptual system reduces size estimates when receptor density is lower, the motor system increases MGA, possibly to provide a larger safety margin.

Brenner, E, & Smeets, J (1996). Size illusion influences how we lift but not how we grasp an object. Experimental Brain Research, 111, 473-476

6. Differences between the hands when veterinary students perform the component tasks of bovine pregnancy diagnosis in a simulated environment

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Certain veterinary palpation tasks are single-handed and students often ask: “Which hand should I use?” There are practical reasons that support the use of either hand, while some anecdotal evidence from clinicians favours the left hand. However, when allowed to choose, most students prefer to learn with their dominant hand. An experiment has been designed to assess the performance of the left and right hands for the component tasks of bovine pregnancy diagnosis. When palpating a cow, veterinarians compare the size and fluid content (softness) of the two uterine horns. Students performed one or other of these tasks in a virtual environment with their left and right hands using the PHANTOM haptic device. The perceptual limits of each hand were determined using a 3 to 1 staircase. Thirty-six female right-handed students compared the size of two uterine horns. One horn, the standard, was 30mm in diameter and the other, the comparison, was 40mm initially. The point of subjective equality was 34.54mm for the left hand and 33.87mm for the right hand (no significant difference). Another group
of students are currently performing the second part of the experiment comparing the softness of two uterine horns.

7. Proprioception contributes to the recognition of visual feedback of finger movement

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The ability to identify visual feedback from passive movements is decreased or even absent relative to active movements. So, it is not certain whether proprioception contributes to self-recognition of active movements. We compared the ability to recognize self-produced visual movement in a patient with chronic loss of proprioception (IW) against a group of 6 healthy controls. All subjects were tested on two tasks: ownership (O) and control (C). In O, the subjects saw screen cursor movement that was either synchronous with their finger movement or asynchronous, with an imposed random delay, and detected whether the cursor had been triggered by their own action. In C the subjects made similar finger movements, saw a brief small cursor jump to either left or right, and were asked to detect jump direction. This required visual discrimination while performing finger movements, and controlled for IW’s known increased attentional demand during movement. IW was less accurate than the controls in the ownership task. Two-way ANOVA [GROUP (IW or healthy) and TASK (O or C)] showed a significant interaction (F= 9.29, p=0.012). Proprioception appears thus to contribute to the correct identification of visual hand feedback. We suggest that in neurologically intact subjects, the interaction between proprioception and vision may allow for more effective processing of visual feedback.

8. Effects of working memory load on lemma selection

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Evidence from neuroimaging suggests that working memory plays a vital role in selecting among response alternatives during lemma retrieval in language production. In the present study, the interaction of the ease of lemma retrieval and WM-load was investigated. Participants repeatedly named sets of visually dissimilar objects that were either semantically related (“cat, duck, mouse, fish, snake”) or unrelated. The participants’ naming latencies were longer in the related than in the unrelated sets (semantic blocking effect), most likely due to increased lexical competition among the members of the related sets. When engaged in a digit retention task during naming, participants displayed significantly slower naming latencies and a larger semantic blocking effect. A word naming task using the same materials yielded a smaller effect of WM-load but no significant effect of semantic blocking or its interaction with WM-load. These findings confirm that lemma selection requires working memory capacity.
9. Stimulus-driven control in task switching and restarting

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We examined how stimulus-driven control affects the preparation for and the execution of a goal in task switching and in task restarting after an interruption. In each block of 16 trials, two cues indicated either a color or a form match task. Cue1 was presented at the beginning of a block, and Cue2 after trial 8. The two cues either indicated the same task (non-conflict condition) or different tasks (conflict condition). After trial 10, a warning signal was presented which forced a task switch in the conflict, but not in the non-conflict condition. Congruent stimuli (the both tasks required the same response) were presented either on trial 9, or on trial 10, or on trial 11. All other trials within a block were incongruent (the both tasks required different responses). The results showed: (1) Elimination of switch costs when congruent stimuli were presented at the switch trial itself; (2) Restart costs turned into a restart gain when congruent stimuli were presented at the restart trial itself. These findings suggest that stimulus-driven control facilitates task switching as well as restarting at the moment of the execution of a goal.

10. Reading disappearing text: Effects on adults' and children's oculomotor control

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We monitored readers' eye movements as they read sentences that literally disappeared as they read. Adults, children aged 7 - 9, and children aged 10 - 11 read two sets of sentences - one which was normally presented, and one in which each word disappeared 60 ms after it was fixated. Rayner, Liversedge, White & Vergilino-Perez (2003) found that adults can read normally under disappearing text conditions. In this experiment we also found that adults showed no differences in their oculomotor behaviour between the normal and the disappearing text conditions. However, the two groups of children showed significantly different patterns of eye movements when reading disappearing text compared to normal text. There were differences in oculomotor behaviour between both groups of children, as well as between the children and the adults, reflecting varying levels of disruption to lexical access and sentence processing. These data indicate a different relation between foveal and parafoveal processing in children of different ages and adults.

11. A Preliminary investigation into the design of multi-dimensional vibrotactile messages

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The simple vibrations used in mobile phones and handheld computers do not fully exploit the potential of vibration as a means of communication. This research investigates how to construct multi-dimensional vibrotactile messages called Tactons, which could be to provide more informative alerts in such devices. Previous studies have found recognition rates of 71% for Tactons encoding two parameters of information (Brown et al., 2005). A preliminary study with six participants was carried out to investigate the effect of adding a third parameter. Tactons, representing information about upcoming appointments for use in electronic diary alerts, were created and presented using three C2 Tactors (http://www.eaiinfo.com). The type of appointment (meeting/lecture/tutorial) was encoded in the rhythm, the importance (low/medium/high) in the vibrotactile “roughness” and the time until the appointment (five/fifteen/thirty minutes) in the spatial location of the vibration on the forearm. Results showed an average recognition rate of 54.3% for the 27 different Tactons, with recognition rates of 96.9% (rhythm), 59.6% (roughness) and 98.8% (location) for the individual parameters. Reducing the complexity to just two levels of roughness (low/high) resulted in an average recognition rate of 80.6% for the 18 Tactons, with individual parameter rates of 99.1% (rhythm) 82.4% (roughness) and 99.8% (location).


12. Does attention improve spatial and temporal visual acuity?

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The ability to resolve finer changes of an image in space (spatial resolution) can be enhanced by attending to the spatial location where that image appear. (Yeshurun & Carrasco, 1999). However, the ability to resolve finer (fast) changes of an object in time (temporal resolution) and its relation to attention is not clearly understood yet. Thus, it is reported that exogenous spatial attention either enhances, has no effect or impairs temporal resolution (Shore & Spence, 2005). To prevent such a disparity on the attentional effects over spatial and temporal-resolution processes, we developed a task to measure such processes using identical physical stimulation. We presented a square which had a spatial gap and a temporal gap, so that participants were to discriminate the size or the duration of that spatial or temporal gap, respectively. Moreover, participants were cued in advance to be prepared for either the spatial or the temporal resolution task. Thus, we explored whether endogenously attending to a particular task influences the spatial and temporal resolution of perception. The results showed higher perceptual
sensitivity to resolve the cued versus the uncued task, suggesting that the temporal dimension can be prioritised over the spatial dimension to enhance processing, and vice versa.


13. The role of the spatial and temporal configuration in perceptual causality

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Humans see causality in schematic events: If square A moves towards B, which moves upon contact, observers report physical causality. If B moves before contact, so that both move simultaneously for some time, they report social/psychological causality. Our studies extend work on causal impressions between A’s and B’s motion to different spatio-temporal configurations. Exp. 1 varied whether A moved prior to B or the reverse, whether both moved contiguously or simultaneously, and size of the gap between motion trajectories. A-first contiguous motion received high physical and low psychological ratings; for the other events psychological ratings were higher. Gap size affected only A-first contiguous motion: Physical ratings decreased with it, psychological ratings increased. Causal impressions thus depended on both the temporal event configuration and spatial contiguity. Event effects could, however, be disguised spatial contiguity effects, because identical trajectory gaps produce different gaps at the point of common motion for different temporal configurations. Exp. 2 equated events on this motion gap. Now ratings for all event types depended on gap size, but effects differed across event types. Within A-first events, in contrast, gap size and degree of simultaneous motion had independent effects (Exp 3). These findings suggest multiple mechanisms of causality perception.

14. Do imagery and memory share a common short-term store?

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One important distinction within visuo-spatial working memory is that between memory for a presented image and memory for a mental image. According to Logie (1995), both types of image share a common resource known as the passive visual store or visual cache. In contrast, Cornoldi & Vecchi (2003) suggested that memory for mental images requires active storage processes whilst presented images require relatively passive processes. The present research explored whether differences exist between the two types of images in terms of memory performance. Participants in the present research performed a matrix matching test under three different conditions; a mental rotation
requirement followed by an interval, an interval followed by a mental rotation requirement, and, just a short interval. If memory for mental images does require more active processes then we would expect performance to be different when a mental image is formed before the interval than when it is not formed at all or formed after the interval. No differences in performance were found between a short interval with no rotation and an interval followed by rotation. This suggests that the rotation instruction itself did not make the task generally harder. However, performance was reliably worse when mental rotation was required before the interval. This suggests that memory for a mentally rotated image is not equivalent to that of a presented image.


15. An EEG study of masking effects in RSVP

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We present an EEG study investigating how target items are processed in Rapid Serial Visual Presentation (RSVP). A single-target paradigm similar to the letters-in-digits task (Chun and Potter, 1995) is used. Half the targets are followed by a blank. A skeletal task (Ward et al., 1997) reveals how targets are processed if presented stand-alone or followed by just a single mask. Methodological issues complicate the ERP analysis of a single target in multi-target paradigms. During the Attentional Blink, for instance, both targets follow in such close succession that subtraction techniques have been used to extract target ERPs (Vogel et al., 1998). Our study explores the dynamics of processing single targets to better understand the processing of multiple targets. Predictions from the ST2 model of temporal attention (Wyble and Bowman, 2005) motivated this study. We find that whereas stand-alone targets show clear early components, these are indiscernible in RSVP. The P3 component associated with working memory update is delayed and larger for RSVP targets. In contrast to a previous assumption (Kessler et al., 2005) a following mask delays target processing. A target item analysis based on subject performance shows an inverse relationship between task difficulty and P3 size.


16. Colour discrimination and memory: Dissociable skills

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Over 100 participants including many working in colour related professions were tested on colour discrimination and memory to establish normative data. They were tested on the Farnsworth Munsell (FM) 100 hue task, colour discrimination at two levels of difficulty (both timed and un-timed), and two forms of memory (AFC and recognition) again both timed and un-timed. Statistical analyses indicated that only the FM 100 distinguished between colour professionals and controls. Experts were to be found in both groups. Different types of expert were found with a double dissociation in their abilities. AL, an artist, was expert in AFC memory but not in matching, the reverse was true of AS who had no professional interest in colour. The dissociation between memory and matching of colour samples (throughout spectrum) was found to be reliable over a period of 3 years.

17. Looking to social information in complex scenes: A preferential-looking task

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It has been suggested that people will orient to social information such as faces automatically but spontaneous attention to social information as part of a complex scene may not be allocated in the same way. A preferential-looking study was designed in which participants viewed side-by-side pairs of photographs of real-life scenes, one of which contained a person (a social stimulus) and one of which did not. Eye-movements were recorded using a dual Purkinje eye-tracker. In the first part of the study, participants were given no specific instructions but in a second condition, participants were instructed to decide the gender of the person in the image. In the spontaneous-looking condition, participants spent approximately 58% of their fixation time looking at the social image and directed over 70% of their first fixations into the social image. Fixations on the body and particularly the face took up approximately one third of fixation time and over 50% of first saccades were directed to the face or body. All of these findings were exaggerated in the second, gender-decision condition. Results are discussed in terms of their relevance to developmental accounts of social attention.
18. How do we choose anaphoric expressions? The role of syntax and semantics

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A general assumption is that the saliency of the antecedent plays a role in how language users choose anaphoric expressions (Ariel, 1990; Gundel et al., 1993). However, what factors affect saliency is a matter of debate. According to syntactic saliency accounts, saliency is determined by syntactic factors (Gordon & Scearce, 1995; Grosz et al., 1995), whereas semantic and thematic saliency accounts (Arnold, 2001, Stevenson et al., 1994) claim that semantics also has an effect. We tested these accounts in experiments using a written sentence-completion method. Experiment 1 investigated the effects of thematic role saliency (Arnold, 2001; Stevenson et al., 1994) by contrasting stimulus-experiencer with experiencer-stimulus verbs. Experiment 2 examined different connectives (because vs. so). Experiment 3 investigated antecedent animacy. All experiments showed syntactic saliency effects: more pronouns (relative to names) were used to refer to the first than to the second noun phrase in the sentence. However, no effects of thematic role saliency and semantics of the connective were found. By contrast, animacy of the antecedent did have an effect. We propose that syntactic information and semantic properties of the antecedent (e.g., animacy) influence the choice of anaphoric expressions, but the semantics of other words in the sentence does not.


19. Crossing the divide: Interaction and accommodation between past-tense verbs in a case of progressive fluent aphasia

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We report a study of the production of past-tense verbs by a man (AM) with a refractory phonological system associated with a progressive fluent aphasia. Irregular verbs ending in an alveolar stop consonant (/d/, /t/) tend to be better preserved than other irregular verbs in people with progressive fluent aphasia (Patterson et al (2002). We explored this phonological effect using the standard ‘Today-Yesterday’ task, but using
blocked lists of verbs, with or without a final alveolar stop consonant. We then alternated the established verb with a different verb-type. We found patterns of interference and accommodation that crossed the regular-irregular verb divide. Established regular and irregular verbs with base forms that end in an alveolar stop consonant, such as ‘want’ and ‘write’, interfered with each other but neither of these established verbs affected the past-tense forms of regular verbs, such as 'look'. However, both verbs caused embedded irregular forms, such as 'give', to be completed with /d/ or /t/ (eg 'gived'). These, and other findings, are consistent with an interactive morphological-phonological system in which final alveolar stop consonants behave as past tense markers, and past tense rimes behave like morphemes. Moreover, from within this system both regular and irregular verbs are produced.


20. Is implicit action activation affected by Parkinson’s disease?

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In Parkinson’s disease (PD), external stimuli can hinder movement and produce ‘freezing’, yet visual cues can sometimes help reinstate or facilitate movements. We asked whether two classes of action relevant stimuli, which activate sensorimotor brain areas in healthy controls, would also implicitly evoke action in patients. We compared the influence of both action observation and action-relevant objects on movement execution in PD patients and age-matched controls. In experiment 1, participants viewed a moving finger or object (baseline), and subsequently performed a finger response to a target. Responses were faster if the executed and observed movements had compatible directions. The controls showed a larger effect for the finger than object movements, but the patients showed the reverse trend. In experiment 2, participants responded to the shape of a door handle (action-relevant object) or an abstract bar stimulus (baseline) that could be oriented toward or away from the response hand. Responses were faster when response hand and object were spatially compatible. Controls, but not patients, showed a larger effect for the action-relevant object over baseline. Thus, our results revealed that whilst low-level spatial or directional cueing were unaffected by PD, the patients did not show an additional effect of action-relevance.
21. The role of spatial integration in the perception of surface orientation with active touch

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Perception of the orientation of a visual line, in the human fovea, improves with length (Westheimer & Lee, 1997). This suggests that vision uses spatial integration to improve orientation perception. Here, we investigate the role of spatial integration in the perception of surface orientation using kinaesthetic and proprioceptive information from shoulder and elbow. Participants actively explored, with their left index finger, virtual slanted surfaces of different lengths and orientations and were asked to judge their absolute and relative orientations. In the first experiment, participants reproduced the orientation of the explored surfaces. In the second and third experiments participants discriminated between the orientations of two surfaces (of different and equal length, respectively) presented sequentially. Results showed that absolute and relative judgements of surface orientation improve with longer surfaces. It is concluded that increasing spatial integration improves judgments of surface orientation. This suggests that the proprioceptive shoulder-elbow system may make use of redundant spatial information resulting from extended arm movements to improve orientation judgments.


22. The development of dynamic object individuation

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The ability to segregate individual objects from the visual array and to track their movement through time and space is fundamental to human perception and cognition. We present three studies that explore the development of this ability through early childhood by pitting different cues against each other using Michotte's (1964) tunnel illusion. Study One shows a clear developmental trend in children's ability to use featural cues over spatio-temporal confounds. Study Two shows that in 3 year olds, priority is given to spatio-temporal cues even over gross featural changes but that the ability to flexibly use salient cues is developing. Lastly, Study Three addresses the proficiency of the older children who are passing the task and finds a dissociation between their performance on different measures. We propose that sensitivity to salient cues to individuation and the ability to over-ride reliance on spatio-temporal cues develops throughout this period from 3 to 5 years of age and that alternative response modalities may mature at different rates. These findings inform debates not only in developmental research, but also in visual attention and comparative psychology.
23. Effects of AoA, familiarity and word length on word and picture naming in Serbian

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Two experiments examined the effect of AoA, familiarity, and word/picture name length on picture (Experiment 1) and word naming (Experiment 2) in Serbian (a language with highly regular orthography where each phoneme corresponds to a single letter). Our results reveal AoA as a significant predictor of naming latencies in both experiments, but proportion of variance accounted for by AoA is significantly larger for pictures compared to words. Familiarity had equivalent and small effect in both experiments. Word/picture name length had significantly larger effect on word than picture naming. The implications of the results are discussed with reference to current models of word and picture naming.

24. Executive functions and cross-modality binding in serial temporary memory

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Re-integration of multi-modal information in working memory was investigated in three experiments. Experiments one and two focused on the effects of executive loading tasks on recognition of serial order of presentation of auditory stimuli paired with icons flashing in different locations. Items to be recognised belonged to the same or to a different sensory modality. It was observed that recognising the order of presentation in the same-modality condition was faster and more accurate than in cross-modality conditions. However, here participants may sometimes have used alternative strategies to solve the task without taking into account the order of all the items presented. Experiment three ensured they were doing this by presenting a probe and asking participants to generate the next step in the sequence, thus forcing serial recall. In cross-modality conditions, the probe was from a different modality than the item to be reported. In same-modality conditions, the probe and the item to be reported belonged to the same modality. Cross-modality recall was again worse than same-modality recall. Therefore, additional resources were indeed required for cross-modal integration. Moreover, concurrent random and fixed interval generation selectively affected performance and speed of recall in the mixed-modality condition. This was in accordance with the predicted greater attentional requirement of this condition.

25. Attentional capture and competition-for-action: Two forms of auditory distraction?

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It is well established that a task-irrelevant auditory stimulus that deviates in some way from recent stimulation captures attention and disrupts ongoing behaviour. In this study, we examine whether the disruption of visual-verbal short-term memory by to-be-ignored changing-state auditory stimuli can be explained by the repeated triggering of an attentional capture mechanism. Serial recall of visually-presented digit-lists was disrupted by irrelevant changing-state letters compared to a repeating letter. In addition, the presence of a deviant event – a single change in the voice conveying the letters – produced further disruption and, critically, this deviation effect was additive to the changing-state effect (Experiment 1). Moreover, a repetition of voice within an otherwise alternating male-female pattern also disrupted serial recall (Experiment 2). The results suggest that auditory attentional capture by a single deviant auditory event represents a functionally distinct form of interference from that produced by continuously changing stimuli. It is suggested that attentional capture is the result of a violation of an algorithm characterising a recent stimulus-sequence. The changing-state effect, however, results from a competition for action: Changing-state stimuli automatically yield order cues which compete for, and therefore interfere with, the action of deliberately maintaining the order of the to-be-remembered events.

26. Visual and tactile influences upon aesthetic preference

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Recent studies of perception and attention show strong links between vision and touch. However, links between aesthetic and evaluative aspects of vision and touch have hardly been studied. We investigated if tactile information influenced visual evaluation. Thirty-four participants made aesthetic evaluations about small cards which had visual texture (gratings of 1, 2, 3.2 mm ridge width) on one side, and orthogonal gratings on the reverse. Participants haptically explored the reverse sides of 2 otherwise identical cards to identify which of the two had a very slight convexity. This gave them tactile experience of the gratings. They then turned the card, viewed the grating on the front, and rated how much they liked the visual stimulus using a Likert scale. All possible combinations of touched and viewed grating width were tested. Overall, subjects showed highest visual evaluations when viewing the 1 mm gratings. Interestingly, visual evaluation depended significantly on tactile experience of the card: touching a 2 mm grating lead to greater visual evaluations of the grating the subject viewed when they turned the card. Finally, there was a significant interaction between visual and tactile effects. This arose because tactile modulation of visual evaluation was strongest for the 1 mm grating which subjects visually preferred. The results show that vision unlocks the pleasure of touch. When we like what we see, we allow ourselves to like what we feel.
27. Light touch contribution to reflex and voluntary standing postural adjustments

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Light touch (LT) reduction of sway is assumed to reflect the provision of a sensory spatial reference (SSR). However, it was recently reported that LT produces no improvement in postural reflexes. We examined how LT affects postural stability before, during and after either voluntary (VP) or reactive (RP) postural perturbations. 11 participants stood on a forceplate with (LT) or without (NT) touch at the left shoulder and held a manipulandum (M) in the right hand. In RP, M was pulled forward, in VP participants pulled M backward, using a similar force level. We found: (1) average (AV) centre of pressure rate (CP) in the anterior-posterior (AP) direction was zero except during perturbation (increased by LT in VP). (2) AV in the lateral (ML) direction was zero except for a biphasic pattern at perturbation in VP (decreased by LT). (3) CP variability (SD) in AP and ML before and after perturbation was reduced by LT in VP and RP. (4) SD at perturbation was greater with LT in VP (AP only) but not in RP. We conclude that LT effects represent postural adjustments directed at maintaining contact. Thus, LT reduces sway, not only through its SSR action, but also as a movement constraint.

28. Vocabulary learning in a second language: The effect of multiple choice versus text entry on learning and memory

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Vocabulary acquisition is an important part of the learning of a second language. These experiments made use of a web-based interface to study learning of Japanese vocabulary in participants with no prior experience of Japanese. The interface permitted the use of either text-entry (TE), or multiple choice (MC), formats at each stage of Training or Testing. In these experiments Psychology students, from the University of Leicester, were assigned to four balanced groups for the four conditions arising from the interaction of TE or MC at Training versus TE or MC at Test; Test was conducted one and two weeks later. It was found that the combination of TE at training and MC at test offered a significant and marked advantage over the other three combinations. This was true even after the possible gains from guessing in the MC condition had been allowed for. While at first sight aspects of these results might not conform to predictions from classical ideas about recognition and recall, it should be noted that this material is different from that used in many purely psychological studies on memory. However, the results are likely to have implications for the design and implementation of computer assisted language learning systems.
29. Distraction in semantic memory from irrelevant auditory stimuli: Inhibition, activation and failure to source monitor

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That retrieval involving semantic memory is impaired by auditory distraction is demonstrated in four experiments using a visual category-recall task. The pattern of results indicates the effects to be functionally distinct from that found with serial recall by showing: (a) task-sensitivity to the semantic similarity between visual-relevant and auditory-irrelevant items, and the lexical-semantic, rather than acoustic properties of irrelevant items (Experiments 1 and 2); (b) that semantic similarity between the task and the sound is an important factor, the effect being less with serial than with free recall (Experiment 3); and (c) that disruption produced by semantic similarity is dependent on the dominance of irrelevant items - only highly dominant items interfere (Experiment 4). The results are discussed in terms of the interference by process approach to auditory distraction with reference also to activation, inhibition, and source-monitoring accounts.

30. What do we do with words while we're deciding what to do with them?

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Three experiments assessed the automaticity of visual and spoken word processing within the task-choice paradigm (Besner & Care, 2003). In this dual-task procedure the operation to be performed is signalled by a cue presented either in advance (750 ms stimulus onset asynchrony) or at the same time (0 ms stimulus onset asynchrony) as the target stimulus. Stimulus quality was manipulated in the visual domain by varying contrast, and in the auditory domain by varying loudness. An account that posits automatic recognition of visual and spoken words predicts that the effect of these manipulations will be present in the advance condition but absent when stimulus and cue are presented simultaneously. This is because perceptual processing should proceed unimpeded by and concurrent with the task-cue, meaning that the effects of stimulus quality should dissipate by the time the cue has been decoded. However, for both visual (Experiment 1, and cf. Besner & Care, 2003) and spoken words (Experiments 2 and 3) effects of stimulus quality were statistically equivalent for advance and simultaneous presentation of the task-cue with the stimulus. These results indicate that processing of visual and spoken words is not stimulus-initiated, but delayed until the task to be performed is known.

31. New insights into repetition priming in visual search

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When the target in visual search shares common features with the target on the preceding trial, reaction times are faster compared to trials in which target features change (e.g. Maljkovic & Nakayama, 1994). However, it is unclear under which conditions such repetition priming occurs and how information is stored across trials. In the current experiment, participants searched for a rectangular target (tilted 45 degrees left or right) among vertical distractors. Item colour was irrelevant to the search. In the centre of each item was an upright or inverted ‘T’. Participants searched for the target and responded either to the orientation of the ‘T’ within the target (condition one) or to the orientation of the target bar itself (condition two). Repeating target colour across consecutive trials significantly speeded responses in condition one, but not condition two. These results indicate that more focused attention can modulate the extent of the repetition effect: in this case the repetition of colour. Repetition effects occurred even when a single feature of the stimuli was repeated, and the pattern of interactions was not consistent with the suggestion that episodic memory (Huang, Holcombe & Pashler, 2004) is the underlying mechanism for repetition priming.


32. Adaptation to noise-vocoded speech: Exploring inter-individual variability

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Noise-vocoding is a method of distorting speech that simulates the transduction of the acoustic speech signal by a cochlear implant (Shannon et al., 1995). When normal-hearing English speakers hear noise-vocoded sentences, they initially find them very difficult to understand but learn to “tune in” after a relatively short period of exposure (Davis et al., 2005). However, in recent studies, we have noticed a considerable amount of variability between individuals in their capacity to recognise and adapt to noise-vocoded speech. Inter-individual variability in performance has frequently been described in the literature on cochlear implants (Wei et al., 2004;Shannon et al., 2004;Skinner, 2003). Cleary et al. (2002) highlighted the encoding and manipulation of phonological representations in working memory as important processes in relation to children’s success or failure with their cochlear implant. The current study uses noise-vocoded speech to investigate variability in speech perception performance in the normal-hearing population. In an approach similar to van Rooij and colleagues (Vanrooij et al., 1989), we used a battery of tests to assess the contributions of auditory and cognitive factors to speech perception performance. Regression analyses identified working memory, verbal IQ and rhythm perception as possible factors underlying this variation in performance.

**33. Attention to response effects alleviates between-task interference**

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Previous studies have shown that response selection can be based on the to-be-produced effects associated with the available response options. The present study investigated whether explicitly directing attention to response effects can improve performance under increased cognitive control demands. Here, we employed a task-switching paradigm, in which participants (n=36) switched between making horizontal and vertical judgements as indicated by task cues. Two experimental blocks were realized, differing only in instructions and feedback. In the standard control condition, participants were asked to indicate the correct target position and were given correct/incorrect feedback after a response. In the ‘attention-to-effects’ condition, they were asked to (mentally) move the target box into the correct target location and were presented with the specific effect of their response (moved box). Furthermore, there were two cue-target intervals (CTI): a short 100 ms and a long 1500 ms. The results showed reduced between-task interference in the attention-to-effects condition relative to the control condition, specifically in the short CTI. The results provide evidence that attention to response effects can improve performance under increased control demands faced in the short CTI condition.
34. False recognition to structurally similar items for pictures and words in young and old adults

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It is possible to reliably induce recognition memory in healthy participants in the laboratory using lists of words that are semantically related to a critical, non-presented, distractor word. This study uses novel picture stimuli to replicate this paradigm, in modalities of colour, grey-scale and line drawing pictures, and words, presented to young and old adults. Nine list categories were created using Snodgrass and Vandewart-like images and rated for within list structural similarity and similarity of four critical distractors to each list in an online validation study. It was predicted that structurally similar pictures would create more false memories than those with low structural similarity, and that the effect would disappear when using equivalent words. Experiment 1 found young adults had higher false recognition to CDs with higher rated structural similarity to their associated lists across all modalities, experiment 2 found that the elderly showed the same effect for pictures but not for words, suggesting that they cannot generate pictures from words so readily as the young at encoding. The elderly had similar rates of false recognition to the young when signal detection methods were employed. These results suggest an assimilation between the fuzzy trace theory and the activation monitoring account, and future directions include structural similarity effects in animacy.

35. Context effects on focus identification in reading

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Liversedge et al. (2004) investigated the interpretation of sentences (e.g., 1 & 2) in which "only" adjoins either the indirect object (e.g., "her mother") or direct object (e.g., "the salt") and a continuation is congruous or incongruous. Eye-tracking data indicated that readers associated the focus particle with an adjacent constituent, and had difficulty in processing a continuation that was incongruous with this constituent. Liversedge et al. attributed this effect to syntactic restrictions on focus identification in (1), and to the operation of a locality constraint in (2). The present eye-tracking experiments further investigated these effects, by examining whether discourse context can over-ride focus identification preferences. The results indicated that context can over-ride the preference for associating "only" with an adjacent constituent for sentences like (2), but not for sentences like (1). Thus, the results demonstrate that whereas the locality constraint is violable, syntactic restrictions on focus identification are not. 1. At dinner, Jane passed the salt to only her mother but not [the pepper / her father] as well because she couldn't reach. 2. At dinner, Jane passed only the salt to her mother but not [the pepper / her father] as well because she couldn't reach.
36. Human vibrotactile sensitivity to different pencil types

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We wished to investigate human sensitivity to vibrations caused by manipulating a tool under natural testing conditions. For this purpose we tested sensitivity of artists to different types of pencil lead. The study has shown that expert human observers are able to discriminate between different types of lead used for drawing. They found easier to discriminate an H-range than a B-range lead against a standard HB. A tribological test on the leads used in the experiment has shown that H-range generates more friction than the B-range. In fact, 2H and 4H leads generate approximately 40% and 70%, respectively, more friction than an HB, while B-range leads generate very similar friction with the HB lead. This may suggest that participants responded to frequency differences generated by different frictions. Friction generated by H-type leads could produce frequencies to which the human tactile system is more sensitive than those generated by B-type. Previous studies have shown that sensitivity to vibrations transmitted through an object to the hand follow a U-shape function with minimum between 100 and 300 Hz (e.g., Brisben et al., 1999; Yang et al., 2004). However, in order to compare directly our results with those obtained in previous studies it is necessary to obtain the frequencies generated by the leads used in the present study (in progress).


37. Improved performance following action imagery

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Evidence from brain imaging and magnetic stimulation suggest that action imagery, observation and execution at one level have an equivalent neural process (Buccino et al., 2001; Ehrsson et al., 2003; Fadiga et al., 1995, 1999). It follows that prior action imagery or observation should prime later execution performance (see for example Edwards et al. 2003). Here, we report three experiments that tested whether action imagery could facilitate later execution performance. Sixty right-handed participants (20 in each Experiment) reached and grasped a centrally placed target that was presented alongside two non-target objects (in Experiment 1) and one non-target object (in Experiments 2 and 3) following different imagery conditions. In Experiments 1 and 2, the
imagery conditions consisted of either the participant imagining themselves reaching out and grasping the target (target imagery) or non-target (non-target imagery) object. In Experiment 3, two additional baseline imagery conditions were used (no imagery and imagery of kicking a ball). Actions were recorded using motion analysis tracking and the data consistently showed that target grasping imagery primed movement initiation (reaction time) compared to the non-target grasping imagery condition in all three experiments, and the ball kicking imagery condition in Experiment 3. The data are discussed in terms of how imagery that is congruent with the aims of the task can prime the planning processes of action execution.


38. Subitizing in tactile perception

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Enumerating small sets of up to 3 to 4 items is fast, accurate and effortless and is known as subitizing, but gets slower, less accurate and more effortful with more than 4 items (counting). For over a hundred years researchers have focused on visual enumeration and many theories propose that subitizing and counting are two distinct processes in visual perception. Here we demonstrate for the first time that subitizing also occurs in tactile perception. We designed software and built novel apparatus to simultaneously stimulate the fingertips of both hands. Each hand rested naturally on a separate box with the fingertips spaced well apart from each other. Participants were asked to name the number of stimulated fingertips as quickly and as accurately as possible. We found that both accuracy and correct naming times varied with numerosity. For 1 to 3 fingers, accuracy was near perfect, but was severely impaired in the range of 4 to 6 fingers (74%, 66%, and 48%). ANOVA performed on the naming times showed a significant effect of numerosity [F(5,75)=162.05, p-rep>.99, n²=0.91]. The average correct naming time for 1 to 3 fingers was quicker than the average naming time for 4 to 6 fingers (270 ms/item vs. 627 ms/item). Importantly, there was also a clear
discontinuity in the naming times slope for 1 to 6 fingers. Our findings suggest that subitizing is not restricted to visual perception but also extends to tactile perception.

39. Spatial and Frequency judgments of tactile temporal order

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The ability to report the temporal order of two successive tactile stimuli, one delivered to each hand, has been shown to be affected by arm posture. When the arms are crossed over people are less accurate in their reports of stimulus order than when their arms are uncrossed. It has been suggested that these errors stem from difficulty localising stimuli in space when the interval between the stimuli is short and the arms are crossed over. The stimuli are mislocalised and while temporal order is correctly computed, it is inaccurately reported due to the incorrect spatial codes. However, in previous work, locations were used to report temporal order. Therefore, based on these findings alone it is difficult to exclude the possibility that temporal order errors occur not because the stimuli are mislocalised but because people are incorrectly calculating the relative order of the stimuli. This confound is addressed in the present experiment where participants reported the temporal order of bilateral tactile stimuli based on stimulus frequency (high or low frequency) or location (left or right). It was found that when relative order was reported by location, crossing the hands significantly impaired judgements of temporal order. In contrast, posture did not affect performance when relative order was reported by stimulus frequency. These findings support a mislocalisation account of postural effects on judgments of tactile temporal order and present further evidence of tactile stimuli being localised in non-somatotopic coordinates.

40. Are imitative responses activated automatically?

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Ideomotor theory proposes that an imitative response is always activated when observing another’s action and that inhibition is required to prevent this response’s execution. In contrast, according to Active Intermodal Mapping theory imitative responses are never activated automatically when observing another’s actions – an innate domain-specific mechanism ensures that imitation is always reflective rather than reflexive. In a reaction time study, we investigated whether, and under what conditions, imitative responses are activated automatically in the hand game task. In the Same condition children were told to point a finger when the experimenter made a fist and make a fist when the experimenter pointed a finger. In the Different condition children were told to make a ‘thumb s-up’ gesture when the experimenter made a fist, and make a ‘scissors’ gesture when the experimenter pointed a finger. We tested 144 children aged between 4 and 11 years. Children responded significantly faster in the Same condition
than the Different condition, i.e., the inhibitory demands were greater in the Same condition. These data suggest that imitative responses are not automatically activated in the Different condition. We discuss our findings in relation to Ideomotor and Active Intermodal Mapping theory, and the control of imitation in children’s everyday behaviour.

41. Information integration in decision under risk and delay

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Current models of decision making under risk (e.g., expected utility theory, prospect theory) assume that information about the risk is combined multiplicatively with information about the reward. Similarly, in deciding between delayed rewards, current theories (e.g., exponential or hyperbolic discounting) assume that information about the delay is combined multiplicatively with information about the reward. In experiments reported here, I have found that an additive model of information integration, though normatively quite erroneous, provides an equally good description of people's decisions under risk and delay. This finding challenges the standard models of information integration under risk and delay, and opens the way for models of decision making with psychologically more plausible decision mechanisms.

42. The effects of facial expression intensity on time perception

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Following recent research (Droit-Volet, Brunot, & Niedenthal, 2004) a temporal bisection task was used test arousal- and attentional- based accounts of the effect of facial expressions on the perception of time. According to internal clock models of time perception (e.g., Treisman, 1963), arousal increases the rate of an internal pacemaker leading to an over-estimation elapsed time. Attentional demands are thought to detract from time keeping leading an under-estimation of elapsed time. In Experiment 1, participants were ask to estimate whether faces with different expressions (fear, anger, happiness, neutral) were displayed for either a short or long temporal interval. In support of arousal-based process, the duration of angry, fearful, and happy faces was overestimated relative to neutral facial expressions. In Experiment 2, the intensity of the expressions was varied by manipulating the eye gaze direction of neutral, angry and fearful faces. In further support of an arousal-based process, overestimation was recorded for faces with high emotional intensity (direct gaze) but not low emotional intensity (averted gaze).

43. ISO's new work on guidelines on tactile and haptic interaction

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Tactile and haptic interaction is becoming increasingly important both in assistive technologies and in special purpose computing environments. While considerable research exists, the current lack of ergonomic standards in this area results in many systems being developed without sufficient concerns for either ergonomics or interoperability. This leads to serious ergonomic difficulties for users of multiple, incompatible or conflicting tactile/haptic devices/applications. A new set of ISO standards is being developed as a set of new parts of ISO 9241 Ergonomics of Human-System Interaction by a new working group (WG9 Tactile and Haptic Interactions) of ISO TC159/SC4. These standards, which are being dual-tracked as both ISO and CEN standards, provide ergonomic requirements and recommendations for haptic and tactile hardware and software interactions, including guidance related to the design and evaluation of hardware, software, and combinations of hardware and software interactions. The first working draft of ISO 9241-920, which was developed by experts from 6 countries, combines guidance from 40 research papers and from 10 ISO standards. The next meeting, to take place in Potsdam, Germany in May 2006, is expected to involve an expanded group of experts working to evaluate proposed guidelines and to propose additional guidelines to be considered.

44. Bias in three-dimensional motion estimation reflects the combination of differentially reliable motion signals

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Perceiving objects moving towards us is a vital survival skill. Surprisingly, humans judging 3D motion report an object will miss them when on a collision course with the head (Harris & Dean., 2003). Here I propose that this bias is a consequence of differences in the brain’s sensitivity to lateral motion and motion in depth and advance a Bayesian model of 3D motion estimation. To test the model, I first estimate differences in human observers’ sensitivity to lateral motion and motion in depth by measuring distance increment thresholds. I then use these threshold measures to model (independently) bias in judgments of 3D motion. I show that the model provides a good account of observers’ behaviour when judging the movement direction of an approaching object. Finally, I show that observers’ bias is decreased when external noise results in reduced sensitivity to lateral motion, as predicted by the model. I discuss the data within the framework of statistically optimal information combination whereby information is weighted according to the reliability with which it is encoded. The results provide novel evidence that the brain cannot help but take into account the reliability with which information is encoded even at the cost of a surprising perceptual bias.
45. An action-perception dissociation: the reactive grip force response in a case of somatosensory impairment and tactile extinction, following cortical stroke

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When objects are lifted and held using a precision grip, vertical load force (LF) is counteracted by grip force (GF) (Johansson and Westling, 1988). For neurologically normal participants, when LF is unexpectedly perturbed, tactile input from the fingertips will trigger a reactive GF increase with a latency of around 70ms (Macefield et al, 1996). Observations of this response in patients with elemental somatosensory and motor impairments of central origin, have revealed increased response latencies, and reduced GF response amplitudes (Grichting et al, 2000; Hermsdorfer et al, 2003). However, no studies, so far as we are aware, have investigated the effect of attentional impairments on the reactive GF response. We report the case of patient JB with a unilateral, elemental somatosensory impairment, and tactile extinction. We investigated reactive GF responses to unimanual and bimanual LF perturbations. While JB failed to perceive some LF perturbations applied unimanually to the impaired hand, and all impaired hand perturbations when timed to coincide with non-impaired hand perturbations, the average latency of her GF response, for both hands, remained within normal limits. We discuss these findings in relation to cortical and subcortical pathways involved with the mediation of action and perception.

46. Directional reaching errors in proprioceptively defined space, following cortical stroke

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The spatial location of an unseen hand must be derived from proprioceptive input arising from at least two joints, and associated intramuscular receptors. When neurologically normal participants are asked to localize their unseen hand, or visual targets, perceived locations are subject to limb dependent and modality specific directional biases (Haggard et al, 2000). Furthermore, hand localization precision is seen to deteriorate when its position in visual space is derived only from proprioceptive input.
(Helms Tillery et al, 1991; 1994). These and other findings have been used as evidence for the existence of unimodal visual and proprioceptive coordinate systems, centered on the eye, and shoulder joints respectively (Soechting and Flanders, 1989b). We investigated the performance of patients with central proprioceptive impairments when asked to localize their unseen, impaired hand, in space, and compared this to visual target localization. In addition to more variable performance under proprioceptive conditions, the perceived location of the impaired hand was subject to abnormally large, limb dependent, constant directional biases. We discuss these findings in relation to the central transformations required to derive the spatial location of an unseen hand, from peripheral proprioceptive input.


47. Losing your grip (on purpose)

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Manipulation of an object held using precision grip between thumb and index finger involves controlled slip. Displacing force tangential to the object surfaces (eg due to gravity) is used to overcome stabilising grip force normal to the surfaces. As a first step in describing the control of slip we present an experiment examining the arrest of self-induced slip. Twenty-seven participants gripped an oil-coated manipulandum which was instrumented with grip and load force transducers and loaded with 1.1 kg. Participants wore either a low or high friction glove and were instructed to first produce a slip by slowly releasing their grip and then immediately increase grip to arrest the slip. The average time from slip onset to the time at which grip started to increase again was 182 ms with no difference between the two gloves. Stable grip was restored on every occasion with the high friction glove but the low friction glove resulted in the manipulandum escaping from grasp on 51% of trials (even though the maximum grip force used with the low friction glove was reliably higher, 6.7 vs 5.3 kgf). The re-grip latency is more than twice as long as grip reflex latency measures obtained from sudden loading and we discuss possible reasons for this difference.
College Accommodation

Accommodation has been reserved for the nights of 9th, 10th and 11th April in Manor House, not far from the University of Birmingham campus. All rooms at Manor House are single and en-suite. The rate for single occupancy is £35.50. Delegates are recommended to book rooms at Manor House rather than elsewhere. The house is set in attractive grounds and is an ideal location for a self-contained conference. A licensed bar is available. Links to alternative accommodation are shown below and should be booked directly with the hotel or guest house.

EPS members can make reservations for University accommodation and/or the conference dinner on the enclosed booking form, which should be returned to Professor Jane Riddoch, before 17th March, 2006. Cheques must be made payable to “University of Birmingham” and sent to “Professor Jane Riddoch EPS Meeting, School of Psychology, University of Birmingham, Edgbaston, Birmingham. B15 2TT

NVP members can make their reservations via the NVP, using the website www.psychonomie.nl/birmingham. This website also contains information of payments.

Hotels and Guest Houses close to campus

Birmingham has many hotels around the city centre, ranging in expense (from Malmaison, The Hyatt etc. through to Jury’s Inn, Novotel etc.). Small hotels can be found at http://www.hotels-of-birmingham.com Particularly recommended here are Copperfield House (60 Upland Road, Selly Park, 0121 472 8344), Asquith House (19 Portland Road, Edgbaston 0121 456 4668), and the Awentsbury Hotel (21 Serpentine Road, Selly Park 0121 472 1258).

Early booking is strongly recommended if you wish to use alternative accommodation to Manor House.

Travel

For information on directions and maps, you are invited to consult: http://www.bham.ac.uk. For details to find Manor House go to Information for Visitors, then to Maps & Directions, then either to University Locations (Manor House is item J on the map – south of the main campus) or to Directions & Multi-map directions. From Multi-map directions specific directions can be found according to which route you take into Birmingham.

Manor House is situated off the A38 (Bristol Road) driving south, between the main University campus (Selly Oak) and Northfield. It is about 15-20 min from the city centre.

By Air

Birmingham International Airport (http://www.bhx.co.uk)
By Rail

The main railway station is Birmingham New Street Station
http://www.travelbirmingham.co.uk/travel/dom/stations/nstreet.htm
A taxi to Manor House is recommended.

By Coach

Birmingham Digbeth is a major hub for National Express cross country coach services
http://www.travelbirmingham.co.uk/Travel/dom/Stations/digb.htm

For all further information on local bus timetables and other public transport, call traveline on: + 44 870 608 2608 or visit their website at: http://www.traveline.org.uk

By Car

The University is close to the M5 and M6. For directions and maps see http://www.bham.ac.uk For Manor House specifically (which is NOT on the main campus) see above.

Parking

There is ample parking at Manor House.

Local Taxis

There is a taxi rank at Birmingham New Street Rail Station (the journey to Manor House normally takes about fifteen minutes outside rush hour).

Eating and Drinking

Lunch: Manor House

Lunch must be pre-booked (£8.00 per day). To access places away from Manor House you will probably need a car.

Evening meal: Restaurants in Birmingham

In the centre of Town in an area by the canal-side (Brindley Place) there are a number of good restaurants. Bank (Brindley Place, 633-4466) serves modern English and European food as does Petit Blanc (Brindley Place, 633-7333). The Icon Gallery (Brindley Place, 248-3226) serves excellent Spanish Tapas, while City Thai (Brindley Place, 404 0758) as its name suggests, serves Thai food. Chinese can found either in Chinatown in Hurst St, near New Street station (Chung Ying, Chung Ying Gardens) or in Harbourne (Henry Wong 427-9799). Italian can be found in Harbourne (Bellissimo 426 2444) and the City Centre San Carlo (4, Temple Street, 633-0251).
There are two Michelin starred restaurants, *Jessica’s* (19 Portland Road, 455-0999), and *Simpsons* (20 Highfield Road, Edgbaston, 454 3434). You need to book well in advance for tables at these restaurants. Other highly recommended restaurants in the City Centre are *Hotel du Vin* (Church Street, 200-0600), and *La Toque d’Or* (St Paul’s Square, 233-3655). A favourite Indian Restaurant is *K2* (Alcester Rd, 449 3883) based in Moseley Village, and we have reserved the whole of K2 for the evening of Monday 10 April (8pm). K2 holds about 50 people and places will be given on a first come first served basis - if you are interested in taking this opportunity to sample genuine high-class Balti (with great music) then contact Jane Riddoch. Aside from K2, the city is awash with excellent Indian restaurants – particularly in Ladypool Road (Moseley/Balsall Heath) but there are also several along the Bristol Road heading towards the University.

**Conference Dinner**

This will be held at the Botanical Gardens on the evening of 11th April. The cost for three courses excluding transport will be £30.00. EPS members please book and indicate any dietary requirements, on the enclosed form which should be returned to “Professor Jane Riddoch, EPS Meeting, School of Psychology, University of Birmingham, Edgbaston Birmingham. B15 2TT” before 17th March 2006.

NVP members please book, and indicate any dietary requirements via the NVP, using the website [www.psychonomie.nl/birmingham](http://www.psychonomie.nl/birmingham).

**Places of Interest**

The world-renowned *Barber Institute*, situated on the University of Birmingham campus, houses the works of Monet, Manet, Renoir, Turner, Degas, Picasso and Reubens in a chronological history of art from the 13th to the 20th century. Highly recommended. Also, near the main University campus (Edgbaston Park Road), the *Winterbourne botanic garden* houses plants from around the world. Its dramatic displays throughout the seasons are popular with both students and visitors. Set within the original Edwardian design of borders, terraced lawns and woodland walks, the botanic garden is a focus for garden history and plant conservation. The University of Birmingham has its own sculpture trail which runs from the University’s East Gate, where you can see the 1722 *statue of King George I* by Van Nost, through to the West Gate, where *Sir Eduardo Paolozzi’s Faraday* stands. From east to west, you can also see *Ancestor I by Barbara Hepworth* in University Square and *Mermaid by William James Bloye*, which is in the Guild courtyard.

For first Time Visitors to Birmingham –The city isn’t far from the open countryside of Warwickshire, Staffordshire and Derbyshire or Stratford-upon-Avon, where the Royal Shakespeare Company stages plays regularly. Warwick and Kenilworth Castles are well-known landmarks and for those who like the great outdoors, Coombe Park and the expanses of Cannock Chase are easily accessible.

The beautiful towns of the Cotswolds are ideal for day trips, as are Bath and Cheltenham. Smaller villages like Painswick, Biddestone, Winchcombe or Woodstock have unspoilt walks and small independent shops.