Association for the Scientific Study of Consciousness

10th Gathering

23rd to 26th June, 2006

St Anne's College, Oxford

Welcome

Welcome to the tenth annual meeting of the Association for the Scientific Study of Consciousness.

The annual ASSC conferences provide a forum where the most recent developments in the scientific study of consciousness are presented and discussed. The vast bulk of the program comes from member presentations. The shear depth and quality of the proposals, evident in the abstracts in this book, is testimony to the vitality and breadth of this field. It is appropriate that as a member's organization the majority of symposia at the conference come from member-initiated suggestions. We would like to thank all those who tendered proposals. We were disappointed that time limitations forced us to choose only three from the large number submitted. The symposia selected were: Hakwan Lau's “Recurrent processing and visual consciousness”; Sean Kelly's “Action, perception, and consciousness”; and John-Dylan Haynes' “Brain-reading of conscious states”.

The Mind-Science Foundation (www.mindscience.org) is active in a variety of initiatives to support the development of a science of consciousness. Under the auspices of the Tom Slick award they continue to fund an excellent and diverse range of studies. We are very happy to have continued the tradition started at Caltech last year by organizing a special symposium of recent Ton Slick awardees, which will be held on Sunday morning.

The student committee has been active again in organizing its annual student social gathering. The idea is to bring together students from a wide variety of disciplines to meet and discuss ideas about consciousness. As part of the tradition an established scientist (Christof Koch) and philosopher (Tim Bayne) will present a brief talk about how they were able to combine both a passion for consciousness and a successful academic career. All students, and interested “seniors”, are invited to attend. In addition to the social, the student committee has organized a prize for the best student presentation at the meeting. This will not only involve instant fame, but a $250 cash prize. The award will be announced on the last day of the conference.

For the first time, a mentoring program for students has been organized at the meeting. The program is designed to allow more junior members of the association a means of access in a relaxed manner to established researchers; to allow them to discuss topics, exchange ideas, and get some guidance on their future academic careers. We thank Mark Bishop, Susan Blackmore, Ed Hubbard, Christof Koch, Dan Lloyd, Stephen Macknik, and David Rosenthal for generously agreeing to be part of this program.

We would like to warmly welcome our publishing friends: Benjamins, Elsevier, MIT Press, Palgrave Macmillan, and Oxford University Press. You will be able to find them from Saturday in the Martin Woods lecture theatre complex. All members of the association are entitled to a 25% discount on a selection of books from OUP, MIT Press, and Benjamins. In addition, Elsevier is offering a 30% discount to members on its new paperback version of Steven Laureys’ ASSC book “The boundaries of consciousness: neurobiology and neuropathology”. Also of note, OUP is having a special book signing of Derek Denton’s new book “The primordial emotions: The dawning of consciousness”, on Sunday the 25th at 1.30pm.

This conference could not occur without the help of many individuals and institutions. We are grateful to our sponsors:

The Mind-Science Foundation
The Guarantors of Brain
The British Council
Oxford University Press

We would especially like to thank the Mind Science Foundation, and its executive director Joseph Dial. No only have they been very gracious in their financial support of the scientific program; they also independently initiated a generous scheme of travel bursaries to allow practical student support for those most in need.

Many thanks to the scientific program committee who were responsible for guiding the selection of keynotes, symposia, talks, and tutorials within the program. This was composed of Geraint Rees, Tim Bayne, Axel Cleeremans, Susana Martinez-Conde, Alva Noë, Larry Weiskrantz, and Patrick Wilken. A special thanks to Edmund Rolls and Larry Weiskrantz who were extremely helpful in coordinating local arrangements; their unwavering and long-lasting support has been critical to the success of this meeting.

We also thank Ian Campbell, Jeanette McLoughlin, and Lisa Simmons, for their practical and extremely competent support in the organization of the meeting.

On behalf of the organizing committee and the ASSC Board,

Patrick Wilken, Magdeburg and Geraint Rees, London

Scientific Program Committee

Geraint Rees, University College London (Chair)

Tim Bayne, Macquarie University

Axel Cleeremans, Université Libre de Bruxelles

Susana Martinez-Conde, Barrow Neurological Institute, USA

Alva Noë, UC Berkeley

Edmund Rolls, University of Oxford

Larry Weiskrantz, University of Oxford

Patrick Wilken, Otto von Guericke University

Local Organizing Committee

Geraint Rees, University College London (Chair)

Edmund Rolls, University of Oxford

Larry Weiskrantz, University of Oxford

Patrick Wilken, Otto von Guericke University

Meeting Schedule

Friday June 23rd

09.30-12.30 MORNING TUTORIALS

M1 Eduard Marbach: Phenomenological methods for investigating consciousness
M2 Kevin O'Regan: The sensorimotor approach to phenomenal consciousness revisited
M3 Nao Tsuchiya & Christof Koch: The relationship between selective attention and consciousness
M4 Rolf Verleger: Event-related EEG potential correlates of conscious perception: The P3 and N2pc components

13.30-16:30 AFTERNOON TUTORIALS

A1 Igor Aleksander, Ron Chrisley, and Murray Shanahan: Machine models of consciousness
A2 Alan Cowey: Exploring aspects of consciousness by TMS
A3 David Edelman and Anil Seth: A scientific framework for the study of animal consciousness
A4 David Rosenthal: Higher-Order Theories of consciousness

17:00-17:30 WELCOME

17:30-18:30 2006 WILLIAM JAMES PRIZE SPEAKER

18:30-19:30 PRESIDENTIAL ADDRESS
Daniel Dennett: Consciousness: How Science Changes the Subject

19:30-20:30 OPENING RECEPTION

Saturday June 24th

09.00-10:00 KEYNOTE LECTURE
Jon Driver: Selective attention, multisensory integration, and perceptual awareness in the normal and damaged human brain

10.00-10.30 COFFEE BREAK

10.30-12.30 SYMPOSIUM 1: Recurrent processing and visual consciousness

Vincent Walsh: Why primary sensory areas are the gateways to awareness
Victor Lamme: Solving the Mind-Brain relation for conscious vision
Ned Block: The NCC: A Mistaken Methodology
Hakwan Lau: Subjective Awareness, Not Performance or Information Processing

12.30-14.00 LUNCH

14.00-16.00 CONCURRENT SESSIONS

1.1. IMPLICIT PROCESSES

Axel Cleeremans: Automatic priming and conscious expectancy in a simple reaction time task
Edmund Rolls: Consciousness absent and present: the neurophysiology of backward masking
Petroc Sumner: Attention modulates sensory-motor processes that do not support perceptual awareness
Paul Azzopardi: Contrasting high- and low-threshold explanations of dissociations between perceptual discrimination and awareness in patients with brain damage.

1.2. SENSORIMOTOR

Jean-Christophe Sarrazin: Temporality, Intention and Consciousness of Movement
Romi Nijhawan: Movement of invisible limbs distorts visual space
John Jacobson: Retroactive Modulation of Subjective Intentions
Janet Bultitude: Prism adaptation and attention: Investigating higher-level effects of low-level visuomotor training

1.3 PHILOSOPHY 1

Colin Klein & Gabriel Love: Kicking the Kohler Habit
Erik Myin: The colour debate revisited
David Philipona: The structure of color space: color naming, unique hues and hue cancellation quantitatively predicted from viewer-surface interactions
Roblin Meeks: Imitation and Representing The Body

16.00-16.30 COFFEE BREAK

16.30-17.30 KEYNOTE LECTURE
J David Smith: Uncertainty Monitoring and Metacognition by Humans and Nonhuman Animals

17:30-19:30 POSTER SESSION 1

20:00-22:00 STUDENT RECEPTION

Sunday June 25th

9:00-12:30 **SYMPOSIUM 2:** 2005 Tom Slick Research Award in Consciousness

Christof Koch: Toward the cellular architecture of consciousness
Jim Blascovich: Virtual Reality and the clash of consciousness
Aaron Schurger: “Something happened”: Gamma oscillations, awareness, and attention without awareness in a hemianopic patient

Michael Snodgrass: What can unconscious perception tell us about consciousness?

12.30-14.00 LUNCH

14.00-16.00 CONCURRENT SESSIONS

2.1. PHILOSOPHY 2

Michael Beaton: Animal Consciousness
Douglas Meehan: The Modality Specificity of Visual and Tactile Shape Sensations
Dan Lloyd: Neurophenomenology of time: functional neuroimaging in the past and future tense
Wayne Wu: Attention, Consciousness and Representationalism

2.2. CAPACITY LIMITS

Hélène Gauchou: The context induced change illusion
Ilja Sligte: Iconic memory revisited: a plea for a distinction between a retinal and cortical icon
Bruce Bridgeman: How much of a visual scene is represented in consciousness?
Ilya Farber: An alternative theory of change blindness

2.3 CLINICAL INSIGHTS

Melanie Boly: When thoughts become action: an fMRI paradigm to study volitional brain activity in non-communicative brain injured patients
Tristan Bekinschtein: Movement Related Brain Activity in Patients Without Awareness
Caroline Schnakers: Intact consciousness and cerebral functioning in Locked-in syndrome?
Andrea Eugenio Cavanna: Precuneus and consciousness

16.00-16.30 COFFEE BREAK

16.30-17.30 KEYNOTE LECTURE
Fred Dretske: What Change Blindness Teaches About Consciousness

17:30-19:30 POSTER SESSION 2

20.30 CONFERENCE DINNER

Monday June 26th

09:00-10:00 KEYNOTE LECTURE
Anthony Greenwald: Catching consciousness unaware: Using modus tollens to establish what conscious cognition does

10:00-10:30 COFFEE BREAK

10:30-12:30 SYMPOSIUM 3: Action, Perception, and Consciousness

Allesandro Farnè: Uni- and Multi-sensory modulation of perception
Sean Kelly: Perceptual normativity and human freedom
David Milner: Unconscious visual processing in the dorsal stream

12.30-14.00 LUNCH

14.00-16.0 CONCURRENT SESSIONS

3.1. SENSATION AND PERCEPTION

Roi Cohen Kadosh: Playing with One's Mind; Being a Synesthete
Susana Martinez-Conde : The role of fixational eye movements in visibility and visual awareness
Gijs Brouwer: Neural mechanisms underlying ambiguous structure-from-motion and voluntary control revealed by functional imaging
Michael Proulx: Seeing "where" through the ears? Localization by sensory substitution

3.2. PHILOSOPHY 3

Elizabeth Irvine : Why phenomenological considerations should not guide research and theorizing into NCCs
Robert Van Gulick: Physicalist Qualia Realism
Alan Thomas: Reconciling Conscious Absorption and the Ubiquity of Self-Awareness
Nicolas Shea : Using phenomenal concepts to explain away the illusion of distinctness

3.3. SELF

Petra Stoerig : Behavioural and Pupillary Indices of Own-Voice Recognition
Manos Tsakiris: Functional and Neural Signatures of Bodily Self-awareness
Henrik Ehrsson: Threatening a rubber hand that feels to be yours elicits a cortical anxiety response
Navindra Persaud & Peter McLeod: Consciousness is confidence: Post-choice wagering accurately represents consciousness

16:00-16:30 COFFEE BREAK

16:30-18:30 SYMPOSIUM 4: Brain-reading of Consciousness

John-Dylan Haynes: Brain reading of conscious and unconscious mental states
Rainer Goebel: BOLD Brain Pong: Self-regulation of local brain activity in synchronously scanned, interacting subjects
Thomas Metzinger: High-level content NCCs: Conceptual and methodological issues
Frédérique de Vignemont: Brain reading and the privacy of the mind

18.30-19.30 GORDON HOLMES LECTURE
Martha Farah: Severe brain damage and the problem of other minds

19:30 OFFICIAL CLOSE: POST CONFERENCE DRINKS

Locations

All **keynotes** and the **symposia** will be held at the Martin Wood lecture theatre complex (comprising the main **Martin Wood** lecture theatre with any overflow in the linked **Lindemann** theatre), where **coffee** and **tea** will also be served. **Lunch** will be served at St. Anne's College in the Marquee. For other venues, please check below:

Friday	Tutorials	M1: St. Anne's College, Tsusuki lecture theatre
		M2: St. Anne's College, Seminar Room 1
		M3: St. Anne's College, Seminar Room 2
		M4: St. Anne's College, Seminar Room 3
		A1: St. Anne's College, Tsusuki lecture theatre
		A2: Department of Psychology, Floor C, Weiskrantz Room (Cowey Lab)
		A3: St. Anne's College, Seminar Room 1
		A4: St. Anne's College, Seminar Room 2
	Welcome	University Natural History Museum
	William James Prize	University Natural History Museum
	Presidential Address	University Natural History Museum
	Opening reception	University Natural History Museum
Saturday	CS 1.1	St. Anne's, Tsuzuki lecture theatre
	CS 1.2	Martin Wood lecture theatre
	CS 1.3	Lindemann lecture theatre
	Poster session 1	St. Anne's, marquee + seminar rooms
Sunday	CS 2.1	St. Anne's, Tsuzuki lecture theatre
	CS 2.2	Martin Wood lecture theatre
	CS 2.3	Lindemann lecture theatre
	Poster session 2	St. Anne's, marquee + seminar rooms
	Conference dinner	St. Anne's, Hall
Monday	CS 3.1	St. Anne's, Mary Ogilvie theatre
	CS 3.2	Martin Wood lecture theatre
	CS 3.3	Lindemann lecture theatre

A shortcut to visual oblivion
Abdolhosein Abbassian
Research Manager, School of Cognitive Neurosciences (SCS)

Sunday, June 25th, 17:30-19:30: Poster Session 2

This paper addresses the paradox of invariance without indifference. For example, if we learn how to recognize a target, let's say the letter A, no matter what its size, how can we then know its size? Invariance to noise is another example: if we recognize a letter A by removing everything that is non-A, how do we know there was anything else present? In both cases, we human observers experience a rich scene-the letter A at its actual size and surrounded by the background texture. So, the main question is what is to be gained by, say, filtering the image if our visual system can afford to see the image as if it has not been filtered. We may call this the" re-entrance dilemma" or the "do-undo dilemma" if we like. The central issue is how to preserve the original implicit image while moving back and forth between many complex computational processes. The paper is written as a dialogue between the sceptic and the other side representing the mainstream machine vision approach, both sides agree that major problems remain to be solved. In the denouement the analysis by synthesis approach is mentioned as a possible remedy to the current debate.

Being happy and feeling good: The influence of mood on tactile perception
Dania Adamuszek
Concordia University

Saturday, June 24th, 17:30-19:30: Poster Session 1

Aim The motivation behind the experiment is to investigate factors contributing to the affective component of a stimulus' conscious perception. It is hypothesized that a stimulus' affective experience is influenced by our current emotional state. Method: This was tested by inducing an emotional state through two-minute movie clips: happy, neutral and fearful. After the movie clip, four different objects were randomly placed twice on the subject's forearm: a claw, roller, soft cloth and toy slime. Nineteen subjects were required to rate the valence (pleasantness/ unpleasantness) of the touch on a 9 point scale. Results: Each touch was rated more pleasant following a happy emotion induction while the same physical stimulus was rated less pleasant followed a fearful emotion induction. The claw was on average rated 3.08 (SD=1.38) after the fearful movie, 3.23 (SD= 1.23) after the neutral movie and 3.38 (SD= 1.28) after the happy movie ($F(1.8,31.8)=2.96$, $p=0.07$). The average affective ratings for the soft cloth after a fearful movie 6.48 (SD= 1.07) after a neutral movie 6.74 (SD=0.92) and 7.24 (SD= 0.75) after a happy movie ($F(1.5,27.3)=5.14$, $p<0.05$). The roller after a fearful movie 5.01 (SD= 0.62), after a neutral movie 5.10 (SD= 0.22), after a happy movie 5.35 (SD= 0.44) ($F(1.5,26.2)=4.71$ $p<0.05$). The slime was rated after a fearful movie 3.27 (SD= 1.59), after a neutral movie 3.83 (SD= 1.72) and after a happy movie 4.08 (SD= 2.13) ($F(1.5,27.3)=8.25$, $p<0.01$). Conclusion The emotion induction influenced the valence rating of each touch stimuli. These results suggest that the affective component of a stimulus' conscious experience is influenced not only by its physical attributes, but by our current mood as well.

Machine models of consciousness
Igor Aleksander, Ron Chrisley, and Murray Shanahan
Department of Electrical and Electronic Engineering, Imperial College London

Friday, June 23rd, 14:00-17:00: Tutorial

The work of several laboratories on the modelling of consciousness is reviewed. This ranges, on one hand, from purely functional models where behaviour is important and leads to an attribution of consciousness, to, on the other hand, material work closely derived from what is known about the anatomy of the brain and addresses the problem of phenomenology. At the functional end of the spectrum is the attribution of consciousness by a user to an artifact that is reviewed (Franklin) as well as general schematic frameworks (Sloman/Chrisley, Haikonen). At the material end, attempts at modelling brain mechanisms (Edelman, Baars), and basic bio-chemical processes are discussed (Taylor/Cotterill). There are also general prescriptions for functional schemas which facilitate discussions for the presence of consciousness in computational systems and axiomatic structures that define necessary architectural features without which it would be difficult to represent sensations (Aleksander). Another distinction between these two approaches is whether one attempts to model phenomenology (material end) or not (functional end). The former is sometimes called 'synthetic phenomenology'. Finally the work of those who use robot vehicles is reviewed (Krichmar, Shanahan and Holland).

A Formal Analysis of the Crick and Koch "Framework for Consciousness"
Igor Aleksander
Imperial College, London

Sunday, June 25th, 17:30-19:30: Poster Session 2

Crick and Koch in Nature Neuroscience, February 2003, (CK03) set out a framework for the study of consciousness. In this paper, automata-theoretic concepts are used to address a lack of definition in (CK03) and show ways of remedying this. What is gained by formal analysis? While one can agree in broad terms with the intuitions expressed in CK03, these are not being served by being left at the level of intuitions (albeit in some cases are supported by a broad neurophysiology). The aim of formalisation is to translate intuitions into structures that can be checked if not by a closed mathematical theory, then by simulation on a computer. In greater detail: 1. CK03 uses terms such as 'the front of the brain looks at the back of the brain'. It is useful to formalise, as neural automata, the cited areas of the brain. Such automata have inputs, outputs, internal states and means for changing the state structure in order to suggest that 'looking at' implies state trajectory control relationship. 2. CK03 refers to Zombie and conscious areas. These can be given distinguishing definitions in terms of their power to represent reality. 3. A 'coalition' of node activity is central to CK03. This is distinctly ambiguous: it appears to mean the active neurons in a field of neurons. It is clearer and more accurate to refer to the entire pattern of neural firing in a neural area (i.e. the state of that area). 4. The concept of a 'neural node' can be given a formal definition as a group of input-sharing neurons. 5. The concept of a 'net wave' can be given the necessary condition for propagation. 6. 'Competition' and 're-entrance' can be formalised as emergent properties of a complex system. 7. Binding is said to arise from being part of a coalition. It is shown that control links between automata provide an explanation. 8. Attention can be formalised as a bias due to input. 9. 'Meaning' of a percept, rather than being a mysterious 'penumbra' may be formalised as feature of the accessible state trajectories that involve the percept.

Synthetic Phenomenology?
Igor Aleksander
Imperial College, London

Saturday, June 24th, 17:30-19:30: Poster Session 1

Is synthetic phenomenology (SP) a valid concept? In computational models of consciousness SP is found in the details of internal representation. Here we submit that SP is involved when two conditions are fulfilled: first there is a meaningful sense in which a first person may be ascribed to the model and second, when the architecture caters for an explicitable and action-usable representation of "the way things seem" within the machine. We contend that rather than this being an idealist notion, phenomenal representations are as close an approximation to "the way things are" as is permitted by the sensory apparatus of that organism. This is assumed to be sufficiently close to reality to enable the organism to take appropriate action in its world. So one expects to find accurate phenomenological representation in successfully evolved organisms because a major difference between a representation and reality does not augur well for successful evolution. We have developed a notion of Ôdepictive' representations which yields a set of architectural definitions that determine whether a system could be said to be phenomenological or not. For example, Block's use of 'Phenomenal consciousness' as distinct from 'Access consciousness' is shown to have an ambiguous physical grounding. Two known architectures are scrutinised from the point of view of these definitions: our own kernel architecture (Aleksander, 2005) and Shanahan's embodied version of Baars' Global Work-space architecture (Shanahan, 2005). The first shows a clear distinction between phenomenal and 'zombie' areas of the architecture. The second shows that if the broadcast from the global workspace is phenomenologically conscious a deeper than currently available definition of the GW competing processes is required. In summary, we argue that considering SP within computational models of consciousness may be essential to give credence to such models as having explanatory power.

The recognition of others in a simulated environment, the case of minimalist devices
Malika Auvray (1), Charles Lenay (2), John Stewart (2)
(1) Department of Experimental Psychology, Oxford University, Oxford; (2) C.O.S.T.E.C.H, Université de Technologie de Compiègne, Compiègne, France

Saturday, June 24th, 17:30-19:30: Poster Session 1

How, in real life or through the use of technical devices, can we recognize the presence of another person, and under which conditions can we differentiate it from an object or a program? Does the ability to recognize others depend on properties of the observer (e.g., the ability to attribute mental states to others), on properties of the perceived element (e.g., self-propelled object), or on properties of their interactions? We investigated the hypothesis that the ability to recognize another person is intrinsic to the perceptual activity itself. In particular, the situations in which we experience a perceptual crossing, that is the situations in which two perceptual activities of the same nature interact (e.g., a mutual gaze or a mutual touch), allows the recognition of the presence of another person. In a set of studies, we created a network of two minimalist devices. We investigated whether it was possible to differentiate the perception of another participant from the perception of an object when the sensory stimulation was reduced to a bare minimum. We showed that participants were able to recognize that the all-or-none tactile stimulation they experienced was due to the active exploration of another participant, and they were able to differentiate it from the perception of an object with strictly similar characteristics of movements. Analysis of the results led us to the hypothesis that, in the case of minimalist devices, we do not recognize the presence of another participant by any particular structure of their movements, but primarily by the perception of another perceptual activity and, more

specifically, by a perceptual activity oriented towards us.

Contrasting high- and low-threshold explanations of dissociations between perceptual discrimination and awareness in patients with brain damage.
Paul Azzopardi
University of Oxford

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.1

Brain damage can lead to striking dissociations in which patients seem to lose awareness of sensation while still being able to respond to unsensed sources of stimulation. A classic example is blindsight, in which patients can accurately point towards objects placed in their visual field defects which they emphatically deny seeing. To many neuropsychologists this shows that distinct parts of the brain support ‘discrimination' and ‘awareness'. This modular interpretation follows from adopting the ‘high-threshold' assumption that the presence and absence of a stimulus are associated with discrete mental representations. The alternative ‘low-threshold' assumption, that the presence and absence of a stimulus are associated with continuous, overlapping representations, leads to parsimonious descriptions of the behaviour in terms of sensitivity and response bias which are often discounted as being irrelevant to understanding the mechanisms of awareness. Using blindsight as an example, I will argue that - far from being irrelevant - low-threshold models of discrimination in the absence of awareness can lead to clear and testable predictions about the processes which underpin awareness in normal perception.

Zombies and Epiphenomenalism
Andrew Bailey
Philosophy, University of Guelph

Sunday, June 25th, 17:30-19:30: Poster Session 2

This paper examines the relationship between the claim that zombies are metaphysically possible and the notion that phenomenal consciousness is epiphenomenal. It is often taken that the former entails the latter, and that therefore any implausibility or even incoherence in the notion of conscious epiphenomenalism thus calls into question the genuine possibility of zombies. After laying out this initial intuition as forcefully as possible, this paper considers four ways in which the zombist might respond, arguing two are inadequate but the others more forceful. The two responses which I argue are uncompelling are: 1) appeals to causal overdetermination; 2) appeals to non-standard accounts of causation (e.g. Humean regularities; panprotopsychism); I then consider in more detail two further responses: 3) that the zombist need appeal only to the physicalist's *best guess* about physics, and thus is not in principle committed to causal closure in the actual world; 4) that the zombist can make use of 'gap-filling' or 'gap-bridging' to deal with causal lacunae in zombie worlds. I conclude that the relation between the zombie hypothesis and epiphenomenalism is a fairly complex one, and that although it is too simple to say that the zombie hypothesis entails the epiphenomenalism of phenomenal consciousness in the actual world, nor is it plausible for the zombist to deny any connection between the two.

Implicit acquisition of abstract rules is still possible
Robert Balas (1) and Joanna Karczewska (2)
(1) Polish Academy of Sciences; (2) Warsaw School of Social Psychology

Saturday, June 24th, 17:30-19:30: Poster Session 1

The aim of presented studies was to disentangle the role of abstract and exemplar knowledge

representations in artificial grammar learning. The issue has been widely debated in the literature with a general conclusion that the possibility of rule-based representations of implicitly acquired knowledge has not been convincingly documented yet. Exemplar accounts has been formulated on the basis of artificial similarity indexes defined as a row number of changes introduced to the test material in comparison to the training strings. This study uses subjective measures of similarity between training and test strings to assess separate influences of rule vs exemplar-based knowledge in a standard artificial grammar learning paradigm. The results replicate the standard effect of above chance classification accuracy in a task involving grammaticality judgment. However, subjective judgments of similarity between training and test material does not significantly contribute to individuals' performance. Thus, the data seem to support abstractionist rule-based account of implicit knowledge acquisition. We argue that unconscious knowledge representations may also be described as general abstract rules of statistical distribution of learned features.

A Model of Sensory Perception in Hilbert Space
Marcus Baldo
University of Sao Paulo

Saturday, June 24th, 17:30-19:30: Poster Session 1

Conscious perception often involves, beyond the detection of a given sensory stimulus, its comparison with other concurrent stimuli as well, encompassing tasks akin to discrimination, identification and categorization measures. Over the last forty years, Signal Detection Theory (SDT) has been the paradigmatic source of psychophysical models for perceptual processing. Here I offer a conceptual framework based on the vector structure of Hilbert spaces that, besides assimilating in a natural way the probabilistic character of perceptual operations as formulated in classical SDT, avoids some of its inherent drawbacks. Its essence is the representation of a percept by a vector or, more generally, by a subspace of a vector space S. A sensory stimulus, being initially broken down into its components, is further transformed yielding the generation of a normalized vector representing a sensory state in a Hilbert space. A given class of perceptual outcomes would be thus equivalent to an observable specified by an operator H. For a system in a sensory state s, the probability prob(H, p) that the perceptual processing will result in the percept p is given by the scalar product between s and Us, where U is the projection operator onto the ray containing v, an eigenvector of H whose p is the corresponding eigenvalue. This statistical algorithm relates a set of perceptual outcomes to the probabilities of their occurrence. The present model, while quantitatively consistent with the main results predicted by standard SDT, offers a more straightforward computational tool for measures of detectability and response bias. In addition, it is able to capture, in a more natural and unifying perspective, some perceptual phenomena usually left out by the conventional theory. The novel theoretical framework presented here is substantiated by empirical data stemming from temporal order judgments and spatial localization tasks performed by human volunteers.

Differentiating, Enabling, & Unifying NCCs: A Framework
Tim Bayne
Macquarie University

Sunday, June 25th, 17:30-19:30: Poster Session 2

Although there has been extensive discussion of which neural events and mechanisms might subserve the neural correlates of consciousness, there has been rather less discussion of what it is to be a neural correlate of consciousness (although see Chalmers and Block). It is useful to distinguish three types of NCC: a differentiating NCC, an enabling NCC, and a unifying NCC.

Differentiating NCCs are responsible for the difference between the various contents of experience - say, the taste of coffee various the pang of hunger. Enabling NCCs are those minimal systems responsible for the subject having conscious states in the first place. And unifying NCCs underwrite the unity of the subject's various conscious contents into a single state of consciousness. In this paper I address the question of how these forms of NCCs are related. A number of recent theorists appear to adopt a building block approach to this question, according to which differentiating NCCs are not closely related to either enabling or unifying NCCS. In contrast to such accounts, I argue that there are conceptual and methodological grounds for thinking that differentiating, enabling and unifying NCCS are intimately related.

Brain and Behavioral Correlates of Unconscious Phonological Similarity: An ERP study at the objective detection threshold

Ariane Bazan (1) (2), E. Samuel Winer (3), Ramesh Kushwaha (2), Linda A.W. Brakel (1), Michael Snodgrass (1), Howard Shevrin (1)
(1) University of Ghent, Belgium; (2) University of Michigan, Ann Arbor; (3) University of Illinois, Chicago

Saturday, June 24th, 17:30-19:30: Poster Session 1

In this study we investigated levels of unconscious linguistic processing; in order to differentiate between basic structural and true linguistic processing phonological palindromes were used (e.g. SIGN/NICE, SCOFF/FOX, GNOME/MOAN). 32 participants were exposed to a tachistoscopic subliminal priming procedure in which both prime and target were presented for 1 ms (SOA = 750 ms). In the experimental condition, a prime word was followed by a target card with two words, one of which was a phonological palindrome of the prime while the other was an unrelated distractor; in the control condition, both target words were unrelated to the prime. The experimental effect was measured as the number of experimental condition phonological choices corrected for the number of control condition phonological choices. ERPs were measured at 14 electrode sites. At the end of the experiment, participants completed a series of personality questionnaires. A detection experiment confirmed that the d' was not significantly different from zero, thereby excluding any conscious perception. There were 2 major ERP experimental effects indicating that the participants clearly recognized the subliminal phonological palindrome similarity at the brain level. In the experimental versus the control condition: (1) N320, the 'Phonological Mismatch Negativity' (Connolly et al., 1992; Newman et al., 2003) was less negative at 6 frontal electrode sites, (2) P300 reflecting recognition of (phonological) similarity (Bentin et al., 1999; Liu et al., 2003) was more positive at the right side of the brain, particularly at T4 and T6. Remarkably, there was no main behavioral effect and no correlation between the ERP experimental effects and the behavioral responses. Rather, we found that personality factors played an important moderating role: defensiveness, measured by the Marlow Crowne and the BIDR, was correlated with an inhibition of palindrome similarity recognition, while self reported anxiety (STAI) correlated with an increased palindrome effect. Taken together, brain results show that phonological similarity is processed unconsciously, but strikingly, anxiety and defensiveness play a significant role in how this recognition is reflected in behavior. Bentin et al. (1999). J Cogn Neurosci 11:235-260. Connolly et al. (1992). Brain Lang 43:1-18. Liu et al. (2003). J Exp Psychology 29:1231-1247. Newman et al. (2003). Psychophysiology 40:640-647.

Animal Consciousness

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Sunday, June 25th, 14:00-16:00: Concurrent Session 2.1

There is a view, most famously articulated by John McDowell, to the effect that animals are not conscious precisely because they are not capable of conceptual thought. Conceptual abilities, for McDowell, are abilities to think rationally about categories of objects (or processes, or events) in the world, and they entail the ability to notice when one's several conceptual representations of how the world is, or seems to be, are in conflict. This, I will argue, is a correct account of conscious experience, but no basis on which to deny consciousness to animals. The staple of Evolutionary Psychology is the study of the many areas in which human reasoning is much less than perfect (the Wason selection task, probabilistic reasoning, and so on). By comparison, many animal families - including crows (corvidae), parrots (psittacidae) and the entire primate order (possibly the entire class mammalia) - show evidence of significant, practical rationality within their own domains of competence. I consider McDowellian, and other, analyses of the conceptual and argue, based on the above considerations, there is no stable notion of the conceptual on which humans possess conceptual abilities but all non-linguistic agents (animals, pre-linguistic humans) do not. Of particular import is the relationship between conceptual thought and symbolic thought. I will argue that symbolic thought (including, as an advanced form, grammatical linguistic thought) is built on the prior ability to reason practically about perceived categories in the world. Symbolic thought enables a creature with (pre-existing) sensory consciousness to transcend the limits of its rationality in the exercise of an additional ability to treat some aspects of the world (thought about consciously) as symbols for other parts of the world (also thinkable consciously). Additionally, symbolic thought allows thought about various abstractions over the sensory world which could not, otherwise, be thought about in sensory consciousness at all. Symbolic thought is an ability which several non-human animals possess, in limited form. In the degree to which we possess it, it massively increases the range of thought, but it in no way increases the fact of consciousness, which humans share with many animals.

On the psychophysics and electrophysiology of flicker-induced subjective experiences

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Sunday, June 25th, 17:30-19:30: Poster Session 2

It is generally assumed that conscious visual experiences result from the interaction of our nervous system with light reflected from spatial structures in the environment. Indeed, most conscious experiences seem to be directly related to the characteristics of the external stimulus, so that for example spatial properties of the external stimulus are directly mapped onto spatial properties of the internal experience. Yet, circumstances exist where conscious visual states are triggered by external stimulation which is not related to the phenomenal content in any direct sense. In the following we will refer to such states as subjective experiences. If these subjective experiences can be shown to be objectively attributable to processes in the causal chain of normal visual perception, they may enhance our understanding of the human visual system. In a recent study (Becker & Elliott, Consciousness & Cognition, in press) we showed that subjective visual experiences of color and form can reliably be induced by stimulation with intermittent light over the entire visual field. These subjective experiences specifically relate to characteristics of the intermittent stimulation, such as frequency and phase. The observed frequency specificity of subjective color may be explained by the varying response latencies of the three cone types. Furthermore, opponent colors have been reported at clearly opponent phases of the stimulation rhythm suggesting that color opponency is coded in different phases of neural processing rhythms. The perception of subjective forms may have its origin in states of oscillatory resonance in the neural tissue. What is more, forms like spirals, gratings, and radials appear to be associated with distinct colors, such as red and green, suggesting that it is primarily red/green coding pathways which enter such states of resonance. Using EEG recordings we found that the

report of a subjective color is preceded by a widespread decrease of power in the lower alpha frequency band. We speculate that this decrease acts as a gating process enabling the brain to establish the observed increase in gamma band activation which ultimately leads to the formation of a coherent percept of subjective color.

Contextual Emergence of Neural Correlates of Consciousness

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Saturday, June 24th, 17:30-19:30: Poster Session 1

The concept of contextual emergence has been proposed as a non-reductive relation between different levels of description of physical and other systems where the lower level description comprises necessary but not sufficient conditions for the higher level description. These are supplied by contingent contexts obeying particular stability conditions. We shall show that Chalmers' definition of "neural correlates of consciousness" (NCCs) can be recast in terms of contextual emergence, where a neural system is necessary for the emergence of an NCC. The sufficient conditions are then provided by contextually given "phenomenal families" of mental observables that partition the state space of the neural system in classes of "epistemically equivalent" states. These equivalence classes can be regarded as contextually emergent neural correlates if the required stability conditions for the mental dynamics hold. This is the case if the resulting dynamics is a Markov chain either with periodic behaviour or possessing a mixing measure. We argue that compatible mental descriptions, which are also topologically equivalent with the neurodynamical description, emerge if the partition of the neural phase space is generating. If this is not the case, mental descriptions are incompatible or complementary. An example for the latter case taken from syntactic language processing will be discussed.

Movement Related Brain Activity in Patients Without Awareness

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Sunday, June 25th, 14:00-16:00: Concurrent Session 2.3

While in Vegetative State, patients have no awareness of themselves or their environment. They are not able to perform voluntary actions after a simple command is given. Here we used functional magnetic resonance to map the brain activity of these patients while hearing commands to move their right or left hand. On the basis of a previous hypothesis we predicted activation of movement related cortices in unaware patients, and lateralised motor or premotor cortex if residual conscious processing was present. Five out of six patients showed movement related activity in response to command, and only one showed lateralized activation in premotor and dorsolateral prefrontal cortices. No overt motor response was linked to the brain activation. In the control condition all patients showed unilateral or bilateral auditory cortex activity when only words were presented. These findings show partially preserved cognitive processing for movement preparation in subjects clinically defined as unaware; and also suggest that conscious access might be necessary to select the action to be performed.

Time and consciousness

Marek Binder

Jagiellonian University

Sunday, June 25th, 17:30-19:30: Poster Session 2

The theme of this poster is a proposal of how to include time into our understanding of consciousness and its possible physical underpinnings. My reasoning is based on two assumptions. The first is that there exists an objective and irreversible passage of time. Despite this issue has been problematic in current physics, there are theoretical standpoints which present this view. This assumption means that every physical event in the universe, apart of its physical properties, has the property of being absolutely singular. Let us call this property a "uniqueness" of physical events. According to the second assumption every conscious experience has a neural correlate. Let us call neural events correlated with conscious experiences the "C-events". On the basis of the above assumptions we can put forth a following statement that links phenomenal aspect of conscious experiences and occurrence of C-events: the phenomenal aspect of conscious experience (qualia) is a property of uniqueness of C-events. In other words, qualia are occurrences of C-events that take place in an environment characterized by a the objective and irreversible passage of time. Conclusion is that the existence of qualia depends both on brain activity and on the global arrow of time (which has been expressed here by the property of uniqueness of physical events). In other words, qualia indicate the "unique" existence of the universe. I hope that this reasoning can help us to understand inaccessibility of "what-it-is-tobe- like" property of consciousness. In accordance with Nagel let us assume that a bat has a certain kind of conscious experience. Thus we have accepted that in its brain there happen C-events in some form. According to our assumptions the bat's brain C-events, whenever they take place, they possess the property of uniqueness and they are correlated with the bat's qualia. It implies that our knowledge about "what it is like to be a bat" is impossible. It must be so, because by virtue of our assumptions the bat's phenomenal experiences are unique and they are inseparably bound with the place and the time of the occurrences of the C-events in its brain.

A Reductio of Jackson's Knowledge Argument: There's A Lot Mary Doesn't Know

Jared Blank
CUNY Graduate Center

Saturday, June 24th, 17:30-19:30: Poster Session 1

Jackson's knowledge argument is intended to establish a metaphysical conclusion; that an ontological gap exists between qualia and physical reality. Recently, Tim Crane has argued that although the knowledge argument fails to establish this conclusion, it does establish an epistemic one: that Levine's explanatory gap exists between explanations of qualia and explanations of physical phenomena. According to Crane, what Mary knows, everything there is to know about color and color vision that's compatible with her being confined to a black and white room, is what he calls "book learning". Because Mary learns something new once she experiences the color red first hand, book learning ain't all the learning there is. Let's distinguish, then, two variants of the knowledge argument according to which gap they purport to show exists: the ontological gap knowledge argument (OKA) and the explanatory gap knowledge argument (EKA). It may be that the standard replies to the OKA, that Mary gains a new ability or that she discerns an already known fact under a new concept, apply equally to the EKA. However, I pursue a different line of criticism: I show that the EKA is susceptible to a reductio and that this has consequences for the OKA. The very same argument strategy used in the EKA applies equally well to any body of theoretical knowledge, say for instance theoretical physics: however, it would be absurd to conclude that an explanatory gap exists with respect to physics itself.

Virtual Reality and the clash of consciousness
Jim Blascovich
University of California, Santa Barbara

Sunday, June 25th: 9:00-12:30: Symposium 2

Although the term 'virtual reality' connotes non-natural or virtual environments that are created and experienced digitally, this technology is only the most recent one for the creation of virtual worlds. Arguably humans have been 'wired' for and have created virtual worlds for as long as we have dreamed, daydreamed, and communicated with each other. Often, our conscious experience and unconsciously controlled behaviours vacillate between being wedded to the places in which we are physically present and the places in which we are mentally or psychologically present. Sometimes, we are aware (i.e., metaconsciously) of the simultaneity of this duality, often we are not.

The history of virtual reality 'technology' is as old as communication media. From low tech methods such as story telling, cave paintings, writing, sculpture and theatre to higher tech methods such as photography, cinematography, audio recordings, radio, television, the internet and now digital immersive virtual environment technology, we have as a species developed and used technology to facilitate and control our presence in places and times other than where we are physically grounded in space and time. The more modern of these technologies tend to immerse individuals in virtual places more easily and quickly than older ones.

Interestingly, investigators in various disciplines have used these technologies to investigate the human mind and the gamut of human behaviour for a very long time.

Indeed, digital immersive virtual environment technology seems to be particularly effective. We report our initial foray into a program of research using this digital immersive virtual environment technology to help separate conscious from unconscious contributions to emotional responses (i.e., fear) as well as to gauge the contribution of metaconsciousness to these effects.

The NCC: A Mistaken Methodology
Ned Block
Departments of Philosophy and Psychology, New York University

Saturday June 24th 10:30-12:30: Symposium 1

We know that the trees in the forest that we don't see have much the same scientific nature as the trees in the forest that we do see. But how can we know whether there are any unreportable (and otherwise cognitively inaccessible to the subject) conscious states that have the same phenomenology as the conscious states that we can report? How can we know whether whatever it is that makes them unreportable also makes them unconscious? It would seem that any evidence that the neural basis of unreportable states is the same as that of reportable states would only be evidence that that neurological basis characterizes only a pre-conscious state. I argue that this reasoning presupposes a false "correlational" methodology embedded in a widely accepted methodology for finding consciousness in the brain. Further, if we adopt an "abductive" methodology, we can see the case that the neural basis of perceptual consciousness is recurrent processing in the back of the head, which can occur without cognitive access--whose basis is in the front of the head.

When thoughts become action: an fMRI paradigm to study volitional brain activity in non-communicative brain injured patients

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Sunday, June 25th, 14:00-16:00: Concurrent Session 2.3

The assessment of voluntary behaviours in non-communicative brain injured patients is often challenging due to their frequent motor impairment. In the absence of a full understanding of the neural correlates of consciousness, even a near-to normal activation in response to passive sensory stimulation cannot be considered as a proof of the presence of awareness in these patients. In contrast, a robust, task-specific regional activation in response to the instruction to perform a mental imagery task would provide evidence of voluntary task-dependent brain activity, and hence of consciousness, in non-communicative patients. The aim of the present study was to validate this approach in healthy subjects. Methods. A spatial navigation imagery ("imagine visiting all the rooms in your home") and a motor mental imagery tasks ("imagine playing tennis") were performed by 24 healthy volunteers at two imaging centres (Cambridge, UK, n =12; Liège, Belgium, n=12) using an fMRI block design (30 seconds alternate of tasks and rest periods). Statistical parametric mapping (SPM2) was used to identify task-specific activation at the single subject level. Random effects analyses identified areas activated for each mental imagery task relative to baseline, and compared to the other task, common to both centres. All results were thresholded at FDR corrected $p<0.05$. Results. Imagining spatial navigation activated at the individual level, bilateral parieto-occipital junction (24/24 subjects), retrosplenial (23/24 subjects) and parahippocampal cortices (23/24 subjects). Motor imagery elicited activation in supplementary motor area in all volunteers. All these areas were found specifically activated for each task at the group level. In Liege's volunteers, differentiation of each imagery task and rest periods was tested by a blinded observer and could be made with 100% accuracy.

Conclusion: The spatial navigation and complex motor imagery tasks described here permit the identification of volitional brain activation at the single subject level, without an overt motor response. Our data strongly suggest that this paradigm may provide a method for assessing the presence of volitional brain activity, and thus of consciousness, in noncommunicative brain-injured patients.

Failing Identity? Brain disorders as a test for psychological and philosophical terminology

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Sunday, June 25th, 17:30-19:30: Poster Session 2

This project combines classical philosophical theories on the phenomenon of personal identity with psychological theories of personality and scientific data concerning psychiatric disorders within an interdisciplinary terminological study. “Personal identity” is used as a technical term for the identity of one and the same person over a period of time. The classical philosophical discussion distinguishes three different criteria to determine personal identity. The substantial criterion, among others presented by Swinburne (1973), is less discussed nowadays. Two other criteria are confronted with three main problems. Firstly, neither the physiological nor the psychological criterion suffices to define personal identity. The psychological criterion originally developed by Locke (1689) fails to prevent duplication-cases, thus identification is impossible. The criterion of physiological identity, provided by Williams (1973), allows only a gradual relation

with physiological continuity. That also impedes identification. Secondly, the difference between the first- and the third-person perspective is rarely considered. A third problem arises from methodological deficits concerning the frequently used thought experiments. In many cases they are not only counter intuitive, but also badly composed in different ways. This mainly applies to a fourth kind of theory, the reductive approach by Parfit (1971). Because of this difficulty there has been some effort to find a new strategy of argumentation. Studies by Wilkes (1988) and Northoff (2003) show how thought experiments can easily be substituted by real cases. A huge amount of examples is, e.g., provided by the so called "identity disorders". We will present our own argumentation-strategy to show that real problem-cases can be used to test different criteria or theories of personal identity and that a biological criterion provides many satisfying answers. The other two problems in the personal identity discussion can be related to the theory of personality. In the philosophical debate of personal identity, many theories are based on a concept of personality lacking accurate definition. We attempt to gain more intelligibility regarding this term. Moreover, this might initiate a fresh discussion about personal identity as a means to understand the phenomenon of personality disorder philosophically and establish a modified biological criterion for personal identity.

Effect of Load and Landmark Distance on Mental Self-Rotation
Bruce Bridgeman and Steven Macramalla
University of California, Santa Cruz

Saturday, June 24th, 17:30-19:30: Poster Session 1

Though moment-to-moment navigation through the environment is largely accomplished unconsciously, we can also consciously imagine spaces and locomotion through them even without overt movement. We have found consistent differences between imagery for locomotion and the actual physics of locomotion. Chronometric studies provide strong support that mental imagery recruits perceptual processes (Shepard & Metzler, 1970; Shepard & Cooper, 1971). An emerging trend suggests that information on effort is intrinsic to perceptual coding (Proffitt, 2003). If imagery recruits perceptual processes, and perception is influenced by anticipated effort, then imagery should exhibit effects of anticipated effort. Two experiments examined the role of effort in mental imagery. In Experiment 1, participants imagined self-rotation through a right angle from a route perspective across two conditions of distance (Room / Field). Simulated rotation required 150 ms more in the larger setting, suggesting that the length of the resultant arc is incorporated when rotating through a given angle, even though the imagined rotation is the same in each condition. Experiment 2, a replication with an effect size of 188 ms for larger settings, added a variable for imagined load (Heavy / Light). Subjects wore a heavy backpack on a walk through a set of hallways, then did the imagery task without overt rotation. Subjects responded with 198 ms longer latency for imagined heavy loads. The results suggest that both spatial metrics and anticipated effort play a role in coding of mental imagery, but further research is required to ascertain whether the information on anticipated effort is due to sensorimotor processes or semantically based knowledge.

How much of a visual scene is represented in consciousness?
Bruce Bridgeman
University of California, Santa Cruz

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.2

We have a consistent illusion that the visual world is represented in complete form and detail, and does not decay across successive visual fixations. Evidence from change blindness, however, suggests that only a few attended objects and a general gist are carried from one fixation to the

next. This result leads to an unexpected prediction: if perception of attended objects can be suppressed, it should be possible to exchange one image with a completely different one of the same gist without noticing the change. We test this prediction with a new change blindness paradigm; we progressively alter segments of an image until one image is completely changed into another, a 'progressive transformation paradigm'. To avoid misalignments of parts of the old and new images we superimpose a checkerboard of white squares on the image, then exchange old image segments for new ones within each checker. It is possible to exchange several checkers at a time, with a complete swap in about 12 steps. In half the trials, the image is not changed. Subjects fail to detect the image swap in about 1/3 of change trials; when detection occurs, it tends to occur late in the sequence. We apply this technique with pairs of same-gist images and different-gist images; same gist transformations are frequently undetected, while different-gist transformations of similar geometric similarity are usually detected. Control change trials, transforming to an image of different gist, are always detected.

Neural mechanisms underlying ambiguous structure-from-motion and voluntary control revealed by functional imaging

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Monday, June 26th, 14:00-16:00: Concurrent Session 3.1

Using functional imaging, we investigated the neural mechanisms of bistable perception and voluntary control over perception during viewing of ambiguously rotating spheres (structure from motion or SFM). Psychophysicsal findings revealed that subjects are quite capable of exerting voluntary control over perception but that the success of voluntary control depends on exogenous stimulus parameters. Subjects were shown an ambiguously rotating sphere continuously during scanning and were instructed to report any alternation in the perceived direction of the sphere. Changes in fixation dot colour cued the subject to either 'hold' the current perceptual state for 3s or 'switch' the perceptual state as fast as possible (taking on average 3s). Also included were physical (on-screen) alternations in the direction of the spheres. Both tasks ('switch' and 'hold') were associated mainly with signal increases in the frontal and supplementary eye fields (FEF/SEF). No differential activation was found between tasks. Both spontaneous alternations (naturally occurring alternations in perceived direction between tasks) as well as voluntary alternations (alternations occurring as a resulting of the 'switch' task) were associated with BOLD signal increases in (right-hemispheric) supramarginal gyrus. In addition, early retinotopic visual areas (V1,V2,V3,V3A,VP and V4V) as well as hMT+/V5 showed signficant signal increases correlating with both types of perceptual alternations. Eye movements were recorded during scanning were analyzed to ascertain the correlation between specific eye movements and found signal changes. First, no significant deviations were found in eye position or velocities during either perceptual state (clockwise perceived rotation / counterclockwise perceived rotation). More specifically, we determined the correlation between velocity, position and direction of eye movements around alternations with both quality and amplitude of BOLD signal changes during these same alternations. We found that none of our measures of eye movement velocity, position and direction can account for amplitude and quality of BOLD signal changes during alternations.

Dissociation and cognitive inhibition as correlates of hypnotic suggestibility.

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Saturday, June 24th, 17:30-19:30: Poster Session 1

Hypnosis provides a window to understanding volition, involuntary experience and cognitive

control. In response to suggestion, highly hypnotisable participants report involuntary movements, hallucinations, amnesia, and paralyses. Further, behavioural and physiological data converge to indicate that these reports and responses reflect genuine changes in experience. One of the most notable characteristics of hypnosis is the stability of individual differences in responsiveness to suggestion. Despite the prominence and reliability of individual differences in responding, reliable correlates of hypnotisability have been very difficult to find. Nonetheless, given dominant theoretical views, there should be reliable correlates. Two of the most popular theories of hypnosis, neo-dissociation theory (Hilgard) and dissociated control theory (Bowers and Woody), postulate that hypnosis involves alteration in the normal integrative functions of consciousness, identity and memory; such alterations are called "dissociation". If either of these theories is right, there ought to be a substantial association between tendencies to dissociate in various situations and hypnotisability. Surprisingly, however, dissociation has not been found to predict hypnotisability. However the dissociation scale that has been used in past research is highly skewed in non-clinical populations; we have developed and published a dissociation scale that is normally distributed in normal populations. Many theorists have argued hypnotisability can be seen as consisting of cognitive skills, for example executive function or attentional abilities. One consequence of effectively ignoring stimuli is that those stimuli can become inhibitory on future trials. However, little empirical work has looked at the relation between executive abilities as reflected in cognitive inhibition and hypnotisability, and the work that has been done can be criticised methodologically. We used three different tasks all measuring the degree to which to-be-ignored stimuli become inhibitory. If cognitive inhibition is a stable executive ability as such, it should express itself on a range of relevant tasks. In sum, we measured hypnotisability, dissociation, and cognitive inhibition in a sample of 180 undergraduates to test common theories of hypnosis.

Prism adaptation and attention: Investigating higher-level effects of low-level visuomotor training

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Saturday, June 24th, 14:00-16:00: Concurrent Session 1.2

Prism adaptation has been applied to the rehabilitation of patients with unilateral neglect, a disorder in which visuospatial attention is biased away from the contralesional (left) hemispace (Rossetti and colleagues, 1998). Following adaptation to rightward shifting prisms, improvements have been observed in visual, tactile, and representational neglect, as well as in proprioception, standing balance, and wheelchair navigation. The generalisation of these improvements to multiple sensory modalities and spatial domains has led to the hypothesis that prism adaptation can influence higher-level attentional mechanisms. The effect of prism adaptation on visuospatial attention in healthy participants and patients with neglect has been examined by using visual search (Morris and colleagues, 2004) and temporal order judgement (Berberovic and colleagues, 2004) tasks. It is of interest that, in healthy participants, adaptation to leftward shifting prisms results in neglect-like patterns of performance on line bisection tasks. In the present study, twenty-seven healthy participants (mean age = 21.59) adapted to leftward shifting prisms, and thirteen control participants (mean age = 21.62) performed the adaptation task while wearing neutral prisms. Visuospatial attention was measured using a Posner-type cueing paradigm (Egly and colleagues, 1994), in which attention was directed to one of eight locations in four displayed rectangles. A target appeared either in the same location as the cue (valid-cueing; 58%) or in a different location (invalid-cueing; 28%). The remaining 14% of trials were uncued. The invalid trials required a shift in attention either to one end of the same rectangle (within-object shift) or to the same end of a different rectangle (between-object shift). Two neglect-like patterns were predicted for the experimental group based on previous research: 1) a gradient of decreasing

attention (therefore increasing RTs) with more leftward target placement; and 2) a disengage deficit in the LVF, characterised by elevated RTs to invalid targets. Overall, results showed significant RT benefits for validly cued targets compared to invalidly cued and uncued targets. The analysis also revealed differences between the performance of the experimental and control groups in visuospatial and object-based components of attention, demonstrating that prism adaptation may influence higher-level cognitive function in healthy participants.

Attention allocation in cortical predictive models
Giedrius Buracas
University of California, San Diego

Sunday, June 25th, 17:30-19:30: Poster Session 2

Previously we have proposed that phenomenal awareness is an outcome of the corticothalamic predictive information processing mechanism and is a subjective experience of a metacognitive signal validating a currently active cortical model (Buracas, 2005). Herein we elaborate the hypothesis that selection of predictive cortical models is determined by attention/intention mechanisms. We propose, in the spirit of Neisser's perceptual cycle (1974), that actions and intentions to act lead to updating of the predictive model: p(t+1= Fa(pt), where Fa is an operator of transformation that depends on the (cognitive or motor) action (a), pt is the currently active model (which, when validated, is subjectively experienced as a current percept), and pt+1is the updated model. Action transformations Fa, in turn, are a function of the goal state gt and pt. Specification of Fa is guided by an objective function that minimizes a distance measure between gt and pt+1. The process of specifying Fa leads to uncertainty about pt, and drives allocation of attention. Our central thesis herein is that allocation of attention is driven by two factors: First, selective attention is allocated based on selection criteria defined by content of awareness. A selection criterion specifies behaviorally (or cognitively) relevant objects, object classes, features, locations, time intervals, and acts as a prior information guiding allocation of attention. Second, selection by attention is controlled by uncertainty (lack of information) that is established in the process of specifying Fa. Uncertainty arises due to lack of (sensory, mnemonic or other) information necessary to achieve a behavioural (cognitive) goal state gt. This missing information can be acquired via definition of an interval of interest within one or more selected perceptual dimensions. The function of attention is to modulate neuronal representations such that the specified uncertainty is resolved in a way that maximizes information gain. Succinctly, such operation mode of attention can be expressed as the conditional information maximization. For example, interactions between the spatial and featural attention obey this principle so that one kind of attention optimizes deployment of the second kind of attention. We discuss functional anatomy that might implement the conditional information maximization principle of attention.

The Implicit Self in Perception
Arnon Cahen
Washington University, St. Louis

Sunday, June 25th, 17:30-19:30: Poster Session 2

A host of philosophical problems in the philosophy of mind, consciousness, self-awareness, and perception, have led various philosophers to appeal to an implicit presence of the self within the contents of perception as a way towards a possible solution. For example, such appeals have been made in response to Hume's elusiveness of the self thesis; to ground the possibility of self-awareness in general; to explain the possibility of immunity to error through misidentification with respect of the first person pronoun; and most importantly, in this context, to explain the distinctiveness of the contents of experience. This last project, which is also my central concern in

this paper, is widely present in recent literature on consciousness in attempts to explain the essentially perspectival nature of the contents of experience (For example, Noë 2004, Eilan 1995, Van Gulick, 2004). However, while an appeal to the implicitness of the self seems on the right track, it has generally been left unclear what it would mean for the self to be implicit, rather than explicit, in perception, and how such an appeal is to explain the perspectival nature of experience. It is my main goal in this paper to give a positive account of the implicit participation of the self in the contents of experience as it relates to the distinctive nature of such contents. I argue that the way we should understand the implicitness of the self in perception is by recognizing that at least part of the contents of perception are relational properties that hold between the perceiving subject and its environment. However, while such relational properties are part of the content represented in perception, it is only one of the relata that the subject is made aware of in having the perception, namely that object to which the subject bears the relation in question; it is in this sense that the self is implicit in perception. I then proceed to explain how such relational properties could be part of the content of perception, given that in having the perception one is made perceptually aware of only one of its relata.

Psilocybin causes a functional dissociation between attention and working memory tasks
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Sunday, June 25th, 17:30-19:30: Poster Session 2

Increasing evidence suggests a link between attention, working memory, serotonin (5-HT) and prefrontal cortex activity. In an attempt to tease out the relationship between these elements, this study tested the effects of the hallucinogenic 5-HT1A/2A receptor agonist psilocybin alone and after pretreatment with the 5-HT2A antagonist ketanserin on multiple object tracking and spatial working memory, in eight healthy human volunteers. Psilocybin significantly reduced attentional tracking ability, but had no significant effect on spatial working memory, suggesting a functional dissociation between the two tasks. In line with the 5-HT1A receptor's known role in modulating prefrontal activity, pretreatment with ketanserin did not attenuate the effect of psilocybin on attentional performance, suggesting a primary involvement of the 5-HT1A receptor in the observed deficit. Based on physiological and pharmacological data, we propose that this impaired attentional performance may reflect reduced ability to suppress or ignore distracting stimuli rather than reduced attentional capacity.

Precuneus and consciousness
Andrea Eugenio Cavanna and Michael Robert Trimble
Institute of Neurology, Queen Square, London

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.3

Converging evidence suggests that the neuronal aggregates involved in conscious awareness, also referred to as the neural network correlates of consciousness, include extensive areas of the human frontoparietal association cortices (Vogt et al 2005). However, little is known about the exact role of the precuneus, the main component of the posteromedial portion of the parietal lobe. This cortical region has long been neglected, mainly because of its hidden location, buried in the interhemispheric fissure, and the virtual absence of focal lesion studies. Local interconnections and partially shared remote projections among the heterogeneous areas forming the posteromedial cortex (precuneus, posterior cingulate and retrosplenial cortex) argue for a

functional unity, despite cytoarchitectural boundaries (Parvizi et al 2006). Furthermore, the precuneus and surrounding posteromedial areas are amongst the brain structures displaying the highest level of cortical glucose metabolism and cytochrome c oxydase activity at baseline ("hot spots") and are characterized by transient decreases in the tonic activity during engagement in non self-referential goal-directed actions ("default mode of brain function"). Therefore, it has recently been proposed that the precuneus is involved in the interwoven network of the neural correlates of self-consciousness, engaged in self-related mental representations during rest (Cavanna and Trimble 2006). This hypothesis is consistent with the selective hypometabolism in the posteromedial cortex reported in a wide range of altered conscious states, such as sleep, drug-induced anaesthesia, and vegetative states.

Experience-specific facts and physicalism
Ron Chrisley
COGS/Informatics, Sussex

Saturday, June 24th, 17:30-19:30: Poster Session 1

Any apparent difficulty in conceiving of a physicalistic science of consciousness may be the result of an inaccurate view of what is involved in actual physicalistic scientific explanation. This idea suggests a line of response to Jackson's Knowledge Argument (KA; Jackson 1982). This response is to claim that the two premises of the KA are contradictory: It cannot be the case that Mary knows all the physical facts concerning colour and also has not had an experience of, say, red. Put another way, the response maintains that to assume at the outset that Mary could know all the physical facts without having had this or that particular colour experience is to beg the question: it assumes that the knowledge provided by the particular experience is not a part of "completed physics, chemistry, and neurophysiology, and all there is to know about the about the causal and relational facts consequent upon all this" (Jackson 1986). I make a distinction between experience-specific and experience-general facts: the former can be known only by having an experience of a particular sort, while the latter have no such restriction. I then argue that the KA at most shows that there are experience-specific facts (compare Alter 1998). This only counts against physicalism (in either its epistemological or metaphysical forms) if it is further shown that the physical sciences include only experience-general facts. One might attempt to establish this from the objectivity of science; I argue instead that the inclusion of experience-specific facts is compatible with objectivity. In fact, the success of science at least sometimes, if not always, requires knowledge of experience-specific facts; I give several examples from scientific practice of this dependency. My analysis concludes that science is, at heart, an experiential activity, and furthermore it is conducted by communities rather than individuals. Once these aspects of physical science are acknowledged, it can be shown that the KA fails, for the reasons given. More importantly, it suggests that a better understanding of the role of these elements of science may be crucial to achieving a breakthrough in scientific explanations of consciousness.

Automatic priming and conscious expectancy in a simple reaction time task
Axel Cleeremans (1), Arnaud Destrebecqz(1), Pierre Perruchet (2), Philippe Peigneux (3)
(1) Université Libre de Bruxelles; (2) Université de Bourgogne; (3) Cyclotron Research Center, Université de Liège

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.1

Some authors claim that learning is always accompanied by awareness while others defend the notion that learning can occur unconsciously. In this study, we present a series of experiments in which the conscious and unconscious components of performance are pit against each other in a

simple reaction time task where a preparatory signal (a tone) is associated with an imperative stimulus (a visual target) in 50% of the trials. We also manipulated the time interval between the preparatory signal and the imperative stimulus. We show that, when the preparatory signal is increasingly followed by the imperative stimulus (a visual target), reaction times to this latter event tend to decrease. Importantly, the conscious expectancy for the target decreases at the same time. Results showed that conscious expectancy was systematically dissociated from reaction time, whatever the temporal relationship between the tone and the visual target. These results challenge those who argue against the existence of genuine dissociations between consciousness and behaviour and correspond to previous results indicative of the same dissociation in the context of classical conditioning (Perruchet, 1985). By contrast, in the conditioning literature, behaviour tends to be no longer dissociated from conscious expectancy when the delay between the preparatory and imperative events increases. This study therefore suggests that the influence of temporal factors on associative learning mechanisms differs when voluntary instead of automatic responses are involved.

Playing with One's Mind; Being a Synesthete

Roi Cohen Kadosh (1), Avishai Henik (1), Andres Catena (2), Luis Fuentes (3)
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Monday, June 26th, 14:00-16:00: Concurrent Session 3.1

In synesthesia, certain stimuli (e.g., sounds) or concepts (e.g., words, numbers) automatically evoke additional percepts (e.g., color). For example, color-grapheme synesthetes automatically perceive achromatic numbers as colored (e.g., 7 is turquoise). Since synesthesia appears early in development, it is unclear whether it is a result of: 1) abnormal neuronal connections (Baron-Cohen, Harrison, Goldstein, & Wyke, 1993; Hubbard, Armanm, Ramachandran, & Boynton, 2005), probably due to failure of pruning (Maurer, 1997), or 2) malfunction in inhibition (Grossenbacher & Lovelace, 2001). In this study posthypnotic suggestion was used to further explore this issue. We induced colorgrapheme synesthesia in an otherwise non-synesthete participant (MCB). The current results show that a wide range of synesthetic phenomena can be evoked in an otherwise normal participant. Since it is highly improbable that new cortical connections were established in this individual in the short time the experiments were run, we conclude that synesthesia is, at least partially, due to disinhibition between brain areas.

Exploring aspects of consciousness by TMS

Alan Cowey
Department of Experimental Psychology, Oxford University

Friday, June 23rd, 14:00-17:00: Tutorial

Transcranial magnetic stimulation (TMS) is a technique now widely used to study brain function. Unfortunately it is also widely misunderstood, even by some of us who use it. TMS allows us to stimulate parts of the cerebral cortex and underlying white matter by a brief electrical current induced by a similarly brief, rapidly fluctuating magnetic field which is itself produced by rapidly discharging a current through an insulted coil held against the scalp. TMS can produce positive signs, such as movements or phosphenes (illusory visual percepts), but its major effect when applied beyond sensory or motor cortex is to disrupt cortical processing, which is reflected in longer response times and/or a failure to be aware of particular sensory events. When combined with magnetic resonance structural and functional images of the subject's brain the stimulation can be directed at specific cortical areas. Over a period of only 15 years TMS has revealed hitherto unsuspected aspects of brain function, such as the role of distant parts of the brain in

recovery from stroke, and has helped to resolve several previously intractable disputes, notably the neuronal basis of conscious awareness. The proposed tutorial would describe and discuss the origins and nature of TMS, its applications and limitations, and its especial usefulness in conjunction with other techniques of evaluating or imaging brain activity. The technique would also be demonstrated.

A Framework for Conscious Information Processing

Balaram Das
Discipline of Philosophy, University of Adelaide, SA 5005, AUSTRALIA

Sunday, June 25th, 17:30-19:30: Poster Session 2

Phenomenal experience is a product of information processing by the central nervous system. Yet, much of information processing carried out by the brain is unconscious processing; intense activities by neurons often fail to engage conscious attention. Visual processing for example can be both conscious and unconscious, and empirical evidence suggests that these are mediated by different neuronal channels. Is it also true that these different channels adopt different ways of processing information; or more generally, does conscious information processing differ from unconscious ones, if so how? This paper makes an attempt to answer this question. It is generally theorized that, individual neurons communicate by the frequency with which they spike Ð rate coding. This is a way of summarising the information contained in a spike train through a single scalar variable. I argue that while such scalar variables may be sufficient to model unconscious information processing they are poorly equipped to represent the manifold percepts of conscious experience. In vitro experiments with neural tissues suggest that neurons, when subjected to stimuli resembling synaptic activity, can generate spikes with very fine temporal precision. A finding, somewhat supported by recent in vivo experiments. I exploit these findings to suggest that a spike train provides a time series representation of some particular aspect of a deterministic, albeit chaotic, dynamical system. It is the characteristics of this dynamical system which adequately encode the information contained in the spike train. These characteristics are captured by the attractor traced by the dynamical system in its state space. A topologically equivalent image of this attractor can be constructed from the interspike intervals. I postulate that constructing this image, which is a multi-dimensional manifold, is necessary for processing information consciously. The manifold itself now provides a mathematical representation of phenomenal experience. These considerations are extended to a population of neurons. To give empirical support, I show how the proposed framework can neatly explain, the delay in eliciting conscious awareness as observed by Libet and the related backwards referral in time; and also the temporal problems associated with the cutaneous rabbit and the colour phi phenomena.

Altered colour perception induced by hypnosis

Phillip Davidson, Luigi Sciambarella, and Martin Farrell
University of Manchester

Sunday, June 25th, 17:30-19:30: Poster Session 2

To determine whether reports of altered perception induced by hypnosis are genuine or whether they are the result merely of compliance with the demands of the hypnotic situation, a participant was hypnotised to see one colour as another. The participant was able, after hypnotic induction, to maintain a stable perception of yellow stimuli as being coloured red. He then performed a Stroop task in which colour names written in different colours were presented on a screen (e.g. the name 'RED' might be written in green). The participant's task was to press a button to indicate the colour in which the name was written. Typically, participants are quicker to name the colour in which the word is written if this is congruent with the colour name (e.g. 'RED' is written in red), but

there is interference, and hence slower responses, if the colour and the name are incongruent (e.g. 'RED' is written in green). In the present experiment, however, the participant showed an altered pattern of interference consistent with his genuinely seeing the colour yellow as red. When the word YELLOW was written in yellow, there would normally be no interference, and the participant should have responded quickly. In this case, however, the participant responded slowly, consistent with interference caused by seeing the colour yellow as red. When the word RED was written in yellow, there would normally be interference, but in this case the participant responded quickly, and response times were similar to those in which the colour name and the colour in which it was written were congruent. This pattern is again consistent with seeing yellow as red, this time resulting in a lack of interference. As it is difficult to deliberately prevent Stroop interference from taking place, we conclude that the participant could not have been simply complying with the demands of the hypnotic situation and that the most likely explanation of his performance is that he did indeed have altered perception of colour induced by hypnosis.

Being Mary
Lars De Nul
University of Antwerp, Belgium

Sunday, June 25th, 17:30-19:30: Poster Session 2

Jackson's colour-deprived neuroscientist Mary has conquered a central place in the reasoning of analytic philosophers struggling with the problem of phenomenal consciousness. The thought experiment captures the problematic relationship between the conviction that "everything is physical" and the seemingly non-physical nature of phenomenal experience. I will provide a short overview of two interesting and well-known rebuttals of the argument: the Churchland/Lewis/Nemirow ability hypothesis and Dennett's (1991, 2005) flat-out denial of the argument's conclusion. Using recent comments on these approaches by Crane (2003) and Beaton (2006), I will argue that the first of these solutions is less than convincing because of the vague distinction between ability- and propositional knowledge. As for Dennett's account, Beaton thinks it fails to take the importance of Mary's cognitive architecture into account. Crane believes Dennett surpasses subjective facts, facts that are only available from the situated point of view of the experiencing subject. Having an experience is a subjective fact and therefore falls outside of the scope of objective physics. This does not falsify physicalism as an ontological thesis -the threat of dualism is thus averted- but does refute an epistemological physicalist objectivism. I will build on these critiques and, by borrowing concepts from No's (2005) enactive approach, will try to show that the phenomenal should not be understood as something that can be known the way the physical state of the world can be known. Rather, it should be interpreted as the fundamental representational basis that links abstract knowledge to the cognitive agent's active being the world. Mary, while locked in the room, lacks this grounding of her knowledge of colours and is therefore unable to develop a human (phenomenal) understanding of what red looks like. Even when given a complete description of the world, Mary is unable to relate these descriptions to her direct, situated and specifically human understanding of the world.

The 'visceral' origin of the subjective perspective: problems and possibilities
Helena De Preester
Ghent University

Saturday, June 24th, 17:30-19:30: Poster Session 1

Recent accounts of the coming about of emotions, self-awareness and consciousness often focus on what happens in in-depth layers of the body, which afford material for interoceptive processes and regulatory representations of the in-depth, visceral body (cf. Craig, Damasio). In this lecture,

we pay attention as to how this in-depth bodily dimension is presented as constitutive for the subjective perspective. Next, we trace a number of difficulties that arise in this representational account of the origin of the subjective perspective. This happens from a phenomenological (Husserlian) point of view, in which it is argued that a perspective cannot be based on representations, since the content of a representation is constituted (from within a perspective) and not itself constitutive (for a perspective). As an alternative, we plea for an account in which the subjective perspective has interoceptive 'thickness', but is not based on representations. In this, we use a version of Husserl's formal account of the auto-constitution of consciousness.

Do Scientists Understand Consciousness?

Herman de Regt
Tilburg University

Saturday, June 24th, 17:30-19:30: Poster Session 1

One of the most pressing philosophical objections to an understanding of consciousness is that there is no way that we could ever give an intelligible causal account of how anything subjective and qualitative [consciousness] could be caused by anything objective and quantitative [neurobiological phenomena] (cf. Hohwy & Frith 2004). Searle dismisses this critique arguing (Searle 1998, p. 1938) that the problem is analogous to earlier apparently unsolvable problems in the history of science. However, he misses the point. The philosophical point is that we are not only completely in the dark now, but that we will be completely in the dark forever if we just keep tracking the neurobiological phenomena. Dennett is much more straightforward in his understanding of consciousness. In his recent book Freedom Evolves (2003) he suggests once more that mental contents become conscious by 'winning the competitions against other mental contents for domination in the control of behavior'. His character Conrad then asks: 'but how does that make them conscious?'. (254) Dennett's well-known reply is that 'what you are is this organization of all the competitive activity between a host of competences that your body has developed'. Dennett argues for an identity claim. So does Giulio Tononi. His theory (BMC Neuroscience, 2004) suggests that consciousness is the integration of information. Searle's anticipated 'Conrad-reaction' at the ASSC 9 conference in Pasadena was that Tononi did not show how that makes one conscious. Does Tononi scientifically understand consciousness, and if so, why doesn't Searle? To answer this question we need to ask what we mean by 'scientific understanding'? I will apply the criterion for scientific understanding recently suggested by De Regt & Dieks (Synthese, 2005) to the problem of consciousness. However, the criterion doesn't work, since on this criterion both Tononi and Searle ought to scientifically understand consciousness, but they don't. Alternatively, I will defend the claim that scientists understand consciousness using "identity claims", but only if we gloss 'identity' in pragmatistic terms.

Discriminating faces from other objects with and without conscious awareness: distinct and overlapping processes

Leon Deouell, Ido Amihai, Shlomo Bentin
Department of Psychology, The Hebrew University of Jerusalem

Sunday, June 25th, 17:30-19:30: Poster Session 2

Several lines of evidence suggest the faces are processed using well defined neural structures and processes. We used high density event related potentials to examine whether these specialized processes reflect conscious awareness of whether a face or another object was presented. We focused mainly on the N170 face effect, the most extensively studied and the most reliable electrical signature of face processing. Sixteen participants were tested and requested to detect faces or watches among other stimuli in separate blocks. Photographs of natural faces,

watches and Easter eggs were presented for 10, 15 or 50 ms, and were either masked (forwards and backwards) or not. The main comparison contrasted the responses to target faces and target watches. The participants could easily perform the task if the stimuli were either not masked or were masked but exposed for 50 ms. In contrast, when the masked stimuli were presented for 10 or 15 ms detection of either faces or watches was at chance. The N170 effect was evident only in the conditions where the participants could consciously discriminate faces from other objects. Thus, we conclude that this component is associated with conscious awareness of the observed objects. However, when the subjects were unaware of the stimulus category, faces elicited a posterior positive potential, compared to watches. This effect was maximal around 270 ms post stimulus onset. With the advent of principle component analysis (PCA) we investigated whether this effect manifests automatic object processing which is present whether or not awareness is present, or whether it is suppressed when the objects are processed under conditions of conscious awareness.

Sensing the Difference: Intuitive-Rational Thinking Styles Moderate Change Detection for Facial Expressions.

Karolina Dessoulavy and Joanna Sweklej
Warsaw School of Social Psychology

Saturday, June 24th, 17:30-19:30: Poster Session 1

The presented studies concern whether the change blindness effect depends on the adaptive importance of the changing stimuli as well as individual differences in intuitive vs rational thinking style (Epstein et al. 1996). The adaptive importance was manipulated by introducing gradual changes in either facial expression of a person displayed on the picture or other object with low adaptive importance. The location of the changing element (central vs marginal) was also controlled. The presented study confirmed previous results (Dessoulavy & Sweklej, 2005) suggesting that the adaptive role of changing stimuli as well as its location moderate change blindness effect. It is concluded that automatically attending to highly adaptive stimulus results in better explicit change detection. Moreover, Rensink (2004) has recently claimed the existence of a non-sensory "mindsight" mechanism of sensing the presence of a recurring change before explicit identification of the change. We argue that this feel-before-see phenomenon is related to intuitive-rational thinking styles. Thus, the second experiment was aimed to replicate the above result and test for possible individual differences with respect to willingness to use intuitive 'hunches' of the occurring change. We predict that intuitive thinking style facilitates sensing the change but not explicitly detecting it. This would show that change blindness involves fringe consciousness feelings differentially used as cues for change detection. The data is currently being analyzed.

Do amnesics learn quickly?

Zoltan Dienes, University of Sussex Subsidiary Author:
Ashok Jansari, University of East London

Sunday, June 25th, 17:30-19:30: Poster Session 2

Commonly, individuals with amnesia are supposed to have impaired functioning for one memory system (for conscious memory or conscious learning) and spared functioning for another (for unconscious memory or learning). In contrast, Kinder and Shanks (2001, 2002) argued that there is just one memory system and amnesia is characterized by a reduction in learning rate in that one system. A small learning rate means slow learning. But a small learning rate means the less the impact of the current event and hence a long memory into the past. So do amnesics have a small learning rate (learn slowly but long memory into the past) or a big learning rate (strong

influence of immediately preceding trial and short memory)? We developed a very simple learning situation (either predicting or responding to a square appearing on the left or right) in which to measure learning rate and compare amnesics and matched controls. We also provide evidence that our task involves unconscious learning and hence measures the time window into the past amnesics and controls have when learning unconsciously.

What Change Blindness Teaches About Consciousness
Fred Dretske
Department of Philosophy, Duke University

Sunday June 25th 16:30-17:30: Keynote lecture

Change blindness is sometimes described as a failure on the part of normally sighted individuals to be aware of visible (often quite prominent) objects. I reject this interpretation. Most cases of change blindness teach exactly the opposite: one can be consciously aware of objects one never notices. When carefully considered, ordinary examples of change blindness also teach that what makes perception of x conscious is not a higher order belief or thought that one perceives x, but lower order knowledge of x grounded in and justified by one's experience of x. If you can see (and thus know) x is F by the way x looks, x is being perceived consciously. This operational test for consciousness explains the behavioral significance of consciousness and, at the same time, allows for the possibility that our conscious experience of the world is much richer than theorists (especially HOR theorists) have been willing to admit.

Selective attention, multisensory integration, and perceptual awareness in the normal and damaged human brain
Jon Driver
Institute of Cognitive Neuroscience, University College London

Saturday June 24th 09:00-10:00: Keynote lecture

It is now well known that selective spatial attention can modulate sensory processing and perceptual awareness for the normal human brain, as can multisensory interactions between different sensory modalities also. Moreover, spatial attention often operates crossmodally. Furthermore, putative deficits in spatial attention after brain injury (as in spatial neglect, or spatial extinction) can have dramatic effects on perceptual awareness that are typically multisensory in nature. After reviewing such phenomena, I will emphasize that most are now thought of as reflecting causal interactions between remote but interconnected brain regions (e.g. multisensory regions within parietal and frontal cortex, plus sensory-specific cortices for vision, hearing and touch). I will outline some new approaches to studying such causal interactions between brain regions, and their possible roles in awareness, including combined use of fMRI with the lesion approach, plus concurrent TMS and fMRI in the normal brain. Finally, I will generalise such approaches to the study of motor awareness as well as of perceptual awareness.

Mood modulates nonconscious perception of positive and negative words
Doris Eckstein (1), Philipp Schmutz (2), Walter Perrig (2)
(1) Open University, MRC Cognition and Brain Sciences Unit Cambridge; (2) University of Bern

Saturday, June 24th, 17:30-19:30: Poster Session 1

It is well known that contextual factors such as mood, task set and stimulus frequency guide and constrain responding in experimental tasks. When performing a task, we explicitly or implicitly

register stimulus frequencies and task characteristics, and this usually optimises task performance. Interestingly, task set and stimulus frequency effects have also been reported with stimuli that were not perceived consciously. This indicates that expectations formed in a task have a similar influence on nonconscious as on conscious processes. In this study, we investigated if mood modulates nonconscious perception. We conducted an experiment in which nonconscious perception was assessed after participants' mood was shifted to a more positive or more negative mood. To measure non-conscious perception, we used an experimental method developed by Greenwald et al. (1995), in which the task is to classify a target word according to two categories, e.g. positive and negative words. The target word is preceded by a masked prime word, which is not consciously perceived by the participants. Participants' responses are less accurate when the prime and target words belong to different categories than when they belong to the same category. This effect is called congruency priming, and is thought to represent interference effects between prime and target processing. The presence of a congruency priming effect strongly indicates that words have been non-consciously processed, even though the words were not consciously perceived. Results were as follows. When participants were in a positive mood, positive and negative words had differential effects: Positive primes led to more interference than negative primes. In contrast, participants in a negative mood did not show differences in interference effects of positive and negative primes. Thus, interference effects of the primes varied with the actual mood. Also, mood effects were more pronounced in the measure of nonconscious perception, i.e. congruency priming, than in the measure of conscious perception, i.e. accuracy of target classification. We discuss these findings with a focus on the interactions of emotion, attention and perception.

A scientific framework for the study of animal consciousness

David Edelman and Anil Seth
The Neurosciences Institute

Friday, June 23rd, 14:00-17:00: Tutorial

Accurate report of conscious experience is the benchmark of consciousness studies in humans. In species without a language faculty, however, accurate reports are difficult to acquire. Fortunately, recent advances in functional neuroanatomy, neurophysiology, and genetics offer alternative strategies for amassing evidence for consciousness in non-human mammals, birds, and possibly other species. It is now possible to pursue evolutionary homologies in anatomical substrates and to measure physiological correlates of conscious states across species [1]. For example, the basic structure of the thalamocortical complex seems to have been conserved among mammals for some 200 million years. Moreover, data from human studies can provide a benchmark, and frame of reference, as we search for evolutionary homologs or analogs of the substrates of consciousness in non-human animals. We know, for instance, that an intact thalamocortical system is necessary for mammalian consciousness [2], and there are suggestive similarities between this system and structures in the avian brain. Finally, creative means can be developed for eliciting behaviors consistent with consciousness (e.g., the "commentary key" paradigm employed by Cowey and Stoerig in their studies of blindsight in monkeys [3]). This tutorial will 1) present a picture of animal consciousness (i.e., which species are likely to possess it) that has been gleaned from comparative psychological, physiological, and anatomical studies; 2) draw a clear distinction between sensory and higher order consciousness and justify that distinction; and 3) lay out an interdisciplinary framework for the study of animal consciousness.

Threatening a rubber hand that feels to be yours elicits a cortical anxiety response

H. Henrik Ehrsson (1), Katja Wiech (1), Raymond J Dolan (1), and Richard E. Passingham (2)
(1) Wellcome Department of Imaging Neuroscience, Institute of Neurology, University College London, London; (2) Department of Experimental Psychology, University of Oxford, Oxford

Monday, June 26th, 14:00-16:00: Concurrent Session 3.3

People can be induced to have the experience that an artificial hand is their own hand. This is achieved by brushing the person's real hand when it is out of view and synchronously brushing the artificial hand which lies in front of the person in full view (‘rubber hand illusion'). It has been claimed that the feeling of ownership is genuine because participants take it as a threat if the experimenter injures or prepares to injure the model hand. We here use functional magnetic resonance imaging to show that threatening the rubber hand induces activity in brain areas associated with anxiety (insula and anterior cingulate cortex), and that this response is related to the illusion of ownership of the limb. We also provide evidence from activity in a motor area (the supplementary motor cortex) that the subjects are tempted to withdraw the model hand when it is under threat. This provides the first objective neurophysiological evidence that artificial limbs can be fully incorporated into one's own body image. It also shows that the feeling of ownership engendered by correlated visual and tactile stimuli extends into the interoceptive system.

Consciousness and epilepsy
Bidi Evans
Kings College Hospital, London

Saturday, June 24th, 17:30-19:30: Poster Session 1

Following the suggestions of Damassio and Newman full consciousness is considered to consist of three essential elements. The most important aspect is awareness, defined as the abillity comprehend, at the same time, all the information arising from the environment and within the body. Full consciousness requires the addition of some aspects of memory, Working Memory and Episodic Memory(EM), as well as intact emotional responses. The anatomy of the cortico thalamic(CT) network, described by E. Jones, is relevant for understanding both consciousness and epilepsy. Jones’ work suggests a dual CT system. A direct CT network connects the middle layers of the specific cortical areas to the associated specific thalamic nuclei. A diffuse CT network connects the superficial layers of the cortex as a whole to most thalamic nuclei including the specific ones.These systems are distinguished from each other by different Ca++ binding proteins.It is suggested that the diffuse system may be related to awareness and also to generalised epilepsy; a seizure type that commonly results in Loss Of Consciousness(LOC). The direct system may be associated with focal epilepsy, which often does not cause LOC. If the discharge spreads from the direct system to the diffuse system it becomes generalised(secondary generalisation) and LOC will result. Some focal seizures arise in the limbic system, which is closely related to the areas associated with EM and emotion. These seizures are called Complex Partial Seizures(CPS) and are associated with LOC. LOC in CPS may be due to the involvement of EM or emotion rather than awareness. Epilepsy may be a disorder of the neural mechanisms of consciousness. Damassio,A. The feeling of what happens.

Masking interrupts feedback processing: implications for visual awareness
Johannes Fahrenfort, Steven Scholte, and Victor Lamme
University of Amsterdam

Sunday, June 25th, 17:30-19:30: Poster Session 2

In masking, a stimulus is rendered invisible through the presentation of a second stimulus shortly after the first. Over the years, authors have typically explained masking by postulating some early disruption process. In these feedforward type explanations, the mask somehow "catches up" with the target stimulus, disrupting its processing either through lateral inhibition or through interchannel inhibition. However, studies from recent years indicate that visual perception - and

most notably visual awareness itself - may depend strongly on cortico-cortical feedback connections from higher to lower tier visual areas. This has led some researchers to propose that masking derives its effectiveness from selectively interrupting these feedback processes. In this experiment, we used EEG measurements to determine what happens in human visual cortex during detection of a texture defined square under nonmasked (seen) and masked (unseen) conditions. EEG derivatives that are typically associated with feedback processing turn out to be absent in the masked condition. Moreover, high tier visual areas are still being activated early on by both seen and unseen stimuli, as shown by spline laplacian distribution maps. This indicates that feed-forward processing is preserved, even when subject performance is at chance. From these results we conclude that masking derives its effectiveness, at least partly, from interrupting feedback projections, thereby interfering with visual awareness.

Severe brain damage and the problem of other minds

Martha J. Farah
Center for Cognitive Neuroscience, University of Pennsylvania

Monday June 26th: 18:30-19:30 Gordon Holmes Lecture

The problem of inferring the mental status of severely brain-damaged patients is a version of the 'problem of other minds'. Clinically, we reason by analogy. If a patient can display behaviors that, in us, are associated with cognition and awareness, then we attribute cognition and awareness to the patient. Unfortunately, this approach suffers from problems well known to all philosophy students. Functional neuroimaging has recently been used to measure the brain response to meaningful stimuli in severely brain-damaged patients, enabling us to draw a different kind of analogy relating mental states and brain activity (rather than behavior) in normal and damaged brains. Is this simply a high-tech version of the same failed approach? I will argue that it is different and offer an account of why.

An alternative theory of change blindness

Ilya Farber
Singapore Management University

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.2

After the initial flurry of interest in change blindness (CB), recent years have brought surprisingly little new insight into the underlying mechanisms and causes. Discussions of change blindness still fall into the same two basic types that have been around since the beginning: cautious, narrowly empiricist approaches which treat CB as a failure of hypothetical "change detection mechanisms," and more radical, philosophical approaches which take CB as evidence that conscious visual representation is "sketchy" (i.e. contains less detail than is standardly assumed). These approaches have different virtues, but they share some fairly basic flaws: they don't map very well onto the very extensive body of knowledge that we now have about the neuroanatomy of the visual system and the neural correlates of consciousness; they don't explain why CB is so surprising (in person and at the theoretical level), or why evolution has left us with "change detectors" which are so easily defeated by simple, commonly-occurring distractors; and so far, they have yielded very little in the way of testable, non-trivial experimental predictions. At ASSC 8 I presented an alternative approach, one which focuses on the recurrent dynamical structure of the brain's representational systems (per the NCC theories of Llinais and Crick & Koch), and which interprets CB not as a failure to detect change but as a failure to reject an anomalous update to an object- or scene-representation. In this presentation I will briefly describe the model, will show how recent experimental evidence regarding the temporal dynamics of object perception on small timescales (e.g. Enns, Lleras & Di Lollo 2005) provides fresh support for it,

and will demonstrate how it leads to some testable predictions about the interactions of CB and memory at more naturalistic timescales. (I have just begun setting up a lab to test some of these predictions, and as a novice experimentalist, I hope that attendees will be able to help out by poking holes in my experimental design!).

Uni- and Multi-sensory modulation of perception
Allesandro Farnè
INSERM U534 Espace et Action, Bron

Monday, June 26th: 10:30-12:30: Symposium 3

Farne will discuss some recent work on the relation between action, perception, and conscious awareness. This may include discussion of:

- ∞ Time constraints on dorsal and ventral routes to action towards visual stimuli
- ∞ Dissociation between action and conscious perception
- ∞ Implicit sensory processing for action
- ∞ Integration of visual and proprioceptive information for hand action

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Embodied cognition and Merleau-Ponty
Martin Farrell
University of Manchester

Saturday, June 24th, 17:30-19:30: Poster Session 1

In recent years, a number of authors have argued that cognition cannot be understood as a purely abstract mental activity, and that instead the body and the way that it interacts with the environment provide the crucial foundation on which cognition is based. Embodied cognition theorists argue, for example, that traditional cognitive conceptions, such as internal representations of the environment, have a much smaller role to play in cognition (if any at all) when one considers that cognition takes place in an environment that itself contains the information needed to control and guide the subject's actions. They also argue that the traditional picture of perception as the gaining of knowledge about the world ignores the fact that the goal of perception is not to produce an internal representation of the world, but to enable the perceiving subject to interact with the environment. Critics of the embodied cognition approach have replied by pointing out that cognition is not always driven by one's current physical environment and that perception does not always have as its goal the performance of a specific action. Much of the philosophical inspiration of the embodied cognition approach comes from the work of Merleau-Ponty, but both the supporters of embodied cognition and its critics have frequently interpreted his work in too objective and naturalistic a way. I demonstrate that by emphasizing that the embodied subject is situated in the world, Merleau-Ponty did not mean that behaviour is driven by one's current material environment. The subject lives instead in a meaningful situation rather than one that is simply physical. Nor, by pointing to the motor significance of perception, did Merleau-Ponty mean that perception was necessarily tied to a specific motoric response, but that the phenomenal body is an experiencing unity. The criticisms of embodied cognition put forward by supporters of a more traditional representationalist approach only apply to an objective and naturalistic interpretation of Merleau-Ponty, but not to Merleau-Ponty's theories themselves.

The Affective Neuroscience of Alexithymia
Bill Faw
Brewton-Parker College

Saturday, June 24th, 17:30-19:30: Poster Session 1

The realm of emotional responses constitutes the personal sphere wherein one interacts with the environment, past and random thoughts, reasoning and planning thoughts, and ones and other persons' immediate and ultimate values. Components of emotional events include subliminal/liminal perception of real, or imagining of imaginary, objects; representations of those objects; reflex motor responses; memory and significance appraisals; instinctive, conditioned, and deliberate emotional responses; and a range of unattended, attended, and higher-order emotional experiences. Alexithymia has been defined as "a diminished awareness and inability to describe ones mood state". This paper will sketch the neuroanatomy of the components of emotion and suggest possible mechanics -- at virtually each component of emotion -- by which such "diminished awareness" comes about. major focus will be given to two crucial anatomical routes: (1) the overlapping input routes (with possible cross-talk) for (a) emotional autonomic feedback and for (b) interoceptive body feelings -- involving the Vagus, solitary tract, amygdala, insula, and orbitofrontal cortex; and (2) circuits purportedly involved in (a) primary consciousness of emotion and (b) higher-order consciousness of emotion.

The Reality of First Person Science
Michel Ferrari
University of Toronto

Saturday, June 24th, 17:30-19:30: Poster Session 1
Dennett calls the 1st-person science advocated by Chalmers and others a fantasy. At the very least, he considers this approach to have no scientific program that can distinguish it from his own 'heterophenomenology', a methodology that claims to coordinate evidence about consciousness from 3rd and 1st person data. First-person science, he says, collapses into heterophenomenology or places qualia beyond science. Dennett may be right about that. This paper looks at a different kind of 1st-person science based in contemplative practices. This 1st-person science has a definite and distinct programme from heterophenomenology: to foster self-understanding, peace of mind, and inner fortitude in those who practice it. Indeed, this approach to the science of consciousness is what William James advocated in the second half of his career, as announced in his Presidential Address to the American Psychological Association in 1894. An example of it is James's empirical study of Varieties of Religious Experience. But Dennett may rightly claim, again, that James's own study can be subsumed under heterophenomenology. A more powerful example of this kind of 1st-person science is seen in ancient philosophy. In particular, Stoicism and especially ancient and contemporary Buddhism both propose specific techniques designed to develop a deep 1stperson knowledge of one's own mind, and great personal strength. Well-documented examples of the power of these techniques are found in the modern stoic Stockdale (a pilot held prisoner of war in Vietnam for over 4 years) and especially in that of Thich Quang Duc (a 67-year old Buddhist monk who set himself on fire in 1963 to call attention to the plight of Buddhists in South Vietnam). Very few will become like these 'Olympic champions' at this kind of training, but many can benefit from it. For example, people with no previous training in these techniques felt less chronic pain after only a 10 week course in Mindfuness Based Stress Reduction, and those following a program using Mindfulness-Based Cognitive Therapy were less likely to relapse into depression than were those following the usual treatment for depression. These examples show that this kind of 1st-person science is no fantasy.

Dissolving the Explanatory Gap by adopting an Evolutionary Stance on Consciousness
Anton Frantzen
Tilburg University

Sunday, June 25th, 17:30-19:30: Poster Session 2

In line with William James' claim that consciousness is an organ, which helps an organism in his struggle for existence, Tononi (2004) argues that '[É], consciousness corresponds to the capacity of a system to integrate information.' And just like the function of an organ can be explicated, it seems possible to quantify the capacity of a physical system to integrate information. However, even if this research program turns out to be extremely successful, some will argue that this approach leaves the Hard Question unanswered. What seems to be missing from a scientific description of a cognitive system is the relation between an information integrating organ and the qualities of our conscious experiences. The reason for this gap in the explanation of consciousness is that we adopted a particular framework - inherited from our philosophical tradition - which forced the immediate qualities out of the domain of science. Philosophers such as Descartes and Locke, despite their differences, both defined consciousness as an internal phenomenon to debunk any mechanical explanation of consciousness. Many contemporary philosophers / scientists accept this traditional conception of consciousness and simultaneously concur with James' claim that consciousness is an evolutionary adaptation. This inevitable creates a framework in which the environing conditions are seen as the input of consciousness and behaviour as the output, while consciousness itself is still considered an internal phenomenon hidden from the scope of science. To counter the above view, we should finally take the evolutionary stance on consciousness seriously. Accepting that consciousness is a complex biological structure and given that natural selection is the only mechanism that could account for complex biological structures, we cannot escape the conclusion that consciousness is indeed an evolutionary adaptation. Adaptations (e.g. consciousness) are the result of selective pressure on the interactions as a whole and not just on parts of the interactions (e.g. behaviour, neural processes or genes). Hence, consciousness cannot be an internal phenomenon but should be attributed to a set of interactions. The main aim of the science of consciousness should therefore be to describe conditions shared by this set of interactions we call conscious interactions.

The Limits of the Left Hemisphere Interpreter in a Split Brain patient
Rami Gabriel
UCSB

Sunday, June 25th, 17:30-19:30: Poster Session 2

Research has shown that the Right Hemisphere is superior at tasks which necessitate spatial reasoning while the Left Hemisphere is superior at tasks that necessitate higher level cognitive processing. I investigate these findings by exposing a Split Brain patient to two types of sequences of images: a) narrative events (viz. comic strips) and b) spatial patterns. After viewing a given spatial or narrative sequence, the patient is given a two alternative forced choice asking her to decide "what comes next" in a given sequence. Each hemisphere is tested separately using both types of sequences. In this way I am able to compare narrative vs. spatial interpretation across hemispheres. Normal participant responses will be used as control data. I hypothesize that the Right Hemisphere will be able to complete the spatial, but not the narrative sequences; the Left Hemisphere, by contrast, is hypothesized to show the reverse pattern in performance. This experiment joins the debate on how narrative, and thus interpretation, within consciousness is represented in the mind of a Split Brain patient. It helps clarify the nature of the Left Hemisphere interpreter through identifying its specific type of content, namely, narrative events. Further work will focus on the nature of the relationship between interpretation and conscious experience.

The context induced change illusion.
Hélène L. Gauchou (1), Juan R. Vidal (2), Kevin O'Regan (1)
(1) CNRS / Univ. Paris 5; (2) Radboud University Nijmegen

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.2

Is a feature change detection dependant of its visual context? In order to answer this question we conducted change detection experiments and observed an unexpected effect: If the visual context changes when change detection of a cued item has to be performed, subjects are sure that they see the cued item changing too. We studied this "context induced change illusion" and tried to determine if it results from either memory or perceptual mechanisms. In the first part of this presentation we will show experimental data of 3 change detection experiments supporting the memory hypothesis and confirming the existence of the illusion. In the second part of this presentation we will comment these results as a function of different theoretical approaches. Most studies testing and evaluating the capacity of visual short term memory implicitly consider that each information unit (feature or object) is stored independently of the others. Nevertheless there is evidence that relational information exists within each feature dimension in visual short term memory and links information from individual units (Jiang et al., 2000; Vidal et al., 2005). Thus, we will propose and discuss a new model of change/non-change detection based on the structural properties of relational information that could explain the context induced change illusion and predicts the possibility of change detection among items not individually stored in visual short term memory.

Orienting attention in space and motor preparation in hearing and deaf subjects
Luiz G Gawryszewski(1), Rodrigo A Rocha (1), Altiere A Carvalho Carvalho (2), Erick F Q Conde (1), Fernanda Ferreira
(1) Programa de Neuroimunologia-UFF, CAIXA POSTAL 100180, Niter—i, 24001-970, RJ, BRASIL; (2) USP, SP, BRASIL; (3) Departamento de Neurobiologia- UFF, Niteroi, RJ BRAZIL

Saturday, June 24th, 17:30-19:30: Poster Session 1

Voluntarily orienting attention to a particular location in visual space facilitates target detection at this position and increases the response latency at non-attended positions. Likewise, a preparatory warning signal usually reduces Manual Reaction Time (MRT) to a visual target. These two effects are mediated by distinct neural networks which can be selectively modified by alterations in the early environment. In this work, we measured the effects of attentional orienting and warning signals on the MRT to peripheral visual targets. A visual cue (arrow) appeared above the Fixation Point (FP) and remained on for 1000 ms. Simultaneously, 200, 300 (500) or 1000 ms after cue offset, a target appeared 9 deg to the left or to the right of the FP. Eight deaf and eight hearing subjects volunteered to participate in one session with two blocks of 160 trials. The intervals between cue- offset and target onset were 0,200,300 or 1000 ms in one block and 0,200,500 or 1000 ms in the other block. The target appeared either at the cued position (75% probability) or at a contralateral position. MRT medians were calculated to determine the effects of attention orienting and cue-target interval on manual latency. We found that: 1) for both groups, MRT at 0 ms cue-target interval was 50 ms longer than on the other intervals, which did not differ among them; 2) for hearing subjects, MRT in the valid condition was faster than MRT in the invalid condition for all intervals (cost = 55 ms); 3) for deaf subjects, there is a smaller attentional effect at 0 ms cue-target interval (cost = 24 ms) and no effect at the other intervals and 4) for the deaf subjects, MRT to a right stimulus was longer than that to a left stimulus at 0 and 200 ms cue target intervals. These results suggest that the deafness has a stronger effect on the orienting of attention in space than on motor preparation to an impending target and that the differences seen

between hearing and deaf people may be related to an impairment of the left hemisphere.

Memory and the Content of Experience
James Genone
UC Berkeley

Saturday, June 24th, 17:30-19:30: Poster Session 1

To what extent, if any, are concepts involved in conscious perceptual experiences? Some philosophers such as McDowell (1994), Brewer (1999), and Noë (2004), have claimed for a variety of reasons that the content of perceptual experiences should be understood as fully conceptual. In this paper, I consider a challenge to this view posed by the relation between perception and memory. Michael Martin (1992) has argued that the role perceptual experiences play in memory provides us with reason to think that perceptual experiences are at least partially nonconceptual. According to line of thought, that fact that a subject can recall aspects of an experience that she lacked concepts for at that time, but has since gained; shows that experience must possess at least some nonconceptual content. I argue that the phenomenon Martin cites in favor of his claim does not in fact support it. Rather, I claim that conceptualism has the resources to explain the way experience and memory are related. There are two strategies here: first, supposing that many concepts are complex, a subject can recognize the marks of a more sophisticated concept in the content of an experience that she conceptualized originally according to more basic concepts. Second, for concepts that are too fine grained to be equated with more basic concepts, a subject can employ demonstrative concepts in conceptualizing the relevant aspect of her environment. Having defended conceptualism from Martin's attack, I go on to suggest that the upshot of this challenge is to highlight an explanatory demand that conceptualism must provide an account of concept acquisition. This can seem to be a difficult burden for conceptualism because if perceptual experience requires the possession of concepts, then it is hard to understand how we can gain concepts on the basis of it. I conclude that the need for such an account points towards a new way of thinking about the nature of concepts and how they are involved in perception.

BOLD Brain Pong: Self-regulation of local brain activity in synchronously scanned, interacting subjects
Rainer Goebel
Department of Psychology, University of Maastricht

Monday, June 26th: 16:30-18:30: Symposium 4

We explored a novel type of neurofeedback for fMRI signals that allows scanning two subjects simultaneously while they compete in a simple video game (ping pong). Subjects saw the same screen depicting the tennis field, the moving ball and the two rackets. Each subject was instructed to move her racket to the correct position using the BOLD signal. The fMRI measurements were performed on two MRI scanners. For real-time data analysis and synchronized stimulus presentation, we developed a novel brain-computer interface, which allows the experimenter to observe the ongoing brain activity of the two subjects as well as to select the BOLD signal in selected regions-of-interest (ROIs) for neurofeedback. Before running the pong game, each of the participating subjects was trained to modulate regional brain activity to reach specific target levels and to adapt to the hemodynamic response delay. The ROI with the best modulation results was selected in each subject for controlling the racket in the subsequent video game. Subjects succeeded in controlling the up and down movement of the racket by regulating voluntarily the activity in the selected ROIs achieving a hit rate of 60 to 80 %. The results revealed that with extensive practice, subjects learned to reach and maintain intermediate levels of brain activity

with high accuracy. This study demonstrates that it is possible to simultaneously measure two subjects engaged in joined attention during social interactions and to use subjects brain activity in real-time during these interactions.

The Neglected Ambiguity of Sensory Terms
Nicholas Georgalis
East Carolina University

Sunday, June 25th, 17:30-19:30: Poster Session 2

Sensory terms are systematically ambiguous in reference between phenomenal and physical qualities. While the ambiguity is often acknowledged, its significance typically goes unappreciated. I examine: (1) sensory terms in their pre-scientific use and (2) the character of classical identities, such as: Heat = kinetic energy of molecules. The latter are thought to provide the basis for a reduction. This two-part examination supports the systematic ambiguity of sensory terms. Importantly, my examination of (2) establishes that the alleged identity offered in support of such supposed reduction fails. The arguments readily generalize to the other secondary qualities. I distinguish two types of reduction: feature reduction and theory reduction. The former includes heat to kinetic energy, the latter includes: Thermodynamics to Statistical Mechanics, and Wave optics to electromagnetic theory. A crucial difference between these two kinds of reductions is that in theory reductions the terms on both sides are already regimented in some scientific theory, whereas in feature reductions only one of them is, the other term is embedded in pre-scientific discourse. This difference in regimentation is crucial to showing that, while theory reductions are genuine reductions, the alleged feature reductions are not reductions at all, and the alleged identities upon which they are based are not identities. The latter actually mark a discovery of a new phenomenon - nothing at all is reduced. The feature reductions are, however, a critical juncture for sensory terms. They provide the reason and the occasion for the resulting ambiguity in the target sensory term. The lesson from this that is typically missed is that talk of the true or real nature ("essence") of, say, heat or color is without merit. Therefore, Objecitvists and Subjectivists regarding sensory qualities are engaged in a pseudodispute.

Dummies talk and the blind see: Connecting conscious experience with function
Brian Glenney
University of Southern California

Sunday, June 25th, 17:30-19:30: Poster Session 2

Does conscious experience go with function or brain state? The answer may be decisive in the debate between functionalists and physicalists. (Block, 2003) Like Noë and Hurley (2003), I argue that the implementation of tactile-visual substitution systems (TVSS) is a case where conscious experience goes with function, applying new evidence from PET scans (Ptito et.al., 2005) and subject reports of the blind who tested a TVSS for the tongue called a BrainPort, which has a greater resolution (144 electrodes) than previous TVSS. I further argue that sensory dominance, where one sense is favored over another when a subject is presented with contradictory stimuli, is another case where conscious experience goes with function and not brain state. For instance, in the Ventriloquism effect we consciously experience the dummy talking (i.e. sound coming from the dummy's mouth) even though audition localizes the sound as coming from elsewhere. (Choe et al., 1975) The conscious experience of the location of the sound follows the breakdown of the dominated localization function. This and other cases of sensory dominance show that only the conscious experience of the sense whose function wins out is present to the subject. So, we must attach conscious experience to function, for when the function goes so does the conscious experience. After defending this view of the sensory dominance case against several objections, I

conclude with some implications that this and the TVSS cases have for Block's suggestion that different kinds of conscious experience are attached to brain state and function.

The conditional interpretation of the possibility of doing otherwise

Gilberto Gomes
Laboratory of Cognitiona and Language - UENF, Campos, Brazil

Sunday, June 25th, 17:30-19:30: Poster Session 2

According to Moore (1912), to say that one could have done otherwise is to say that one would have done otherwise if one had so willed. Lehrer (1966) argues against this, assuming: (1) S will X, if C; (2) S can X only if C; (3) ~C. Lehrer considers these assumptions compatible with one another and from (2) and (3) he infers: (4) ~(S can X). Thus, (1) could not be equivalent to 'S can X'. Despite criticisms by Aune (1967) and Thomas (1995) Lehrer's argument is widely considered as valid (Berofsky 2002; Kapitan 2002). However, it does not disclose an inconsistency in Moore's equivalence. If we adopt this equivalence, it must be applied at all points and (2) would become: (2') If S will X if C, then C. From (1) and (2') we infer: C. Thus, (3) is incompatible with (1) and (2) and Lehrer's argument fails. Moore's equivalence is consistent if consistently applied. Yet, one may find the consistency among Lehrer's assumptions more plausible than Moore's conditional analysis. I will argue against this in this talk. I will show that Lehrer's assumptions imply that, if it had been the case that S could have done otherwise, she would have done otherwise (and would not have been able to do what she did); and that this is not the normal use of 'could'. Then why does it seem natural to admit, for example, 'Jim could have passed the test only if he had studied', 'Jim would have passed if he had studied' and 'Jim did not study'? I will argue that the first of these sentences, when admitted in conjunction with the second, is equivalent to 'Jim would have passed only if he had studied'. Both 'could X only if' and 'would X only if' indicate a necessary condition for X'ing, since a necessary condition for being able to X is also a necessary condition for X'ing. However, when one says 'could X only if C', one asserts that C is necessary but one also suggests that it is not necessarily sufficient for X'ing. In ordinary language, we rarely use 'if and only if' when we think of a biconditional relation. I claim that the reason for using 'can... only if C' is avoiding the presumption that C might be sufficient. However, when this sufficiency is also stated (as in Lehrer's first assumption), this sole reason is lost. I conclude that Lehrer's argument fails to show the implausibility of Moore's equivalence, let alone its inconsistency.

Catching consciousness unaware: Using modus tollens to establish what conscious cognition does

Anthony G Greenwald
Department of Psychology, University of Washington

Monday, June 26th: 09:00-10:00: Keynote Lecture

After centuries of attempting to understand consciousness, both scientists and philosophers might well conclude that introspective analysis of subjective experience does not offer the path to consensus. Consensus similarly is not to be found when the starting point is analysis of mind-body relationships. Instead of starting from the bright light of qualia, one can start from the darkness of unconscious non-experience, using the reasoning device of modus tollens (If A then B; not-B; therefore not-A). Take A = unconscious cognition and B = failure of a specific cognitive achievement. If the failure (B) is observed when cognition is limited to the unconscious realm, "If A then B" is empirically established. Observation of the corresponding achievement (not-B) therefore implies presence of conscious cognition (not-A). We explore some failures (Bs) that can be associated with limiting cognition to the unconscious realm (A). These failures permit logical

inference of what conscious cognition does.

How do atomic sensorimotor contingencies look like? A mathematical approach.
Hans-Jürgen Graf Grote
Technische Universität Darmstadt

Saturday, June 24th, 17:30-19:30: Poster Session 1

In this work, a purely mathematical model of an embodied agent in an unknown environment is defined and studied. The definition strictly follows the paradigm of the enactive approach that perception can only happen through interaction. Taking a radically constructivist stance, it is investigated which sort of information exists in this hypothetical setting, while the innate knowledge of the agent is kept minimal. The ultimate goal of this work in progress is to develop a generic learning algorithm which shows functional similarities to the development stages of a child as claimed by Piaget. Particular attention is paid to the development of the concepts relating to event, causality and self. Drescher pursued a similar goal when developing his schema mechanism, yet there are fundamental differences in how the primitives on which the mechanism works are constructed. While the schema mechanism uses elementary actions and sensations as the basic elements to manipulate, this work focuses on formal statements about such actions and sensations. I argue that these statements make a good candidate for atomic sensorimotor contingencies. What makes them interesting is the fact that although they can be treated as symbols, they are physically grounded in the body structure of the agent and its embedding in the environment.

Automatic Gender Categorization is a Function of Familiarity
Ruth Habibi and Beena Khurana
University of Sussex

Saturday, June 24th, 17:30-19:30: Poster Session 1

Automatic facial categorization along dimensions such as familiarity, gender, race, expression and age facilitates social exchange. Here we focus on familiarity and gender in order to gauge their independence. Previous experiments are equivocal as to whether these dimensions are processed independently or not (Bruce and Young, 1986; Goshen-Gottstein and Ganel, 2000). If familiarity and gender were independent then facilitation or inhibition of one should not affect future performance on the other. Famous and unfamiliar faces were presented in a series of go no-go tasks. External features were removed ensuring that both famousness and gender decisions were based on the internal features of a face. Faces were presented in paired blocks such that a gender block (e.g., go male, no-go female) was followed by a familiarity block (e.g., go famous, no-go unfamiliar) or vice versa. The first block of each pair consisted of five famous males, five famous females, five unfamiliar males, and five unfamiliar females (each presented twice) in a random order. The second block consisted of the previously seen faces from the first block (old) with an additional 20 new faces (five of each type) so that every block contained 20 go and 20 no-go stimuli. An experimental session consisted of 16 counterbalanced block pairs. Results indicate that only unfamiliar faces solicit automatic gender categorization. When observers made a no-go decision on unfamiliar faces based on familiarity they were subsequently slower to determine the gender of those faces compared to previously unseen faces. However, if they made a no-go decision on unfamiliar faces based on gender, subsequently they were faster to determine the unfamiliarity of those faces relative to previously unseen faces. This interaction was not found for famous faces. Since in the present studies familiarity and famousness were correlated, at this juncture it is not clear whether the results will hold for familiar but not famous individuals. We conclude automatic gender categorization is part and parcel of the 'identity' of

unfamiliar faces. Familiarity results in the differentiation of identity from gender. In others words, unfamiliar individuals are automatically coded as male or female whereas Madonna is not.

Multisensory temporal cues for figure-ground segregation
Vanessa Harrar and Lauence R. Harris
York University

Saturday, June 24th, 17:30-19:30: Poster Session 1

Our ability to distinguish two events in time contributes to determining which features from an array of stimuli are bound together to create the perception of a figure moving against a background. A dot that is flashed so quickly that separate flashes cannot be perceived is interpreted as distinct from other dots whose flashes can be separated. This is the basis of the Ternus illusion: if the flashes of a central dot cannot be located in time that dot is seen as part of the background. If its flashes can be localized in time, it is treated as two items which are each free to bind with neighbouring dots and create a moving figure. In the classic Ternus illusion three lights (ABC) are arranged in a row. A and B are illuminated and extinguished and, after a delay, B and C are illuminated and extinguished. At short delays, A appears to jump over a stationary B to C. At longer delays, A and B are perceived as a bound group that moves to the location specified by B and C. The "critical delay" where the central dot changes from being part of the background to part of the moving object, indicates the temporal resolution of the binding process. In order to investigate multisensory temporal resolution and binding properties we used a classic Ternus configuration with three types of stimuli: lights, mechanical touches and combined lights and touches. Stimuli were positioned on three neighbouring fingers. Subjects were asked whether they perceived AB moving to BC or A moving to C. For all three stimulus types, at short delays A to C dominated, while at longer delays AB to BC dominated. The critical delay was significantly different for visual and tactile ternus illusion. The multimodal critical delay was not different from the visual critical delay. The critical delays correspond to the temporal resolution of the binding process that segregated figures from ground. Repeated exposure experiments showed that binding properties are not fixed and can be changed after experience.

Brain reading of conscious and unconscious mental states
John-Dylan Haynes
Max-Planck Institute for Cognitive and Brain Sciences, Leipzig and
Institute of Cognitive Science, University College London

Monday, June 26th: 16:30-18:30: Symposium 4

Decoding conscious and unconscious mental contents from brain activity alone is one of the greatest challenges in cognitive neuroscience. Here I will present a brief introduction to this fascinating field, and show how emerging methods for fMRI can be used to shed new light on this issue in awake and behaving human subjects. It will be shown that fMRI signals can be used predict the precise time course of conscious visual percepts with high temporal precision while they undergo many rapid spontaneous changes. This amounts to a simple form of "mind-reading" and is achieved by exploiting the information present in spatial patterns of brain activity using multivariate pattern recognition. This research also reveals that even the information present in single "snapshots" of brain activity is sufficient to predict which of two stimuli a subject is currently seeing, even when these are presented so briefly that they are effectively invisible. Using similar techniques it was also possible to determine other covert mental contents, such as where a person is currently attending. This research provides further evidence for a close link between conscious and unconscious mental contents and their neural carriers.

Laterality and modality in simultaneity judgment
Tomomitsu Herai and Ken Mogi
Tokyo Institute of Technology & Sony Computer Science Laboratories
Sony Computer Science Laboratories

Saturday, June 24th, 17:30-19:30: Poster Session 1

The integration of the sensory and motor information in space and time is an essential element of consciousness. Libet's "time-on" theory (summarized in Libet 2004) is a classical demonstration of the non-trivial role played by the temporal factor in the perception of cause and effect, agency, and contingency in the interaction with the environment. Without an appropriate "book-keeping" in time, it is not possible to arrive at a coherence understanding of the world and the self. The auditory and visual stimuli are perceived simultaneously when they occur within the certain time extent. This subjective simultaneity is affected by adaptation (Fujisaki et al. 2004) and the subject's knowledge about the situation involved. Studies have also suggested that intentional action affects the perceived time of consequent sensory information? Haggard et al. 2002). Thus, conscious intention and the perceived time of consequent effects are the key to recognize whether an external event is linked or not, providing an integral building block of the sense of agency. Here we examine how the subject's intention to produce auditory tone and visual flash simultaneously affects the simultaneity judgment. Using both hands, the subjects are asked to push two buttons that produce beep sound and flash with various controlled delays. As a control experiment, the subjects are asked to judge the simultaneity (or temporal ordering) of beep and flash without pushing the button. In a further experiment, the subjects are asked to push two buttons that both produce sound or flash. We discuss the implication of the results in the light of contingency perception involving both hemispheres of the cortex. In particular, the laterality involved in the judgment of temporality of auditory and visual stimuli are examined, with a special reference to the language function. Finally, we discuss how simultaneity judgment extends over different sensory modalities, contributing the coherent conscious experience.

Representing Consciousness
Brian Hill
IHPST University Paris 1

Saturday, June 24th, 17:30-19:30: Poster Session 1

One of the major difficulties with consciousness is talking about it properly. This paper shall be concerned with this difficulty, that is, with the task of proposing a way of representing states of consciousness which is not only faithful, in the sense that it does not smuggle in unwarranted properties or assumptions, but also useful, in the sense that it can serve to clarify discussions of consciousness and express theories about consciousness. The question with which this paper is concerned is thus methodological (how should states of consciousness be represented?), rather than, say, epistemological (how do we know the composition of states of consciousness?). Two traditional approaches to the representation of consciousness are the first person, 'introspective' approach and the third person, 'objective' approach. Methodologically speaking, the first person approach has the dubious property that that the observer and the observee coincide, which may place undue limits and exert unwarranted influences on the representation of consciousness. By contrast, the third person approach runs the risk of losing the personal perspective which is an important aspect of consciousness. There is no need to appeal to 'phenomenal' experiences to see this: Dennett's heterophenomenology (1991) for example does not take into account the locality of the agent's situation in his heterophenomenological world at a particular moment (he 'sees' or 'encounters' a small fragment of his heterophenomenological world at any give moment), nor the evolution of the agent's situation or of the heterophenomenological world itself over time.

However, this locality is undeniably an important general property of consciousness, of which any representation of consciousness should take account. A more felicitous point of view is the third person point of view on a first person point of view: the representation of consciousness will be that that would be available to (fictional) theorists who, although different from the subject, could observe his states of consciousness. The practical infeasibility of this point of view does not impair its methodological utility. On the contrary, this point of view avoids both the confusion of observer and observee and the loss of information relating to the perspective of the subject at a given moment. To flesh out the idea, a neutral representation of the state of consciousness at a particular instant shall be proposed, as a structure consisting of elements entering into certain relations. This representation immediately delivers a distinction between 'explicit' and 'implicit' parts of ones consciousness: the elements correspond to those aspects which are 'in focus', or in the foreground, of consciousness at the appropriate moment, whilst the relations correspond to those aspects which are out with the 'focus of attention', or in the background.

Predictive coding explains binocular rivalry

Jakob Hohwy and Andreas Roepstorff
Aarhus University

Sunday, June 25th, 17:30-19:30: Poster Session 2

Binocular rivalry provides a core experimental paradigm for consciousness studies. The findings of such studies are however often conflicting and very difficult to interpret. This may be because the representational mechanism underlying binocular rivalry is not known. We propose an explanation in terms of generative models and predictive coding that integrates most of the diverse neurophysiological and psychophysical findings in rivalry studies. This explanation accounts for why one stimulus is favoured at any one time as well as why there is alternation between favoured stimuli.

Internal models and the conscious self

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Saturday, June 24th, 17:30-19:30: Poster Session 1

In order for an embodied agent to operate intelligently, it must be able to predict the outcomes and the values of possible actions before choosing the best one to execute. The most flexible way to do this is by internal simulation, and the most effective way to carry out such simulations is through separate but interacting simulations of the agent and the environment. In such schemes, the models of the agent and the environment must constantly be updated by other parts of the system in order to reflect the current dispositions of the body and the environment. A consequence of using such a scheme is that the internal agent model (the IAM) will have most or all of the properties of the transparent self-model identified by Metzinger (2003) as being at the centre of human consciousness. It does not sense the world directly, but instead is given pre-processed updates which need not be tied to the sensory processing elsewhere in the system; these updates need only be good enough to enable effective planning. It does not act on the world directly; instead, information about the preferred action must be made available to the rest of the system to enable execution, and the subsequent changes in the body and environment may then be interpreted by the IAM as being the effects of its own actions. The successful operation of such an architecture requires the presence of a number of structural and functional features, and these impose certain constraints on the relationship between the reality of the relationship between the agent and the environment, and the representation of that reality in the corresponding internal models. We believe that the study of architectures like this may reveal the presence of distortions, biases, and omissions qualitatively similar to those associated with the

nonveridical aspects of consciousness, indicating that consciousness itself may be constrained or enabled by a similar architecture in humans. We will report the progress of studies of such architectures in simple and complex simulated robots, and in a complex real robot with a convincingly anthropomimetic embodiment. Metzinger, T. (2003) Being No-one. MIT-Bradford

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Extension of egocentric space perception

Eiichi Hoshino and Ken Mogi
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Sunday, June 25th, 17:30-19:30: Poster Session 2

The perception of space is an important factor in the conscious and unconscious perception of the self and the environment. Several studies into spatial cognition have shown that hippocampus is much involved in retrieving the information of the comprehensive spatial map. On the other hand, it has not been shown for certain where the spatial information is finally encoded. It has been suggested that the parahippocampal region collects spatial information, possibly involved in its encoding (Gabriele and Miranda (2004)) Reference frames are useful when explaining the spatial structure from different viewpoints. Here we study the two variations in how the human perceives the space depending on their own point of view (i.e. the egocentric frame of reference as apposed to the allocentric frame of reference). The "view dependent space" (VDS) includes only areas directly viewed by the subject, whereas the "view independent space" (VIS) includes those areas not directly viewable. It is expected that a good navigator is able to reproduce VIS from Voss using effective special clues. There are differences in the nature of memory involved in both perceptions. Evidences suggest that VIS is stored as long-term memory. On the other hand, VDS is invoked only as working memory. The extension of VIS from VDS is interesting because, e.g., as it emulates the extension of one's own body image in tool use, and the space in a sense a "tool". In this experiment, the subjects were presented with several pictures taken in a simulated exhibition. Subjects were instructed to find out the layout of displays with special attention to a particular object group. After a delay, the accuracy in VIS and rotated-objects recognition task were measured, with a focus on the dependence on attention and the relationship between objects and its environment (i.e. at the corridor or open space). Based on the result, we discuss how the perception of space is related to the perception of oneself in the conscious and unconscious cognition of humans. In particular, the significance of the "self" as an "anchor" in the otherwise neutral physical space is discussed.

Perception / action dissociations in rod bisection: Task demands affect the performance of patients with neglect and controls.

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Saturday, June 24th, 17:30-19:30: Poster Session 1

One concern for theories of visual cognition is how and why 'conscious' visual perceptual judgements can dissociate from 'non-conscious' visually guided actions. We have demonstrated such a dissociation with neurologically normal participants using a rod-bisection task. In this task, participants' perceptual judgements of the centre of the rod were biased to the right, yet when participants were required to grasp the rod by the centre no such bias was evident. One theory used to explain this type of dissociation suggests that the tasks use two different representations provided by separate neurological streams: the ventral and the dorsal stream. The current paper presents additional evidence of dissociations on the rod bisection task in a second group of

neurologically normal participants and in two patients with visuospatial neglect. We used two adaptations of the rod-bisection task to investigate possible links between local and global processing demands and the perception/action dissociation. In these tasks, participants were directed to focus on either the local or global level when bisecting sets of rods. For the neurologically normal participants, the two variants of the rod-bisection task removed the dissociation previously observed: in the local-processing version, both perceptual and grasping bisections were biased to the right and, in the global-processing version, there was no directional bias for either perceptual or grasping bisections. For the patients, the local-processing version resulted in poor performance for both perceptual judgements and grasping whereas the global-processing version resulted in impaired perceptual judgements but relatively improved grasping. The results for neurologically normal participants suggest that the original perception/action dissociation may be due to the use of different levels of processing (local versus global) rather than two separate streams. When perceptual judgement and visually guided action tasks both rely on the same level of processing (local or global), the dissociation is removed. However, this proposal cannot fully account for the patient data. Thus a combination of the local/global and ventral/dorsal stream theories may be required to explain why neglect may occur on some but not all measures of bisection.

Differential effects of explicit knowledge on accuracy and speed in procedural learning: Evidence from differential tolerance against workspace rotation

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Sunday, June 25th, 17:30-19:30: Poster Session 2

Does knowing what to do always help to quickly do it learning? Recent studies have suggested that procedural learning may occur in two separate neural networks, one contributing to quick performance and the other to accurate performance, and therefore that it may not always be true. The purpose of the present study was to examine the effect of explicit knowledge of stimulus configuration (workspace) on learning of accuracy and speed of visuomotor procedure. We employed a sequential button press task, called the 2x10 task (Hikosaka et al 1996). In this task, 2 out of 16 (4x4 matrix) LED buttons (set) were illuminated and subjects had to press these set in correct order determined in advance. 10 sets were presented in a fixed order (hyperset) and subjects had to learn correct order by trial and error. Subjects learned the sequences of button presses in two sessions. In the first session, both accuracy and speed improved, confirming learning occurred. In the second session, the stimulus configuration was rotated with a fixed angle without notifying so. About the half number of the subject were not aware of the workspace rotation, while the remaining subjects noticed the rotation. For the subjects who were not aware of the rotation, neither accuracy nor speed performance was preserved in the second session. On the other hand, the subjects who noticed the rotation were able to use the explicit knowledge to perform the task more accurately in the second session. Nonetheless, this explicit knowledge of workspace rotation did not decrease the performance time. This study thus demonstrated that knowing a visuomotor sequence to perform does not necessarily contribute to quick performance in executing the sequence. The differential effects of explicit knowledge on accuracy and speed performance are in accordance with the parallel network model of visuomotor learning, where accuracy and speed of performance can be achieved separately (Nakahara et al 2001).

Why phenomenological considerations should not guide research and theorizing into NCCs

Elizabeth Irvine
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Monday, June 26th, 14:00-16:00: Concurrent Session 3.2

Many phenomenological notions have been used, for the most part explicitly, to argue for or against theories of conscious experience and of its underlying cognitive architecture. The arguments tend to run as follows; my subjective conscious experience has a certain character, (e.g. is unitary or continuous), therefore the presentation of my experience embodies this character, and therefore the neuronal basis for the experience must somehow embody or reflect this structural property. Among these arguments is the richness argument; that the 'richness' of conscious experience cannot be captured by a finite number of concepts (or in any case the number a person can normally possess), and that there is too much 'information' in my visual field for to me use, therefore visual consciousness is non-conceptual (Evans) or of an analogue nature (Dretske), and therefore the neuronal basis for visual consciousness must somehow be non-conceptual or analogue. (Such arguments can conclude with there being either partial or complete non-conceptualism, or 'analogism'). Phenomenological notions are problematic in building a theory of cognitive structure; one version of the richness argument will be shown to be inconclusive, and in any case it will be argued that the non-conceptual/analogue terminology involved is not easily or meaningfully applied to sub-personal visual processes. Therefore phenomenological notions should not be used to provide null hypotheses about the underlying cognitive structure of consciousness. The challenge of explaining the nature of conscious experience is then shifted down a level; instead of explaining how neural structures reflect the structure of experience, we have to explain how neural structures can give rise to the 'apparent' structures of consciousness (unity, continuity over time, richness etc.) given that these structures may be very different.

Retroactive Modulation of Subjective Intentions

John Jacobson
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Saturday, June 24th, 14:00-16:00: Concurrent Session 1.2

Undefeatable Rock, Paper, Scissors beats human players on every trial, even though the computer appears to move up to 200ms before the human player (Jacobson 2005). In reality, the computer displays its move after the human, but the program induces a temporal-order reversal illusion, so that the key-press, which occurs before the computer displays its move, appears to occur after the computer displays its move (Stetson & Eagleman 2004). We apply a similar trick to retroactively modulate subjective intentions, the intentions subjects' report having. Subjects respond to a stimulus with keys assigned to multiple values, a second stimulus follows a key press, but this subsequent stimulus appears to occur before the key press and biases the subjective intention associated with the key press. Thus, we manipulate the subjective intention associated with an action after the action. Aesop's Fables and other research reveal we confabulate intentions, but this paradigm catches us in the act, over very short time scales (cf. Wegner 2002). We also investigate the possibility, or at least the fragility, of subjective intentions which might occur before the button press, but are forgotten after the second, biasing stimulus. Furthermore, we investigate the integrity of the folk notion 'volition', the ramifications of this result for anti-compatibilist determinists (cf. Pereboom 2001), and applications to interface design. According to the folk notion, volitions are i) picked out by subjective intentions, ii) the causes of intentional actions, iii) are what we are morally responsible for, and iv) that which learning responds to. These experiments indicate that 'volitions' do not have both properties i & ii, and further experiments with this paradigm can tell us how the other properties will associate. Since our subjective intentions depend on the results of our actions, these intentions provide a model for understanding how, contra-determinists, our intentions are determined, paradoxically, by both

the past and the future. Finally, we discuss the prospects for modifying interactive feedback, such as online spell correction, so alerts after actions can merge seamlessly with our will.

Motor intentionality and the case of Schneider

Rasmus Thybo Jensen
Center for subjectivity research, Copenhagen

Sunday, June 25th, 17:30-19:30: Poster Session 2

Merleau-Ponty's Phénoménologie de la Perception proceeds through an immanent critique of psychological theories. Merleau-Ponty argues that psychological concepts like "body schema" and "motor intentionality" are ambiguous as long as a dichotomy between an intellectualist and an empiricist interpretation is not transcended. In my paper I critically examine Merleau- Ponty's claim to have disambiguated the notion of motor intentionality. My analysis is not only relevant to a proper understanding of Merleau-Ponty's text, but raises question to philosophers, who have further developed the notion of motor intentionality and raises methodological questions about how to use pathological cases in the attempt to establish a general theory of consciousness. Merleau-Ponty develops his notion of motor intentionality through an interpretation of certain psychopathological cases, in particular the case of Schneider. Schneider was wounded by mine-splinters in the back of his head during the First World War and became a patient of Gelb and Goldstein. He was diagnosed with the condition known as apperceptiv visual agnosia. Recently it has been proposed that we should reclassify Schneider as an example of integrative agnosia (Marotta/Berhman, 2004). In my paper I present an inconsistency in Merleau-Ponty's interpretation of the Schneider case, originally identified by Zaner (Zaner 1964, p. 186). The inconsistency is analysed in terms of the ambiguous methodological role of the case: To display motor intentionality both by its presence and by its absence. I argue that the case does confront an intellectualist conception of intentionality with a real dilemma but that the dilemma is offered as two distinct arguments in Merleau-Ponty's presentation. To make a convincing case against intellectualism we should stick to the second of the two arguments. The analysis allows us to identify the challenge which has to be met not only to present a coherent reconstruction of the arguments of Merleau-Ponty but also to positively develop the concept of motor intentionality. Marotta, J. J. & Behrmann, M. (2004): "Patient Schn: has Goldstein and Gelb's case withstood the test of time?" in Neuropsychologia 42. Zaner, R. M. (1964) : The problem of embodiment, some contributions to a phenomenology of the body, Phaenomenologica 17, Martinus Nijhoff.

The Role of Long-distance Connections: Non-optimal Total Wiring Length but Optimization for Rapid Processing in C. elegans Neural as well as Primate Cortical Networks

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Sunday, June 25th, 17:30-19:30: Poster Session 2

The architecture of the brain shows a remarkably high specificity of connectional organization, which relates to its functional properties. It has been suggested that one defining feature of neural connectivity across several scales of organization is optimal component placement, in which any spatial rearrangement of the connected neural components would lead to a lengthening of total wiring among them (Cherniak 1994, J Neurosci 14: 2418; Klyachko & Stevens 2003, PNAS 100: 7937; Cherniak et al. 2004, PNAS 101: 1081). We tested this concept by applying an evolutionary search algorithm to an extended data set containing metric spatial representations of neural networks. We found that optimized component rearrangements could substantially reduce total

wiring length in all tested neural networks. Specifically, total wiring among 95 Macaque monkey cortical areas could be decreased by 32%, and wiring of neuronal networks in Caenorhabditis elegans could be reduced by 48% on the global level, and by 49% for neurons within frontal ganglia. These findings suggest that neural systems are not exclusively optimized for component placement, but for multiple, or alternative, constraints. Wiring length reductions were possible due to the existence of long-distance projections in neural networks. We tested the role of these long-distance connections by comparing the original networks with minimally rewired networks of the same size, which possessed only the shortest possible connections. In the minimally rewired networks, the number of processing steps along the shortest paths between components was significantly increased compared to the original networks. Generally, neural networks appear to be relatively closer to network layouts that minimize the length of processing paths, rather than wiring length. These findings suggest that neural systems are not exclusively optimized for minimal global wiring, but for a variety of factors including the minimization of processing steps. Short processing pathways have functional advantages, by reducing transmission delays and signal interference. Therefore, the evolutionary benefit of long-distance connections might be a faster behavioral response as well as better multi-modal integration and feature binding.

Sensorimotor dependence and behavioral space

David Michael Kaplan
Duke University

Saturday, June 24th, 17:30-19:30: Poster Session 1

This paper aims to develop the notion of constitutive motor dependence and survey its range of applicability to theories in cognitive science and philosophy. This notion is intended to capture the fundamental links between cognitive or perceptual and sensorimotor behavioral abilities, including their respective neural substrates. It is argued that this concept is centrally embodied in both recent sensorimotor views of perception (e..g., O'Regan and Noë 2001) and Gareth Evans' (1982, 1985) account of spatial representation. Particular focus will be placed on Evans' view, which posits a deep and abiding connection between spatial representation in conscious perceptual experience and behavioral skill. It is argued that Evans provides a distinctive articulation of constitutive motor dependence in suggesting that the spatial contents of perception are, in part, determined by their employment in the control and cueing of behavioral skills. Beyond framing Evans' account in terms of this key notion, a suitably refined version of his view is shown to be both philosophically defensible and to have substantial empirical support from recent work on spatial representation in cognitive neuroscience (e.g., Andersen 1997; Andersen, Essick, and Siegel 1985; Andersen et al. 1997; Xing and Andersen 2000). Finally, a related but importantly distinct way of conceiving constitutive motor dependence of behavioral spatial representation is considered and defended based on the empirical or probabilistic theory of perception (e.g., Purves et al. 2001; Purves and Lotto 2003; Purves and Howe 2005; Yang and Purves 2003), which argues that all perception (including spatial perception) necessarily exploits the statistical relationship between the proximal stimuli (sometimes called ‘sensation' by philosophers) and the likely generative sources of those stimuli (which are arguably unknowable directly on the basis of this proximal stimulation). The empirical theory involves a form of constitutive motor dependence because the crucial image/source statistics for accurate perception are only accrued through the behavioral engagement of the observer (or the observer's evolutionary forbears) with the real-world sources. Thus, it is argued, the empirical theory supplies another novel and compelling form of constitutive motor dependence, and moreover, one that is consistent with the refined version of Evans' philosophical account.

Perceptual normativity and human freedom
Sean D. Kelly
Department of Philosophy, Princeton University

Monday, June 26th: 10:30-12:30: Symposium 3

Kelly will propose a philosophical account according to which our direct visuo-motor engagement with an object and its visual properties is essential to, though not identical with, our experience of those very properties. For example, our experience of the shape of an object is not identical with our capacity to respond differentially to the shape, but this capacity nevertheless plays an essential role in our experience of the shape. In particular, our visuo-motor engagement with an object, he argues, is an essentially normative way of taking account of the context in which it is presented. Since every visual property of an object is presented in a context, the visuo-motor engagement with the object is essential to our experience of it.

Kicking the Kohler Habit
Colin Klein and Gabriel Love
Princeton University

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.3

A number of recent philosophers have appealed to some rather outdated psychological experiments with inverting lenses to make their case for an "enactive" or "sensorimotor" or abilities-based theory of perception. Examples of such philosophical treatments include Hurley (1998), Noë (2004), and Pettit (2003, 2004). The psychological experiments they appeal to are due to Stratton (1897) and Kohler (1961, 1964). Unfortunately for these philosophical accounts of perception, significant doubt has been cast on the Stratton and Kohler results. A more recent study by Linden et al. (1999) found that four subjects who wore inverting lenses for long enough to regain normal visuomotor functions did not report that their visual image had returned to its rightside up orientation. Rather, the visual image remained upside down but the subjects learned to use the inverted image to perform normally on most visuomotor tasks. Focusing on Noë, we assess the damage this result does to the case for abilities-based accounts of perception, considering (a) whether the Linden et al. results undermine the positive argument for No's enactive approach and (b) whether they provide a counterexample that Nos approach cannot accommodate.

Toward the cellular architecture of consciousness
Christof Koch
California Institute of Technology

Sunday, June 25th: 9:00-12:30: Symposium 2

I will talk about the current status of recording from up to 128 channels in the medial temporal lobe of epileptic patients that we carry out in the laboratory of Dr. Itzhak Fried at UCLA. In particular, I will discuss a theoretical model that places an upper bound on the sparseness and the number of neurons activated by any one specific concept as well as the study by Quian-Quiroga et al. that decodes, from the firing of a handful of firing cells during a single trial, which image the patient was currently seeing, a simple form of mind-reading.

In the long-term, understanding the principles and the circuitry underlying any one conscious perception will require delicate, deliberate, transient and reversible interventions at the level of specific neuronal population in behaving animals. It is most likely that this will be accomplished in

the mouse. This requires a mouse-model of consciousness or awareness as well as tools to intervene in this manner. I will discuss one such behavioral assay (work done in collaboration with David Anderson at Caltech; Han et al., 2003) as well as tools that are now coming available, in particular the complete expression at high-spatial resolution of all 20,000 genes in the mouse brain (the Allen Brain Atlas), millisecond-timescale, genetically targeted optical control of neural activity (Boyden et al., 2005) and silencing specific neuronal populations (Slimko et al., 2006).

Electrophysiological Correlates of Target Detection in the Attentional Blink

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Sunday, June 25th, 17:30-19:30: Poster Session 2

The 'attentional blink' refers to a fundamental limit in the temporal resolution of attention: If two visual targets (T1, T2) are presented in close temporal proximity (200-400 ms), the second target often goes undetected. Importantly, this limit is not absolute and the attentional blink paradigm therefore provides the opportunity to study differences in the processing of identical stimuli that either reach or fail to reach awareness. Previous research suggests that the attentional blink arises from resource limitations which are assumed to be reflected in the N2 and/or P3 components of the event-related potential (ERP). Accordingly, the amount of resources respectively devoted to T1 and T2 processing should affect these components. To investigate this hypothesis we recorded the electroencephalogram (EEG) from 15 healthy participants during a standard attentional blink experiment. We expected that if compared to undetected targets, detection of T2 should go along with a relatively smaller P3 evoked by T1 (T1-P3) and a relatively larger P3 and/or N2 evoked by T2 (T2-P3, T2-N2). As expected, a significant interaction was found between T1-P3 and T2-P3, indicating that the detection T2 was associated with a smaller T1-P3 and a larger T2-P3. A similar effect was found for T1-P3 and T2-N2. Additionally, the T1-P3 amplitude was found to predict T2-P3 and T2-N2 amplitudes in the averaged ERP, and importantly also in the single-trial EEG. This indicates that processing of T1 and T2 draw on the same attentional resources. It also suggests that resources are differently distributed in instances in which T2 is detected, and in which it is missed. However, the ERP findings are unlikely to reflect the cause of the attentional blink. To investigate this issue the event-related EEG preceding the T1-P3 was explored by means of time-frequency and coherence analyses. Systematic differences between trials in which T2 was detected and in which it was missed revealed in these analyses will be presented and discussed with respect to potential causes of the attentional blink.

Kanizsa shrinkage illusion without a modal completion

Armin Lak
Cognitive Neuroscience Sector, International School for Advanced Studies (SISSA)

Sunday, June 25th, 17:30-19:30: Poster Session 2

A partially occluded figure looks narrower than a completely modally visible one. Kanizsa (Kanizsa, 1975 Italian Journal of Psychology 2 187-195) found this illusion and maintained that such phenomenal shrinkage occurs because the former figure seems to complete amodally. In other words, Kanizsa ascribed this illusion to occlusion and amodal completion. Current study examine whether Kanizsa's hypothesis can explain the observed shrinkage. Studies on time course of perceptual completion have pointed out that amodal completion occurs within 100-200 ms after the onset of stimulus appearance and presentations shorter than this time leave the

fragmented figure uncompleted (Ringach and Shapley, 1996 Vision Research 36 3037 - 3050). Based on this finding, if Kanizsa shrinkage was because of amodal completion, this illusion must be perceived stronger in presentations longer than 100 - 200 ms when completion has almost happened compared to presentations shorter than these times. We tested this prediction by estimating the illusion magnitude in different presentation times. In each trial of the experiment, after fixation cross presentation, the occluded rectangle (the occluder rectangle was narrower than occluded one and located on the middle part of it) and unconcluded rectangle were presented simultaneously on two sides of the fixation cross for variable times (80-280 ms with steps of 40 ms in different trials) and then a mask was showed [it has been shown that masking can interrupt perceptual completion (Rauschenberger and Yantis, 2001 Nature 410 369 372)]. Observers had to report which rectangle seems wider. The width of the occluded rectangle was fixed in all trials but the width of the unconcluded one in each trial was chosen randomly among five possible widths. The results showed that observers were more likely to report the illusion in shorter presentations. This finding is at odd with the claim that Kanizsa shrinkage is due to the amodal completion of occluded figure. It might be possible to argue that mechanisms faster than amodal completion must be in operation for the perception of this illusion. Significantly weaker illusion in longer presentations might implies that a correcting mechanism developing throughout the time can weaken the illusion magnitude.

Solving the Mind-Brain relation for conscious vision
Victor A.F. Lamme
University of Amsterdam

Saturday June 24th, 10:30-12:30 Symposium 1

It has been proposed that a key step in understanding consciousness will be to find its neural correlate. However, when trying to find the Neural Correlate of Consciousness (the NCC) we have to rely on so called heterophenomenological observations, i.e. a subject reporting in one way or another about his conscious experience. This results in the confusion of conscious experience with the cognitive processes enabling the report, such as action, language, attention, or memory. In this way, finding the NCC is an ill-posed problem, and we run into unsolvable problems when trying to prove that something is or is not part of the NCC. I therefore propose to attack the problem form the other end: Let's identify more or less fundamental aspects of neural processing, and identify the Mental Correlates (MC) that go along with these. Defining the MC's of two aspects of cortical processing results in separate definitions of attention and consciousness, and at the same time argues for the existence of (at least) two different types of conscious visual experience. One of these is loosely linked to our intuitive 1st and 3rd person notion of consciousness (Access-consciousness), while the other is more elusive and can be seen as independent of introspection or reportability (Phenomenal consciousness). This shows that we can get a grip on the mind-brain relation and may close the explanatory gap, not by bridging it, but by moving our notion of mind towards that of brain.

Subjective Awareness, Not Performance or Information Processing
Hakwan Lau
Wellcome Department of Imaging Neuroscience, London / University of Oxford

Saturday June 24th, 10:30-12:30 Symposium 1

Many of us share the intuition that visual awareness might be something more than just information processing. Given this, it is important that we control for the effectiveness of information processing when trying to identify the neural correlate of visual awareness. At the moment, it is unclear whether recurrent processing is simply supporting superior performance in

visual cognition, or does it directly contribute to the subjective feeling of seeing. This is because the two are often treated as the same, and both are often tested together in forced-choice paradigms. Using metacontrast masking I show that the subjective report of seeing can be dissociated with the objective measures of performance in a forced-choice task. I show that the two are associated with different patterns of dynamic interactions between visual areas.

Consciousness, Volition and Affect Neuromodels
Rabinder Lee and Igor Aleksander
Imperial College, University of London

Sunday, June 25th, 17:30-19:30: Poster Session 2

The interaction between perception, recall, volition and action is one of the more complex facets of consciousness which may benefit from being understood at the level of neural architectures. In this paper we investigate a neuromodel that is intended to demonstrate how affect and volition interact with depictive (phenomenological) areas of a system in task selection. A virtual robot has been used as a vehicle. The scheme uses biological principles, modelling the energization of the organism, how it enters an appetitive state, the mechanism of its motivational drives, and the simulation of emotionally regulated goal-oriented behaviour. Our model of will is based on a kernel architecture proposed by Aleksander (The World In My Mind, 2005). The theory states that four broad neural areas, performing the functions of inner depiction, imagination, emotion and motor control, are necessary for conscious planning and possibly unconscious decision taking. The first two are assumed to be responsible for conscious sensation where the rest are not. After learning, an agent takes decisions by a process of conscious cycling through options while remembering their affective value, the decision being taken when an unconscious ‘intensity of desire' threshold is crossed. To avoid paralysis, a random process allows the threshold to be crossed even if ‘desires' are weak. The present work describes tested refinements of the model. We use virtual robot software, (Webots), interacting with neural network software, NRM (the brain of the robot). The architecture designed by the authors consists of about 40 interacting neural layers with a total of about 11,000 neurons. The robot learns the salient and affective properties of "food" (objects in its environment) within its own space, which include a virtual camera and infrared (IR) proximity sensors. The robot explores, learns and uses the built up experience this for planning. Volition and action are unconscious neural processes interacting with the conscious ones providing an explanation for theories such as those of Wagner (The Illusion of Conscious Will, 2002) that suggest that volition is illusional.

The Role of Attention in Propagation of Perceptual and Cortical Waves during Binocular Rivalry
Sang-Hun Lee
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The cortex is an excitable medium through which waves of neural activity can propagate. A rare opportunity to observe the perceptual concomitants of wave propagation is conferred by binocular rivalry, perceptual alternations induced when incompatible patterns are presented to the two eyes. During an alternation, one sees a travelling wave in which the dominance of one pattern emerges locally and expands progressively as it renders the other pattern invisible. During rivalry early visual cortex exhibits travelling waves of activity, measured with functional magnetic resonance imaging (fMRI). These waves of cortical activity propagate over subregions of cortex that correspond topographically to the perceptual waves, and the spatiotemporal dynamics of cortical waves co-vary with the propagation speed of perceptual waves. When attention is effectively diverted from the spatial location of the perceptual waves, there is a progression of differing results across the hierarchy of visual cortical areas; waves of cortical activity are

preserved in primary visual cortex (V1) whereas their presence is very weak in visual areas V2 and completely gone in V3. Our findings imply that perceptual waves during binocular rivalry are mediated by neuronal waves arising from an interplay between multiple areas in the visual hierarchy, wherein neuronal waves are triggered in V1 but necessarily advancing to later visual areas to promote perceptual waves.

Seeing oneself: experimental studies of perceptive interactions
Charles Lenay (1), Malika Auvray (2), and François-David Sebbah (1)
(1) COSTECH, Université de Technologie de Compiègne, Compiègne, France; (2) Department of Experimental Psychology, Oxford University

Sunday, June 25th, 17:30-19:30: Poster Session 2

Under which conditions can we recognize the image of our own face, i.e. of the image that we present to others and that we ourselves do not see? Within the framework of a minimalist experimental paradigm on perceptive interactions, we have been able to demonstrate the capacity of the participants to recognize the presence of another perceptive activity directed towards them. One can then wonder whether the sensorimotor dynamics of these reciprocal active perceptions could also offer an access to the consciousness of the image that each participant presents to its partner. We thus built an experimental device making it possible to vary the perceiving bodies and the body images of two partners interacting in a two-dimensional virtual environment. We showed then that, even in the absence of a mirror or an equivalent technical device, each partner can guess the form of the image which they present to the other. The sensory stimuli given to each participant were limited to 16 tactile stimuli. These stimuli corresponded to a square matrix of 16 receptive fields (the perceiving body) that the participant could freely move in the space of the screen with the mouse of the computer (software "Tactos"). When a black pixel was present under a receiving field, the corresponding tactile stimulator was activated. We then attached, to the perceiving body, a body-image, i.e. a black form that only the partner can perceive. So, the participant ignored the form of his own body-image (in a known repertory of possible forms); this body-image move exactly with his perceiving body. We then asked to each participant to determine successively the form of the body-image of the partner, and then the form of its own body-image. The first question is a traditional recognition task that did not pose any true problem to the participant. For the second question, the participant succeeded, in recognizing the form of his body image, through the recognition of the way by which its partner explores this form that he presents to him. Analysis of errors showed, moreover, that there was a crossed interdependence between the successes of the two partners. These results present many practical and theoretical consequences.

Neurophenomenology of time: functional neuroimaging in the past and future tense
Dan Lloyd
Trinity College

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.1

Phenomenology in the Husserlian tradition stresses the importance of temporality to consciousness, constructing every state of awareness from a complex of retentions, anticipations, and occurrent sensations. Husserl's own writings particularly emphasize the immediate past, while several contemporary cognitive scientists and neuroscientists stress the importance of anticipation and prediction in perception (e.g. Grush, Llinas, Hawkins). Yet functional neuroimaging research remains firmly focused on the present tense. That is, current research paradigms examine the metabolic state of the brain as a function of current task and stimulus conditions, and are methodologically blind to the temporal inflections that constituted any state of

awareness. In this paper, I report on research techniques in functional MRI that lift the curtain on the past and future. Combining the statistical technique of independent component analysis with the pattern detection capabilities of artificial neural networks permits us to probe the temporal information in fMRI images, and measure the extent to which each image inscribes its own history and anticipated future. Reanalysis of fMRI subjects performing a virtual driving task shows both Husserlian retention and anticipation, but particularly reveals anticipation of the immediate future, from one to ten seconds ahead of the current imaged now-point. Reanalysis of a second study shows differences between healthy subjects and individuals with schizophrenia. Patient brain images have less information available from the immediate temporal context than those of healthy controls, which may help to characterize some of the positive symptoms of the illness. Overall, temporal analysis of functional neuroimaging appears to be a useful tool for neurophenomenology and may eventually be an essential component of a science of consciousness.

Awareness in visuo-verbal perception is linked to dopamine release

Hans Lou (1), Pedro Rosa (1), Troels Kjaer (2), and Albery Gjedde (1)
(1) Aarhus University; (2) Copenhagen University

Saturday, June 24th, 17:30-19:30: Poster Session 1

The specific role of neurotransmission in the maintenance of consciousness is unknown. Recent evidence assigns a causal function of dopamine to the gating of sensory stimuli. We claim that striatal dopamine release increases the signal-to-noise ratio in perception to preferentially gate salient stimuli to awareness. Specifically, this hypothesis predicts that dopamine release is linked to awareness. In a test of this prediction, the present study shows that awareness of visuo-verbal stimuli is linked to striatal release measured as reduction of the number of dopamine receptor sites binding [11C]raclopride, a competitive antagonist of D2-like receptors.

Apparent size, Emmert's law, and the Role of Oculomotor Adjustment in Object-Centered Perception

Liang Lou
Grand Valley State University

Sunday, June 25th, 17:30-19:30: Poster Session 2

To what extent does taking an analytic perceptual attitude lead to a viewer-centered rather than object-centered percept? In a series of experiments, the apparent size of an afterimage viewed from distances between 5cm to 580cm was matched to that of a size-adjustable stimulus at a fixed distance (20, 30, 90, and 200cm). The experiments were conducted in a room with normal illumination and with a procedure that facilitated ‘analytical attitude'----the mental set for perceiving the angular size of the object. The apparent size (in visual angle) was found to increase with the focusing distance within one meter and very little beyond one meter. Observations with an equivalent set of real stimuli with proportionally larger sizes at greater distances led to similar results. These results suggest that Emmert's law fails as an accurate and useful description of the apparent afterimage size as a function of viewing distance. Following von Holst (1950), Leibowitz (1974) and Enright (1989), the results are interpreted as suggesting a distinct role of oculomotor adjustment for accommodation and convergence in size perception, in that it leads to visually apparent sizes that are more object-centered than viewer-centered, and more resistant to attitudinal influences than most optical cues.

Emotional and cognitive workload during Word Association Test

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Saturday, June 24th, 17:30-19:30: Poster Session 1

In the presented study we explore the emotional and cognitive workload during the Word Association Test (WAT) using physiological measures. The early beginnings of this approach were proposed by C.G.Jung (1907). During WAT the participants experience both emotional and cognitive workload. Emotional workload appears when a stimulus is related to some emotionally significant complex. Cognitive workload is usually caused by some parameters of stimulus e.g. its rarity, level of abstraction or participant's knowledge. The current research builds on the recent work of P.Slechta (2002), who developed a methodology for computer administered version of WAT. In this experimental design the participants are presented with 40 word stimuli (300 ms word presentation time, 16 s interword interval) and their skin resistance is recorded with Metex multimeter. These data could be used in clinical assessment (Slechta, 2002), the skin resistance data are also related to Eysenck's temperament traits (Lukavsky, 2002). According to Slechta's hypothesis, the emotional workload manifests in increased skin conductance and cognitive workload in longer response times. In the presented study we explore the workload differences in skin resistance and pupilar reaction patterns in order to investigate the possible linkage between cognitive and emotional workload (participants later become stressed because of their cognitive workload). We use the pupilar reaction data as the second source of information for validation and because of higher time sensitivity. This information would help to discriminate the pure emotionally demanding topics and improve the sensitivity of the method.

Consciousness: a constitution view

Pessi Lyyra
University of Jyväskylä

Sunday, June 25th, 17:30-19:30: Poster Session 2

Most philosophers of mind pretend to be materialists about the nature of consciousness. Nevertheless, the most profound materialist view, the identity theory, is more often rejected than supported, given problems such as multiple realisability. Materialists, then, have often accommodated their position in terms of supervenience. However, it has been claimed that an appeal to supervenience cannot guarantee materialism in principle (e.g., Lehar 2003). This is because supervenience is a negative principle that says nothing other than how mind and body are not related, not how they are related. According to Lehar, this leaves subjective experience as a "nomological dangler", an extraphysical entity outside scientific investigation. He concludes that "[In] fact the only epistemology that is consistent with the modern materialistic world view is an identity theory" (p., 379). As an alternative solution to the controversy pointed to by Lehar, I will propose that instead of identity or supervenience, though often confused with each, the relation between body and mind should be seen as a relation of constitution (e.g., Van Gulick, 1992). Constitution is not identity; the constituting material can change without a change in identity. As a positive relation, constitution is not equally unsatisfactory as supervenience, and as a fully materialist view it allows scientific study of consciousness by studying its physiological constituting substrate. However, a prominent theorist of constitution, Lynne Baker (2000) points out that constitution is a relation between two material things, like a statue and a piece of bronze that constitutes it. It seems clear that the relation between subjective experience and body is not quite equal to the relation of statue and its constituting piece of bronze. I will discuss this discrepancy and whether it poses a threat for constitution as a relation between mind and body.

Perspectival content as a transformation
Michael Madary
Tulane University

Saturday, June 24th, 17:30-19:30: Poster Session 1

My work identifies a certain type of content of perception and suggests that the mathematical transformation is the best way to model this content. First, using an insight central to Husserlian phenomenology, I identify the perspectival content of perception (the term comes from Noë 2004). This content is the way the world appears from our perspective. Perspectival content depends on our body's relation to the environment and is nonrepresentational. The bulk of the presented material supports the hypothesis that perspectival content is best modeled using the mathematical transformation, since both perspectival content and the transformation share the following formal features: 1. dynamic and essentially relational Perspectival content is dynamic because it is the content that changes with the perceived change in the relationship between the body and the environment (see note 1). The transformation is dynamic because it is a change from an element in the domain to an element in the range. Perspectival content is essentially relational, because it is constituted a priori by the relationship between subject and environment. The transformation is essentially relational because its essence is the relationship between its domain and its range. 2. no mediation Perspectival content seems unmediated. There seems to be no entity in virtue of which we have a connection with reality. Our connection seems direct. Likewise, the transformation is not an entity that mediates between one entity and another. The transformation is a process that constitutes a relationship between two sets of elements, and a relationship is not itself a mediating entity. 3. preservation of invariant structures In virtue of the perspectival content of perception we are able to form beliefs about the objective structure of things. What we are doing with perspectival content, then, is extracting the invariant features of the object, the properties that the object has from all perspectives. Likewise, mathematical transformations preserve structural features of the domain and change certain other features (see note 2). Works Cited Gibson, J. J. The Ecological Approach to Visual Perception. Boston: Houghton-Mifflin. Reprint. Hillsdale, NJ: Lawrence Erlbaum Associates, 1986. Noë, A. Action in Perception. Cambridge, MA: MIT Press, 2004. Pacherie, Elisabeth. "Leibhaftigkeit and Representational Theories of Perception" In Petitot et al., eds. Naturalizing Phenomenology. Stanford University Press, 1999. note 1: Elisabeth Pacherie (1999) argues, also from Husserlian concerns, that what I have called perspectival content can be modeled using dynamic and informationally rich representations. I agree about the importance of dynamics and informational richness, but such an entity is not a representation; I maintain that there are no correctness conditions for perspectival content. note 2: This third feature of perspectival content is taken from Gibson (1986), which influenced a similar position in Noë (2004).

Development of children's knowledge about consciousness
Nikos Makris (1), Dimitris Pnevmatikos (2)
(1) Democritus University of Thrace; (2) University of West Macedonia

Saturday, June 24th, 17:30-19:30: Poster Session 1

Even though there is an explosion of research regarding children's awareness about the nature and the functioning of the human mind during last two decades, very little of this research has focused on children's knowledge about consciousness and its various aspects. The present study aims at providing an insight into this topic from a developmental perspective. For this purpose, children 5, 6, 7, 9, 11 years old and young adults were asked a) to estimate whether protagonists of stories who are engaged in cognitive activities related to the activation of cognitive functions (such as memory, attention, and comprehension) and of specialized capacities (such as quantitative, imaginal, and verbal) are thinking (primary consciousness activities), b) to determine

the content of protagonists' thinking, c) to determine whether protagonists know that they are thinking (reflective consciousness activities), and d) whether protagonists could change the content of their thinking. The results of the study showed that even though preschoolers demonstrate efficient knowledge about various aspects of consciousness the development of this knowledge undergoes several changes during childhood. Also, this development is not necessarily linear. Moreover, it was found that children made significantly more consciousness attributions in specialized capacity situations than in general cognitive function ones. The results are discussed on the basis of the literature regarding children's theory of mind as well as in relation to a 'person - time - condition' enacted conception of cognitive development.

The essential connection between representing and learning

Helge Malmgren
Dept. of Philosophy, Göteborg University

Sunday, June 25th, 17:30-19:30: Poster Session 2

The core of the so-called "simulation theory" of mental representing is the idea that in the absence of peripheral stimulation, the brain creates an output which is in certain respects perception-like. This output can fulfil the main functions of perceptual states in the absence of the latter. In the present paper, I argue that another clause should be incorporated in the simulation theory, namely, that both kinds of output - perceptions and mental representations - are re-registered in the brain in the same way. In other terms: they are fed back through shared channels. Phenomenologically and epistemically, this feedback may correspond to the fact that we are conscious both of our perceptions and of our thoughts. More importantly from a theoretical point of view, the feedback clause allows several fundamental principles of learning to be derived from the simulation theory together with certain simple and plausible constraints on the brain as a causal system. The basic reason for this is that in the presence of common feedback channels and under the mentioned constraints, similarity between perceptions and representations tends to stabilise the system while dissimilarity tends to disrupt it. Strict proofs of these propositions, and formal derivations of learning principles, are here given for two special cases: randomly composed, deterministic finite systems, and continuous systems whose time derivatives fulfil certain specified conditions. Systems of the former kind are shown to behave like Popperian hypothesis-testing machines with quasi-random generation of hypotheses from data. In the long run, they will with high probability adapt to environmental constraints of a categorical or hypothetical form, substituting "internal stimuli" for the environmental ones. These systems can even be classically conditioned. Systems of the mentioned continuous kinds will behave as perfect inductive reasoners. If exposed to a categorical environmental constraint, they will gradually build up an internal simulation which is guaranteed to approach the external stimulus. The fact that a properly formulated simulation theory both agrees with our phenomenological intuitions and offers a fundamental explanation of learning phenomena is, it is argued, a strong argument for its correctness.

Phenomenological methods for investigating consciousness

Eduard Marbach
University of Bern

Friday, June 23rd, 9:30-12:30: Tutorial

This tutorial will introduce to the (auto-)phenomenological study of consciousness in the tradition of the philosopher Edmund Husserl (1859 1938). The main emphasis will be on explicating and practicing how one does phenomenology; for Husserl was particularly careful in elaborating methodical tools for the first-person study of consciousness. In his analyses, Husserl has been

inspired by mathematics, proceeding by way of contrasting conscious experiences of distinctly different structures (as they obtain in, e.g., perceiving something, in episodic remembering, in merely imagining something, in picturing something, or in judging about a state of affairs, etc.) in order to establish those invariant components that make up the specific structures of conscious experiences of one kind or another. An important aspect of Husserl's pre-experimental, philosophical enterprise concerns the question to what extent a first-person reflective clarification of structures of conscious experiences could serve as a guide for cognitive neuroscientific studies much more specifically than would be possible without a rigorous (auto-) phenomenological analysis preceding the scientific work. Quite generally, this aspect of bringing together first-person phenomenological methods and third-person scientific methods, including Dennettian heterophenomenology, would seem to be of utmost importance for making progress in the scientific study of conscious experiences, given that a specification of the explananda can only help the elaboration of the corresponding explanantia. Participants of the tutorial should get a good grasp of the first-person phenomenological methodology, and ideally even discover ways for making good use of phenomenology in the advancement of the scientific study of consciousness.

The role of fixational eye movements in visibility and visual awareness
Susana Martinez-Conde, Stephen Macknik, Xoana Troncoso, Thomas Dyar
Barrow Neurological Institute

Monday, June 26th, 14:00-16:00: Concurrent Session 3.1

Our visual system contains a built-in contradiction: when we fixate our gaze on an object of interest, our eyes are never still. Instead we produce, several times each second, small eye movements of which we are unaware, called "microsaccades", "drifts" and "tremor". Microsaccades are miniature saccades produced during fixation, drifts are slow curvy motions that occur between microsaccades, and tremor is a very fast, extremely small oscillation of the eye superimposed on drifts. If all these eye movements are eliminated in the laboratory (using any number of retinal stabilization techniques), our visual perception of stationary objects fades, due to neural adaptation. Since we fixate our gaze about 80% of the time during visual exploration, fixational eye movements often are responsible for driving most of our visual experience. When our eyes move across the image once again, after having stabilized the retinas, visual perception reappears. Due to their role in counteracting adaptation, fixational eye movements are an important tool to understand how the brain makes our environment visible. Moreover, because we are not aware of these eye movements, they can also help us understand the underpinnings of visual awareness. Some studies have suggested that fixational microsaccades refresh retinal images, thereby preventing adaptation and fading. However, other studies disagree, and so the role of microsaccades remains unclear. Here we correlate, for the first time, visibility during fixation to the occurrence of microsaccades. We asked subjects to indicate when Troxler fading of a peripheral target occurs, while simultaneously recording their eye movements with high precision. We found that before a fading period, the probability, rate and magnitude of microsaccades decreased. Before transitions towards visibility, the probability, rate and magnitude of microsaccades increased. These results reveal a direct link between suppression of microsaccades and fading, and suggest a causal relationship between microsaccade production and target visibility during fixation.

The Modality Specificity of Visual and Tactile Shape Sensations
Douglas Meehan
CUNY Graduate Center

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.1

We sense the spatial properties of objects in different sensory modalities. We can, e.g., both see and feel an object's shape. And we sense objects' properties in virtue of having states, e.g., sensations, with mental qualities. So both visual and tactile sensations have mental qualities pertaining to shape. We must therefore determine whether the mental qualities of visual and tactile sensations pertaining to the same shapes are themselves the same, i.e., whether visual and tactile sensations of the same shape have some amodal property, in virtue of which both are sensations of that shape. Campbell (1996) argues that the qualitative characters of visual and tactile sensations of shapes are the same. Qualitative character, he claims, is determined by the properties we perceive; and since we see and feel the same shapes, the qualitative characters of seeing and feeling shape are the same. Recent fMRI studies (James et al., 2006) showing visual and tactile shape perception involve common representations in the lateral occipital cortex (LOC) appear to support this view. These studies show visual and tactile shape primes cause equivalent increases in activation of LOC when subjects are subsequently presented with shapes matching those primes. James et al. argue this shows visual and tactile shape perception involve only those common, amodal representations. If so, visual and tactile sensations of shape are amodal and have common mental qualities. However, I argue, these experiments don't show visual and tactile shape perception involve only the amodal representations in LOC, so they don't show visual and tactile mental qualities pertaining to shape are the same. I argue that experimental data revealing asymmetries in infants' abilities to recognize shape across sensory modalities (Streri and Pêcheux, 1986; Streri, 1987) suggest the mental qualities of visual and tactile sensations pertaining to shape are different. And I argue the homomorphism theory of sensing (Rosenthal, 2005) best explains the nature of modality-specific mental qualities pertaining to shape.

Imitation and Representing The Body
Roblin Meeks
Princeton University

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.3

The prevalence and ease of imitation has long proved puzzling. Imitating another's behavior requires that one coordinate one's own muscle activity with the observed actions of another, yet how does one's motor system accomplish this amazing feat of coordination? Generalist theories of imitation have gained prominence in the literature, as evidence of a special purpose mechanism dedicated to imitation has been lacking. Moreover, the discovery and study of mirror neurons has led many to conclude that imitation draws upon general motor control and learning systems, systems apparently automatically active both when observing and executing actions, and even when observing viscero-motor reactions such as disgust. Though much evidence suggests that observing actions trigger motor representations similar to those triggered in action execution, I argue that we nevertheless have reason to believe that body representations may be importantly specialized. Studies involving autotopagnosics, for example, suggest that double dissociations between the ability to point to one's own body parts and the body parts of others indicate an important self-other distinction in body representations. Hence, though I do not believe that such specialized systems are for imitation, they nevertheless suggest that imitation involves more than generalists tend to allow--namely "subjectless" motor representations plus associative learning. They also involve coordinating to some degree internal representations of both one's own body and the bodies of others.

Non-perceived stimuli elicit local but not large-scale neural synchrony
Lucia Melloni (1) (2) and Eugenio Rodriguez (2)
Universidad Catolica de Chile; (2) Max Planck Institute for Brain Research

Saturday, June 24th, 17:30-19:30: Poster Session 1

When studying conscious perception, visible stimuli are usually associated with more extensive processing or better performance than invisible ones, intermixing the variables visibility and amount of processing. Thus, it could be argued that some of the already found neural correlates of awareness are in fact correlates of depth of processing. One of such putative neural correlates is neural synchrony (Singer, 2001; Varela & Thompson, 2003). Here we tackle directly this issue by controlling independently visibility and depth of processing in an unconscious semantic priming paradigm while measuring neural synchrony in an EEG study. 30 subjects were instructed to determinate if a visible word belonged to a natural or a man-made category. Unknown to them, each visible word (target) was preceded by a masked word (prime), which could be semantically congruent or incongruent with the target. Subjects responded 15 ms faster in the congruent compared with the incongruent trials, enabling us to conclude that the prime, though invisible, was processed up to semantic levels. The prime was omitted in one third of the trials. By comparing the prime-present with the prime-absent trials we were able to asses the neural impact of the highly processed unconscious prime. The prime-present trials showed increased gamma power (59-87Hz) between 130-230ms after prime presentation without concomitant phase synchrony augmentation. In contrast, the visible target-words showed increased gamma power and phase synchrony. These results suggest that long distance synchronization correlates with perceptual awareness and not with extension of processing. On the other hand, depth of processing seems to be related with increments in gamma activity. It has been proposed that spectral power is a signature of local neural coordination whereas phase synchrony involves large-scale brain coordination. This would suggest that cognitive processing, even highly complex, can rely on local network whereas conscious awareness would require the global ignition of large scale brain assemblies.

Evolution of Representations and Intersubjectivity as sources of the Self. An Introduction to the Nature of Self-Consciousness
Christophe Menant

Saturday, June 24th, 17:30-19:30: Poster Session 1

It is agreed by most people that self-consciousness is the result of an evolutionary process, and that representations may have played an important role in that process. We would like to propose here that some evolutionary stages can highlight links existing between representations and the notion of self, opening a possible path to the nature of self-consciousness. Our starting point is to focus on representations as usage oriented items for the subject that carries them. These representations are about elements of the environment including conspecifics, and can also represent parts of the subject without referring to a notion of self (we introduce to this end the notion of "auto-representation" that does not carry the notion of self). The next step uses the performance of intersubjectivity (mirror neurons level of evolution, corresponding to pre-human primates and to today great apes) where a subject has the capability to mentally simulate the observed action of a conspecific (Gallese 2001). We show how this intersubjectivity allows the subject to identify his auto-representation with the representations he has of his conspecifics, and so to consider his auto-representation as existing in the environment. We show how this evolutionary stage can introduce a notion of self for a subject, opening a road to self-representation and to self-consciousness. This evolutionary approach to the self via self-representation is close to the current theory of the self linked to representations and simulations (Metzinger 2003). We then use a scenario about how evolution has brought this performance of self representation up to self-consciousness. We develop a process describing how the anxiety increase resulting from identification with endangered or suffering conspecifics may have called for the development of tools to limit this anxiety (empathy, imitation, language), and how these tools have accelerated the evolutionary process through a positive feedback on self-

representation (Menant 2004, 2005). We finish this paper by summarizing the points addressed, and propose some possible continuations. Key words: representation, primate, conspecific, evolution, self, auto-representation, intersubjectivity, self-representation, self-consciousness, anxiety.

High-level content NCCs: Conceptual and methodological issues
Thomas Metzinger
Johannes Gutenberg-Universität Mainz, Germany, Frankfurt Institute for Advanced Studies

Monday, June 26th: 16:30-18:30: Symposium 4

At the second conference of the ASSC David Chalmers introduced a helpful conceptual instrument, the working concept of a "content NCC":

"An NCC (for content) is a minimal neural representational system N such that representation of a content in N is sufficient, under conditions C, for representation of that content in consciousness." (Chalmers 2000: 31)
Eight years later, we now see intriguing empirical data, which seem to point not only to content NCCs in the sensory domain, to receptive fields and the like, but to higher-level properties like the temporal dynamics of perception or conscious volition. However, philosophical issues remain: How do we reliably identify representational content on the phenomenal level as well as in active neural systems; what are the identity criteria and the methods of identification? To proceed from mere correlation to reductive explanation, I will argue, we would need a coherent idea of what it actually means to "match content". We may not have such an idea yet, and therefore we must be cautious not to jump to any conclusions. In my contribution, I will take a look at the theoretical options currently on the table and make a positive proposal for a theoretical framework.

Unconscious visual processing in the dorsal stream
David Milner
University of Durham

Monday, June 26th: 10:30-12:30: Symposium 3

When we reach out to pick up an object our visual system needs to process the shape, size and location of the target object. But we also need to take account of other visual information: (a) about the properties of other objects that could potentially constitute obstacles to the action, and (b) about the 3-D trajectory of our hand. Although there has been extensive neurophysiological, neuropsychological and neuroimaging research on the visual processing of target properties, there has been little or none concerning the processing of this non-target information. I will present evidence from studies of patients with neglect, extinction, and optic ataxia to argue that the human dorsal stream mediates these kinds of visuomotor processing as well, and that this processing can proceed efficiently without the mediation of visual awareness.

Taking the neural correlates seriously.
Ken Mogi
Sony Computer Science Laboratories

Sunday, June 25th, 17:30-19:30: Poster Session 2

The neural correlates of consciousness (NCC) is one of the key concepts to emerge in the scientific study of consciousness (Crick and Koch 1995). NCC is important in making it possible

to carry out a continuous and open-ended investigation into the enigma of consciousness, without encountering the familiar philosophical dead ends. With the advent of the modern non-invasive imaging techniques in addition to single unit recordings, it has become possible to conduct an empirical study of the neural basis of conscious experience in humans. On the other hand, NCC has been criticized as "an easy way out", avoiding the really important and difficult issues. Here I present a case to "take the neural correlates seriously". Namely, I argue that NCC, although embedded in empirical methodology and relatively easy to handle, can lead to some essential and intriguing problems concerning consciousness, and can lead to some specific problems to be attacked both empirically and theoretically. Thus, elucidating NCC becomes not only a tractable research agenda but also a serious attempt to solve the hard problem (Chalmers 1996) Specifically, the very basis of "neural correlates" must be reassessed from the realization that meta-cognition is ubiquitous in conscious experience. In addition to the typical meta-cognitions that involve active measurements of one's own state (e.g., monitoring the likelihood one is going to succeed in a task, Hampton 2001), visual awareness can be considered as an instance of meta-cognition in a broader sense, considering the rich dynamics of the matching between bottom-up and top-down processes in binocular rivalry (Logothetis et al. 1996, Taya and Mogi 2005). I present a fundamental argument based on the ideas of Ernst Mach why this should be so. In respect of ubiquitous meta-cognition, elucidating the NCC involves a systems level reconsideration of relevant neurophysiological data, away from the simple picture that specific information ("qualia" when they emerge in consciousness) can be represented in disparate regions of the cortex. Thus, elucidating the NCC goes straight into the heart of the hard problem of subjectivity, providing the reason why we should take the neural correlates of consciousness seriously.

Decision-Making, Emergence and Consciousness
Gabriel Mograbi
UFRJ

Saturday, June 24th, 17:30-19:30: Poster Session 1

This talk will be divided into three short and complementary parts. First part deals with ontological issues. Second part discusses conceptual issues. Third part critically analyzes neuroscientific experiments and their philosophical repercussions. The first part proposes an account of downward determination consistent with a nonreductionist ontological model that can fit the ideas of evolution and adaptation, namely a newer version emergentism of properties. The second part shows that the dialogue between philosophy of mind, epistemology and neuroscience is impaired by the use of a vocabulary under the bondage of the metaphysical tradition. In order to overcome this problem, we must avoid using some traditional terms and provide an adequate vocabulary that be consistent with the state-of-art of our current neuroscience. The idea of free will and the division represented by the pair of words physical mental are the misleading vocabulary I have mentioned before. In order to overcome this metaphysical tradition, I am proposing that rather than talking about free will we should instead consider a concept of decision-making, and in place of using the opposition of physical and mental states we must put forward an ontology that is able to deal with different emergent levels. The third part will try to invalidate experiments that research free will and consider the achievements of experiments testing decision-making specially those that research decision-making in conscious and unconscious levels and under different time constraints.

Dimensions of ictal consciousness in temporal lobe epilepsy: a preliminary investigation.
Francesco Monaco (1), Patrick O'Callaghan (2), and Andrea Eugenio Cavanna (3)
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UK

Sunday, June 25th, 17:30-19:30: Poster Session 2

Impairment of consciousness has long been thought to be a landmark of epileptic activity. The current classification of focal epileptic seizures differentiates between simple and complex seizures according to the presence or absence, respectively, of consciousness, as assessed by ictal responsiveness. However, focal seizures originating from the temporal lobe can be accompanied by subtle alterations in the subjective conscious state (so-called ictal experiential phenomena or "emotional qualia"), even in the absence of verbal responsiveness (Johanson et al 2003; Monaco et al 2005). The accurate analysis of such seizure-induced modulation of the level and contents of ictal consciousness is likely to shed some light on the brain mechanisms involved in the production of both physiological and pathological conscious experiences (Lee et al 2002). The authors evaluated 41 seizure descriptions from 33 consecutive patients with temporal lobe epilepsy (TLE) referred to the Epilepsy Unit of the Department of Neurology, Amedeo Avogadro University, Novara, Italy. Accurate descriptions of ictal semiology and subjective experiences were collected by means of semistructured clinical interviews with patients and reliable witnesses. All subjects underwent psychometric assessment using the Beck Depression Inventory (BDI), the State-Trait Anxiety Inventory (STAI), and the ICI (Ictal Consciousness Inventory), a new 20-item questionnaire specifically developed to assess (1) the level of general awareness/responsiveness and (2) the "vividness" of ictal experiential phenomena. Our preliminary quantification of both objective and subjective ictal features in patients with TLE showed that the vast majority (>80%) of seizures involving altered conscious experiences are accompanied by a degree of responsiveness and/or retained awareness of the surroundings. Thereafter, each seizure was plotted into a biaxial diagram according to the level vs contents of ictal consciousness. ICI subscores for level (L) and contents (C) showed a positive correlation ($p<0.05$). L and C dimensions were not associated with age at onset, duration of disease, seizure frequency, or localisation of electroencephalographic (EEG) focus (right vs left temporal lobe, anterior vs posterior). Interestingly, only C subscores correlated significantly with affective psychopathology, as assessed by supra-threshold BDI and STAI scores ($p<0.01$).

Predictive and reconstructive influences on action awareness
James Moore & Patrick Haggard
University College London

Sunday, June 25th, 17:30-19:30: Poster Session 2

A recent computational model of motor control suggests that awareness of actions uses predictions (e.g. Blakemore, Wolpert & Frith, 2002). Others (Wegner, 2003) propose a 'reconstructionist' view, in which action awareness arises from post-hoc inferential processes. We have used the perceptual attraction between time estimates of voluntary actions and their subsequent effects (intentional binding; Haggard, Clark & Kalogeras, 2002) to investigate whether action awareness depends upon the occurrence of the effect, or on a prediction that the effect will occur. 10 subjects made keypresses, which could produce a tone 250 ms later. They judged the time of the keypress using Libet's (1983) method. The contingency between action and tone was 50% in one block, and 75% in another. We compared the perceived time of actions as a function of contingency (blocked factor), and of whether a tone occurred or not (randomised). Subjects also performed baseline blocks consisting of keypress actions only (without tones). A planned comparison between those actions in the 50% block that did or did not cause a tone was significant ($p<.05$). Since these tones were unpredictable, the shift in action awareness towards the effect in beep-causing trials was purely reconstructive. To investigate the further contribution of prediction, we compared results in the 50% and 75% blocks. ANOVA showed a significant interaction ($p<.05$). This arose because actions that did not cause a tone were nevertheless

shifted towards the predicted time of its occurrence in high contingency blocks only ($p<.05$). We conclude that both predictive and reconstructive processes contribute to action awareness. The effects of actions induce mental reconstruction of action awareness. However, prediction of an effect can produce the same changes in awareness. Interestingly, the binding effect was largest when the tone was predicted but absent. Prediction may operate over a short timescale only, and may normally be discarded when sensory evidence makes reconstruction possible.

From correlated noise in reaction times to intentional content: disentangling explicit from implicit learning

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Saturday, June 24th, 17:30-19:30: Poster Session 1

Considering human learning, the question of whether the learning is explicit or implicit has been answered by calling into play the dissociation paradigm, a paradigm whereby learning is demonstrated with an indirect measure, and awareness of the learning (and of the learned material) is shown to be null with a direct measure. Thus, most demonstrations of implicit learning rest on a null hypothesis. A noteworthy exception is the study of Destrebecqz & Cleeremans (2001) that used a serial reaction time task coupled to a subsequent direct test of awareness through free generation tasks based on Jacoby's (1991) process dissociation procedure. Indeed, the demonstration of implicit learning in this setting rests on participants' inability to refrain from generating (parts of) a training sequence when told to generate everything but the training sequence. We propose here a supplementary measure, based on a totally different reasoning, that speaks to the nature of the learning. This measure is presented here in the framework of the adaptation of the process dissociation procedure to a free generation task that was made by Destrebecqz & Cleeremans (2001), but can be easily extended to other paradigms. The measure is based on the following reasoning. Learning, for a given system, consists in a structural change as a result of exposure to external events the system is sensitive to. The intention to perform a specific task is reflected in the behavior, and the behavior unfolds following chronometric parameters. In line with Van Orden, Holden & Turvey (2003), it is considered here that from the particular type of noise present in the reaction times, one may follow the trail back to intentional content. Thus the measure that is proposed here is the fractal dimension of the background noise present in the reaction times in the free generation tasks. The performance of a participant who achieved in a serial reaction time task perfect (explicit) knowledge of the sequence is presented both by the standards proposed by Destrebecqz & Cleeremans (2001) and in terms of fractal dimension. It is further speculated what fractal dimension values in the generation tasks would sign implicit learning.

Emergentism revisited

Kristina Musholt
Otto-von-Guericke University

Saturday, June 24th, 17:30-19:30: Poster Session 1

Emergence theories were originally developed to provide a middle way between vitalistic and mechanistic theories (Alexander, 1920, Lloyd Morgan, 1923, Broad, 1925). They have recently generated new interest, proving valuable for philosophy of mind, especially for the evaluation of nonreductive materialism (Beckermann, 1992, Kim, 1992, Van Gulick, 2001). Although there are

a great variety of emergence theories (Stephan, 1999, Van Gulick, 2001), only so-called synchronic property emergentism, as originally proposed by Broad (1925), is relevant for the discussion of nonreductive materialism. In this view, emergent properties are principally irreducible properties. In current philosophy of mind discussions, these irreducible properties are often referred to as phenomenal properties or qualia, and arguments similar to those introduced by Broad can be rediscovered in more recent discussions (Levine, 1993; Jackson, 1986; Chalmers, 1996). However, some critics have argued that it is untenable to hold, as emergentism as well as nonreductive materialism do, both physicalism and principally irreducible properties as true, as this leads either towards epiphenomenalism (Pepper, 1926) or violates the physical closure of the world by accepting some form of downward causation (Kim, 1992, 1999). Some light can be shed on these problems by having a closer look at what exactly it is that cannot be explained by reductive approaches. With reference to the insights of the late Wittgenstein, I argue that many difficulties faced in current debates in philosophy of mind are due to a conflation of different levels of description and subsequently of explanation. I thus argue for the systematic value of synchronic emergentism in pointing out conceptual difficulties in the way mental phenomena are discussed. This view holds that once a certain level of description has been chosen (one which usually turns out to be the physical), discussion is constrained within a conceptual realm that necessarily excludes other concepts, such as those commonly associated with conscious mental states (Ros, 2005, Schneider, 2005). Accordingly, I hope to demonstrate how with the help of Wittgenstein's insights, we can make some sense of emergence.

The colour debate revisited

Erik Myin
Centre for Philosophical Psychology, Department of Philosophy, University of Antwerp, Belgium

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.3

According to neurophysiological reductionism about colour, colours are 'in the head'. Colour realists, on the other hand, claim that colours should be identified with something perfectly objective, namely surface spectral reflectances. Colour reductionists point out that realism cannot account for colour experience. First, it seems obvious that colour experiences are not ‘out there’ in the sense that surfaces are. Second, various aspects of colour experience, such as the experiential opponency of red versus green and yellow versus blue, or the existence of unique hues such as a pure yellow or red, seem to have no physical counterparts, and thus seem entirely due to the way the human color system is wired up. The most detailed realist answer to these concerns to date (by Alex Byrne and David Hilbert) comes down to adapting physical colour categories to the alleged opponent organisation of the neural colour system. From a physical point of view, this reply seems ad hoc because unrelated to any form of salient physical structure of light and surfaces. This presentation will go into the consequences for this debate of an important recent theoretical development in color science (Philipona and O’Regan, Visual Neuroscience). It will be argued that this novel approach shows, against reductionism, that the structure of colour experience derives from the physical facts about the interaction between lights and surfaces, as measured by the human visual apparatus with its particular limitations. Thus the approach might be thought to provide realists with a better basis for answers to worries about the structure of colour experience. However, so will be argued, the novel treatment is better interpreted as calling for an analysis of color that frames color and its experience in terms of an interaction between a perceiver with a particular perceptual structure and an external world with a particular physical structure, rather than in terms either of self-standing entities in the physical world, namely surfaces, or of self-standing mechanisms in the brain.

Function and mechanism of consciousness

Douglas Newman

Saturday, June 24th, 17:30-19:30: Poster Session 1

I argue that everyday conscious processes reflect a well-defined function that is consistent with evolution. This function is then shown to determine important features of the mechanism that produces it. Examples are given showing that our conscious content mostly fits one or other of the following descriptions: 1. Taking the current situation into account, predicting the effect of actions on the agent. Predictions can be short-term (deciding to run to catch a bus), medium-term (predicting what can be found in the local supermarket) or long-term (deciding to learn a new skill). 2. Analysing reasons for previous errors of prediction, with the aim of improving future predictive ability. 3. Predicting changes in situation due to external reasons beyond our personal control, such as the actions of others or natural forces. 4. Timing actions to improve the likelihood of a successful outcome. 5. Using spoken language to get others to perform actions with outcomes that are expected to benefit the speaker. 6. Acquisition of information, e.g. by reading, that is expected to improve our ability to predict outcomes. Exceptions to this general pattern occur when conscious attention is alerted by perceptions, or by pathological conditions such as suffering pain. All numbered examples are consistent with identifying the function of consciousness as predicting of the outcome of actions as they affect the agent. In so far as these predictions are accurate, they have survival value, and are therefore consistent with the evolution of consciousness. Predicting outcomes and assessing their value to the agent is self-referential. This involves constructing a model of self that would enable the agent, on the basis of predicted outcomes, to select actions from an action repertoire. The function of this self-model is to generate the conscious content required for action selection. It need not, itself, be conscious. It is concluded that, in so far as its content under control, consciousness is used to predict the outcomes of actions, as they will affect the agent. This self-referential process, based on a self-model, projects actions and their predicted outcomes into consciousness.

Movement of invisible limbs distorts visual space

Romi Nijhawan and Gerrit Maus
Dept. of Psychology, University of Sussex

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.2

Introduction: In humans, vision is believed to be the dominant sensory modality, particularly when the task involves sensing spatial location of objects. Here we ask if movement of unseen limbs, that the observer actively controls, can influence the visual location of static stimuli. Method: Six observers produced bimanual movements of their arms in the horizontal plane; movement for one arm was in the proximal-distal direction and for the other arm in the distal-proximal direction. During movement, in which the index fingertips were extended, two flashes were optically projected in the path of movement of the fingertips, one for each fingertip. During movement the observers judged the relative positions of the two flashes. We used the method of adjustment in which the position of one flash was changed until the two flashes appeared aligned. Results: The subjects reported each flash as shifted in the direction of movement, as if ‘dragged' by the unseen moving finger closest to it; thus, physically aligned flashes appeared misaligned. Discussion: Many areas of the central nervous system consist of multimodal neurons that process visual as well as touchproprioceptive signals (Graziano, Yap and Gross 1994; Gallese, Fadiga, Fogassi, and Rizzolatti, 1996). Visual receptive fields of many such neurons are ‘attached' to the tactile receptive fields, and code visual location of stimuli in limb-centred coordinates. Thus, when the animal moves its limb (while holding eyes still) the visual receptive field of the neuron shifts with the limb (Graziano, et al. 1994). A neural mechanism that attempts to supply a common spatial code to a moving limb and a visual stimulus in order to coordinate vision and action may account for the present results. The flashes, being weak in information content (MacKay, 1958) are ascribed a spatial location that is influenced by the forward-shifted location of the limb.

Frontal feedback and the decentering effect in the production of "self" and conscious experience in humans
Raymond Noack

Sunday, June 25th, 17:30-19:30: Poster Session 2

Piaget asserted that a child's concept of "self" as a distinct and independent entity in relation to its environment was not fully manifest until a developmental "decentering" process took effect around the age of 6 or 7 years. That age marks the beginning of what Piaget referred to as the "concrete operations" period of the cognitive development of the child which, in turn, marks a midway point in a larger developmental epoch that begins around the age of 2 and peaks around the age of 11 or 12. It will be argued here that this larger developmental epoch reflects the development of a biological system within the brain of the child that is unique to humans. This system, the frontal feedback system, begins to form in the child's brain around the age of 2 when the preferred direction of information flow in the neocortex begins to reverse from a largely caudo-rostral bias to a largely rostro-caudal bias. The strength of that rostro-caudal driving bias then steadily increases in the brain until the child reaches about the age of 11 or 12. This entire developmental-epoch/reversal-effect is accompanied by the disproportionate development of the human prefrontal motor cortex relative to posterior sensory cortices, which flourishes postnatally but continues to develop steadily between the ages of 2 and about 11 or 12. Decentering occurs about midway through this process when the effects of prefrontal cortical driving on posterior sensory cortical systems becomes great enough so as to separate an autonomously functioning "frontal feedback system" from the constraints of current sensory influences moving in the opposite (caudo-rostral) direction. This distinguishing of the frontal feedback system as an autonomously functioning agent in the developing child's forebrain corresponds to the distinguishing of the child's "self" as an autonomous agent in its cognitive world and in the larger world in general. Comparative and developmental evidence will be presented that supports the proposal of an information-flow reversal in humans and its absence in nonhuman primates, and a specific experimental prediction will be made in relation to new multivariate statistical-analysis techniques that may be used to test the hypothesis.

Continuum of Dreaming in the Transition between Sleep Stages 2 and 3
Valdas Noreika, Katja Valli, Hetti Lahtela, and Antti Revonsuo
University of Turku

Sunday, June 25th, 17:30-19:30: Poster Session 2

According to previous laboratory studies, most of the awakenings from Stage 2 produce dream reports, while Stage 3 tends to be dreamless. Yet, the transitional process of dream cessation has not been carefully investigated, and it is not evident how rapidly the probability of dreaming decreases. Our aim was to find such a moment for awakening, where the presence and the absence of dream recall would occur with equal probability. We argue, that the usual practice in the study of the neural correlates of dreaming, i.e. the comparison of dreaming versus dreamless sleep obtained from different sleep stages, is confounded. Ambiguities remain whether the suggested correlate is associated with dreaming as such or simply with a certain sleep stage. Whereas, dissociation between the conscious and unconscious states of mind when a stage of sleep is controlled, would be a valid starting point in the research of the neural basis of dreaming. In a laboratory study, we awakened each participant several times per night at five different points of sleep: 5 min after the beginning of Stage 2, 1 and 3 min after the first appearance of slow waves in Stage 2, 1 min and 3 min after the beginning of Stage 3. The dream reports were collected and later analyzed considering the relatively objective complexity of the dream content and the intensity of subjective experiences of the dreamer. Both the empirical results and their

theoretical implications of the present study will be discussed in detail.

Why Hearts Don't Love and Brains Don't Pump: Neocortical Dynamic Correlates of Conscious Experience

Authors: Paul Nunez (1) and Ramesh Srinivasan (2)
Affiliations: (1) Tulane University; (2) University of California at Irvine

Saturday, June 24th, 17:30-19:30: Poster Session 1

Human brains exhibit complex dynamic behavior measured by external recordings of electric (EEG, electroencephalography) and magnetic fields (MEG, magnetoencephalography). These data reveal synaptic field oscillations in neocortex at millisecond temporal and centimeter spatial scales. The neural networks underlying behavior and cognition are believed to be embedded in these synaptic action fields, analogous to social networks embedded in a culture. These synaptic fields may facilitate the binding of the disparate networks to produce a behavior and consciousness that appears unified to external observers. EEG, MEG, anatomy, physiology, and complex physical systems are considered here to suggest fundamental physical and biological properties of human brains that may be required for consciousness to occur. Emphasis is placed on the hierarchical structure of brains, nonlocal connections between distant regions, and resonant interactions between networks. While several of these ideas are supported by experimental data and mathematical theory, mathematics is replaced by metaphor for this presentation. One conjecture is that the schizophrenias and other diseases occur when neural networks fail to conform to global synaptic fields. Perhaps consciousness is a resonance phenomenon and only properly tuned brains can orchestrate the beautiful music of sentience.

Unpredictable visual changes causes distortion of temporal memory of visual events

Junji Ohyama (1) And Katsumi Watanabe (2)
(1) Graduate School of Comprehensive Human Sciences University of Tsukuba, Japan; (2) University of Tokyo / AIST / ERATO-JST, Japan

Sunday, June 25th, 17:30-19:30: Poster Session 2

Transients, including unpredictable changes, are ubiquitous in the visual world. Previous studies reported various effects of visual changes on perception, memory, and attention. However, it is much less known how sudden visual changes (and predictability of changes) affect the temporal perception or memory of other visual events. We conducted three experiments to examine how a visual change (color change) in a continuously moving object would influence the remembered timing of another event (visual flash). In each trial, subjects saw a green or red disk rotate clockwise or counterclockwise and a visual flash (white frame) appeared at random timing for one frame (40 ms). After the stimulus presentation, they were asked to report when the visual flash occurred in the stimulus sequence by adjusting the clock position of the disk (using appropriate keys). In the no-change condition, the color of the rotating disk did not change its color. In the unpredictable condition, the disk color changed (either red to green or green to red) at unpredictable timing. In the predictable condition, the color change occurred at the fixed timing relative to the stimulus sequence. When there was no change in color of the rotating disk, the memory of timing of the visual flash was relatively accurate. However, when the color change occurred was at random timings in the stimulus sequence, subjects reported that the flash occurred closer to the color change than actual timing. Importantly, when the timing of the color change was fixed (and therefore predictable), the results were not different from the no-change condition. Thus, the present study demonstrated that an unpredictable visual change distorts the temporal memory of another visual event, such that the remembered moment of the event is attracted to the unpredictable visual change. The results are discussed in relation to previous

studies on the temporal capture of transient auditory stimulus to auditory segment (Fodor et al 1965; Gregory, 1978) and recent studies on the time distortion by intentional action (e.g., Haggard et al 2002; Morrone et al 2005)

The jealous mind--significance of interpersonal resource assignment.
Fumi Okubo and Ken Mogi
Sony Computer Science Laboratories

Sunday, June 25th, 17:30-19:30: Poster Session 2

Intelligence has been widely touted as a hallmark of human excellence. However, as the classical study of Charles Darwin has suggested (Darwin 1872), the various expressions of emotion is an equally remarkable aspect of the human psyche. The advances in evolutionary psychology have demonstrated the promises of bridging brain science and theories of evolution through the empirical and theoretical studies of human emotion. In particular, emotions involved in interpersonal relations are biologically important because they possibly lead to mating and reproduction of offsprings, reinforcing the view that the experience of romantic love is an important aspect of human conscious experience. Jealousy is an intriguing aspect of romantic love. Although the pet subject of novels and films, it has received relatively small scientific attention. Recently, there have been some interesting investigations into the nature of the perception of fairness in humans, including the gender difference in the neural correlates of "schadenfreude" and empathy (Singer et al. 2006). Jealousy provides an interesting instance of constrained fairness, as the resource involved (i.e. personal affection) is limited by nature. Monetary resources can be in theory infinite. Romantic love can be spared only to a few. Here we report an experiment on jealousy from the point of view of perception and enactment of fairness in the distribution of limited resources. The subjects played a simple game. Personal favors are expressed in terms of the commitment and the actual transfer of resources. We define a measure of jealousy in terms of observable behavior of the subjects involved in the interaction. Transfer of the object of jealousy, the temporal dynamics of jealousy building and dissolvement, and the personal differences in fairness assessment are analyzed. Finally, we present some arguments on the importance of resource assignment in the perception of interpersonal relationship, and how they affect the cognition of the self and others, possibly involving the mirror system.

Intentionality and choice beyond probability--the nature of human emotion.
Ayako Onzo and Ken Mogi
Tokyo Institute of Technology & Sony Computer Science Laboratories

Sunday, June 25th, 17:30-19:30: Poster Session 2

The interaction between conscious and unconscious elements in human cognition is one of the most interesting aspects of the brain system. It is of particular interest how the brain adapts to uncertainties in the environment, invoking conscious neural processing when necessary. Various studies have suggested the fundamental importance of the emotion system in the robust handling of uncertainties. Here we report an experiment which demonstrates that the choice in the presence of uncertainty do not necessarily follow simple reward maximization, being affected by real and illusory perception of agency and controllability. The reward systems in the human brain respond not only to primary biological rewards, but also to more abstract stimuli involving social interactions such as money, eye-contact with an attractive person (Kampe et al. 2001), and punishing people for unfair actions (Singer et al. 2006)). TD learning, a representative of the reinforcement learning paradigm, handles uncertainties with a statistical approach and modifies the behavior of the neural system in such a way that the prediction errors are diminished. We conducted a simple betting game in which the average expected reward was kept constant. The

subjects had a choice of either betting a fixed amount or escape. Although from the statistical point of view no single optimum behavior could be defined, the subjects demonstrated a tendency to bet with certain patterns. In particular, the spatio-temporal phenomenological aspect of event occurrence was found to affect the subject's behavior in a significant manner. As the phenomenology of space and time disappears in any statistical treatment based on "ensembles", this particular behavior lies outside the statistical approach. The novelty of our result lies in the fact that the differential behavior cannot be explained by any measures of statistics, including the average, variance, or any statistical measures of higher order. Thus, human choice in the presence of uncertainty cannot be explained purely in terms of statistical properties of the reward, as is tacitly assumed in the conventional studies of the reward system. Our result puts some interesting constraints on the nature of intentionality and choice in the conscious and unconscious interaction with the environment.

The sensorimotor approach to phenomenal consciousness revisited

Kevin O'Regan
Laboratoire Psychologie de la Perception Centre National de Recherche Scientifique Institut de Psychologie, Centre Universitaire de Boulogne71,

Friday, June 23rd, 9:30-12:30: Tutorial

After briefly synthesizing the current formulation of the sensorimotor approach to phenomenal consciousness, and after quickly reviewing recent empirical results (in particular on colour) and theoretical developments (on pain), the tutorial's main purpose will be to address and discuss (with the help of participants):

Common misunderstandings about the sensorimotor approach

1. Why it does not deny representations
2. Why it does not claim action is required for perception
3. Why hallucinations, dreams and imagery do not contradict it
4. Why it does not deny 'qualia' nor simply explain 'away' phenomenal consciousness
5. Why appealing to cognitive access does not make it circular
6. Why the approach is not a denial of the brain

Relation to other approaches

1. Why the sensorimotor approach is different from the enactive and dynamical systems approaches
2. How the sensorimotor approach is different from behaviorism
3. How it's different from Gibson's ecological approach
4. Is it just a form of functionalism? Is it eliminativist?
5. Is it just another higher order thought theory?
6. How does it differ from global workspace type models?
7. In what way does the approach differ from Dennett's?
8. What is the relation to Merleau Ponty/Heidegger/Bergson/Al Hazen

Limits of the approach

1. What does the theory have to say about the dorsal-ventral distinction, cortical maps, filling-in, mirror neurons, face areas?
2. How does it deal with inverted qualia and the knowledge argument?
3. What does it say about emotions? The notion of self? Free will? The experienced quality of thoughts?

4. Does the approach need a leap of faith?
5. Can the sensorimotor approach be tested (ie is it a scientific theory)?

The Place of ACC and dlPFC in Phenomenal Consciousness
Morten Overgaard (1), & Uriah Kriegel (2)

Affiliations: (1) Hammel Neurocenter; (2) University of Arizona

Sunday, June 25th, 17:30-19:30: Poster Session 2

In previous work, Uriah Kriegel suggested - on conceptual and philosophical grounds - that phenomenal consciousness might arise from the neural synchronization of simultaneous monitoring and monitored brain activity. For instance, in the case of color consciousness, there is simultaneous activity in the visual cortex (most notably in V4, given findings by Zeki, ffytche, and others) and in whatever area is responsible for online monitoring, and the two activities are neurally synchronized or cohered. Kriegel calls this the Cross-Order Integration model of consciousness, or COI for short. In order for the suggestion to be testable, some brain area or activity must be offered as subserving online monitoring. Recent work on error detection and attention control may be interpreted to suggest that monitoring takes place somewhere in the anterior cingulate cortex (ACC) and/or the dorsolateral prefrontal cortex (dlPFC). In a series of experiments currently prepared, we use Transcranial Magnetic Stimulation [TMS] to inhibit the activity in the ACC and the dlPFC. The planned empirical research will compare patients with focal damages to ACC and/or dlPFC to healthy subjects where TMS in delivered at different durations during neural processing of information that otherwise would be supposed to lead to a conscious experience. We intend to use different stimuli and report methods as there, at present, is no single known methodology to obtain reliable information about subjective states. If subjects experience a decrease in conscious awareness due to the stimulation, it lends support to the COI model, even though other interpretations will be possible. For instance, consciousness may in fact have 'survived' the stimulation, while introspective access may be reduced. Also, the areas may be necessary for consciousness without being sufficient correlates. However, if consciousness survives the TMS, the model is falsified, at least in the version that takes the ACC/dlPFC to subserve monitoring.

Simon Sees as Simon Does: Evidence for a Perception-Action Model of Letter Recognition
Jim Parkinson and Beena Khurana
University of Sussex

Saturday, June 24th, 17:30-19:30: Poster Session 1

Does the perception of objects that are the result of human actions reflect the dynamic structure of the actions that give rise to them? Previously (ASSC9), we showed that stroke order primes letter recognition: Computer generated letters, e.g., 'N', are presented as a temporally unfolding sequence of constituent strokes. Letter recognition is faster if the stroke sequence mimics writing action compared to when it does not. We proposed that stroke order priming is due to letter perception reflecting the temporal structure of letter production. Here we manipulate the availability of the strokes via masking and reduced exposure durations in order to test the non-strategic nature of stroke order priming. In Experiment 1 each frame in a stroke sequence was presented for 50 ms interspersed with 50 ms pattern masks. Stroke order priming occurred even in the presence of masking. In two further experiments, each frame was presented without masking for durations ranging from 10-500 ms. A significant stroke order priming effect occurred even at 20 ms per stroke. Moreover, we also observed a 'garden path' effect, in that an initial

stroke order consistent with letter writing slowed responses to a subsequent non-letter. This replication of stroke order priming across a large range of frame durations attests to the robustness of the effect. The magnitude of the priming effect, in relation to frame-duration, appears to be normally distributed; reduced priming at both lower and higher frame-durations with a peak priming effect at frame-durations of around 100 ms. Intriguingly, the frame-durations that render peak priming are consonant with average writing speed in terms of time-per-stroke (Plamondon, 1991). The modulation of stroke order priming by frame-duration suggests that priming may have both visual and motoric contributors. In sum, the masking and frame-duration findings endorse a perception-action model of letter recognition, even in the absence of the dynamic information associated with handwritten letters. Priming in the presence of visual masks and greatly reduced exposure intervals further questions the tenability of a strategic account of stroke order priming. Peak priming with frame durations that match writing speed suggests that Simon sees as Simon does.

Knowledge as Personal: The Representation of Self in the Representation of Knowledge
Joel Parthemore
University of Sussex (UK)

Saturday, June 24th, 17:30-19:30: Poster Session 1

Knowledge is always knowledge of: knowledge requires an object, but not an object on its own, for the object requires a subject. Just as one probably cannot begin to understand conceptual knowledge without an appreciation of non-conceptual knowledge, so, too, one cannot understand knowledge, conceptual or non-conceptual, in the absence of an understanding of intelligence. Some philosophers have argued that any understanding of intelligence needs to be broad-based and not anthropocentric; but I will argue that what I call the "anthropocentric stance" is at least useful and at most possibly necessary. This anthrocentric stance is fundamentally a part of our relations to other human intelligences, and it may be fundamental to our relations to any intelligent entities. In understanding others, we begin with an understanding of ourselves. If we take a representational approach to mind, then what is the general nature of our representations of "other" (one-who-is-like-self) and "self"? I suggest that our representation of "other" begins with a modified representation of "self". In turn the representation of "self" may begin with a representation of boundary: the "self" from the "not self". I talk about two distinct but related notions of self, which I call "I(1)" and "I(2)", and briefly mention a third, "I(3)". The "self" can masquerade as the homunculus in the mind without being one: following a line of thought from Daniel Dennett, a form of the "meta-level argument" offers an escape from infinite regress. This is not a paper about consciousness, but it does attempt to show how a certain approach to consciousness might shape any subsequent approach to knowledge representation.

An Interdisciplinary Study of Visual Indeterminacy
Robert Pepperell (1), Alumit Ishai (2)
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Sunday, June 25th, 17:30-19:30: Poster Session 2

Visual Indeterminacy occurs when viewers are presented with apparently detailed and vivid images that nevertheless resist identification. This invokes an unusual state of awareness in which the formal aspects of perception (form, colour, motion) become temporarily dissociated from the semantic aspects (meaning, memory, association). The resulting condition differs from our habitual mode of seeing, in which visual sensation is accompanied by immediate recognition. Instead the viewer is presented with a perceptual conundrum - an apparently meaningful yet momentarily meaningless scene - which they struggle to resolve. Visual Indeterminacy is,

therefore, an excellent case study through which to investigate conscious awareness. I will summarise some references to visual indeterminacy in art history and literature, where it has been associated with heightened states of awareness and aesthetic experience, and in recent neurobiological research, where it is associated with increased neural activity. I will then present my own examples of indeterminate images created through painting, and report on the recent research undertaken in collaboration with neuroscientists which measures the behavioural and affective responses to these works. Comparing these indeterminate paintings with similar yet recognisable paintings, using colour and monochrome examples of each, subjects performed an object recognition task followed by a judgment of aesthetic affect task. Preliminary data indicate that regardless of image type (indeterminate vs recognisable) and colour (colour vs monochrome), all subjects rated the aesthetic affect of all paintings similarly. Nevertheless, significant differences in response latencies were observed between categories of images, such that indeterminate images were associated with longer reaction times. These differential latencies likely reflect the underlying cognitive processes which mediate the resolution of object indeterminacy. The interdisciplinary study of visual indeterminacy is important to our understanding of consciousness because it may offer an insight into the very mechanisms through which our sensory apprehension of the world is integrated with our knowledge and experience. Understanding this integration, and how it sometimes falters, would further enhance our account of human consciousness. Space permitting, a small selection of paintings will be exhibited with the poster.

Consciousness is confidence: Post-choice wagering accurately represents consciousness

Navindra Persaud and Peter McLeod
University of Oxford

Monday, June 26th, 14:00-16:00: Concurrent Session 3.3

We propose that consciousness can be meaningfully identified with confidence. This is because there is nothing more to being conscious of the fact that X than deciding with confidence that X. We apply this definition to the study of learning without awareness, or implicit learning. Demonstrating learning without awareness relies on assessing internal conscious states. The use of subjective measures of internal states (e.g., asking participants what they are aware of) is problematic as they can underestimate strategy awareness. We report an objective measure of strategy awareness: having participants place a wager on the outcome of a choice they have already made. Post-choice wagers demonstrate learning without awareness objectively in the artificial grammar task and the Iowa gambling task. The data indicate that objective measures that assess confidence directly can represent internal conscious states more accurately than subjective measures.

Self-based Theories of Consciousness

Donald Perlis
University of Maryland

Sunday, June 25th, 17:30-19:30: Poster Session 2

I will survey "self-based" theories of mind or consciousness (that urge a fundamental role for self-reference or self-awareness) and contrast such theories with various alternatives, giving special attention to the so-called hard problem. Why should a particular process (in a particular cognitive architecture) be accompanied by a feel, a what-it's-like to be that process? I will argue that self-based theories at least hold out a hope and a direction here, unlike most non-self-based theories. Further, self-based theories and their relatives come from divers parts of cognitive science, an

intriguing further hint of their significance.

The structure of colour space: colour naming, unique hues and hue cancellation quantitatively predicted from viewer-surface interactions.
David Philipona and J. Kevin O'Regan
CNRS, Université René Descxartes Paris 5

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.3

One of the most basic aspects of color vision, namely the special role of the colors red, green, blue and yellow, is usually assumed to have a purely neuronal cause. We will show a fact that suggests a fundamentally different origin: from the viewpoint of human photopigments, red, green, blue and yellow surfaces alter light in a simpler way than all other surfaces. This is demonstrated by constructing a biological restriction of the physicist's notion of reflectance that takes into account the statistical constraints satisfied by natural illuminants and the limitations induced by human photopigments. Using a dataset of natural and artificial reflectances, we then show numerically that the existence and the identity of four singular hues is actually to be expected from trichromatic theory alone, independently of any opponent mechanisms. This approach very directly provides correct quantitative predictions for psychophysical data about unique hues, hue cancellation, and cross-cultural data about colour naming.

Objective and subjective similarity and intuitive choice
Grzegorz Pochwatko (1), Robert Balas (1), Joanna Sweklej (2), Malgorzata Godlewska (2)
(1) Institute of Psychology Polish Academy of Sciences; (2) Warsaw School of Social Psychology

Saturday, June 24th, 17:30-19:30: Poster Session 1

The following line of studies concerns intuitive choice and its underlying cognitive mechanisms. Intuition is regarded as a process involved in simple choices, decision making, problem solving and also social judgment that lack consciously available premises of the solutions. We argue that implicit learning serves as cognitive mechanism of intuitive judgment. To test this hypothesis we used a new paradigm - transitive rules learning - in which after learning of permitted transitions between two figures participants are tested for their ability to generalize this knowledge over new stimuli - that is new exemplars, but first and foremost new transitions. It has been shown that people are able to recognize learned (old) transitions far better than new ones. Differences among close and far new transitions were also observed. Far new transitions are accepted significantly less frequently as permitted ones than close new transitions and not permitted control stimuli. Objective and subjective similarity influences in the above effects are discussed with respect to conscious accessibility to different knowledge representations.

Seeing "where" through the ears? Localization by sensory substitution
Michael Proulx, Petra Stoerig, Eva Ludowig, and Inna Knoll
Institute of Experimental Psychology, Heinrich-Heine-University Duesseldorf

Monday, June 26th, 14:00-16:00: Concurrent Session 3.1

Vision is knowing what is where by looking (D. Marr). We here asked whether blindfolded subjects can localize objects from sound patterns that were generated by image-to-sound conversion. The vOICe program transformed images taken by a small video camera into sounds that were heard by the subjects through stereo headphones (Meijer PB. IEEE Trans Biomed Eng. 1992). We tested 13 subjects. Eight used this mobile visuo-auditory substitution device only for

the four testing sessions; two were also tested with the device but used it daily throughout a 3-week period. Another one used the device for 10 days, and performed the tasks twice with and twice without it. Finally, two subjects performed the tasks without the device, and explored the setting only tactually. All subjects were informed about the principles of conversion: up-down was coded by frequency, left-right by time and stereo-panning, and pixel brightness by loudness. In the 1st localization task, subjects had to indicate which of 24 LEDs, arranged in a horizontal semicircular array, was actually lighted, and received auditory feedback when they correctly pressed it. In the 2nd task, objects that were placed singly on a large table had to be located and grasped. Results show that in both tasks, subjects who wore no device were much faster (mean < 20 s), but their accuracy was expectedly at chance level. In contrast, the initially much slower subjects who used the device, showed excellent accuracy which improved significantly ($r = 0.71$, $p < .05$) along with search time ($r = -0.65$, $p < .05$) across sessions in the light localization task. The most dramatic changes were observed in the three subjects who had free use of the device for 10 or 21 days. They became almost as fast (mean 22 s) as those who simply pressed every LED they encountered, and increasingly grasped the object on the table in a direct and grip-adjusted manner ($r = 0.79$, $p < .05$). Together, the results indicate that daily immersive use of the device effectively improved performance, and that image-to-sound conversion allowed blindfolded subjects to increasingly know where something was by listening.

Perception as Dynamic Segregation and the Phenomenology of Perceptual Presence

Olivier Putois
University of Paris-IV Sorbonne

Sunday, June 25th, 17:30-19:30: Poster Session 2

In this paper, developing some intuitions of Merleau-Ponty's, and in accordance with a recent paper from Siegel, I claim that perception is an interactive relation of dynamic segregation to the world, i.e. of reciprocal differentiation between one object and the surrounding ones. Perception is a relation to the world since it is the successful enaction of a relation between an object and its surroundings. Phenomenal awareness of an object hence occurs when the segregation is successful, i.e. makes perceptual individuation possible. Perception can thus be conceived, following the determination of circular emergence proposed e.g. in the neurophenomenological model developed by Varela, as the subpersonal processing of information oriented (bottom-up) toward the emergence of phenomenal consciousness as successful object-segregation (top-down constraint). This leaves open the higher conceptual determination of perceived content as well as the problem of the extent to which it is only conceptual. I want to show the relevance of this model of perception in two steps, using it to assess the recent Kelly-Noë debate on perceptual presence. I first argue that this account of perception, by proposing an intrinsically contextual and ecological version of intentionality (determining constitutively perceived items as successfully segregated entities), respects the phenomenology of perceptual presence of the object as a three-dimensional whole Kelly defends, in accounting for the perceptual presence of actually unseen parts of perceived things by considering tri-dimensionality - the feature of perceptual presence which involves the presence of actually hidden parts of the object - as the fundamental segregative determination of perceptual objectivity. I then argue that this version of perceptual intentionality is direct since it involves that object properties just are the ways in which three-dimensional segregation is enacted. It thus provides a bridge between Kelly's demands and Noë's enactive claim according to which the perceptual presence of the object as a whole just is the anticipatory sense I have of the potential effects of object-related movements on perceptual content, since its particular properties just are ways for it to be tri-dimensional, thanks to this tri-dimensionality being a segregative determination.

Watching representations

Susanna Radovic
Dept. of Philosophy, Goteborg University, Sweden

Saturday, June 24th, 17:30-19:30: Poster Session 1

One kind of substantial critique which has been raised by several philosophers against the so called higher order perception theory (HOP), advocated for mainly by William Lycan, concerns the combination of two important claims: (i) that qualia are wide contents of perceptual experiences, and (ii) that the subject becomes aware of what the world is like (to her) by perceiving her own experiences of the world. In what sense could we possibly watch our own mental states if they are representations whose content and qualitative character is determined by factors that are external to the mind? And, furthermore, how can we become aware of what the world is like by means of this process? Fred Dretske (1995, p. 108) says that all we could become aware of by this alleged activity are activities of the nervous system. But being aware of what e.g., a certain colour is like to us, does not seem to be the same as being aware of what a particular nervous activation pattern is like to us. Barry Maund (2003, p. 169) points out that it is not ruled out that the representational vehicle and the representational object share some properties, nor that it is in virtue of having certain properties that a mental state has the content it does. If it were the case that the properties of the representational states showed some iconic resemblance relation to that which they represent, there could perhaps be some point in watching them. But again, we have little reason for thinking that this is the case. It seems improbable that an experience of red would be (intrinsically) red, i.e., that the representational vehicle would have these properties. The important issue is this: what features could the representational vehicle possibly have that would make it suitable as an object for inner sense and, in turn, would enable us to become aware of what it is like for us to perceive external objects by "looking" at the representation of these objects? I will explore these questions in this paper.

The role of awareness in incidental language learning

Patrick Rebuschat
University of Cambridge

Saturday, June 24th, 17:30-19:30: Poster Session 1

This paper focuses on the possible role of awareness in the incidental learning of a semiartificial language. The experimental study reported in this paper addressed this question by randomly assigning 40 adult native-speakers of English to either an experimental or a control condition. The experimental group was initially required to judge the semantic plausibility of 256 sentences of a semi-artificial language consisting of an English lexicon and German syntax. In the testing phase, participants were then asked to rate 80 novel tokens in a timed grammaticality-judgment task. (Controls were only required to participate in the second part of the experiment.) In order to assess the role of awareness, three different measures were employed, namely (i) binary confidence judgments (on trial-to-trial basis), (ii) accuracy estimates (on block-to-block basis) and (iii) verbal reports (at the end of the experiment). The linguistic focus was on four syntactic rules that determined the placement of verbphrases in the semi-artificial language. These rules, which are largely based on German syntax, state that, depending on the type of VP (simple vs. complex), the type of clauses (main vs. subordinate), and the sequence of clauses (subordinate/main vs. main/subordinate), verb forms have to be placed either in second position, final position or first position in terms of the phrasal sequence of a given clause. The results of the experiment indicated significant above-chance performance for the experimental group and chance performance for the control group in the grammaticalityjudgment task. The three measures of awareness revealed that, while most participants in the experimental group were not consciously aware of the verb-placement rules, some participants seemed to have formed explicit representations. This allowed for a comparison of the participants' classification performance in

terms of whether they were aware or unaware of the rules in question. Differences in the learning outcome of aware and unaware participants across the four verb-placement rules will be discussed. We will also report on the usefulness of the different measures of awareness for investigating conscious and unconscious learning.

Intentions in everyday life: The contribution of the medial frontal cortex
Erik Rietveld
University of Amsterdam

Saturday, June 24th, 17:30-19:30: Poster Session 1

How do intentions arise in the brain-body-environment system? For answering this question I propose to take an "enriched" cognitive neuroscience approach, integrating insights from the neuroscience of decision and action, ecological psychology, phenomenology and the philosophy of action. It makes sense to distinguish between reflective and unreflective intentionality (Merleau-Ponty, 1945; Wittgenstein, 1978; Rietveld, 2006). Unreflective intentionality is crucial in everyday life and the focus of this paper. Often we simply respond skilfully to 'affordances' (Gibson, 1979), understood here as perceived possibilities for action in the environment. I will show how unreflective intentionality is supported by the ability of the organism to flexibly anticipate the long-term value of affordances. The medial frontal cortex (ACC/pre-SMA) and interconnected subcortical areas play crucial roles here. I argue that recent research on the functions of the medial frontal cortex sheds a new light on the neural mechanisms underlying unreflective intentionality. Especially the work on performance monitoring (Holroyd and Coles, 2002; Rushworth et al., 2004) and action selection (Shima and Tanji, 1998; Walton et al. 2004; O'Doherty et al. 2004) is important for understanding how this might work. It has two aspects. Firstly, both performance monitoring and action selection are anticipatory in nature. Moreover, these two fields of research share the innovative hypothesis that on-line monitoring and action selection are based on expected (reinforcement) value. Work in animal decision making (Schultz et al., 1997) and computational neuroscience (review: Montague et al., 2004) provides additional support for this hypothesis and stresses the role of the midbrain dopamine system in updating expectations of reinforcement value. Studies on reward prediction (review: Knutson, 2004) suggest that reinforcement value might be a rich notion and closely related to the concerns of the organism, which are central in emotion theory (Frijda, 2004). I suggest that when perception/feedback indicate that things are going better or worse than expected a potential switch moment to another, more valuable, possibility for action (affordance) occurs. This can be understood as the arising of an unreflective intention. In sum, the medial frontal anticipatory system for action control contributes to the unreflective generation of intentional action in everyday life.

The Neutrality of Evolution for the Consciousness/Brain Problem
William S Robinson
Iowa State University

Sunday, June 25th, 17:30-19:30: Poster Session 2

This paper considers the relation between biological evolution and three theories of conscious, qualitative events: Physicalism, interactionism, and epiphenomenalism. It is sometimes supposed that evolutionists must be physicalists. This paper argues, in contrast, that while each of the three theories can be made compatible with evolution, this compatibility can be achieved only by adding an assumption to evolutionary considerations (a different assumption for each case). It further argues that, for each of these additional assumptions, (1) the theory that needs it cannot explain it, and (2) it cannot be supported by any evidence drawn from evolutionary biology.

Evolutionary considerations are thus neutral with respect to the choice among the three theories.

Consciousness absent and present: the neurophysiology of backward masking
Edmund Rolls
Oxford University, Dept of Experimental Psychology

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.1

Backward masking was used to investigate the amount of neuronal activity that occurs in the macaque inferior temporal visual cortex when faces can just be identified. It is shown that the effect of the pattern mask is to interrupt neuronal activity in the inferior temporal visual cortex. This reduces the number of action potentials that occur to a given stimulus, and decreases even more the information that is available about which stimulus was shown because the variance of the spike counts is increased. When the onset of the mask follows the onset of the test stimulus by 20 ms, each neuron fires for approximately 30 ms, provides on average 0.1 bits of information, and human observers perform at approximately 50% better than chance in forced choice psychophysics, yet say that they are guessing, and frequently report that they are unable to consciously see the face and identify which face it is. At a longer Stimulus Onset Asynchrony of 40 ms, the neurons fire for approximately 50 ms, the amount of information carried by a single neuron is 0.14 bits, and human observers are much more likely to report conscious identification of which face was shown (Rolls 2003 Progress in Brain Research 144: 95-106). The results quantify the amount of neuronal firing and information that is present when stimuli can be discriminated but not reported on consciously, and the additional amount of neuronal firing and information that is required for human observers to consciously identify the faces. It is suggested that the threshold for conscious visual perception may be set to be higher than the level at which small but significant information is present in neuronal firing, so that the systems in the brain that implement the type of possibly serial information processing involved in conscious thoughts are not interrupted by small signals that could be noise in sensory pathways. The results also show that there is insufficient time for top-down processing from higher cortical areas (such as the inferior temporal visual cortex) to lower order cortical areas (such as V1) to be a requirement for conscious visual perception.

Higher-Order Theories of consciousness
David M. Rosenthal
Program in Philosophy and Interdisciplinary Concentration in Cognitive Science, University of New York

Friday, June 23rd, 14:00-17:00: Tutorial

Any satisfactory theory of consciousness must explain how conscious thoughts, feelings, and perceptions differ from those which are not conscious. One promising explanation starts by noting that, whenever such states are conscious, we are conscious of those states, whereas we're never conscious in the same way of mental states that aren't conscious. Being conscious of something, moreover, requires being in some mental state that pertains to that thing. It's natural to conclude that a mental state is conscious only if there is some higher-order state in virtue of which one is conscious of the state that's conscious. Such is the basic motivation for the higher-order theories of consciousness that have proliferated over the last 20 years.

Alternative higher-order approaches differ on several crucial issues. Do the requisite higher-order states resemble perceiving? Or are they thoughts? And does consciousness require occurrent higher-order states? Or do dispositions suffice? Further, must we posit distinct higher-order states, or might the requisite higher-order content be intrinsic to conscious states. Finally, some

have raised a challenge to all higher-order theories, arguing that we aren't actually conscious of those thoughts, perceptions, and feelings which occur consciously. These issues will occupy the first half of the tutorial.

In the second half, we'll consider several specific applications of higher-order theories. The first is how these theories might explain conscious qualitative character: How can higher-order states result in there being something it's like for one to be in qualitative states? And can higher-order states explain all the subtle qualitative variation that occurs among conscious states?

The second application concerns the function of consciousness. Can higher-order theories explain what role, if any, is played by mental states' being conscious? Are there selection pressures that might have made such higher-order states adaptive? If not, why would higher-order states occur so often, and why would they typically be so accurate?

Finally, we'll briefly consider how higher-order theories can accommodate the strong intuitive tie between consciousness and speech, as well as such dissociative disorders as blindsight and the striking results about timing found in experimental work by Benjamin Libet and Patrick Haggard.

Investigating the role of the prefrontal cortex in visual consciousness using transcranial magnetic stimulation (TMS)

Elisabeth Rounis (1) and Hakwan Lau (2)
(1) Institute of Neurology, University College London; (2) University of Oxford

Sunday, June 25th, 17:30-19:30: Poster Session 2

One controversial issue in consciousness research is whether the prefrontal cortex needs to be intact for a subject to perform conscious visual perception. Crick and Koch famously argued, based on theoretical motivations, that the prefrontal cortex is important for conscious processing. This is also supported by recent imaging results. However, critics (such as Daniel Pollen) have argued that there is a lack of reports of deficit in consciousness in prefrontal patients. We speculate that one reason for this discrepancy could be due to the fact that patients with bilateral lesions are very rare, and when they are tested, the examination might not be thorough enough with regards to conscious perception, in particular the subjective aspects that cannot be assessed using a forced-choice paradigm. One way to resolve this issue is to use TMS to create “virtual lesions” in the prefrontal cortex in normal subjects. Here we used a new method of TMS called theta-burst stimulation, which has been shown to create long-lasting (~1 hour) changes in cortical excitability. We applied this method bilaterally to the prefrontal cortex, and tested subjects in a visual discrimination task before and after TMS. This behavioural paradigm is based on metacontrast masking and has been used previously to dissociate the subjective and objective aspects of conscious visual perception (i.e. the subjective rating of confidence vs accuracy in a forced-choice task). We particularly focus on the effect of TMS on the subjective measure, which we consider an important measure of consciousness.

Is synaesthesia limited to cross-sensory correspondences? The case of animism.

Noam Sagiv
Brunel University, West London

Sunday, June 25th, 17:30-19:30: Poster Session 2

In ‘The Child's Conception of the World', Jean Piaget (1929) maintains that children exhibit a form of animism, i.e., they attribute consciousness to inanimate objects. The idea has been challenged

since. In particular, it was unclear that animistic description necessarily suggests genuine animistic thought (rather than immature language skills). Substantial efforts are now devoted to studying children's understanding of other peoples feelings and intentions, but the fantasy world in which inner life is attributed to objects is virtually ignored. While animistic ideas seem to have an appeal to many of us (e.g., they are utilized in poetry, children's stories, and advertisement) and may be normative in some cultures, we normally treat such ideas with suspicion. It seems, however, that some healthy, non-delusional adults do tend to attribute life to non-living things. Particularly, some synaesthetes attribute not only colour to graphemes, but also gender and/or personality (Calkins, 1895). Some of them also extend this to inanimate objects. Like the synaesthetic colour, the animistic experience is idiosyncratic yet consistent over time. Furthermore, it is automatically induced and has some predictable behavioural consequences. I will argue that this should be considered a type of synaesthesia in its own right although the induced experiences are not strictly sensory. I will examine the phenomenological, cognitive, and biological characteristics of the phenomenon and show that despite its peculiarity, it could provide some insights into normal cognition and brain function.

The latency of the earliest ERP correlate of visual awareness depends on the difficulty of the subjective perceptual discrimination

Niina Johanna Salminen-Vaparanta, Maria Wilenius, Antti Revonsuo, and Mika Koivisto
University of Turku

Saturday, June 24th, 17:30-19:30: Poster Session 1

The high temporal resolution of EEG might clarify the time-course of neural activation that is related to changes in phenomenal visual awareness. According to a recent and widely accepted model, recurrent processing of stimulus information in visual cortical areas is required for visual awareness to arise [1]. This kind of processing is relatively slow, beginning after 100 ms from stimulus onset. In accordance with this model, the earliest reliably occurring ERP response specific to visual awareness (visual awareness negativity, VAN) has been observed between 200-300 ms from stimulus onset [2,3,5]. This paper presents two ERP studies in which VAN was further explored. Study 1 was designed to provide information about the onset of visual awareness. Masked high-contrast letter stimuli were presented near the subjective threshold using a constant stimulus-mask SOA. The physically identical stimuli were either subjectively detected (52%) or not. The effect of subjective threshold (VAN) started 120 ms from stimulus onset and was strongest at right posterior electrode sites. In study 2, the aim was to explore whether VAN is delayed when the perceptual discrimination of the stimuli is difficult. In a previous ERP study using low-contrast stimuli, VAN was significantly delayed, starting at 330 ms and peaking at 460 ms [4]. However, in that study there were large physical differences between the conscious and nonconscious stimuli that may have confounded the results. In study 2, we explored whether VAN is similarly delayed when the conscious and nonconscious stimuli are physically identical. Lowcontrast stimuli were presented near a subjective contrast threshold. A delayed VAN peaked at 400 ms at right occipito-temporal sites to subjectively perceived stimuli. A separate RT experiment was conducted. The RTs were 240 ms longer for low-contrast than for highcontrast stimuli. The processing speed of stimuli is known to depend on stimulus qualities such as contrast [1]. In accordance with this, VAN was delayed for low-contrast stimuli as compared with high-contrast stimuli. Our results lend further support to the interpretation that VAN is the earliest ERP correlate of phenomenal visual awareness and that VAN seems to reflect recurrent processing in the ventral visual stream.

Temporality, Intention and Consciousness of Movement
Jean-Christophe Sarrazin (1), Axel Cleeremans (1), and Patrick Haggard (2)

(1) Cognitive Science Research Unit, ULB; (2) Institut of Cognitive Neuroscience, UCL

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.2

Time is a fundamental dimension of consciousness. Here we examine the relation between the intention to perform an action and the subject's conscious experience of subsequently making that action. These amount to pre-constructive and re-constructive aspects of action awareness, respectively. To do this, we combined several existing paradigms. The first relies on the influence of expectancy judgment on the subjective report and its modulation by time delays. The second concerns the relation between on-line motor control and conscious experience in visuomotor adjustment of reaching movements following unpredictable lateral target displacements. In our task, participants (1) expressed their expectancy of the occurrence of a target shift during the upcoming movement, (2) reached to point at a virtual target as quickly and accurately as possible before returning to the start position, and (3) reproduced the spatial path of the movement they had just made as accurately as possible. The expectancy of the target shift, and the ensuing reproduction of the trajectory adjustment evoked by the target shift measure the preconstuctive, intentional and reconstructive, motoric aspects of action awareness respectively. The relative importance of these two aspects was investigated by introducing timing delays at two key points in the task. Adding a 6 s delay between expectancy judgment and the start of the trial strengthened the correlation between expectancy and movement reproduction error. That is, the conscious experience of actions is strongly influenced by prior thoughts, when sufficient time is available. Conversely, adding a 6 s delay between the reaching movement and the reproduced movement reduced the influence of prior intentions, and boosted the influence of sensory aspects of the action itself, producing lower errors in reproduction which were less dependent on expectancy. The awareness of our own actions is a dynamic, and relatively flexible mixture of what we think we will do, and what our body actually does. We discuss these ideas in light of current theories of consciousness; emphasizing the role of time in the mixture of consciousness.

Neural correlates of crossmodal visual-tactile extinction and of tactile awareness revealed by fMRI in a right-hemisphere stroke patient

Margarita Sarri, Felix Blackenburg, & Jon Driver
University College London

Saturday, June 24th, 17:30-19:30: Poster Session 1

We used fMRI to study neural correlates of crossmodal, visual-tactile extinction in a single case (patient GK). GK has chronic extinction after a lesion centred on right inferior parietal cortex, and has previously been investigated extensively in purely visual fMRI studies (Rees et al., 2000; 2002). With concurrent stimulation of the right visual field plus left index finger, GK showed crossmodal extinction of left touch on approximately half of such trials here, becoming aware of left touch on the other half. fMRI revealed activation of contralateral primary somatosensory cortex on crossmodal trials where touch was extinguished from awareness, suggesting unconscious residual processing there. When GK became aware of the left touch, additional activation was found in surviving right parietal cortex, and in frontal regions; moreover, functional coupling was enhanced with a region of frontal cortex implicated in awareness by previous work. Finally, on trials where crossmodal extinction arose, surviving right parietal cortex showed stronger functional coupling with the left visual and right somatosensory regions driven by the competing stimuli, indicating that crossmodal extinction arises when inputs to separate modalities interact competitively via multimodal cortex. Crucially, we show here that multimodal parietal areas may be actively involved in modulating sensory awareness by means of interacting with primary sensory areas. Moreover, that frontal areas previously implicated in studies of purely visual awareness may also be involved in the conscious processing of tactile information and thus

play modalityindependent roles in awareness.

Decoding the content of consciousness states: A neurophilosophical perspective on mind reading

Stephan Schleim
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2:Department of Philosophy, University of Mainz; 3:Brain Imaging Center, University of Frankfurt

Saturday, June 24th, 17:30-19:30: Poster Session 1

Until recently, the term "mind reading" in a scientific context usually referred to a subject's theory of mind (TOM) capability to discern a conspecific's mental state. However, the increasing understanding of methods of neuroimaging, especially fMRI, have led investigators to infer the content of mental images, effort to control racial prejudice in social interaction, imagery of bodily movement, the strategy to count a number of visual objects, lie detection, and even the orientation (Haynes & Rees 2005) and colour (Kamitani & Tong 2005) of subjectively experienced bistable stimuli from aggregated or single-trial blood oxygen level dependent (BOLD) signals. Especially the last two studies are of immediate importance for consciousness research, as they provide means to access a subject's first-person state from a scientific third-person perspective and are therefore a first step in the direction of breaking the neural code of representation. Nevertheless, what can count as true mind reading requires conceptual clarification, because the distinction between non-private (e.g. stimulus-related) and private (e.g. imagery, thought, attention) mental states plays an important role. Further, it is a qualified question in how far these results have to be considered rather as a mere reproduction or retro-diction of previous findings than a genuine prediction, because virtually every imaging paradigm with statistically significant findings can trivially be used to infer a subject's state from the retrospective view. After summarizing the above mentioned studies, I suggest a theoretical framework providing necessary and sufficient conditions for weak vs. strong forms of mind reading. I then evaluate the presented studies by means of this newly introduced conceptual distinction to answer the question of whether true mind reading is already possible or remains - for the time being - mere fiction.

Me-ishness. A Kantian explanation of subjektive character.

Tobias Schlicht
University of Tübingen

Sunday, June 25th, 17:30-19:30: Poster Session 2

To explain the subjective character of phenomenal consciousness is to explain the "me-ishness" (Block 1995) of conscious experiences, i.e. the fact that they are something "for me", their subject, that it is somehow for me as their subject to undergo them. Higher-Order (HO) Theories (Rosenthal 1997, Lycan 1996) specify what it means for a mental state M to be conscious in terms of some form of self-awareness, i.e. the subjects' (higher-order) awareness that it is in M. But these theories typically postulate a distinct and separate mental state (M*), either thought-like or perception-like, which is supposed to explain what it's like to be in the first-order state M. Of the many objections which have been raised against HO theories, the most pressing have to do with this theoretical posit of a distinct second state M*. In the paper, I try to show how these problems can be avoided by an approach which is more Kantian in spirit. On this account, no second-order state is needed to explain my conscious experience of M. Rather, the condition which M has to meet in order to be conscious (something "for me"), is being part of a "global" mental state (Brook 2001), i.e. a combination (or network) of mental representations which amounts to the "total state of consciousness" (Bayne/Chalmers 2003) the subject is in at a time. Kant calls this the unity of self-consciousness. Accordingly, the neural substrate of M has to be part of a "cluster"

(Edelman/Tononi 2004) of neuronal assemblies which underlie the subjects' "total state of consciousness" and which have to be integrated by some process or other to display a certain unity. This "cluster" might be comparable to what Damasio (1999) calls the "proto-self", a biological signature of the subject's "core consciousness", which carries its first-person perspective. On this account of subjective character, the unity of experience and its neuronal equivalent play a crucial role. With this in hand, a couple of otherwise perplexing phenomena regarding self-consciousness such as self-reference, failure of error through misidentification, and the sense of unity of self over time can be explained.

Measuring unconscious cognition: Data or dissociations?
Thomas Schmidt
University of Giessen, Germany

Sunday, June 25th, 17:30-19:30: Poster Session 2

Unconscious cognition is traditionally measured by comparing direct (D) and indirect (I) measures of visual performance, e.g., prime identification and priming effects. Exploring several types of dissociations between D and I, Schmidt & Vorberg (in press) argue that the strongest evidence for unconscious perception comes from data patterns where an experimental manipulation has opposite effects on D and I ("double dissociation"), as in increased response priming under conditions of decreasing prime visibility (Vorberg et al., 2003). Surprisingly, such double dissociations do not require the prime to be unconscious even under very mild measurement assumptions. At the same time, recent data indicate that these same response priming effects are exclusively mediated by neuronal feedforward processing (Schmidt, Niehaus, & Nagel, submitted), probably reflecting an early phase of visuomotor feedforward processing that is initially devoid of intracortical feedback (Lamme & Roelfsema, 2000). This finding is potentially interesting because many recent models argue that feedback and reentrant processes are a necessary condition for awareness to arise. In my contribution, I would like to discuss future ways for investigations into unconscious processing: first, by establishing strong dissociations between direct and indirect measures under minimal measurement assumptions, and second, by identifying necessary conditions for awareness and then applying measures of visual that are known to violate these conditions.

The non-conceptual Intentional content of the bodily experience of acting
Michael Schmitz
Universitaet Konstanz Fachbereich Philosophie

Saturday, June 24th, 17:30-19:30: Poster Session 1

In recent years, there has been a resurgence of interest in the experience of acting, and it is increasingly seen that several components or kinds of this form of consciousness need to be distinguished (e.g. Bayne & Levy *to appear*). The contribution focuses on the immediate experience of bodily action, of moving one's body and of physically acting on things in one's proximal environment – as opposed to the consciousness composed of conscious intentions and plans assigning a particular purpose to a movement. Because of its irreducibly active phenomenology, motor experience is an essential component of 'basic' or 'minimal' actions, supplying an answer to Wittgenstein's question about what constitutes the essential difference between the arm merely going up and the agent raising it. That motor experience is active in turn means that its intentional content presents its object, the bodily movement, as something caused by the experience itself, and thus with a world-to-mind direction of fit (Searle 1983). This view is briefly defended against objections based, for example, on the problem of mental causation, or on the fact that motor experience presents the bodily movement as being simultaneous with itself.

Then the hypothesis that the Intentional content of motor experience is non-conceptual is introduced. It is argued that this hypothesis can account for the essential difference between conceptually structured intentions and plans and the more basic, onto- and phylogenetically prior, motor experience. Arguments parallel to those commonly given for the view that the Intentional content of perception is non-conceptual are given with regard to action. For example, the Intentionality of actions like tying one's shoes seems just as recalcitrant to complete verbal specification as the Intentionality of perceiving a sunset. The non-conceptual representations are 'richer' or 'denser' in both cases. Finally, the hypothesis that intentions and the experience of acting have different representational formats can also account for actions occurring without corresponding intentions, or even in the face of contrary intentions, like, for example, in utilization behaviour or Anarchic Hand syndrome. Actions are intention-independent in a sense parallel to the sense in which perceptions have sometimes been described as belief-independent.

Intact consciousness and cerebral functioning in Locked-in syndrome?

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Sunday, June 25th, 14:00-16:00: Concurrent Session 2.3

INTRODUCTION: Locked-in syndrome (LIS) is defined by anarthria and total paralysis except for blinking and vertical eye movements. This syndrome is caused by a brainstem lesion in the ventral pons. LIS patients are fully conscious of environment and self but may superficially resemble the vegetative state.

OBJECTIVE: We here present electrophysiological, functional neuroimaging and behavioural assessments evaluating cognitive functioning in LIS survivors.

METHODS AND RESULTS: The Bispectral index (BIS;which reduces the information contained in the EEG to a continuous online a number ranging from 0 - isoelectric to 100 - fully conscious) was measured in 3 LIS patients and compared to 10 vegetative patients. Mean BIS values were significantly higher in LIS (94 ± 3) as compared to vegetative patients (60 ± 14). Second, we recorded cognitive evoked potentials (P3 response) in response to the patient's own name as compared to other names. In 4 chronic LIS patients, a P3 component was identified. The P3 response to the own name was however also observed in 3 out of 5 studied vegetative patients. Third, 18F-fluorodeoxyglucose positron emission tomography (PET) data from 12 LIS patients were compared to those obtained in 35 patients in a vegetative state. In LIS, no significant hypometabolism was observed in cortical grey matter whereas vegetative patients systematically showed a metabolic dysfunction in the frontoparietal associative network. Finally, a detailed neuropsychological testing was adapted to an eye-coded communication and used to assess short and long term memory, attention, executive functioning, language and verbal intelligence in 11 LIS patients. Compared to 40 matched healthy controls (responding solely by eye movements), patients showed no significant cognitive dysfunction when LIS was caused by pure brainstem lesion.

CONCLUSION: Overall, our data confirm intact cognitive functioning in LIS survivors. Therefore, even if these patients are totally dependent for all self-care, they are fully conscious and should not be denied the right to make choice concerning their own life.

"Something happened": Gamma oscillations, awareness, and attention without awareness

in a hemianopic patient
Aaron Schurger
Princeton University

Sunday, June 25th: 9:00-12:30: Symposium 2

In studies of sensory awareness, it is difficult to distinguish correlates of awareness in particular from correlates of perception in general (on the assumption that perception can occur both with and without awareness). In order to isolate the neural dynamics associated uniquely with awareness it is necessary to find evidence of perception-without-awareness, so that the accompanying neural activity can be compared to that associated with perception-with-awareness of the same sort of stimulus. We present a study of hemianopic patient GY in which we tested the relationship between induced gamma-band oscillations and awareness, with discrimination accuracy serving as an independent measure of perception-without-awareness.

We tested the hypothesis that the presence of gamma oscillations (~ 30 - 80 Hz) signals the entry of a neural representation into awareness. Hemianopic patient GY sometimes reports an awareness 'that something happened' in his blind visual hemifield, in response to stimuli of sufficiently high contrast, although he may deny 'seeing' anything. At lower contrast levels GY denies any awareness, but may continue to exhibit greater-than-chance accuracy (blindsight). We tested GY on an orientation-discrimination task using stationary stimuli at a fixed near-threshold level of contrast, to which GY sometimes responded 'aware' and sometimes 'unaware'. We recorded brain activity using magnetoencephalography (MEG) in order to determine the relationship between local induced gamma-band oscillations and awareness. GY's accuracy was significantly greater than expected by chance and no different whether or not he reported awareness of the stimulus. Oscillatory activity in the gamma band (44-66Hz) over the left occipito-parietal region was not correlated with accuracy or reaction time, but was significantly correlated with awareness.

Another difficulty in the study of sensory awareness is that awareness is (at least conceptually) confounded with attention: where there is awareness there is attention (to the object of awareness). However, there is now evidence demonstrating that the converse is not necessarily true. Two recent studies involving patient GY provide strong evidence for visuo-spatial attention without awareness. So, within his blind hemifield this patient can exhibit awareness (presumably) with attention, and attention without awareness. A subsequent study of ours (in preparation) capitalizes on the dissociation of visuo-spatial attention and awareness in this patient in an attempt to identify the neurophysiological responses associated with each of these phenomena independently.

* This work was done in collaboration with Alan Cowey and Catherine Tallon-Baudry.

Brain correlates of conscious perceptions
Philippe Schyns (1), Marie Smith (1), and Frederic Gosselin (2)

Affiliations: (1) University of Glasgow; (2) University of Montreal

Sunday, June 25th, 17:30-19:30: Poster Session 2

Transient periods of synchronized oscillating neuronal discharges in the brain have been proposed to support the discrete perceptual moments underlying conscious visual experience. However, the information content of these perceptual moments remains a critical challenge to the understanding of consciousness. We uncovered this information content in four observers who consciously perceived each interpretation of the ambiguous Dali painting 'Slave Market with the

Disappearing Bust of Voltaire'. For each individual observer, we isolated the stimulus Spatial Frequency (SF) features underlying their overt judgments of the input as 'the nuns' and 'Voltaire'. Every 2 ms between stimulus onset and overt response, we derived the sensitivity of the observer's oscillatory brain activity (in the theta, alpha and beta bandwidths) to these SF features. Then, in each bandwidth, we estimated the moments (between stimulus onset and perceptual judgment) when perception-specific SF features were maximally integrated, corresponding to perceptual moments. We show that the centroparietal beta oscillations support perceptual moments underlying the conscious perception of 'the nuns,' whereas theta oscillations support the perception of 'Voltaire'. For both perceptions, we reveal the specific information content of these perceptual moments.

Spatial Awareness and Fringe Consciousness
Murray Shanahan
Imperial College London

Sunday, June 25th, 17:30-19:30: Poster Session 2

This paper outlines an account of conscious spatial awareness, based on global workspace theory, but also drawing on the hypothesis that conscious content has a focus-fringe structure, according to which fringe consciousness carries hints of material that can be brought into focal consciousness if required. The main challenge is to explain the fact that our conscious awareness of space seems to encompass regions we cannot immediately see or touch, such as the street around the next corner or the back of an object on our desk. We don't, of course, perceive these regions of space directly, but we are aware that they're out there, and we know something of the possibilities for action they afford (the relevant "sensorimotor contingencies"). According to the present paper, accompanying the focal awareness of a consciously perceived surface there is always a fringe-borne awareness of the sensorimotor possibilities afforded by the three-dimensional configuration of objects to which that surface belongs. To accommodate such a notion within global workspace theory, the contents of the fringe must, like the contents of focal consciousness, be broadcast. So the question arises of how a whole set of hints of potential sensorimotor trajectories might be encoded and disseminated. One possible answer appeals to the idea of encoding spatial structure in time. Instead of simultaneously broadcasting a set of spatially organised features (the different facets of a solid object, say), spatial features are broadcast one at a time in rapid series (facet A, facet B, facet C, and so on), with each transition from feature x to feature y accompanied by an echo of the motor activity that would lead from the perception of x to the perception of y (such as turning an object in the fingers). When conjoined with a mechanism for simulating interaction with the environment by means of an internally closed sensorimotor loop (Shanahan, 2006), this temporal encoding of the fringe (which is reminiscent of certain proposals for solving the binding problem) may also explain the "systematicity" of conscious thought, that is to say the capacity for its elements to be assembled in arbitrary combinations.

Using phenomenal concepts to explain away the illusion of distinctness
Nicolas Shea
Faculty of Philosophy, University of Oxford

Monday, June 26th, 14:00-16:00: Concurrent Session 3.2

Given that conscious experiences are almost certainly physical things, it is odd that many people have the feeling that the subjective character of their own experiences could not possibly be a physical property. That is the intuition of distinctness. Its appeal is reduced if we can show why people should be so wedded to an illusory appearance of the distinctness of phenomenal and

physical properties. A promising route appeals to phenomenal concepts - the concepts of experiential properties that we acquire by generalising over the subjective character of our own experiences. Loar (1990) and Papineau (2002) have explained the intuition as follows. Thinking with a phenomenal concept is necessarily accompanied by a recreation of the experience to which it refers. Since physical-functional concepts do not have an experiential aspect, people are unwilling to accept that they could refer to the same properties as phenomenal concepts, which do. However, research on concepts in general suggests that their exercise is always accompanied by the reactivation of perceptual experiences (Barsalou 1999). And even if these experiences are attenuated compared with online perception, they are surely at least as conscious as the experiences which accompany more abstract uses of phenomenal concepts, as when I think I am not now having the <experience of seeing red> (where <É> refers to the exercise of a phenomenal concept). This paper offers an alternative explanation. Regular concepts pick out their referents in ways that allow us to acquire additional means of identification. By contrast, a phenomenal concept is acquired by generalising over the subjective character of our own experience. Thus, there is no ready way for us to learn additional means of identifying the referent. Therefore, if science offers an alternative physical-functional means of identification, we have no way of keeping hold of the experience picked out by the phenomenal concept to see that the physical-functional description picks out it. This account makes an empirical prediction: the intuition of distinctness will be less pronounced in people who do have the chance to reidentify their own experiences by means of physical-functional properties, through ERP, fMRI, TMS, etc. on themselves.

Iconic memory revisited: a plea for a distinction between a retinal and cortical icon
Ilja Sligte, Victor Lamme, and Steven Scholte
University of Amsterdam

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.2

The common conception of visual memory is one which encompasses a very short (~300 ms) sensory store with unlimited capacity, and a durable, limited-capacity working memory store. We plea for a distinction in this short sensory store between a retinal icon and a cortical icon. In our experiments, we modified the change blindness (or delayed match-to-sample) paradigm used by Landman et al. (2003) by introducing cues during the interval. Cues could be delivered 10 ms after off-set of the sample display, 1000 ms after off-set of the sample display or 100 ms after on-set of the match display. We varied the usability of context information in the sample display (exp.1), set size (4 - 32 figures, exp. 2), the extent to which the stimuli evoke retinal afterimages (high-contrast black-white vs. isoluminant red-grey; exp. 2), and the length of the interval between off-set of the sample display and the application of the cue (exp. 3). Furthermore, we applied masks and brief flashes of light before cuing (exp.4). Our combined experiments argue for a tripartite division of sensory memory: 1. the traditional working memory store, 2. a 'cortical icon' that has much higher capacity than working memory, is not overwritten by a uniform flash of light, and can still be accessed after several seconds, and 3. a 'retinal icon' of even higher capacity, that lasts only several milliseconds and is overwritten by an uniform flash of light.

How an animal or robot with 3-D manipulation skills experiences the world
Aaron Sloman
School of Computer Science, University of Birmingham

Saturday, June 24th, 17:30-19:30: Poster Session 1

The best way for scientists to explain consciousness is to drop all use of the noun and explain everything else. That presupposes that we can identify what needs to be explained -- and some

things are far from obvious. Only when I started working in detail on requirements for a human-like robot able to manipulate 3-D objects using vision and an arm with gripper did I notice what should have been obvious long before, namely that structured objects have 'multi-strand' relationships not expressible as R(x, y) because the relation between x and y involves many relations between parts of x and parts of y. Hence, motion of such objects involves 'multi-strand' (concurrent) processes: many relationships change in parallel -- e.g. faces, edges, corners of one block may all be changing their relationships to faces edges and corners of another (and things get more complex when objects are flexible, e.g. your hand peeling a banana or a sweater being put on a child). Thus seeing what you are doing in such cases can have a kind of complexity that appears not to have been noticed previously because of too much focus on simpler visual tasks like recognition and tracking. I'll show why we need to postulate mechanisms in which concurrent processes at different levels of abstraction, in *partial* registration with the optic array (NOT the retina, since saccades, etc., occur frequently) are represented. Nothing in AI comes close to modelling this, and it seems likely that it will be hard to explain in terms of known neural mechanisms. The talk will explain some of the implications for human development, understanding of causation, and computational modelling, and spell out requirements to be addressed in future interdisciplinary research, explaining deep connections with Gibson's notion of affordance, and its generalisation to 'vicarious affordance'. The evolution of grasping devices that move independently of eyes (i.e. hands instead of mouth) had profound implications -- undermining claims about sensory-motor contingencies -- also suggesting that mirror neurons should have been called 'abstraction neurons'. Some of the ideas are sketched here: http://www.cs.bham.ac.uk/research/projects/cosy/papers/#dp0601 COSY-DP-0601 'Orthogonal Competences Acquired by Altricial Species' === Aaron Sloman www.cs.bham.ac.uk/~axs

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The Role of the Implicit Sequence Learning in the Task Set Switching Paradigm

Kamila Smigasiewicz, Michal Wierzchon, and Blazej Szymura
Jagiellonian University, Institute of Psychology, Cracow, Poland

Sunday, June 25th, 17:30-19:30: Poster Session 2

Abstract Submission: The aim of the experiment was to explore the influence of the implicit sequence of the tasks on the task set switching efficiency. The procedure combines the task set switching and implicit learning paradigms. It was assumed that task sequence can be acquired implicitly (like in sequence learning paradigm subjects will not report any knowledge about the regularity), thereupon will automatically activate the appropriate task set before the stimulus presentation. It was hypothesized that the automatic activation of the task set on the basis of implicit expectations about upcoming task can reduce the switch costs. All participants switched between four tasks. Similar to the sequence learning experiments design the experimental session consisted of 15 blocks. In the 13 blocks the tasks alternate on the basis of the fixed sequence. In the 14th block the different task sequence was used. If implicit sequence learning occurs the gradual reduction of the switch costs should be observed. The switch costs should increase in the 14th block - the switch costs should be the same as in the beginning of the experimental session. Additionally the awareness of the rules of the tasks order was explored. After experimental session participants were asked to reproduce the task sequence used in the experiment. The results are under analyses.

Uncertainty Monitoring and Metacognition by Humans and Nonhuman Animals

J. David Smith
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Saturday, June 24th: 16:30-17:30: Keynote Lecture

Humans have the capacity to feel consciously uncertain and to know when they do not know. These feelings and the responses to them ground the research literature on uncertainty monitoring and metacognition (i.e., cognition about cognition). It is a natural and important question whether nonhuman animals share this sophisticated cognitive capacity. Indeed, the study of animal metacognition could rival the study of animal language and tool use for its potential to reveal basic continuities or discontinuities between human and animal minds. I will summarize existing and new research confirming animals' capacity for uncertainty monitoring. This research includes perception, memory, and cognitive paradigms and dolphin, monkey, and human participants. This research produces some of the strongest existing human-animal performance similarities-there is a strong isomorphism between the uncertainty-monitoring capacities of humans and animals. Additional research shows that low-level, associative interpretations are insufficient to explain what animals do in these tasks. Rather, the results show that animals have functional features of or parallels to human metacognition and human conscious cognition. However, important issues remain for discussion, relating to which facets of the whole suite of human metacognition animals have and lack, relating to the cognitive level at which animals monitor their uncertainty and respond adaptively to it, and relating to the role of consciousness or protoconsciousness in supporting animals' metacognitive performances.

What can unconscious perception tell us about consciousness?

Michael Snodgrass
University of Michigan

Sunday, June 25th: 9:00-12:30: Symposium 2

As Baars (e.g., 1994; 2003) pointed out, to study consciousness we must treat it as a variable (i.e., vary its presence vs. absence). This turns out to be deceptively difficult, however, because to do so requires both that consciousness be adequately defined and that the formidable methodological problem of ruling out weak conscious explanations for putatively unconscious effects is overcome. In this presentation, I'll suggest that unconscious perception research, in part by virtue of its long and controversial experience with these issues, can indeed ultimately illuminate fundamental aspects of consciousness itself.

Unconscious perception researchers operationalize consciousness in one of two ways. The most obvious and perhaps intuitively appealing approach is to manipulate stimulus intensity and simply ask participants when the relevant stimuli can no longer be seen. Because such methods focus on self-reports of phenomenal states, they are called subjective threshold approaches (Cheesman & Merikle, 1984). Notably, however, discrimination performance robustly exceeds chance under such conditions, raising the possibility that subjective effects may be low-confidence but nonetheless weakly conscious. In contrast, objective threshold approaches (e.g., Greenwald, Klinger, & Liu., 1989) further degrade exposure conditions until discrimination performance no longer exceeds chance. Doing so, however, apparently risks eliminating not only conscious but unconscious influences as well. Methodological issues aside, however, most investigators assume that both methods index a single underlying unconscious process, with objective methods simply yielding weaker effects (vs.subjective methods; cf. Merikle, Smilek, & Eastwood, 2001).

In contrast, however, we (e.g., Snodgrass & Shevrin, in press) argue that objective and subjective threshold methods index separate, qualitatively distinct unconscious processes, which in turn imply two not one, kinds of consciousness: 1) Phenomenal consciousness, which refers to experiential contents and qualia per se; and 2) Reflective consciousness, a higher-order metacognitive process which involves reflecting upon and evaluating various phenomenal contents (cf. Block, 2001). In this model, all reflectively conscious perceptions are also

phenomenally conscious, but only some phenomenal contents are also reflectively conscious at any given time. Similarly, from this perspective, objective methods index phenomenal consciousness, whereas subjective methods index reflective (but not phenomenal) consciousness. Hence, it is vital that the methods be carefully distinguished, not conflated.

Evidence is presented supporting the proposed model, including work supported by the Mind Science Foundation directly comparing objective and subjective effects in the same participants. General implications for consciousness studies are discussed; for example, many paradigms may actually concern reflective, not phenomenal, consciousness (e.g., exclusion, change blindness, blindsight). The relationships between consciousness and control and consciousness and attention are also considered.

Incorrect trial analysis as a method of unconscious perception research: Preliminary study of digit identification task

Dalibor Spok
Institute of Psychology, Academy of Sciences of the Czech Republic, Brno, The Czech Republic

Sunday, June 25th, 17:30-19:30: Poster Session 2

Several experimental paradigms have been developed in the area of unconscious perception research - e.g. dissociation paradigm, qualitative differences, indirect-without-direct effect. Finding reliable evidence of dissociation between awareness and behaviour is their common topic eliciting controversy among researchers: Many studies have been criticized for not being sensitive or exhaustive enough to prove stimulus awareness. Jacoby's process dissociation methodology artfully bypasses the awkward threshold setting procedure by trying to identify situations, in which controlled and automatic processes are in concord and in contrast. In spite of the elegance of this solution, the underlying assumption of independency of both types of processes is questionable. Presented paper proposes analysis of error trials as an alternative approach trying to avoid proving-unawareness problem. In case the subject correctly identifies masked stimuli, this response can be accounted for by subsequent awareness, as well as unconscious processing. However, if the subject misidentifies targets, we can assume the absence of or very limited awareness not sufficient for correct identification. Presented approach investigates errors in target identification and examines the influence of target on choosing the incorrect response: We can surely assume the influence of structural target properties (and fragmentary awareness of these properties). The evidence of determination of incorrect response by semantic properties of misperceived targets would be of more concern. The proposed approach is illustrated by a preliminary study of identification of masked digits using forced multiple-choice method and presentation times that elicited substantial number of incorrect trials. The analysis of incorrect responses shows structural and semantic influences of misperceived targets on responses and tentatively tries to separate both (semantic and structural) processes. This separation is of significant importance, because we would thus demonstrate the particular type of semantic processing, which is both effective in the choice of incorrect response and on the other hand not sufficient for the choice of correct response. However, more studies must be conducted to unequivocally prove this separation.

Framed in space? Object-based effects from a new visual attention paradigm.

Michael Spratt, Anne Aimola Davies, and Martin Davies
The Australian National University

Sunday, June 25th, 17:30-19:30: Poster Session 2

A new attention precueing paradigm was developed to investigate object-based and space-based effects when shifting attention in the visual field. The influential Egly, Rafael, Driver and Starrveveld (1994) paradigm showed that a reaction time (RT) cost was derived when attention was shifted between objects, relative to within-object shifts, even though the spatial distance remained constant. The new "curvangle" paradigm differs from the Egly paradigm in that it allowed shifts of attention to be made without the confounding effects of variable eccentricities or irrelevant object boundaries. Two versions of this paradigm were used. In one, the displayed objects crossed both vertical and horizontal meridians and, in the other, the meridians were not crossed. RT benefits of cue validity were obtained, indicating that attention was successfully shifted to the cued location. In the invalid-cue condition, the expected RT benefits of within-object shifts of attention compared to between-object shifts were also observed. However, this within- versus between-objects benefit was only apparent in the version of the paradigm in which displayed objects crossed the meridians. The findings from this study are interpreted in terms of multi-level effects of framing. First, the "curvangle" object itself acts as a frame of reference for the cue and target locations internal to it, as is indicated by the significant within-object benefit in the crossed-meridian condition. Second, the loss of the within-object benefit in the non-crossed-meridian condition implies that another factor is at work. Here, we tentatively suggest a role for symmetry theory (Palmer 1992), where the screen itself determines a second frame of reference so that the alignment of displayed objects relative to the screen has to be considered. In addition to the effects of framing, overall space-based effects were found with RT benefits for stimuli presented in the lower versus upper hemifield and also for stimuli presented in the lower half of each hemifield.

Brain networks with distinct spatial and temporal structure are selectively modulated by consciousness and attention

Ramesh Srinivasan (1) and Paul Nunez (2)
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Saturday, June 24th, 17:30-19:30: Poster Session 1

We have carried out a number of studies of the relationship between brain dynamics and conscious perceptual experience by using the 'frequency-tagging' method and EEG and MEG recordings of steady-state neural responses. In these studies, we have demonstrated multiple brain networks that can synchronize to a flickering visual stimulus. By varying the flicker frequency by as little as 1 Hz (over the 2-15 Hz range) we can dramatically alter the amplitude, phase, and spatial distribution of EEG and MEG signals measured over the entire brain in a narrow band centered on the flicker frequency. This suggests that we are measuring resonance in large-scale brain networks; different flicker frequencies preferentially drive different cortical networks. We present the results of studies of conscious perception of a visual flicker during binocular rivalry and selective attention to a visual flicker in the context of this physiological framework. In both types of experiments we find evidence of networks involving specific cortical areas, such as occipital-frontal and occipital-parietal networks. We also find evidence of large-scale networks with global spatial structure. Each of these networks has different preferred frequencies, and can be easily segregated in EEG and MEG recordings. When attention is directed to a flickering stimulus, or when a flickering stimulus becomes dominant (i.e., consciously perceived) during binocular rivalry, occipital-frontal networks are the most sensitive to the conscious percept, and phase lock to the consciously perceived or attended flicker. In contrast, networks exhibiting strong responses in parietal cortex appear insensitive to the conscious percept during rivalry and do not phase lock to the consciously perceived flicker. Furthermore, in studies of attention, we have identified a global network that responds preferentially to unattended stimuli with the strongest modulation in parietal cortex. Apparently, some brain networks are sensitive to consciousness but others are not.

Behavioural and Pupillary Indices of Own-Voice Recognition
Petra Stoerig, Guido Hesselmann, and Katrin Schlegel
Institute of Experimental Psychology, Heinrich-Heine-University Düsseldorf, Germany

Monday, June 26th, 14:00-16:00: Concurrent Session 3.3

Can people recognize their own voice? Do their pupil responses differentiate it from familiar and unfamiliar same-gender voices? To answer these questions, we studied 14 female subjects who listened to a series of 250 recorded two-syllable nouns of similar usage frequency presented via stereo headphones. The same 50 words were spoken in the own, in a familiar, and in three unfamiliar voices, and subjects had to categorize the voices accordingly as 'own', 'familiar' or 'unfamiliar'. Throughout the experiment, their pupil responses were recorded with an infrared-sensitive video system (Iview). Following artefact removal, the horizontal pupil diameter values recorded for 2.5s from stimulus onset were z-transformed and baseline corrected with respect to the 100ms time interval preceding stimulus presentation. Traces were sorted, averaged, and compared according to stimulus and response type. Our results show that subjects performed the categorization task at >90% correct; no significant difference was obtained between stimulus categories. We assume that the extensive experience we have acquired with our taped voices accounts for the highly proficient own voice recognition not reported in older studies (eg. Holzman PS et al., 1966). The pupil data reveal that a late (~2s) dilation distinguished the own voice both from familiar and unfamiliar voices whereas the latter did not differ from one another. This effect was not attributable to voice familiarity or frequency, because words were spoken in the own and in a familiar voice, and both were equiprobable. Moreover, comparison of pupil responses from 'own'/own, 'unfamiliar'/unfamiliar, and 'own'/unfamiliar trials revealed that the correct 'own'/own response yielded significantly larger dilation at ~1.5s post-stimulus onset than the false 'own'/unfamiliar one; in contrast, pupil responses for the latter response-stimulus combination did not differ significantly from those of 'unfamiliar'/unfamiliar trials. Together, these results demonstrate that the own-voice recognition effect must be predominantly stimulus- rather than response-driven. A late dilation indicative of self-recognition is a novel psychosensory pupil response.

Distributed representations of task-relevant information in human prefrontal cortex
Mark Stokes, Rhodri Cusack, and John Duncan
CBU, Cambridge

Saturday, June 24th, 17:30-19:30: Poster Session 1

Understanding high-level executive processing within the human prefrontal cortex (PFC) is of central importance to the neurobiological study of consciousness. Although recent functional magnetic resonance imaging (fMRI) studies have sought to segment PFC into distinct subregions associated with different sub-units of executive function, a recent meta-analysis of fMRI studies depicts a more generic processing space within the PFC (Duncan and Owen, 2000). Rather than dedicated sub-divisions, it is suggested that a distributed network within the PFC rapidly adapts to code task-relevant information (Duncan, 2001). Consistent with an adaptive coding model of PFC function, monkey neurophysiology studies reveal task-relevant neural representations that are distributed throughout the PFC with no overall spatial specificity (Freedman et al, 2003). In human studies, however, evidence of adaptive coding has remained limited by the coarse resolution of standard neuroimaging analysis techniques because mean changes in brain activity cannot differentiate overlapping representations. In the present study, we applied a multivariate pattern recognition procedure to resolve patterns of neural activity representing task-relevant activity in the human PFC. Within an event related fMRI design, participants were presented with faces stimuli consisting of either European males, European females, Japanese males or Japanese

females. Participants were instructed to categorize faces according to either gender (male or female) or ethnicity (Japanese or European) depending on task-context (gender task or ethnicity task). Using a non-linear classifier (support vector machine), we could reliably predict whether observed fMRI data related to either of the two target categories (e.g., male or female) within the relevant, but not irrelevant, task dimension (e.g., gender). This evidence supports the role of the PFC in high-level selection and task-relevant representations, and is consistent with an adaptive coding model of PFC in which functionally distinct, although spatially overlapping, neural representation flexibly code task-relevant information.

Typicality and similarity in perceptual categorization.
Tamami Sudo and Ken Mogi
Tokyo Institute of Techonology & Sony Computer Science Laboratories

Sunday, June 25th, 17:30-19:30: Poster Session 2

The development of conscious experience in humans is tightly coupled with that of language. Concepts such as time, space, and objects are essential ingredients of consciousness. It is known that infants only a few months old are able to separate complex visual stimuli into generic object categories (Eimas and Quinn 1994). In addition, children as young as 1 year old are able to recognize the various objects as belonging to a single category, even though they have various attributes such as colour, texture and size (Sudo and Mogi, 2005). Within the field of cognitive psychology and cognitive linguistics, categorization has become a major field of study, where the "prototype effect" is focused as the characteristic features of categorization (Rosch and Mervis, 1975). There are two possible cognitive processes of linguistic categorization within the domain of prototype effects. One possible scenario is that certain members of the categories are derived from the similarity with the most representative members of a category, i.e., "prototypical members". Alternatively, auditory cues (such as the name of an object) can play an essential role, where the coupling of each category membership with relevant labels can be traced to the "symbol grounding" problem. Here we report a series of experiments investigating how infants and adults perceive the environment in terms of categorization. We focused on two major parameters, "typicality" and "similarity" in the perceptual categorization both in infants and adults. Using the preferential looking paradigm (infants) and categorical judgment (adults), we derived a continuous parameter measures for the "typicality" and "similarity" of objects based on the subject's behaviour. Based on the result, we discuss how these "algebra of concepts" underlies the fundamental aspects of conscious experience, such as the identities of sensory and motor information and the judgment of sameness and similarity in the interaction with the environment. Finally, we point out some constraints our results put on the general relationship between consciousness and language.

Attention modulates sensory-motor processes that do not support perceptual awareness.
Petroc Sumner
Cardiff University

Saturday, June 24th, 14:00-16:00: Concurrent Session 1.1

Attention modulates visual perception, and has generally been considered inextricably linked with conscious awareness: we become aware of stimuli as we attend to them, and we attend to stimuli as we become aware of them. Recent evidence suggests that attention can also modulate the effects of stimuli that remain invisible, and a natural explanation would be that attention enhances the sub-threshold perceptual representation of such stimuli, but this enhancement is not always sufficient to boost perceptual processing over the conscious threshold. However, there is also the intriguing possibility that attention may modulate neural processes that are entirely separate from

those supporting perceptual awareness - neural processes that do not create awareness however much they are enhanced. Here we provide evidence in support of this hypothesis by showing that attention cueing can modulate the behavioural response to invisible masked-prime stimuli in a way that is distinct from enhancing their visibility. Thus attention, in addition to regulating what we perceive, seems also to influence our behaviour through neural processing that is unrelated to conscious awareness.

Both implicit affect and moods moderate intuitive choice

Joanna Sweklej (1), Robert Balas (2), Grzegorz Pochwatko (2), and Malgorzata Godlewska (1)
(1) Warsaw School of Social Psychology; (2) Polish Academy of Sciences

Sunday, June 25th, 17:30-19:30: Poster Session 2

Presented studies address the question of affective influences on intuitive judgment regarded as a process characterized by the absence of consciously available premises of the decisions at hand. The first experiment included a manipulation the affective valence (positive vs. negative vs. neutral) of the words that were the solutions of word triads. The results show that both positive and negative affect facilitates giving accurate solutions to coherent triads. However, when no solution was explicitly given only positive affect had facilitating role in intuitive judgments of coherence. Thus implicitly induced positive affect contributes both to insight and intuitive 'hunches' whereas negative affect facilitates only insight into solutions of triads. The goal of Experiment II was to determine whether explicitly induced affective states have similar effects on intuitive judgment. After mood induction procedure that involved self report of positive, negative, or neutral life-events, participants were asked to give solutions to sequentially presented word triads. When no solution was given they were encouraged to guess whether a particular triad was solvable or not. Since the affective valence of the solutions was also manipulated we expect more accurate intuitive judgments of coherence in case of congruency between the valence of the solution and induced mood. Also, we predict that facilitative effect of positive affect on intuitive judgment will be replicated. The results are being analysed.

Evaluative conditioning does require attentional resources and working memory capacity.

Jan Swierszcz and Robert Balas
Warsaw School of Social Psychology

Saturday, June 24th, 17:30-19:30: Poster Session 1

The aim of the presented study was to determine whether evaluative learning is a fully automatic process that requires minimal attentional resources. In a standard picture-picture paradigm neutral facial expressions (conditioned stimuli) were paired either with negative or positive facial expressions (unconditioned stimuli) and repeatedly presented to participants under different levels of working memory loads. N-back procedure that required constant conscious monitoring was used as a secondary task. The manipulation of attentional resources involved asking to respond every time the current digit matched the one presented either 2 or 3 positions before. Control group performed both tasks in turns, i.e. under single task conditions. Evaluative conditioning was assessed by a direct evaluative judgments as well as an indirect picture priming procedure. The data shows that the conditioning effect was present in zero load and medium load conditions. However, when most resource consuming conditions were applied the evaluative conditioning effect was not detected. This suggest that although evaluative learning may operate largely without attentional resources it is not totally resource-free process.

Strength of early visual after effects is correlated with changes in visual awareness

Duje Tadin and Randolph Blake
Vanderbilt Vision Research Center

Saturday, June 24th, 17:30-19:30: Poster Session 1

The strength of visual adaptation presumably reflects the strength of associated neural activation. To measure adaptation strength under variations in visual awareness, we manipulated phenomenal invisibility of adapting stimuli using binocular rivalry and visual crowding. Binocular rivalry and crowding are two extensively studied visual phenomena that are often used to "erase" visual stimuli from awareness. Results showed that both the threshold elevation after effect (TEAE) and the translational motion after effect (MAE) were substantially reduced during binocular rivalry and during crowding, but only if the adapting contrast was low enough to prevent after effect saturation. This suggests that the previous results reporting the failure of rivalry and crowding to affect early visual after-effects (He et al., 1996, Nature, 383, 334-337; Blake & Fox, 1974, Nature 249, 488-490) may be explained by after effect saturation at high adapting contrasts. Importantly, after effect reduction was correlated with the proportion of time that the adapting stimulus was removed from visual awareness. These findings conflict with established reports, whose results formed major psychophysical evidence against the direct role of V1 in visual awareness. Additionally, our findings indicate that neural events underlying rivalry and those underlying crowding are inaugurated at an early stage of visual processing, since both the threshold elevation after effect and the translational motion after effect arise, at least in part, from adaptation at the earliest stages of cortical processing.

The Medium and the Message: Non-conscious processing of emotion from facial expression and body language in blindsight

Marco Tamietto (1), Luca Latini Corazzini (1), Giuliano Geminiani (1), Lawrence Weiskrantz (2), and Beatrice de Gelder (3) (4)
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Sunday, June 25th, 17:30-19:30: Poster Session 2

Non-conscious recognition of emotions in the absence of striate cortex (affective blindsight) has thus far emerged only for facial expressions (de Gelder et al., 2001; de Gelder et al., 1999) and it has been proposed that implicit emotional processing is dependent upon extraction of expressive signals from key regions in the face (Whalen et al., 2004). This raises two unexplored issues: a) is affective blindsight present also when emotions are expressed through non-facial signals? b) non-conscious extraction of affective information is relatively insensitive to perceptual differences between various ways of communicating the same emotion (e.g., a fearful facial or bodily expression)? Here we used indirect measures of blindsight (Redundant Target Paradigm) on the well-known patient DB with left hemianopia to test for affective blindsight for emotional body language (Experiment-1) and for the joint combination of facial and bodily emotional expressions (Experiment-2). Happy or fearful expressions were presented either unilaterally in the right intact hemifield or bilaterally in congruent and incongruent conditions (i.e., with both stimuli showing the same emotion or with one stimulus showing happiness and the other showing fear, respectively). A go/no-go task was used and DB had to press a key when the target emotion (fearful or happy, depending on blocks) was presented in his intact right hemifield. Reaction times (RTs) were faster in the bilateral congruent condition with two fearful bodily expressions than in the unilateral or bilateral incongruent condition (Experiment-1). Most interestingly, two emotionally congruent expressions reduced RTs even when the emotion was conveyed by a body in one hemifield and a

face in the opposite hemifield and this for fear as well as for happy stimuli (Experiment-2). These results indicate that: a) affective blindsight occurs also for bodily and not only for facial emotional expressions; b) the congruency in the emotional meaning instead of the perceptual similarity between the consciously seen and non-consciously perceived stimulus is the critical factor for interhemispheric cooperation in affective blindsight to occur. This latter finding suggests the existence of an automatic mechanism for rapid integration of affective information from facial expression and body language.

Orbital representation of Auditory perception

Yoshi Tamori and Noriyuki Tomita
Human Information System Laboratory, Kanazawa Institute of Technology

Sunday, June 25th, 17:30-19:30: Poster Session 2

It is well known that the primary perceptional space is mapping to the cortical area in a topology-preserving manner. For example, neighbouring neurons' signals in the primary visual cortex code similar inputs that are neighbouring positions in the visual field. We recorded MEG (MagnetoEncephaloGraphy) responses to sounds and/or colours. For the measurement of MEG responses to sounds, we used amplitude modulated tones with diatonic carrier frequencies from C4 (F0=261.63[Hz]) to C5 (F0=523.26[Hz]). ECDs (Estimated Current Dipoles) for N100m, the magneto encephalographic equivalent of the electrical N100 (its supratemporal component) around the latency of 100msec after the onset of each stimulus, are forming different orbits from each other. It is suggested that the conventional tonotopic peak position of proper stimuli are only partial aspects of ECD-orbits. For the measurement of MEG responses to colour stimuli, we used colours of equi-luminance chosen from topological colour space (e.g. CIE chromaticity space). The observations of colour experiments suggest that the chromatic topology is spatiotemporally represented within $V4_{alpha}$. in terms of a continual deformation between neighbouring orbits which are considered to be the representations of neighbouring colours. The MEG measurements of responses to either the auditory and visual stimuli show ECD-orbits. Such orbital representation could be considered to supersede a frequency coding of the brain functions. Note that the word "temporal" does not only mean "latency-wise (chronotopic)" here, but that the temporal information plays an important role for forming the frame of reference as a representation of the brain function, thus chromaticity or pitch perception. Neural representations for other brain function would have similar spatiotemporal property.

Stability of retrieved memory and trace dominance

Fumiko Tanabe (1) (2), Fumihiko Taya (2), and Ken Mogi (2)
(1) Tokyo Institute of Techonology; (2 Sony Computer Science Laboratories

Sunday, June 25th, 17:30-19:30: Poster Session 2

Memory retrieval is one of the key elements in conscious and unconscious experience. The stream of consciousness (James 1892) is sustained by the rich dynamics of memory. The recollection of memory is accompanied by a characteristic feeling, reflecting the underlying cortical processes. A new memory is initially labile and becomes stabilized through a process of consolidation, which ultimately depends on gene expression. Stable memories, however, can again become labile if reactivated by recall and require processes of reconsolidation to be maintained (Nader, 2003). This phenomenon has been reported in a variety of animal species and even in human declarative memory (Tanabe & Mogi, 2005). Eisenberg et al. (2003) have reported that the stability of retrieved memory is inversely correlated with the trace dominance. They used conditioned taste aversion in the rat and fear conditioning in the medaka fish to investigate extinction, i.e. the decline of a conditioned response after its retrieval in the absence

of the reinforcer. The trace stability was judged by the insensibility to the consolidation blocker. According to their results, the competition between the new and retrieved trace depends in part on the intensity of the original training and the number of extinction trials, suggesting that the trace dominance would be important in the editing of the memory during reconsolidation. Here we examined the effect of disruptive factor on the retrieved trace in human memory. We conducted simple memory tasks where the behaviour was controlled by the training intensity. We judged the dominance of learned stimuli, in accordance with the acquirement in test trials one day after the original training. We studied the performance in each group when the memory was interfered with the competing stimulus just after recalling the learned stimulus. Then we compared the sensitivity to the competing trials with the performance of the dominant stimulus. Based on the results, we draw a picture of the system level interactions between the processes of retrieval and encoding, storing, retrieval and editing of memory including longterm and working memory. Finally, we discuss the implications for the "stream of consciousness".

Attention and visual awareness
Fumihiko Taya and Ken Mogi
Sony Computer Science Laboratories, Inc.

Saturday, June 24th, 17:30-19:30: Poster Session 1

The nature of visual awareness is central in the scientific study of consciousness. Change blindness is an interesting phenomenon where subjects fail to detect even a large change in the visual scene (Simons and Levin 1997, Rensink et al 1997). This phenomenon occurs when the automatic change detection system fails to work. Studies on change blindness have proved useful for understanding attention and visual short-term memory (vSTM). It has been suggested that focused attention is necessary for the detection of a change, while not sufficient (O'Regan et al 2000). When changes were applied during blinks, subjects failed to notice a change even when they were looking at the positions of modified stimuli (looking without seeing). The reason why such a change fails to be registered remains to be clarified. One possibility is that the preserved representation is sparse so that the detailed information necessary for detecting the change is lacking, even when the attention is focused on the modified position, e.g., when the modified property is not relevant to the facing task. Another possibility is that the change is detected unconsciously but fails to be consciously perceived. It is also said that the semantic information is used in the comparison process (Simons and Rensink 2005). Here we recorded the eye movements while the subjects were looking at flicker stimuli in which the original and modified images alternated repeatedly separated by a blank. By conducting a series of statistical analysis on the eye-tracking data, we investigated the relationship between the eye positions and the positions of detected changes, testing whether subjects were attracted to the changes unconsciously, and clarifying which aspects of the stimuli are crucial in the change detection. The visual memory task was also conducted before the change detection task in order to study the effect of the representation stored in the memory on the degree of blindness. Based on the data, we discuss the role of attention, the semantic representation and other cognitive factors contributing to the failure or capture of changes in the visual scene.

Reconciling Conscious Absorption and the Ubiquity of Self-Awareness
Alan Thomas
University of Kent

Monday, June 26th, 14:00-16:00: Concurrent Session 3.2

Two compelling, but conflicting, intuitions about conscious experience are that it is absorbed in its intentional objects and gives rise to a ubiquitous sense of self-awareness. No view can combine

both intuitions but adverbialism about consciousness is, overall, most explanatory of both claims. Adverbialism takes person level consciousness to be explanatorily prior to mental state consciousness. The former arises from the holistic interaction of a bundle of rational capacities and explains their mutual co-ordination and focus. Talk of mental states as conscious is derivative and attaches adverbially to the modification of mental act statements. As Dretske has correctly argued, mental states that we are conscious with are not mental states that we are conscious of. (It is people that are conscious, with mental states, of objects.) Adverbialism most closely resembles self-representational theories of consciousness that originate in the phenomenological tradition. All of these theories seek to reconcile the two fundamental intuitions: absorption is described as a more fundamental feature of conscious experience than either attention or awareness; self-awareness is best captured as the claim that my conscious mental states seem essentially owned. I consider three attempts by Lurz, Kriegel and Zahavi to reconcile these intuitions in a self-representational theory. The idea that conscious mental states self-monitor cannot be defended either using a contrast between focal and marginal consciousness or between the functional roles of monitoring or being monitored. Zahavi's central claim is that supervening on conscious experience is a "non-thetic" direct acquaintance, not propositional in form, with our own thoughts (Lurz's view also). It is argued that this Sartrean insight is not that mental states are implicitly selfaware, but that given their feature of being absorbed, or diaphanous, second order reflection on such states will be a self-ascriptive thought that is already conscious. Self-ascription, it is argued, explains the "mode of first person givenness" and explains (away) the ownership of our conscious mental states in a deflationary way. Conscious mental states are owned, but by whole people, in the sense that they are self-ascribed under a certain kind of mode of presentation.

Functional and Neural Signatures of Bodily Self-awareness

Manos Tsakiris
Wellcome Department of Imaging Neuroscience & Insititute of Cognitive Neuroscience, UCL

Monday, June 26th, 14:00-16:00: Concurrent Session 3.3

Awareness of one's own body is a fundamental element of self-consciousness, because the body is "always there" (James, 1890), present with me. Recent research has focused on how multisensory percepts are processed by the brain to generate the sense of body-ownership. "Body ownership" refers to the special perceptual status of one's own body, the sense that bodily sensations are unique to one's self. One paradigm that allows the investigation of body-ownership is the Rubber Hand Illusion (RHI), because it allows for an external object to be treated as part of the body, or not, under experimental control. Watching a rubber hand being touched synchronously as one's own unseen hand gives the experience that the rubber hand is part of one's body. Asynchronous stimulation serves as a control. Body-ownership in the RHI is measured as a drift in the proprioceptively-perceived position of one's hand towards the rubber hand. A series of experiments suggest that multisensory integration is not a sufficient condition for body-ownership (Tsakiris &Haggard, 2005). Instead, body-ownership during the RHI arises as an interaction between multisensory perception and top-down influences originating from representations of the body's permanent structure. Recent studies suggest that the right temporo-parietal junction (rTPJ) maintains a stored reference of the body-image. We used Transcranial Magnetic Stimulation (TMS) over rTPJ to investigate its role for body-ownership. Overall, TMS over rTPJ reduced the extent to which the rubber hand was incorporated into the mental representation of the body. It also increased the incorporation of a neutral object. Disruption of rTPJ therefore eliminated the differential treatment of self-related stimuli, blurring the boundary between the self and the world. The results show that TPJ is necessary for the assimilation of novel multisensory signals to a pre-existing reference representation of one's own body. It actively participates in linking current sensory input either to the self or to the external world. We also investigated the neural signatures of body-ownership using Positron Emission Tomography.

Positive correlation between rCBF and proprioceptive drift showed that the sense of body-ownership is related to activity in the right posterior insula. Conversely, negative correlation between rCBF and proprioceptive drift showed that the sense of disownership, that an object is not linked to "me", is related to activity in the left parietal cortex. Overall, this network may play a fundamental role in "tagging" bodily events, and generating special qualities which underlie bodily self-consciousness.

The relationship between selective attention and consciousness
Naotsugu Tsuchiya and Christof Koch
California Institute of Technology

Friday, June 23rd, 9:30-12:30: Tutorial

Historically, the pervading assumption among sensory psychologists is that what a subject attends to is what she is conscious of. That is, attention and consciousness are very closely related, if not identical, processes. However, a number of recent authors have argued that these are two distinct processes, with different neuronal mechanisms. While the neuronal correlates of consciousness remain elusive, significant progress has been made in studying the neuronal correlates of "unconscious" processing; a multitude of techniques---such as masking, crowding, attentional blink, motion-induced blindness, continuous flash-suppression, and binocular rivalry---permit visual scenes to be presented to subjects without subjects becoming aware of them. Such experiments, coupled to fMRI in humans and single-cell recordings in behaving monkeys, show that vigorous hemodynamic and spiking activity in cortex is often not associated with conscious perception. In this tutorial, we review the experimental literature and argue 1) that invisible stimuli can be attended with top-down attention and can influence subsequent behavior, 2) that to observe some behavioral evidence of unconscious processing, top-down attention to invisible stimuli is necessary and 3) that under some conditions top-down attention and consciousness can result in opposite effects. The philosopher Ned Block has argued on conceptual grounds for two forms of consciousness, access (A) and phenomenal (P) consciousness. Given the data, it may be possible that A is equivalent to top-down attention and read-out (which usually, but not always, goes hand-in-hand with P) while P can occur with or without top-down attention.

Unity of Mind and Neural Synchrony in Schizophrenia
Peter Uhlhaas, Eugenio Rodriguez, and Wolf Singer
Max-Planck Institute for Brain Research, Frankfurt, Germany

Sunday, June 25th, 17:30-19:30: Poster Session 2

One of the core problems in the cognitive neurosciences is the question of how a unified cognitive moment emerges out of scattered mosaics of functionally specialized brain regions. Synchronous oscillatory activity of neural responses is a possible candidate mechanism for the coordination of neural activity between and within functionally specialized brain regions that may underlie the integrated and holistic character of conscious experience (Singer, 2000, Varela & Thompson, 2003). The investigation of pathological conditions, such as schizophrenia, may shed further light on the question of how unified cognition and action emerges in the brain. From its earliest description, schizophrenia has been conceptualized as a disorder of coordination of neural activity that leads to a fragmentation or splitting of mental functions. According to Bleuler (1911), this fragmentation constitutes the primary disturbance in schizophrenia that directly represents the organic pathology whereas the classical secondary symptoms, such as delusions and hallucinations, are accessory or secondary manifestations of the disease process. Recent theories of schizophrenia (Phillips & Silverstein, 2003) have again laid emphasis upon

pathophysiological mechanisms that involve multiple cortical areas and their coordination. These formulations are compatible with evidence from experimental psychopathology and phenomenology that stress the importance of dysfunctional integrative cognitive processes that underlie the fragmentation of mind in schizophrenia (Uhlhaas & Silverstein , 2003). In order to examine the link between cognitive integration and neural synchrony in schizophrenia, we examined the EEG-activity in 19 patients with a DSM-IV diagnosis of schizophrenia and 19 healthy control subjects during a Gestalt perception task. EEG-data were analyzed for phase-synchrony and induced spectral power as an index of neural synchronization. Schizophrenia patients were characterized by a deficit in Gestalt perception that was associated with reduced phase-synchrony in the beta-band (20-30 Hz) whereas induced spectral power in the gamma-band (40-70 Hz) was largely intact. Our findings suggest that schizophrenia patients are impaired in the integration of stimulus elements into coherent object representations that are related to deficits in the long-range synchronization of neural activity, suggesting that dysfunctional synchronization may reflect a core aspect of the pathopyhsiology of schizophrenia that underlies the fragmentation of mind in the disorder.

The Nature of Consciousness: Subjective Facts and the Functional Identity Hypothesis
Tjeerd van de Laar
Radboud University Nijmegen

Saturday, June 24th, 17:30-19:30: Poster Session 1

The purpose of this paper is to formulate a minimal theory on the nature of consciousness* that: (1) allows for it to be scientifically investigated, (2) allows for it to have a function, and (3) allows for there being a fact of the matter as to what people experience. The ingredients of the theory are mostly provided by work of Crane (2003) and Clark (1997, 2005). I use the work of Crane, because his notion of subjective facts accounts for demand (3) posed above. Furthermore, I use Clark's functional identity hypothesis to account for demand (2). My specific interest in Clark's theory is due to the fact that although he explicitly takes several pages from Dennett - which in my opinion is a good idea - he does not succumb to Dennett's interpretationist account of consciousness (Dennett 1991, 2005). The structure of the paper is as follows. I briefly introduce Crane's notion of subjective facts and Clark's functional identity hypothesis. Next, I merge Crane's subjective facts with Clark's functional identity hypothesis. Clark's theory allows for embedding the notion of subjective facts in a broader theoretical context, but this will not work without some terminological tuning on my part. The main obstacle in reconciling Clark's view with Crane's notion of subjective facts is showing that the latter are not in conflict with Clark's firm rejection of the idea that we have categorically private, subject-specific, first-person unsharable knowledge concerning facts about our experiences. If this reconciliation can be achieved we have a workable - in the sense of allowing for further clarification by means of scientific investigation (desideratum 1) - theory on the nature of consciousness. * ‘Consciousness' here refers to phenomenal experience, which is roughly what Thomas Nagel (1974) calls ‘what-it-is-likeness', and is also intended when people apply the notorious term ‘qualia'. What it is supposed to be precisely is the subject of this paper.

Masked priming effects in semantic categorization are independent of category size
Eva Van den Bussche and Bert Reynvoet
University of Leuven, Campus Kortrijk, Belgium

Saturday, June 24th, 17:30-19:30: Poster Session 1

The question whether subliminal primes can activate their semantic meaning or not is still very alive today. Three different competing theories have tried to account for the often inconsistent

research results: the semantic categorization hypothesis, where subliminal primes are assumed to be processed in a series of processing stages, including semantic categorization; the direct motor specification hypothesis, which hypothesizes that subjects can unconsciously develop automatized stimulus-response mappings, bypassing semantic access; and finally the category search model which states that due to the impossibility of an exhaustive search of all members of a broad category, subliminal priming can only be obtained for small categories. The present study aimed to shed light on these different points of view by examining the role of category size in response congruency effects when novel primes are used. Three experiments were conducted, using both small and broad categories, both small and large stimulus sets and various tasks. A transparent pattern of results emerged: significant priming effects were obtained across different tasks, irrespective of category size and irrespective of stimulus set size. The findings are discussed in terms of the three theoretical frameworks. Summarizing the results, we conclude that nor the direct motor specification hypothesis, nor the category search model can explain our findings. It becomes clear that the present results provide strong evidence in favour of the semantic categorization hypothesis, which assumes semantic processing of subliminal primes.

Endogenous control over either of the two percepts that compete for visual awareness in perceptual rivalry

Raymond van Ee, Jan Brascamp, Gijs Brouwer, and Loes van Dam
Helmholtz Institute

Saturday, June 24th, 17:30-19:30: Poster Session 1

We studied distributions of perceptual rivalry reversals, as defined by the two fitted parameters of the Gamma-distribution. We did so for a variety of bi-stable stimuli and voluntary control tasks. The stimuli consisted of binocular rivalry (orthogonal grating, houseface), slant rivalry, Necker cubes, and ambiguously rotating spheres. Subjects were instructed to report reversals and to maintain central fixation (we have analysed gaze position and (micro)saccades). Subjects were given four different tasks: (1) to view a stimulus in a "natural" way without attempting to control the reversal rate, (2) to "hold" one or (3) the other of the two percepts for as great a fraction of the time as possible, and (4) "to speed" up the reversal rate as much as they could. To check whether the subjects were reliably reporting the occurrence of perceptual reversals, so-called ‘catch periods' without ambiguity were included. Subjects' perceptual reversals distributions differed from one another in a systematic way that reflects a constraint on the describing two parameters. We found a variety of twoparameter effects, the most important one being that distributions of different subjects differ in the same systematic way across different stimuli and control tasks (i.e. a fast switcher remains fast across all conditions in a parameter-specified way). The cardinal component of reversal rate variation was not the conventionally used mean reversal rate, but a component that was orientedÑfor all stimuli and tasksÑroughly perpendicular to it. Having established the usefulness of the novel two-parameter analysis we performed two additional experiments: For the Necker cube, we employed specific variations in control exertion over both competing percepts, revealing that subjects had independent control over the reversal rate of either of the two competing percepts. For the ambiguously rotating sphere, we found that voluntary perceptual control depends on the physical parameters constituting the stimulus, implying important constraints on the mechanisms mediating voluntary control as these mechanisms cannot operate independently of stimulus characteristics.

Physicalist Qualia Realism

Robert Van Gulick
Syracuse University

Monday, June 26th, 14:00-16:00: Concurrent Session 3.2

Many physicalist theories of consciousness rely upon a deflationary or even eliminativist view of qualia (Dretske, Dennett). For example, most current versions of representationalism are motivated at least in part by a desire to deny the reality of qualia as internal mental properties of which we are aware in experience (Lycan). The transparency thesis is invoked in support of that denial (Harman). In so far as qualia are acknowledged on such views, they are either identified with properties of external objects (Tye) or with internal properties that are not accessible to awareness (Shoemaker). Qualia of a more traditional sort are typically regarded as an obstacle to physicalism, and the standard physicalist strategy is to deny or explain away the existence of properties of experience that are intrinsic, subjective, and ineffable rather than to find a way to accommodate them (Dennett). At least some of those traditional commiments may need to be jettisoned. Nonetheless, physicalists may be able to construct a more robustly realist account of qualia and that accommodates some of their traditional features. However, doing so may require the physicalist to rethink how and in what sense the relevant properties might be internal, intrinsic, subjective and ineffable and yet exist as aspects of a physically realized functional system. I suggest one such an account that turns on regarding qualia not as features of mental states but properties of experienced objects.

No role of motor responses in sequence learning tasks?

Muriel Vandenberghe, Sandrine Michiels, Patrick Fery, and Axel Cleeremans
Cognitive Science Research Unit - Université Libre de Bruxelles

Sunday, June 25th, 17:30-19:30: Poster Session 2

To disentangle perceptual and motor learning in serial reaction time tasks, we explored a paradigm (see Goschke, 1998) in which successive stimuli and successive responses can follow different sequences. On each trial, four letters are presented horizontally on the screen (e.g. "HDKF"). 400 ms afterwards, one of the letters is presented auditorily. Participants respond by pressing the key corresponding to the location at which the letter they heard appears on the screen (e.g. when the display HDKF is followed by an auditory "D", participants press the second key). The visual arrangement of the four letters was changed from trial to trial, such that two conditions resulted. In the motor sequence condition, the motor response followed a repeating 12-elements sequence, whereas the sequence of stimuli was random. In the perceptual sequence condition, the auditorily presented letters followed a 12-elements sequence, whereas the sequence of responses was random. To investigate the nature of the acquired knowledge, subsequent cued generation and recognition tasks were used. The results surprisingly showed that participants learned only in the perceptual sequence condition. Moreover, results on direct tasks suggested that this learning was conscious in this condition. This study challenges previous findings that motor learning is crucial for sequence learning. However, in a second experiment, we observed that amnesic patients exhibited sequence learning only when both the auditorily presented letters and the motor responses followed a 12-elements sequence. This suggests that, in amnesia, both dimensions (perceptual and motor) of learning are crucial for learning to take place.

The sense of ownership in schizophrenia: study of the Rubber Hand Illusion

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Sunday, June 25th, 17:30-19:30: Poster Session 2

Schizophrenia is characterized by disturbances of self-consciousness. Impaired actionawareness in schizophrenia has been well documented in the literature, but few studies have investigated bodily awareness. Here, we used the Rubber Hand Illusion (RHI), to investigate bodily awareness in schizophrenia. Watching a fake hand being touched at the same time as one's own unseen hand elicits the illusion that the fake hand is part of one's own body. Asynchronous stimulation between one's own hand and the fake hand does not induce this illusion. The RHI is measured as a drift in the proprioceptively-perceived location of one's hand towards the rubber hand. Visuotactile correlation is not the only factor modulating the RHI. For example, the RHI is not present when normal participants see a neutral object being touched at the same time as their own hand. Thus, a pre-existing cognitive representation of the body seems to modulate the RHI. In the present study, we asked whether similar topdown constraints of a pre-existing body representation are present in bodily awareness in schizophrenic patients. Patients and control subjects saw either a rubber hand or a neutral object in front of them being touched, while their own unseen hand was either synchronously or asynchronously touched. Participants judged the perceived location of their own hand before and after stimulation. As predicted, control subjects experienced the RHI only when they saw a rubber hand being touched synchronously with their own hand. Contrary to control subjects, schizophrenic patients showed a proprioceptive drift in the opposite direction, namely a drift away from the rubber hand, when the rubber hand was synchronously stimulated with their own hand. Importantly, when the rubber hand was replaced by a neutral object, control subjects did not show any significant drift, whereas schizophrenic patients showed a significant proprioceptive drift towards the neutral object. The observed pattern shows that schizophrenic patients incorporated the neutral object, suggesting that bodily awareness in schizophrenia may lack the top-down constraint of a preexisting body representation that is present in normal functioning subjects

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Event-related EEG potential correlates of conscious perception

Rolf Verleger
Department of Neurology, University of Lubeck

Friday, June 23rd, 9:30-12:30: Tutorial

Averaged event-related EEG potentials (ERPs) indicate cortical activity with extremely good temporal resolution and therefore continue being the most illustrative means of looking at the brain's activities in perceiving single events. For decades, the P3 (or P300) component of the ERP has been linked to conscious awareness of stimuli. More recently, similar claims have been raised with regard to the N2pc component. This tutorial will provide basic knowledge about psychological and neurophysiological aspects of P3 and N2pc and will give a detailed account of the relevant evidence that relates P3 and N2pc, as well as other ERP components, to conscious awareness, focusing on evidence from studies on conscious vs. non-conscious perception and from studies on hemi-neglect patients. The discussion is open for new, more detailed theories about the functional meaning of these components, based on the available evidence of their neurophysiological basis and of their psychological determinants.

Left-Hemifield Dominance of Healthy Humans' Visual Perception of Targets in Rapid Series: Electrophysiological Investigation into the Mechanisms

Rolf Verleger (1), Sina Gebauer (1), Michaela Fritzmannova (1), and Piotr Jaskowski (2)
(1) University of Luebeck; (2) University of Finance and Management, Warsaw

Sunday, June 25th, 17:30-19:30: Poster Session 2

It is by lesions of the right-hemisphere temporo-parietal junction that the hemi-neglect syndrome occurs most often. This suggests that the right hemisphere is dominant for processes leading to awareness. To study the contributing mechanisms in healthy humans, we used a task in which unusually strong right-hemisphere dominance of visual perception can be observed: a two-stream version of the attentional blink paradigm. In accordance with drastically better perception of left-hemifield than right-hemifield targets, electrophysiological measurement of interhemispheric differences revealed right-hemisphere advantages in continuous engagement, in modification of activation by expectancy, and in rapid interruption of other-hemisphere activation. Damage to each of these processes might contribute to the severe disturbance of perception in hemi-neglect.

Brain reading and the privacy of the mind

Frédérique de Vignemont
Institut des sciences cognitives, France

Monday, June 26th: 16:30-18:30: Symposium 4

Fifty years ago, Armstrong (1963) imagined that a neuroscientist could detect that the subject was not in pain, while he claimed the reverse. This may no longer be only a thought experiment. Recent results about brain reading open new perspectives on this question. Does brain reading challenge the privacy of the mind? If so, what are the theoretical and ethical consequences? According to a traditional Cartesian view of the mind, the subject has a privileged access to his own mental states that nobody else can have. The subject would have more authority than anybody else on his own mental states. However, the progress in brain imaging might lead to the possibility that the scientist knows as well as the subject his own mental states, or maybe even better. Who has the most authority on your mind in case of conflict? On the one hand, self-knowldege is far from being incorrigible. On the other hand, the neuroscientist still needs to rely on the introspective reports of the subject to detect the correlations between brain activations and intentional content.

Why primary sensory areas are the gateways to awareness

Vincent Walsh
Institute of Cognitive Neuroscience and Department of Psychology, University College London

Saturday June 24th 10:30-12:30: Symposium 1

Four main lines of evidence currently contribute to the debate regarding the locus of visual awareness: neuropsychological, brain imaging/recording, brain stimulation and neuroanatomy. None of these approaches alone is sufficient to distinguish between alternative viewpoints. Two polarised viewpoints I will discuss are (1) the micro consciousness view and (2) the sensory gateway view, which, in all lines of evidence is tested against hypotheses generated by assuming a role of recurrent feedback to primary sensory cortex. I will argue that the micro consciousness case is unable to encompass a range of stimuli of which we can become aware, is anatomically unparsimonious, is unsupported by neuropsychological evidence and is falsified by brain stimulation evidence. I will also argue that the sensory gateway view, which views primary areas as the key nodes (rather than loci) in awareness is partly supported by neuropsychological evidence, is anatomically parsimonious because of the role of recurrent feedback and is strongly supported by brain stimulation evidence neurologically intact and brain-damaged subjects. Moreover, the temporal differences in individual attribute awareness that underlie the microconcsiousness theory can be accounted for within the framework of recurrent feedback. I will also discuss some of the other candidates which have been claimed to be important visual awareness, such as the prefrontal cortex and the right parietal lobe and show that these areas

are neither anatomically nor are physiologically suited to make key contributions to normal awareness. Finally, as a general methodological point, I will show why a phenomenon as fleet of foot as awareness requires several methodological approaches and why the limitations met when making inferences using any single technique can only be exceeded by appeal to others.

The early effects of optokinetic stimulation on rightsided hemianopia and hemineglect in three globally aphasic patients: first data

Volker Voelzke, Winfried Mandrella, Barbara Habla, and Werner Ischebeck
Klinik Holthausen

Saturday, June 24th, 17:30-19:30: Poster Session 1

The therapy of visual field defects is based on stimulation and compensation. Both techniques need sufficient vigilance and instruction. Most published studies have excluded severely aphasic patients although a considerable portion shows signs of impaired visual search, reading and spatial perception due to hemianopia and hemineglect. Here, we evaluated the effectiveness of repetitive optokinetic stimulation (OKS) towards the right hemifield in three globally aphasic patients showing rightsided hemianopia and hemineglect. We hypothesized that OKS might be an effective treatment for this patient as it does not require a conscious, verbal strategy for treatment in order to elicit beneficial treatment effects. We studied the effectiveness of 15 optokinetic interventions in combination with alertness training on simple detection tasks in three severely aphasic patients. The clinical observation and neuropsychological assessment before treatment onset suggested complete rightsided hemianopia, rightsided hemiplegia, multimodal neglect and severe global aphasia (according to the AAT). Following fifteen interventions, significant improvements were observed in the areas of activities of daily living and the exploration of the right visual field during a variety of tasks. These tasks included an object-detection task, an animal-detection task and a line detection task.

Having a Point of View: On the Notion of Perspective

Gottfried Vosgerau
Philosophisches Seminar, Uni Tuebingen

Saturday, June 24th, 17:30-19:30: Poster Session 1

It is commonly held that perspectivity is one crucial feature of consciousness and especially of self-consciousness (Newen & Vogeley 2003). There have been different attempts to analyze spatial perspective within philosophical accounts (Peacocke 1983, Bermudez 1998). Hereby, the notion of perspectival sensitivity plays a central role. I will argue that this notion fails to make the important distinction between having a perspective and knowing (representing) this fact. The first is important for consciousness and is rather easy to obtain as a direct consequence of egocentric spatial representations. The second, however, is crucial to self-consciousness and presupposes allocentric spatial representations which require a rather high cognitive level. In egocentric representations, objects are coded in relation to the representer, i.e. in terms of how to get there (Campbell 1993, McNamara 2003). When the representer moves, each of the represented relations changes and hence each relation has to be updated. An animal using this format of spatial representation will already exhibit perspectival sensitivity, i.e. its behavior depends on changes of its own position. This kind of behavior is observed in virtually all kinds of navigating animals (ants, rats, humans; Wang & Spelke 2002). However, this format of spatial representation does not allow for representing how it would look like from another point and hence does not allow for route planning. Imagining to be at another point presupposes that every point can be represented as the own position. However, egocentric representations represent points in space very different from the own position. Thus, to imagine to take another perspective,

allocentric representations are needed. These contain spatial relations between the represented objects whereby the representing system is just one of them. Hence, they allow for route planning as it is observed in humans, apes, and rats. If allocentric representations are used for navigation, the own position and orientation has to be marked as such, i.e. the system has to represent its own perspective within the allocentric representation. In conclusion, knowing the own perspective takes much more than perspectival sensitivity as described by Peacocke whereas having a perspective takes much less.

What is the illusion in music?
Roger Watt and Sandra Quinn
University of Stirling

Sunday, June 25th, 17:30-19:30: Poster Session 2

We start with following observations about music: 1). It generates strong like and dislike reactions 2). It holds attention 3). It can be ignored or actively engaged with 4). It can alter the mood of a listener 5). It can depict affective states We show empirically very high intersubjective agreement when music is judged along dimensions that are normally reserved for people - female/male, young/old, good/evil, joyful/sad, pleased/angry, gentle/violent. This leads us to the proposition that music is perceived without effort as if it were a person. For example, we will show 90+% agreement in listeners about the sex of different pieces of music. From these results, we suggest that this loosely implies that music creates an illusory person in the mind of an active listener. We can develop this notion. Merely being in the presence of music leads to an awareness of its surface characteristics, just as merely being in the presence of a person leads to little more than a recognition of their physical characteristics. Our results show that the product of actively perceiving music is similar in some respects to the perceptual product of engaging with another person. Then we show that the manner of music is similar to the manner by which a person relates to us. Actively engaging with a person involves a two-way process of gradual disclosure of character, mood etc. In order to achieve this, the focus of attention moves co-operatively between participants. One half of the analogy is physically present: music gradually discloses its character and mood to the active and attentive listener, and we will present an analysis of the temporal characteristics of this. The other half, whereby the listener discloses their character to the music as the music attends to the listener, is not physically present. We will argue that this is the real illusion in music and show how the temporal characteristics of music support this illusion. Music generates the illusion in the mind of the listener that they are the focus of its attention. We conclude by showing how our starting observations about music follow naturally from this conclusion.

Empiricism and the Role of Concepts in Perception: An Argument from Binocular Rivalry
Markus Werning
Heinrich-Heine University of Düsseldorf

Sunday, June 25th, 17:30-19:30: Poster Session 2

Is a feature change detection dependant of its visual context? In order to answer this question we conducted change detection experiments and observed an unexpected effect: If the visual context changes when change detection of a cued item has to be performed, subjects are sure that they see the cued item changing too. We studied this "context induced change illusion" and tried to determine if it results from either memory or perceptual mechanisms. In the first part of this presentation we will show experimental data of 3 change detection experiments supporting the memory hypothesis and confirming the existence of the illusion. In the second part of this presentation we will comment these results as a function of different theoretical approaches. Most

studies testing and evaluating the capacity of visual short term memory implicitly consider that each information unit (feature or object) is stored independently of the others. Nevertheless there is evidence that relational information exists within each feature dimension in visual short term memory and links information from individual units (Jiang et al., 2000; Vidal et al., 2005). Thus, we will propose and discuss a new model of change/non-change detection based on the structural properties of relational information that could explain the context induced change illusion and predicts the possibility of change detection among items not individually stored in visual short term memory.

Attention, Consciousness and Representationalism
Wayne Wu
Ohio State University

Sunday, June 25th, 14:00-16:00: Concurrent Session 2.1

In this essay, I discuss the relation between attention and consciousness, focusing on attention's bearing on one theory of perceptual consciousness: representationalism. Representationalism claims that the phenomenal or qualitative character of perceptual experience depends on or is identical with its representational content. It is attractive because it reduces the "hard problem" of explaining qualia to the "easy problem" of explaining representational content. Nevertheless, I argue that when visual attention is properly understood as an aspect of consciousness, we shall see that it poses a problem for representationalism. In cognitive science, the mechanisms of visual attention are understood in terms of informational selection and selection is part of the phenomenology of attention, that is the phenomenology of salience. After characterizing salience and its function in normal visual experience, I present a novel counterexample to representationalism, showing that there can be phenomenal differences due to differences in salience even as visual content remains constant: while maintaining fixation and thus suppressing saccadic eye movements, a viewer can shift attention across the visible scene. With such shifts, different objects become salient while the totality of what is seen, i.e. of what is visually presented, remains constant. This counterexample is resistant to standard representationalist counterarguments. The counterexample depends on an intuitive distinction between what is seen and what is attended to, a distinction challenged by recent empirical work on inattentional blindness. Indeed, some have claimed that conscious seeing is nothing but attention. I critically assess and dispute the stronger conclusions which have been drawn from this work. Indeed, given a proper understanding of attention in terms of selection and salience, inattentional blindness is to be expected even if subjects are not literally blind to that which is unattended. We should be less likely to respond to unattended items that are consciously perceived, for the function of attention is to select and prioritize certain information for influencing subsequent cognition and behavior. Nevertheless, the results suggest that some modification of the counterexample is required, and I show that this can be done consistent with out current understanding of attention.

Binocular Rivalry, Binocular Transparency, and Neural Substrate for Phenomenal Visual Consciousness
Charles Wu
Perception and Cognition Research Institute, Shanghai, China

Saturday, June 24th, 17:30-19:30: Poster Session 1

When an observer’s two eyes receive disparate stimulation, three possibilities may occur in the observer's visual consciousness: binocular rivalry, binocular transparency, and binocular fusion. Here I demonstrate that the site of consciousness suppression in binocular rivalry must be

monocular and must be the locus where phenomenal visual consciousness is directly and explicitly represented. I further suggest that binocular transparency is the maintenance of two monocular images at different depth planes in visual consciousness and that binocular fusion is a special case of binocular transparency where the two monocular images are maintained at the same depth plane. In this view, under dichoptic stimulation, binocular rivalry, binocular transparency, and binocular fusion constitutes a continuum of all possible percepts; in normal binocular viewing, for any depth plane either one monocular image or two monocular images (as in binocular fusion) are represented in visual consciousness. Mapping onto the organization of the human visual system, I suggest that the principal thalamic recipient layer 4C in primary visual cortex (V1) is the neural substrate for phenomenal visual consciousness and is a layered structure where visual surfaces are represented. Layer 4C in V1 has traditionally been viewed as the first stage of cortical visual processing, but here I contend that this layer is the final stage of cortical computation for each and every episode of visual consciousness. To reconcile the "eye view" and the "stimulus view" in binocular rivalry, I propose the following multi-stage model for binocular rivalry: There are competitions at many levels of the visual system, including that between the two eyes at early monocular stages and that between different candidate percepts at later binocular stages. The competitions at later stages send feedbacks to a monocular site (i.e., layer 4C in V1) to suppress the two eyes' inputs in a patch-wise manner so as to yield a final coherent percept. Crick & Koch (1995) hypothesized that we are not directly aware of the neural activity in V1 and advanced a number of arguments for their hypothesis. Their hypothesis is incorrect with regard to phenomenal visual consciousness, and here I refute their arguments one by one.

Emergentism About Phenomenal Consciousness
Peter Wyss
Birkbeck College

Saturday, June 24th, 17:30-19:30: Poster Session 1

The phenomenal properties of conscious experience, or qualia, are a persistent problem for physicalism, because such properties (apparently) resist reduction. Some philosophers think that the irreducibility of qualia shows the ontological inadequacy of physicalism; others think that it signifies an explanatory defect of that position. Recently, troubles with the reduction of phenomenal properties have brought the idea of emergence back in play. The thought is that qualia are emergent properties of the brain, that is, they emerge from a specific neurophysiological configuration. I am suspicious about qualia emergentism, and this paper explores the reasons for these doubts. From a meta-philosophical perspective I want to discuss three problems with emergentism about qualia, viz. a problem with motivation, a problem with triviality, and a problem with coherence. First, qualia emergentism is ad hoc, or at least dubiously motivated. It is ad hoc because physicalists endorse emergentism merely due to problems with complete reductionism, i.e. because a special range of phenomena resist reduction. Emergentism turns into an emergency exit from a philosophical dead end. In contrast, I think that emergence should be subject to serious metaphysical debate. Second, emergentism about qualia is trivial, or at least uninformative. This is because emergence is defined in terms of irreducibility, rather than novelty or its role in the individuation of kinds. As long as emergence and reduction are two exclusive and exhaustive categories, saying that a property is emergent because it is not reducible is not saying much, and may even be false. Third, qualia emergentism is an incoherent position for physicalists, because a major motivation for physicalism is the prevention of emergence. In this sense, it is ironic that the attempt to refute emergentism, e.g., by opting for a restrictive model of reduction, leads to its apparent acceptance for a limited range of phenomena.

The Three Fundamental Elements of Consciousness: Phenomenal Contents, Subjectivity,

and Unity
Karen Yan
National Taiwan University

Saturday, June 24th, 17:30-19:30: Poster Session 1

Block (1995, 1997, & 2002) proposes his two concepts of consciousness: phenomenal consciousness (P, for short hereafter) and access consciousness (A, for short hereafter). P is experience. A is the global availability of information processes which can be used to control rational behavior. Block argues that P is distinct from A and any reduction of P to A on the ground of conceptual analysis is inadequate. But is A indeed a kind of consciousness? Many philosophers such as Burge (1997) are skeptical because A lacks phenomenal characters. Burge argues that the notion of P is the core notion of consciousness. An individual who is not capable of having P cannot have any A. However, Block (2002) says A still can be a kind of consciousness even if it is parasitic on the core notion of P. I contend that A is not necessarily parasitic on the core notion of P if Hurley and No's (2003) interpretation of evidences from tactile vision substitution system (TVSS, for short) is right. Hurley and Noë argue the phenomenality of spatial contents of TVSS-perception goes with visual sensorimotor roles rather than neuro-physiological properties of certain neural pathways. If this interpretation is correct, then the existence of functional phenomenality may sustain that A is indeed a kind of consciousness. I also maintain that TVSS-perception can prove the existence of functional phenomenality only. TVSS-perception cannot be a knockdown argument against physicalism. In this way, the phenomenal contents can be not only physical properties, but also functional properties. Thus, the long-time debate between physicalism and functionalism dissolved. But there still is one unsolved issue: how to propose a theory of consciousness that comprises elements of both physicalism and functionalism? It seems that we need a new conceptual framework that incorporates physical and functional phenomenality at the same time. Furthermore, both subjectivity and unity are necessary condition of consciousness because mere phenomenal contents are not sufficient. Thus, any theory of consciousness must include three features of consciousness: phenomenal contents, subjectivity, and unity.

An extended perceived duration for multiple post-saccadic visual objects
Kielan Yarrow, Doeschka Ferro, John Rothwell, and Patrick Haggard
UCL

Saturday, June 24th, 17:30-19:30: Poster Session 1

Subjects make biased judgements about both the duration and onset time of stimuli seen following a saccadic eye movement. These biases suggest that the brain antedates the perceptual onset of a saccade target to around the time of saccade initiation, helping explain the apparent continuity of visual perception across eye movements. Previously, these biases have only been assessed for the saccade target object. We explored whether such biases extended to other visual objects seen peripherally following a saccade. Subjects made saccades to a target letter in a group of one, five or nine letters. They judged the duration for which they saw one of these letters presented in an altered post-saccadic colour. Regardless of the number of letters in the display, or the presence of advanced information about which letter would change colour, subjects overestimated letter durations compared to constant fixation control conditions. We conclude that multiple post-saccadic objects are subject to antedating biases.

Roles of the blank ISI between subsequent images in the visual consciousness
Qi Zhang and Ken Mogi

Sony Computer Science Laboratories, Inc.

Saturday, June 24th, 17:30-19:30: Poster Session 1

Abstract Submission: Visual consciousness sometimes makes misjudgments of the actually displayed scenes when a blank inter-stimulus interval (ISI) is inserted. One of the remarkable phenomena induced by blank ISI is the change blindness, where the change between alternating displays of an original and a modified scene is extremely difficult to detect (Simons & Levin, 1997, Rensink, et al, 1997, 2000). Another new phenomenon is the two-stroke apparent motion (Mather, 2005), which is induced by two pattern frames from a motion sequence and a blank ISI inserted after the second frame. When the two frames are presented in alternation, only a back-and-forth motion is perceived. But the blank ISI reverses the backward motion to make the motion sequence appear unidirectional. In the change blindness, Rensink (2000) pointed out that when the duration of the blank ISI decreases, the change blindness will disappear. In this study, we examined the temporal features of the two-stroke apparent motion, and found that there is also a temporal limit when the duration of the blank ISI decreased. Here, we argue that the blank ISI acting as a noise to the real images triggers the brain visual system to create a consistent representation with that before the ISI. The temporal limit is the threshold of the noise. When the duration is shorter than the threshold, the noise does not affect the visual processing, and the visual consciousness is identical to the real stimuli. When it is longer, however, the brain will remove it by complementing the information and tend to keep the entire perception uniform unless some specially focused attention is paid. Therefore, the two stationary images in change blindness tend to be perceived as identical by missing the change. Similarly, in the two-stroke apparent motion, the brain creates a direction reversion during the blank ISI to keep the previous motion sequence continuing. These results imply that elucidating the brain mechanism for removing noise such as the blank ISI is an important issue for understanding the human consciousness seeking for coherence in an environment full of noise.

Poster Sessions

Posters will be presented in St. Anne's marquee and seminar rooms. You will be able to setup your poster at lunchtime on the day of your presentation.

We recognize that poster presenters may wish to move around and view other posters during their session. If so, if you have an odd-numbered poster please be present in the first half of the session (17:30-18:30); if you have an even numbered poster please be present at your poster in the second half of the session (18:30-19:30). Of course, poster presenters are most welcome (and somewhat encouraged) be present throughout the poster session.

If you are presenting Saturday please ensure that your poster is taken down no later than Sunday morning; Sunday presenters should have their posters removed by Sunday evening, as boards will be collected sometime Monday morning/lunchtime.

Poster Session 1

1	Adamuszek	Being happy and feeling good: The influence of mood on tactile perception
2	Aleksander	Synthetic Phenomenology?
3	Auvray	The recognition of others in a simulated environment, the case of minimalist devices
4	Balas	Implicit acquisition of abstract rules is still possible
5	Baldo	A Model of Sensory Perception in Hilbert Space
6	Bazan	Brain and Behavioral Correlates of Unconscious Phonological Similarity: An ERP study at the objective detection threshold.
7	beim Graben	Contextual Emergence of Mental States from Neurodynamics Peter beim Graben and Harald Atmanspacher
8	Blank	A Reductio of Jackson's Knowledge Argument: There's A Lot Mary Doesn't Know
9	Bridgeman	Effect of Load and Landmark Distance on Mental Self-Rotation
10	Brown	Dissociation and cognitive inhibition as correlates of hypnotic suggestibility.
11	Chrisley	Experience-specific facts and physicalism
12	De Preester	The 'visceral' origin of the subjective perspective: problems and possibilities
13	de Regt	Do Scientists Understand Consciousness?
14	Dessoulavy	Sensing the Difference: Intuitive-Rational Thinking Styles Moderate Change Detection for Facial Expressions.
15	Eckstein	Mood modulates nonconscious perception of positive and negative words
16	Evans	Consciousness and epilepsy
17	Farrell	Embodied cognition and Merleau-Ponty
18	Faw	The Affective Neuroscience of Alexithymia
19	Ferrari	The Reality of First Person Science
20	Gawryszewski	Orienting attention in space and motor preparation in hearing and deaf subjects
21	Genone	Memory and the Content of Experience
22	Graf Grote	How do atomic sensorimotor contingencies look like? A mathematical approach.
23	Habibi	Automatic Gender Categorization is a Function of Familiarity
24	Harrar	Multisensory temporal cues for figure-ground segregation
25	Herai	Laterality and modality in simultaneity judgment
26	Hill	Representing Consciousness
27	Holland	Internal models and the conscious self
28	Hughes	Perception / action dissociations in rod bisection: Task demands affect the performance of patients with neglect and controls.
29	Kaplan	Sensorimotor dependence and behavioral space
30	Lou	Awareness in visuo-verbal perception is linked to dopamine release.
31	Lukavský	Emotional and cognitive workload during Word Association Test
32	Madary	Perspectival content as a transformation
33	Makris	Development of children's knowledge about consciousness
34	Melloni	Non-perceived stimuli elicit local but not large-scale neural synchrony
35	Menant	Evolution of Representations and Intersubjectivity as sources of the Self. An Introduction to the Nature of Self-Consciousness
36	Mograbi	Decision-making, emergence, and consciousness.
38	Musholt	Emergentism revisited

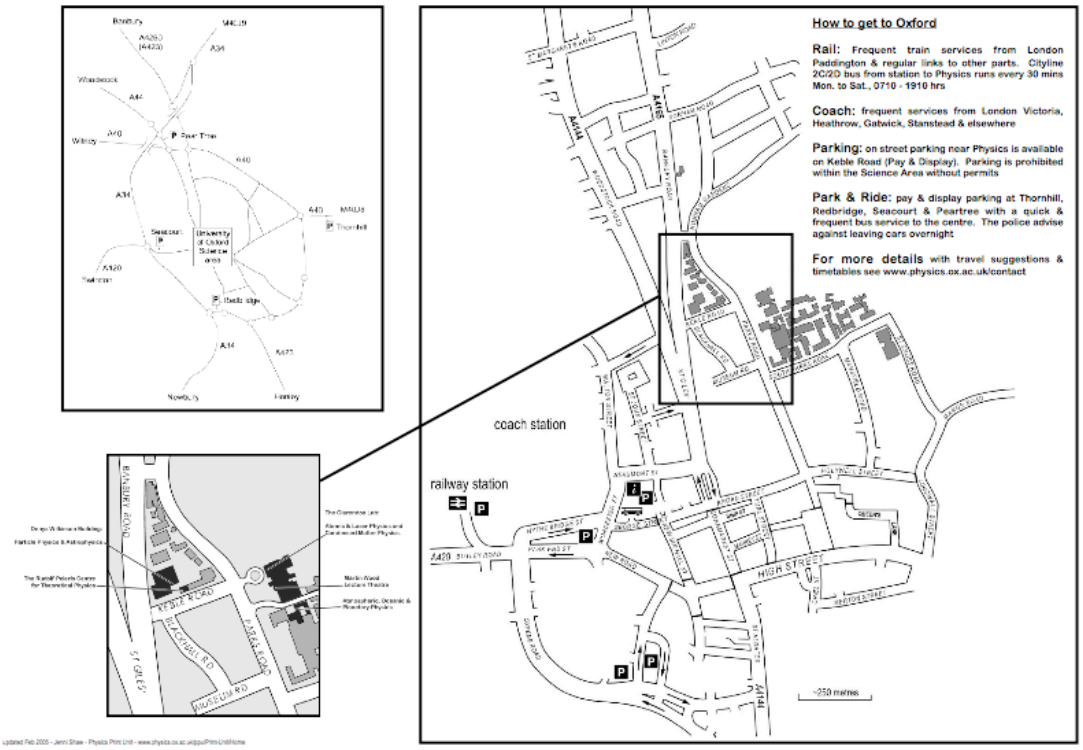
39	Newman	Crucial steps in the development of consciousness
40	Nunez	Why Hearts Don't Love and Brains Don't Pump: Neocortical Dynamic Correlates of Conscious Experience
41	Parkinson	Simon Sees as Simon Does: Evidence for a Perception-Action Model of Letter Recognition
42	Parthemore	Knowledge as Personal: The Representation of Self in the Representation of Knowledge
43	Pochwatko	Objective and subjective similarity and intuitive choice
44	Radovic	Watching representations
45	Rebuschat	The role of awareness in incidental language learning
46	Rietveld	Intentions in everyday life: The contribution of the medial frontal cortex
47	Salminen-Vaparanta	The latency of the earliest ERP correlate of visual awareness depends on the difficulty of the subjective perceptual discrimination
48	Sarri	Neural correlates of crossmodal visual-tactile extinction and of tactile awareness revealed by fMRI in a right-hemisphere stroke patient
49	Schleim	Decoding the content of consciousness states: A neurophilosophical perspective on mind reading.
50	Schmitz	The non-conceptual Intentional content of the bodily experience of acting
51	Sloman	How an animal or robot with 3-D manipulation skills experiences the world
52	Srinivasan	Brain networks with distinct spatial and temporal structure are selectively modulated by consciousness and attention
53	Stokes	Distributed representations of task-relevant information in human prefrontal cortex
54	Swierszcz	Evaluative conditioning does require attentional resources and working memory capacity.
55	Tadin	Strength of early visual aftereffects is correlated with changes in visual awareness
56	Taya	Attention and visual awareness
57	Van de Laar	The Nature of Consciousness: Subjective Facts and the Functional Identity Hypothesis
58	Van den Bussche	Masked priming effects in semantic categorization are independent of category size
59	Van Ee	Endogenous control over either of the two percepts that compete for visual awareness in perceptual rivalry
60	Voelzke	The early effects of optokinetic stimulation on rightsided hemianopia and hemineglect in three globally aphasic patients – first data
61	Vosgerau	Having a Point of View: On the Notion of Perspective
62	Wyss	Emergentism About Phenomenal Consciousness
63	Yan	The Three Fundamental Elements of Consciousness: Phenomenal Contents, Subjectivity, and Unity
64	Yarrow	An extended perceived duration for multiple post-saccadic visual objects
65	Wu	Binocular Rivalry, Binocular Transparency, and Neural Substrate for Phenomenal Visual Consciousness
66	Zhang	Roles of the blank ISI between subsequent images in the visual consciousness

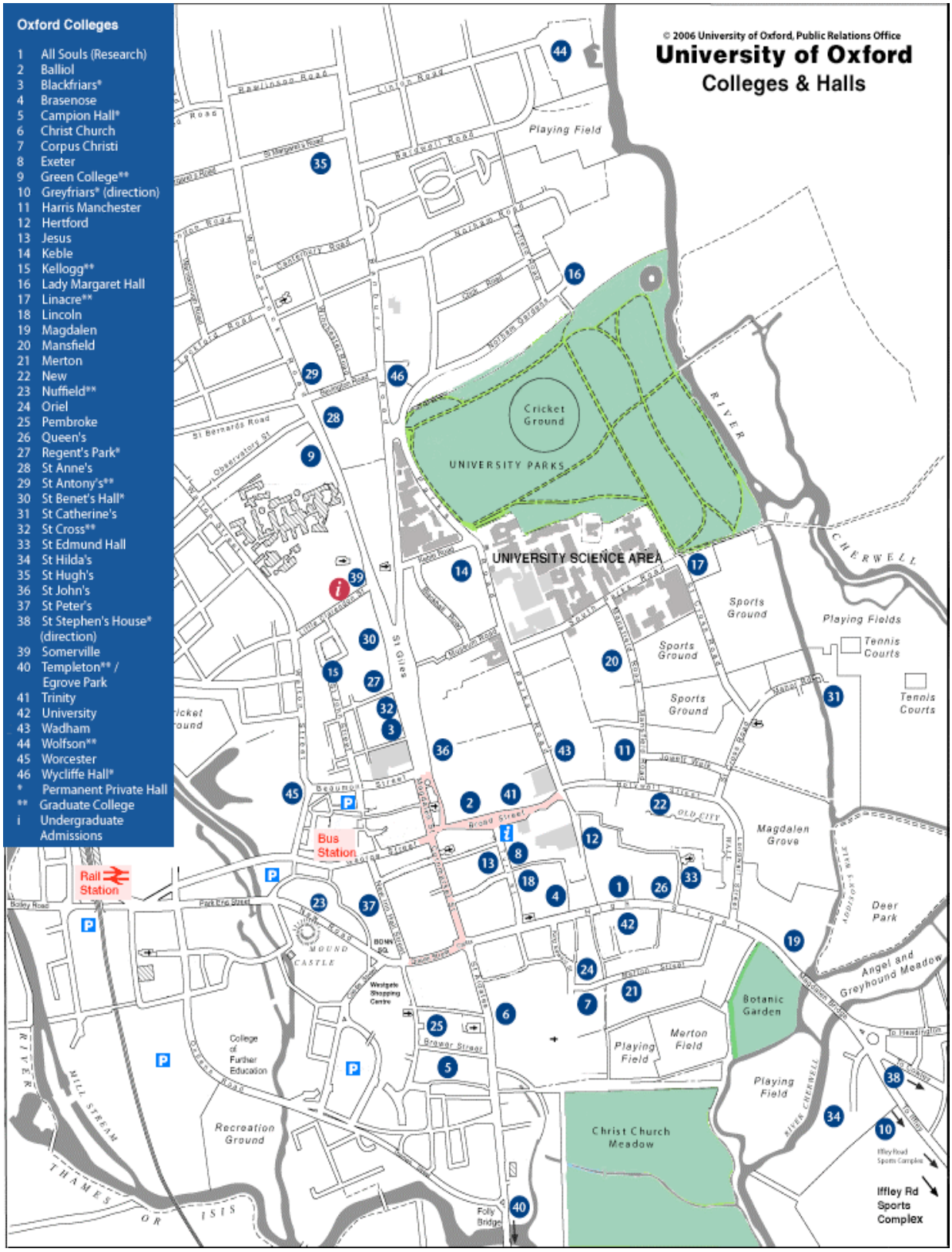
Poster Session 2

1	Abbassian	A shortcut to visual oblivion
2	Aleksander	A Formal Analysis of the Crick and Koch 'Framework for Consciousness'
3	Bailey	Zombies and Epiphenomenalism
4	Bayne	Differentiating, Enabling, & Unifying NCCs: A Framework
5	Becker	On the psychophysics and electrophysiology of flicker-induced subjective experiences
6	Binder	Time and consciousness
7	Brand	Failing Identity? Brain disorders as a test for psychological and philosophical terminology
8	Buracas	Attention allocation in cortical predictive models
9	Cahen	The Implicit Self in Perception
10	Carter	Psilocybin causes a functional dissociation between attention and working memory tasks
11	Das	A Framework for Conscious Information Processing
12	Davidson	Altered colour perception induced by hypnosis
13	De Nul	Being Mary
14	Deouell	Discriminating faces from other objects with and without conscious awareness: distinct and overlapping processes.
15	Dienes	Do amnesics learn quickly?
16	Fahrenfort	Masking interrupts feedback processing: implications for visual awareness
17	Frantzen	Dissolving the Explanatory Gap by adopting an Evolutionary Stance on Consciousness
18	Gabriel	The Limits of the Left Hemisphere Interpreter in a Split Brain patient
19	Georgalis	The Neglected Ambiguity of Sensory Terms
20	Glenney	Dummies talk and the blind see: Connecting conscious experience with function
21	Gomes	The conditional interpretation of the possibility of doing otherwise
22	Hohwy	Predictive coding explains binocular rivalry
23	Hoshino	Extension of egocentric space perception
24	Ikeda	Differential effects of explicit knowledge on accuracy and speed in procedural learning: Evidence from differential tolerance against workspace rotation
25	Jensen	Motor intentionality and the case of Schneider
26	Kaiser	The Role of Long-distance Connections: Non-optimal Total Wiring Length but Optimization for Rapid Processing in C. elegans Neural as well as Primate Cortical Networks
27	Lak	Kanizsa shrinkage illusion without amodal completion
28	Lee	Consciousness, Volition and Affect Neuromodels
29	Lenay	Seeing oneself: experimental studies of perceptive interactions
30	Lou	Apparent size, Emmert's law, and the Role of Oculomotor Adjustment in Object-Centered Perception
31	Lyyra	Consciousness: a constitution view
32	Kranczioch	Electrophysiological Correlates of Target Detection in the Attentional Blink
33	Malmgren	The essential connection between representing and learning

34	Mogi	Taking the neural correlates seriously.
35	Monaco	Dimensions of ictal consciousness in temporal lobe epilepsy: a preliminary investigation.
36	Moore	Predictive and reconstructive influences on action awareness
37	Noack	Frontal feedback and the decentering effect in the production of “self” and conscious experience in humans
38	Noreika	Continuum of Dreaming in the Transition between Sleep Stages 2 and 3
39	Ohyama	Unpredictable visual changes causes distortion of temporal memory of visual events
40	Okubo	The jealous mind--significance of interpersonal resource assignment.
41	Onzo	Intentionality and choice beyond probability--the nature of human emotion.
42	Overgaard	The Place of ACC and dlPFC in Phenomenal Consciousness
43	Pepperell	An Interdisciplinary Study of Visual Indeterminacy
44	Perlis	Self-based Theories of Consciousness
45	Putois	Perception as dynamic segregation and the phenomenology of perceptual presence
46	Robinson	The Neutrality of Evolution for the Consciousness/Brain Problem
47	Rounis	Investigating the role of the prefrontal cortex in visual consciousness using transcranial magnetic stimulation (TMS)
48	Sagiv	Is synaesthesia limited to cross-sensory correspondences? The case of animism.
49	Schlicht	Me-ishness. A Kantian explanation of subjektive character.
50	Schmidt	Measuring unconscious cognition: Data or dissociations?
51	Schyns	Brain correlates of conscious perceptions
52	Shanahan	Spatial Awareness and Fringe Consciousness
53	Smigasiewicz	The role of the implicit sequence learning in the task set switching paradigm
54	Spok	Incorrect trial analysis as a method of unconscious perception research: Preliminary study of digit identification task
55	Spratt	Framed in space? Object-based effects from a new visual attention paradigm.
56	Sudo	Typicality and similarity in perceptual categorization.
57	Sweklej	Both implicit affect and moods moderate intuitive choice
58	Tamietto	The medium and the message: Non-conscious processing of emotion from facial expression and body language in blindsight
59	Tamori	Orbital representation of Auditory perception
60	Tanabe	Stability of retrieved memory and trace dominance
61	Uhlhaas	Unity of Mind and Neural Synchrony in Schizophrenia
62	Vandenberghe	No role of motor responses in sequence learning tasks?
63	Vanhaudenhuyse	The sense of ownership in schizophrenia: study of the Rubber Hand Illusion
64	Verleger	Left-Hemifield Dominance of Healthy Humans’ Visual Perception of Targets in Rapid Series: Electrophysiological Investigation into the Mechanisms
65	Watt	What is the illusion in music?
66	Werning	Empiricism and the Role of Concepts in Perception: An Argument from Binocular Rivalry

Maps


How to get to Oxford
Rail: Frequent train services from London Paddington & regular links to other parts. Cityline 2C/2D bus from station to Physics runs every 30 mins Mon. to Sat., 0710 - 1910 hrs
Coach: frequent services from London Victoria, Heathrow, Gatwick, Stanstead & elsewhere
Parking: on street parking near Physics is available on Keble Road (Pay & Display). Parking is prohibited within the Science Area without permits
Park & Ride: pay & display parking at Thornhill, Redbridge, Seacourt & Peartree with a quick & frequent bus service to the centre. The police advise against leaving cars overnight
For more details with travel suggestions & timetables see www.physics.ox.ac.uk/contact
coach station
railway station
HIGH STREET
~250 metres
KEBLE ROAD
PARKS ROAD
BANBURY ROAD
ST GILES'
MUSEUM RD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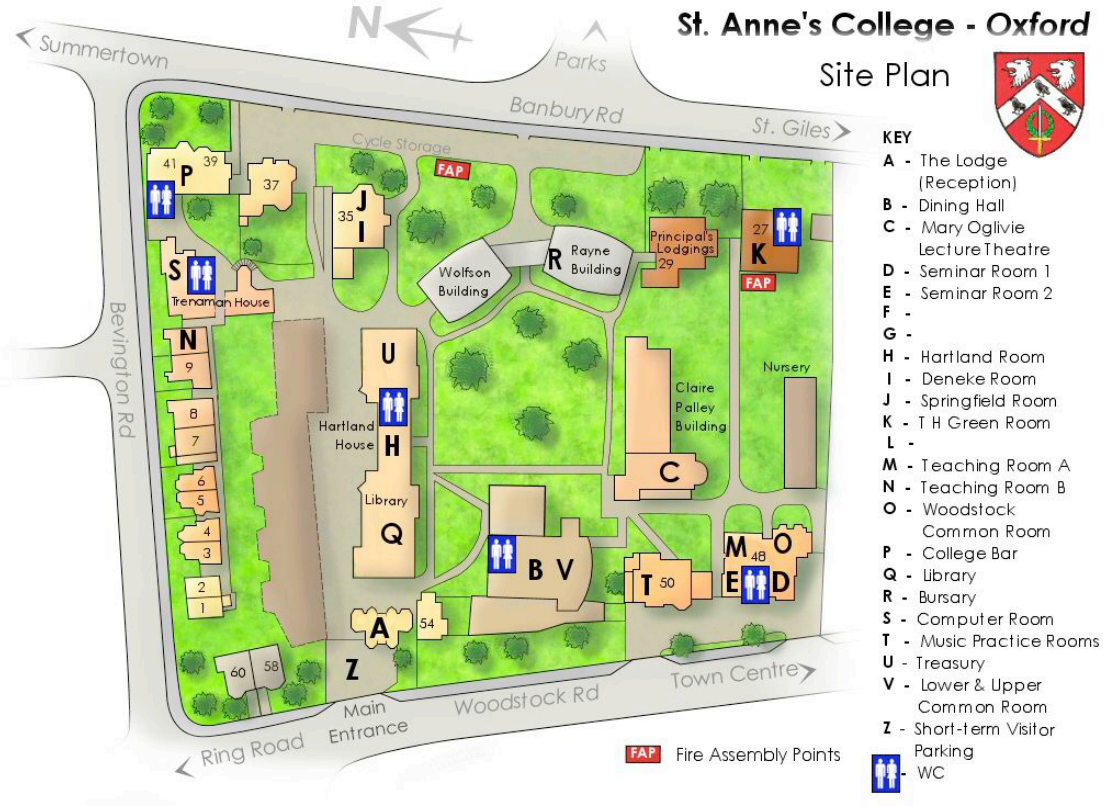
University of Oxford
Colleges & Halls
Oxford Colleges
1 All Souls (Research)
2 Balliol
3 Blackfriars*
4 Brasenose
5 Campion Hall*
6 Christ Church
7 Corpus Christi
8 Exeter
9 Green College**
10 Greyfriars* (direction)
11 Harris Manchester
12 Hertford
13 Jesus
14 Keble
15 Kellogg**
16 Lady Margaret Hall
17 Linacre**
18 Lincoln
19 Magdalen
20 Mansfield
21 Merton
22 New
23 Nuffield**
24 Oriel
25 Pembroke
26 Queen's
27 Regent's Park*
28 St Anne's
29 St Antony's**
30 St Benet's Hall*
31 St Catherine's
32 St Cross**
33 St Edmund Hall
34 St Hilda's
35 St Hugh's
36 St John's
37 St Peter's
38 St Stephen's House* (direction)
39 Somerville
40 Templeton** / Egrove Park
41 Trinity
42 University
43 Wadham
44 Wolfson**
45 Worcester
46 Wycliffe Hall*
* Permanent Private Hall
** Graduate College
i Undergraduate Admissions
Cricket Ground
UNIVERSITY PARKS
UNIVERSITY SCIENCE AREA
Playing Field
Sports Ground
Playing Fields
Tennis Courts
Bus Station
Rail Station
Magdalen Grove
Deer Park
Botanic Garden
Angel and Greyhound Meadow
Merton Field
Christ Church Meadow
Recreation Ground
College of Further Education
Iffley Rd Sports Complex
RIVER CHERWELL
THAMES OR ISIS
MILL STREAM
MOUND CASTLE
Folly Bridge


St. Anne's College - Oxford
Site Plan
N
Summertown
Parks
Banbury Rd
St. Giles
Cycle Storage
FAP
Wolfson Building
Rayne Building
Principal's Lodgings
29
Trenaman House
Hartland House
Library
Claire Palley Building
Nursery
Bevington Rd
Main Entrance
Woodstock Rd
Town Centre
Ring Road
FAP Fire Assembly Points
KEY
A - The Lodge (Reception)
B - Dining Hall
C - Mary Oglivie Lecture Theatre
D - Seminar Room 1
E - Seminar Room 2
F -
G -
H - Hartland Room
I - Deneke Room
J - Springfield Room
K - T H Green Room
L -
M - Teaching Room A
N - Teaching Room B
O - Woodstock Common Room
P - College Bar
Q - Library
R - Bursary
S - Computer Room
T - Music Practice Rooms
U - Treasury
V - Lower & Upper Common Room
Z - Short-term Visitor Parking
- WC

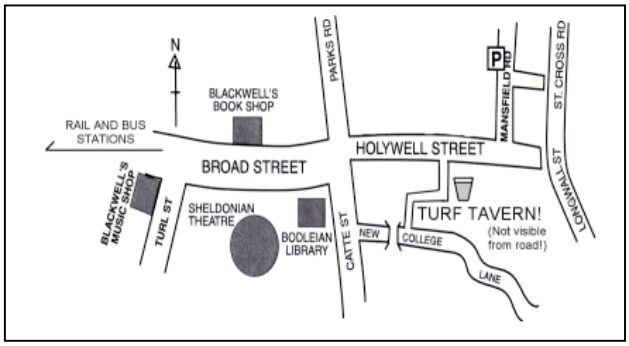
Out and About in Oxford

Local Pubs:

Eagle and Child
49 St Giles, Oxford
OX1 3LU
Tel: 01865 302925 (towards St Cross on the College & Halls map)

Lamb and Flag
12 St Giles, Oxford
OX1 3JS
Tel: 01865 515787 (opposite the Eagle and Child)

Turf Tavern
Holywell Street
Oxford
Tel: (01865) 243235



Cash Points:

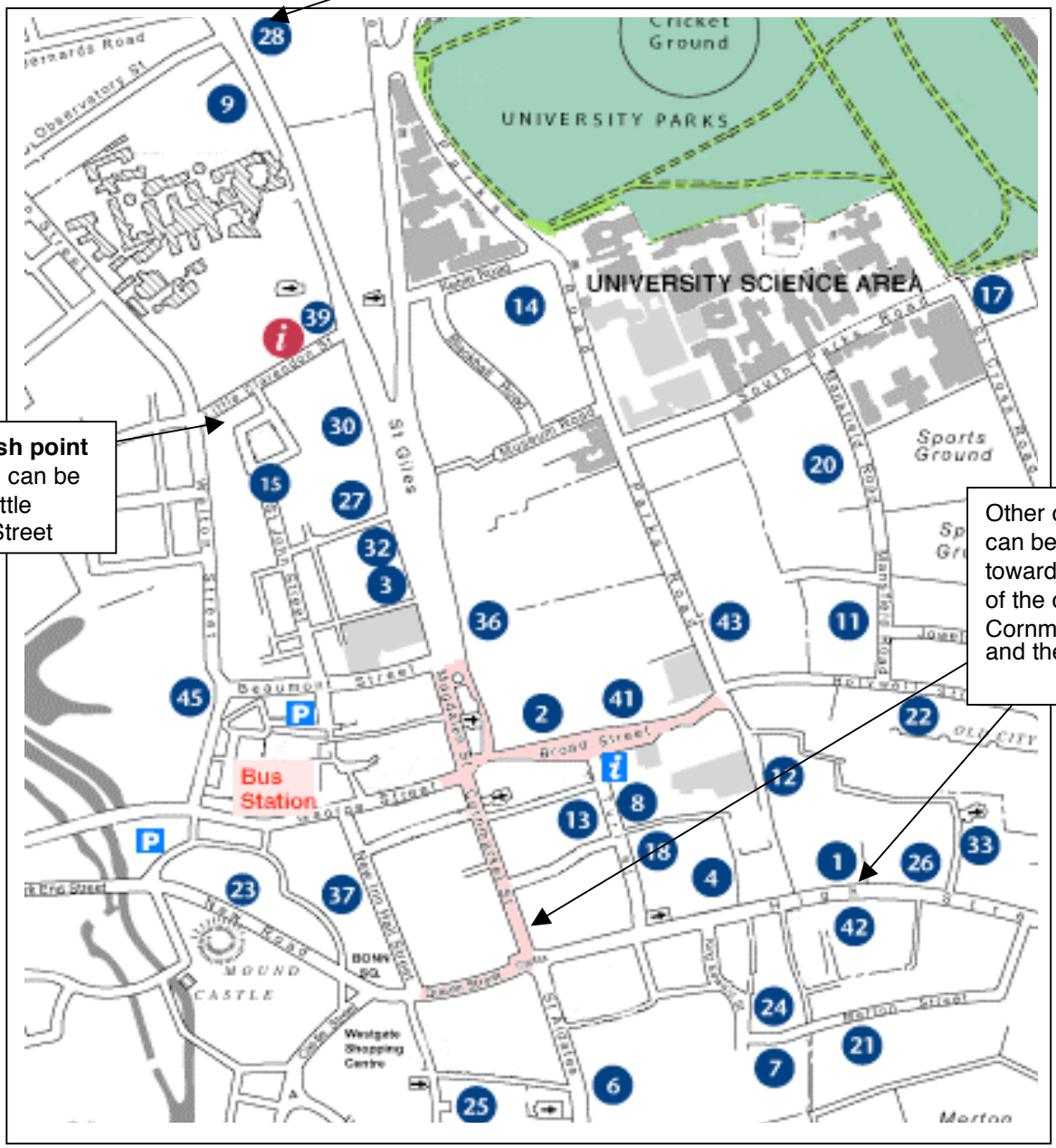
Nearest "Cash & Dash" point to St Anne's College is in Little Clarendon Street, Oxford

NatWest
32 Cornmarket St, Oxford, OX1 3EZ
Telephone: 0845-600 2803

HSBC Bank plc
65 Cornmarket St, Oxford, OX1 3HY
Telephone: 0845-740 4404

Location of Cash Points:

St Anne's College
(No. 28 on College & Halls Map)



Nearest cash point to St Anne's can be located in Little Clarendon Street

Other cash points can be located towards the centre of the city in Cornmarket Street and the High Street

SELECTION of RESTAURANTS in OXFORD

Bagicha 15 North Parade Avenue
OXFORD

Tel: (01865) 513 773

Off Banbury Road, an elegant Indian restaurant set in a characteristic one-way street of old shops.

Bandung 124 Walton Street
OXFORD

Tel: (01865) 511668

Renowned for its great value set meal - eight courses and a bottle of wine - as well as its pleasantly relaxing ambience and selection of Chinese and Indonesian dishes.

Bella Pasta 6-12 George Street
OXFORD

Tel: (01865) 791032

Wine Bar and Italian restaurant. Menu is extensive and portions are generous.

Browns: 5 - 11 Woodstock Road
OXFORD

Tel: (01865) 319600

An Oxford tradition. Popular brasserie with a lively atmosphere. Ideal for a Hot Chicken Salad, Steak, Mushroom and Guinness Pie or a Poached Scotch Salmon. Also good for a late brunch or afternoon tea. Not possible to book so sometimes you will need to wait for a table.

Café Rouge 11 Little Clarendon Street
OXFORD

One block from Rewley House, delightful French café serving both main meals and light snacks or drinks/coffee.

Cherwell Boathouse end of Bardwell Road, off Banbury Road
OXFORD

Small restaurant on the Cherwell River. Excellent food, £20 plus wine set meals. Booking essential. Punts can be hired in summer.

Chiang Mai Kitchen 130a High Street
OXFORD

Tel: (01865) 202 233

A reasonably priced Thai restaurant in a lovely old Oxford building.

Chutney's St Michael's Street / New Inn Hall Street
OXFORD

Tel: (01865) 724 241

This is an authentic, inexpensive Indian brasserie. Arrive early or book a table.

Gee's Restaurant: 61 Banbury Road
OXFORD
OX2 6PE

Tel: (01865) 558346

An imposing Victorian conservatory, transformed into a restaurant in 1984. It has become famous for its well-prepared modern British food and has a unique atmosphere and excellent service. Fairly expensive.

Jamals: 108 Walton Street
Oxford

Tel: (01865) 310102

Excellent Indian food. A warm welcome and large portions. Bring your own wine - no liquor licence.

Le Petit Blanc 71-72 Walton Street
OXFORD

Tel: (01865) 510 999

Raymond Blanc's brasserie. Best to book in the evenings. Very good. Fairly expensive.

Old Orleans: Threeways House
George Street
OXFORD

Tel: (01865) 792718

The home of Southern hospitality is the essence of Old Orleans. It's the taste of the deep South!

Pierre Victoire 9 Little Clarendon Street
OXFORD

Tel: (01865) 316 616

French restaurant chain, good value for money, especially at lunchtime. Near Rewley House.

Pizza Express: The Golden Cross
Cornmarket Street
OXFORD

Tel: (01865) 790442

Pizza Inn set in a medieval courtyard. It is rumoured that Shakespeare may have stayed on his journeys between London and Stratford. Sit and sup with history.

The Gourmet Pizza Co: 2 The Gallery
100-101 Gloucester Green
Oxford

Tel: (01865) 793146

As the name suggests this restaurant offers more than just an ordinary pizza!! Superb pizzas at excellent prices.

Mark your calendars for next year!

ASSC-11

Imperial Palace Hotel, Las Vegas

June 22nd – June 25th 2007

Local Organizers: Stephen Macnick and Susan Martinez-Conde

ASSC11@gmail.com

http://assc.caltech.edu/assc11