

ASSC 11

Association for the
Scientific
Study of
Consciousness

11th Annual meeting



June 22-25, 2007
Imperial Palace Hotel, Las Vegas

Map to Opening Reception and Gala Banquet

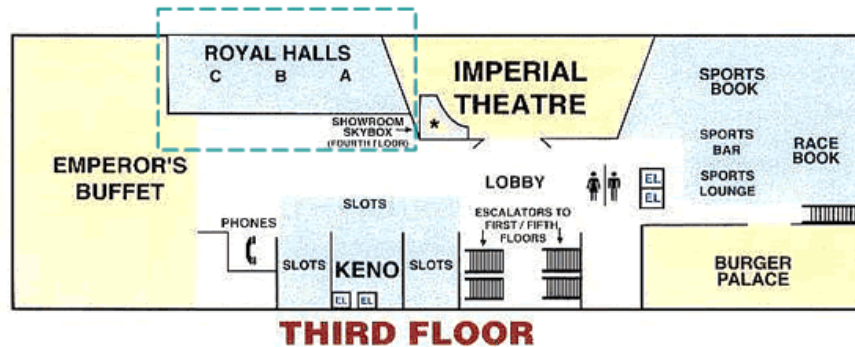


Imperial Palace Hotel - ASSC Home



ASSC Registration Desk

ASSC Talks & Posters



General Information

Local Organizing Committee

Susana Martinez-Conde (co-chair) Stephen Macknik (co-chair)
Jorge Otero-Millan Xoana Troncoso

Scientific and Program Committee

Susana Martinez-Conde (co-chair) Stephen Macknik (co-chair)
Marisa Carrasco Zoltan Dienes Allen Houng
Steven Laureys Alva Noë Elisabeth Pacherie

Volunteer Committee

Xoana Troncoso (chair)
Ravi Atreya Fadi Essmaeel Kristina Musholt
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Supporting organizations

Mind Science Foundation (www.mindscience.org)
John Benjamins Publishing Company (www.benjamins.nl)
Barrow Neurological Institute (www.thebarrow.com)

Exhibitors

Blackwell Publishing (www.blackwellpublishing.com)
Elsevier (www.elsevier.com)
Mind Science Foundation (www.mindscience.org)
Oxford University Press (www.oup.co.uk)

Acknowledgements

ASSC2007 website by Jorge Otero-Millan
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Imperial Palace Hotel-Casino

General Information

Conference Venue

IMPERIAL PALACE HOTEL & CASINO
 3535 Las Vegas Boulevard So.
 Las Vegas, Nevada 89109
 Phone: 1.702.731.3311
 Fax: 1.702.735.8328
 E-mail: frontdesk@imperialpalace.com
 Web: <http://www.imperialpalace.com>

Onsite Registration will be available during the meeting.

Badges and other conference documents should be picked up at the Registration Desk.

Social Program

Venetian Opening Reception

A taste of the finest hors d'oeuvre in a spectacular setting, Canaletto, the restaurant at the unique The Venetian Resort-Casino, with breathtaking views of the Grand Canal and gondolas passing below. The restaurant's architecture is as remarkable as its food with 16-foot ceilings rising above polished hardwood floors and a glorious exhibition kitchen. Chef Luigi Bomparola will recreate the unique flavors of Venice for ASSC2007's exceptional Opening Reception. All delegates are invited - don't miss it!

Date: Friday, June 22. 20:00 – 22:00.

Place: Canaletto Ristorante

Gala Banquet

ASSC 2007 attendees and guests are invited to dine at the Gala Banquet in celebration of ASSC on the evening of Saturday, June 23rd. The banquet will be held at Restaurant Zeffirino (at the The Venetian Resort-Casino). It's a fantastic setting in which to unwind, enjoy a cocktail and prepare your palate to appreciate the delectable dinner awaiting you in Zeffirino's divine dining room.

Note: Special registration required

Cost: \$95

Date: Saturday, June 23. 20:00 – 22:00.

Place: Restaurant Zeffirino

Both of these restaurants are situated in the beautiful Grand Canal Shoppes of the Venetian Resort-Casino (3355 Las Vegas Blvd. South, Las Vegas, NV 89109).

To walk there from the Imperial Palace, follow these instructions (see map on the program cover):

- 1) Exit the Imperial Palace to Las Vegas Blvd and turn right.
- 2) Walk approximately 5 minutes until you get to the green and white awning (on the right) with the Grand Canal Shoppes sign on it (next to Sephora).
- 3) Take the moving walkway over the Venetian bridge (past Madame Tussaud's).
- 4) After the bridge go Left, following the signs to the Grand Canal Shoppes.
- 5) Enter the Grand Canal Shoppes within the Great Hall. Stay on second floor and Zeffirino (banquet) will be down the hall on the Left.
- 6) To go to Canaletto (opening reception), continue past Zeffirino and take a Right at the fork in the hall.
- 7) Once you reach St. Mark's Square, Canaletto will be on the Right.
- 8) Total walking time from Imperial Palace 8-12min.

Student Social

Funded by the Mind Science Foundation the ASSC 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. All ASSC attendees are invited to attend!

Date:

Sunday, June 24. 20:00 – 22:00.

Place:

Freakin' Frog Beer Bar
 4700 South Maryland Pkwy
 Las Vegas, NV 89119

Special Symposium: The Magic of Consciousness

The ASSC11 Co-Chairs are happy to announce a Special Symposium that promises to showcase the “Magic of Consciousness” to even the hardest-nosed skeptic. Please join us and five of the world’s premier stage magicians on Sunday June 24th, 2007, between 5:30pm and 7:30pm, so that these world-class performers may share their deep intuitions and insights on the covert manipulation of attention and awareness with the research community.

The five magicians joining us will be:

- **TELLER**, of Penn & Teller, will discuss the mechanisms of:
“Disguising one action as another”
Such as the difference between motion and action (“Action is motion with a purpose”)
- **APOLLO ROBBINS**, Professional Thief and Pickpocket, who successfully pickpocketed the presidential secret service guarding Jimmy Carter, will discuss:
“Misdirection is the story that you make them remember”
Or how the audience believes what they are tricked into believing, despite evidence to the contrary
- **MAC KING**, headliner at Harrah's on The Strip, will speak about why:
“It’s a bad idea to do the same trick twice”
And why magicians never announce their tricks in advance
- **JAMES RANDI**, aka The Amazing Randi, and Founder of the James Randi Foundation will present:
“Implying data that isn’t there”
Or how an audience can be lulled into eagerly accepting suggestions and unspoken information
- **JOHNNY THOMPSON**, from The Great Tomsoni and Co. will talk about:
“Closing all the doors”
Or the importance of reducing all potential explanations to nothing but magic

Just as visual scientists study visual art and illusions to elucidate the workings of the visual system, so too can cognitive scientists study artists of cognitive illusions to elucidate the underpinnings of cognition. Stage magic shows are the manifestation of the deep intuition and understanding of human attention and awareness held by the accomplished magical performer. By studying magicians, and learning their techniques, researchers can hope to learn the skills necessary to manipulate attention and awareness in the lab, at a quantitative level. In this spirit, each of these performers will describe an aspect of magical technique that serves as a powerful tool to manipulate attention and/or awareness, either on a large scale (to a large audience) or a small scale (such as a card trick, or other close-up manipulation). They will demonstrate an example application of each technique, and then discuss why/how they believe the technique may work, in terms of human cognition.

The goal of the event is to help raise awareness among ASSC delegates about the powerful tools that magicians have already developed to manipulate awareness. And the magicians themselves have also expressed their wish that the information flows both ways! The performers deeply hope to learn from the consciousness research community about new principles in cognitive science that can be exploited to entertain and amaze their audiences.

This event is the first of its kind, but we hope that it will become a regular event at future ASSC meetings, just as visual illusion demonstrations have become a regular event at visual science conferences.

DON'T MISS IT!

Conference Program

Program at a glance

	Friday	Saturday	Sunday	Monday	
08.30 - 09.00				Plenary Symposium Cognitive Basis of Intuitions about Consc.	
09.00 - 09.30		Tom Slick Symposium	Concurrent Sessions A: Visual Approaches B: Philosophy II		
09.30 - 10.00				Break	
10.00 - 10.30	Morning tutorials		Break		
10.30 - 11.00		Break	Break		
11.00 - 11.30					Plenary Symposium Animal Consciousness
11.30 - 12.00			Poster session	Poster session	
12.00 - 12.30					Williams James Prize Lecture S. Kouider
12.30 - 13.00					
13.00 - 13.30	Break	Break	Break	Break	
13.30 - 14.00					
14.00 - 14.30					
14.30 - 15.00	Afternoon tutorials	Keynote speaker L. Pessoa	Plenary Symposium Cortical Networks and Conscious Awareness	Concurrent Sessions A: Sensation & Perception B: Temporality	
15.00 - 15.30					
15.30 - 16.00		Concurrent Sessions A: Attention B: Philosophy I	Keynote speaker M. Chun		
16.00 - 16.30					
16.30 - 17.00					
17.00 - 17.30		Break	Break	Break	
17.30 - 18.00	Break	Concurrent Sessions A: Clinical Insights B: Philosophy I (cont'd)	Special Symposium The Magic of Consciousness	Concurrent Sessions A: Self B: Techniques	
18.00 - 18.30	Welcome Presidential Address M. Gazzaniga	Keynote speaker A. Gopnik		Keynote speaker D. Rosenthal	
18.30 - 19.00					
19.00 - 19.30					
19.30 - 20.00					
20.00 - 20.30	Venetian reception	Gala banquet	Student Social		
20.30 - 21.00					
21.00 - 21.30					
21.30 - 22.00					

Friday, 22 June 2007

MORNING

8:30-10:00 Registration

10:00-13:00 Morning Tutorials

Tutorial 1

(Fuji Room)

The scope and limits of
brain imaging in
consciousness research

Lau

Tutorial 2

(Pearl Room)

Representing and
misrepresenting the body
de Vignemont, and Meeks

Tutorial 3

(Sampan Room)

Reading conscious and
unconscious mental states
from human brain activity

Haynes

Tutorial 4

(Jade Room)

Can inner experience be
faithfully described?

Hurlburt, and Schwitzgebel

AFTERNOON

14:30-17:30 Afternoon Tutorials

Tutorial 5

(Fuji Room)

The pharmacology of
perception

Carter, and Silver

Tutorial 6

(Pearl Room)

What is self-specific? A
tutorial questioning the
cerebral correlates of the
self

Legrand, and Ruby

Tutorial 7

(Sampan Room)

The relationship between
top-down attention and
consciousness

Tsuchiya, and Koch

Tutorial 8

(Jade Room)

“Measuring
consciousness”:
Combining objective and
subjective data, and what it
may all mean

Cleeremans, Overgaard, and
Engel

17:30-18:00 Break

18:00-19:30 Welcome and Presidential Address (Royal Halls A)

18:00 The Structure of Human Consciousness
19:30 Gazzaniga

EVENING

20:00-22:00 Venetian Reception (Canaletto Ristorante, The Venetian Resort-Casino)

Saturday, 23 June 2007

MORNING

8:30-10:30 Plenary Symposium *(Royal Halls A)*

2006 Tom Slick Research Award in Consciousness

Chair: Joseph Dial

8:30	Who Am I? Where Am I? – Neurobiological and Philosophical Concepts of the Self
9:30	Mind Science Foundation – “Distinguished Debates in Consciousness” Dennett, and Gazzaniga
9:30	Cross-modal Plasticity
10:00	Saenz
10:00	Development and Application of Real-Time fMRI
10:30	Hoefl

10:30-11:00 Break

11:00-13:00 Posters *(Royal Halls C)*

AFTERNOON

14:30-15:30 Keynote Lecture *(Royal Halls A)*

14:30	Affective vision: Prioritization does not imply automaticity
15:30	Pessoa

15:30-17:00 Concurrent Talks

Attention *(Royal Halls A)*

Chair: Stephen Macknik

15:30	Cueing can cure crowding
16:00	Freeman, and Pelli
16:00	Spatial Dynamics of Cognitive Orienting Systems:
16:30	Attentional Momentum and Inhibition Durgin, LaVan, and Brandt
16:30	Distinct mechanisms for attention and awareness
17:00	revealed by confidence judgments and reaction times Wilimzig, Einhäuser, Fahle, and Koch

Philosophy I *(Royal Halls B)*

Chair: TBA

Visual Agnosia and Higher-Order Thought Theory
Gennaro
The Exclusion-Failure Paradigm and Signal Detection Theory - P without A consciousness?
Irvine
Do you know what you see when your eyes are closed?
Schwitzgebel

17:00-17:30 Break

17:30-18:30 Concurrent Talks

Clinical Insights *(Royal Halls A)*

Chair: Petra Stoerig

17:30	Sensory discrimination and awareness in patients with severe brain damage
18:00	Perrin, Schnakers, and Laureys
18:00	Inverse Zombies, General Anesthesia, and the Hard Problem of Unconsciousness
18:30	Mashour

Philosophy I (cont) *(Royal Halls B)*

Chair: TBA

Sense of agency and alienated agency: a two-tiered account
Pacherie
Consciousness, Higher-order Thoughts, and What It Is Like
Brown

18:30-19:30 Keynote Lecture (Royal Halls A)

18:30	Why Babies Are More Conscious Than We are
19:30	Gopnik

EVENING**20:00-22:00 Gala Banquet** (Restaurant Zeffirino, The Venetian Resort-Casino)**Sunday, 24 June 2007****MORNING****8:30-10:00 Concurrent Talks****Visual Approaches** (Royal Halls A)

Chair: Susana Martinez-Conde

8:30	The magic of conscious perception. How immediate experience affects the vanishing ball illusion
9:00	Kuhn
9:00	Pupil Dilation precedes and predicts perceptual rivalry switches: Suggesting perceptual selection shares the same noradrenergic mechanisms implicated in behavioral selection.
9:30	Carter, Stout, Koch, and Einhäuser
9:30	Cueless Blindsight
10:00	Stoerig
10:00	The role of feedback in visual masking, visual awareness and attention
10:30	Macknik, and Martinez-Conde

Philosophy II (Royal Halls B)

Chair: Elisabeth Pacherie

Misrepresentation and Consciousness
Blank
Creature consciousness and state consciousness: An explanatory framework
Bayne
Rethinking Qualia
Van Gulick
The Introspective Availability of Intentional Content
Pitt

10:30-11:00 Break**11:00-13:00 Posters** (Royal Halls C)**AFTERNOON****14:30-16:00 Plenary Symposium** (Royal Halls A)**Cortical Networks and Conscious Awareness**

Chair: Alomit Ishai

14:30	Faces, Cortical Networks and Effective Connectivity
15:00	Ishai
15:00	Fundamental antagonistic networks in the human cortex: implication to neuronal models of subjective awareness.
15:30	Malach
15:30	Consciousness and effective connectivity in wakefulness and sleep
16:00	Tononi, and Massimini

16:00-17:00 Keynote Lecture (Royal Halls A)

16:00	Probing Unconscious Perception and Memory with Functional Brain Imaging
17:00	Chun

17:00-17:30 Break**17:30-19:30 Special Symposium** (Royal Halls A)**The Magic of Consciousness**

Chairs: Susana Martinez-Conde & Stephen Macknik

Disguising one action as another *Such as the difference between motion and action ("Action is motion with a purpose")*
Teller, of Penn & Teller

Misdirection is the story that you make them remember *Or how the audience believes what they are tricked into believing, despite evidence to the contrary*
Apollo Robbins, Professional Thief and Pickpocket, who successfully pickpocketed the presidential secret service guarding Jimmy Carter

It's a bad idea to do the same trick twice *And why magicians never announce their tricks in advance*
Mac King, headliner at Harrah's on The Strip

Implying data that isn't there *Or how an audience can be lulled into eagerly accepting suggestions and unspoken information*
James Randi, aka The Amazing Randi, and Founder of the James Randi Foundation

Closing all the doors *Or the importance of reducing all potential explanations to nothing but magic*
Johnny Thompson, from The Great Tomsoni and Co.

EVENING**20:00-22:00 Student Social** (Freakin' Frog Beer Bar)**Monday, 25 June 2007****MORNING****8:30-10:00 Plenary Symposium** (Royal Halls A)**The Cognitive Basis of Intuitions about Consciousness**

Chair: Joshua Knobe

8:30 **Intuitions about Consciousness: Experimental Studies**

9:00 Knobe, and Prinz

9:00 **Dimensions of Mind Perception**

9:30 Gray, Wegner, and Gray

9:30 **The genuine problem of consciousness**

10:00 Robbins, and Jack

10:00-10:30 Break**10:30-12:00 Plenary Symposium** (Royal Halls A)**Animal Consciousness: Towards a Scientific Description and Natural History**

Chairs: David Edelman and Anil Seth

8:30 **Cognition and Communication in Grey Parrots**

9:00 Pepperberg

9:00 **Is there a vertebrate mechanism of consciousness, and how would we recognize it if we saw it?**

9:30 Merker

9:30 **The 'octopus' cognition: reality or dreams of scientists**

10:00 Fiorito

12:00-13:00 William James Prize Lecture (Royal Halls A)

12:00	A neural perspective on the levels of processing associated with unconscious perception
13:00	Kouider

AFTERNOON**14:30-17:00 Concurrent Talks****Sensation & Perception** (Royal Halls A)

Chair: Xoana Troncoso

14:30	The functional impact of mental imagery on conscious perception
15:00	Pearson, Clifford, and Tong
15:00	Peeking at the function of perceptual suppression during binocular rivalry
15:30	Arnold, Grove, and Wallis
15:30	Detecting subliminally presented phobic stimuli: Evidence for bidirectional unconscious inhibition and facilitation
16:00	Snodgrass, Shevrin, and Brakel
16:00	Properties of prolonged interocular suppression of awareness
16:30	Mendoza, and Chaudhuri
16:30	Visual processing without awareness during eye movements
17:00	Watson, and Krekelberg

Temporality (Royal Halls B)

Chair: David Eagleman

Dynamics of cognitive irreversibility in one-shot learning--beyond oneness
Ishikawa, and Mogi
The transition of an unconscious rapid motion signal into a conscious signal by neural braking
Mattler, and Fendrich
Neural correlates of the motion consciousness from two-stroke apparent motion and real motion
Zhang, and Mogi
Laterality and modality in simultaneity judgment
Herai, and Mogi
Behavioral speed contagion: Automatic modulation of movement timing by observation of body movements
Watanabe

17:00-17:30 Break**17:30-18:30 Concurrent Talks****Self** (Royal Halls A)

Chair: Timothy Bayne

17:30	The experimental induction of out-of-body experiences
18:00	Ehrsson
18:00	Acme Corporation Eats a Burrito: Reconsidering our Intuitions about Consciousness
18:30	Sytsma, and Machery

Techniques (Royal Halls B)

Chair: Melanie Wilke

Mice have a prefrontal cortex and they use it
Granon, and Changeux
Descriptive Experience Sampling compared to validity-based and analytically coherent approaches
Hurlburt

18:30-19:30 Keynote Lecture (Royal Halls A)

18:30	Consciousness and Its Function
19:30	Rosenthal

Poster Listing

POSTERS Saturday, 23 June 2007

08:30-19:30 / Attended: 11:00-13:00

NCC

1	The N170 ERP Component Reflects Conscious Perception of Familiar Shape Trujillo
2	Brain-Reading of Mental Activity is Impossible: The History-Dependence Hypothesis Shah, and Urkia
3	Neural correlate of residual vision in monkey with blindsight Yoshida, Takaura, and Isa
4	Modulation of synchronizations with auditory conscious and non-conscious perception Signoret, Bertrand, and Perrin
5	Conscious experience as explained by the frontal feedback model Noack
6	On the Embryology of Consciousness Foster
7	Do Worms Feel Hungry? : Simulating Behavior Transitions in C. Elegans Waterston
8	The Shifting Streams of Consciousness: an fMRI study of consciousness in a simulated driving task Lloyd
9	Synaptic Activity Underlies Cognition and the Action Potential Underlies Subjective Awareness Cook
10	Are dendritic webs the functional architecture of consciousness? Hameroff
11	Electroencephalography correlates of momentary mindfulness Bastos, Baggott, and Rosch
12	Neuronal underpinnings of subjective visibility Wilke, Mueller, and Leopold
13	Stimulus invisibility uncouples the fMRI bold response from neuronal spiking activity in V1 Maier, Wilke, Aura, Zhu, Ye, and Leopold
14	The magical number 10 --- Hertz, that is. Baars, and Franklin

Phenomenology

15	Characterizing Hallucinogen Effects using Quantitative Semantic Analysis of Internet 'Trip Reports' Baggott, Coyle, Lopez, and Presti
16	Cognitive Phenomenology and Cyrillic Texts Dodd
17	The Turing machine revisited: The computational complexity of a visually conscious machine. Does a conscious machine exist? Rosen
18	Individual Differences in the Capacity of Consciousness: Handedness and Openness to Experience Niebauer, and Naegele
19	Sleepwalking Around the Contemporary Consciousness Debate Lay, and Kidd

Philosophy I

20	Modern Consciousness Science as Fechner's "Inner Psychophysics" Faw
21	UNCC: The Cure for Chronic 'Zombie Blues' Deiss
22	Assumed Existence den Hollander, and Ruys
23	Origins of I and Thou: Developmental and neurobiological substrates McGovern
24	Varieties of Intentionality Schlicht

25	Describing the Unimaginable Weisberg
26	(Proto-) Consciousness as a Contextually Emergent Property of Self-Sustaining Systems Jordan, and Ghin
27	Getting to the Heart of the Concept Concept Parthemore
28	The Myth of Superior Intelligence Frank
29	Emergence, Color and the Knowledge Argument Schier
30	Battlefield "Mind": can scientific study of human consciousness help save lives? Essmaeel
31	Scanning for Happiness Shriver
32	The Structuring, Capture, Distillation, and Report of Subjective Experience: Methodological Issues Heavey, Talarico, and Lefforge
33	Two intuitions about Mary Brown
34	A Zombie's View of 'What it's Like' Beisecker

Visual Approaches

35	Attentional binding and the root of visual illusions Baldo
36	Contribution of ipRGC to conscious visual perception Tsujiura, Ohama, Yoshida, Nuruki, and Yunokuchi
37	Face value: What we get from a crowd of faces Haberman, and Whitney
38	Neural correlates of changes in visual awareness Taya, Sekine, Tanabe, and Mogi
39	Conscious Awareness of Objects in Indeterminate Art Pepperell, Fairhall, and Ishai
40	When to encode implicit contextual cue Ogawa, and Watanabe
41	Acuity in the Grand Illusion Kaelberer, and Jacobson

POSTERS Sunday, 24 June 2007

08:30-19:30 / Attended: 11:00-13:00

Implicit Processing

1	Effects of word recognition learned in a context Hoshino, and Mogi
2	Replicated inhibition of unpleasant word identification under objective threshold conditions Lepisto, Winer, Shevrin, and Snodgrass
3	Imaging subliminal and supraliminal speech priming using MEG and fMRI de Gardelle, and Kouider
4	Do I see it or do I think I do? Distinguishing perception and memory influences of implicit sequence learning on perceptual consciousness of the learned stimuli. Timmermans, and Cleeremans
5	Awareness and Novelty in Explicit (Deliberative) and Implicit (Evocative) Learning and Memory of Artificial Grammar Dulany, and Pritchard
6	ADHD children perform better than normal children in an Artificial Grammar Implicit Learning Task: ERP and RT evidence Rosas-Díaz, Ceric, Tenorio, Mourgues, Thibaut, Hurtado, Aravena, and Valenzuela

Memory

7	Anosognosia for personality changes in AD: A combination of memory and perspective taking deficits ? Ruby, Collette, D'Argembeau, Péters, Degueldre, Balteau, Luxen, Maquet, and Salmon
8	Energetic consideration on evolutionary analysis of unified consciousness in working memory Hirabayashi, and Ohashi
9	The power of successful experience: Immediate change in learning strategy for visuomotor sequences Ikeda, and Watanabe
10	Memory and Consciousness Droege
11	Stability of human declarative memory studied by EEG Tanabe, Taya, Sekine, and Mogi

Philosophy II

12	A dogma about consciousness? Kauffmann
13	Consciousness, Complexity and Testability Mograbí
14	AWAREness: A framework for conceptualizing the varying components of consciousness. MacLin, and MacLin
15	The Problem of mental causation and how to solve it Chen
16	Phenomenology and Intentionality Bailey, and Richards
17	Some Suggestive Correspondences and Similarities Between Shamanism and Cognitive Science Hubbard
18	The calculus of anomalies and the origin of consciousness Mogi
19	The Pernicious Underdetermination of the NCC Molyneux
20	Chaos and Complexity in the Dreaming Brain Krippner, and Combs
21	Resolving the "Hard Problem" Within the Circuitry of a Philosopher's Brain: Creating a Phenomenal Link Between Qualia and Neural Activity Marton
22	Transactional Cognition: Building a reliable Post-Chomsky Model for Human Language and Cognition. Schwarz

23	Beyond the special case: applying neural theories of consciousness to non-human animals Farber
24	Brain beyond ensembles Onzo, and Mogi
25	Towards a mathematical psychiatry: Modeling repetition compulsion with game theory Amsel

Self

26	Sense of agency: Inference and the role of contingency Deal, Moore, Lagnado, and Haggard
27	The self of subjectivity: you have to first be somebody to have a perspective Chiu, and Hounq
28	Qualitative investigations into the phenomenology of self-awareness: two methods applied to the brain-injured Rose, Brown, and Lyons
29	Bodily self-consciousness: neuroscientific results in light of philosophical considerations. Legrand
30	An inference to the sense of agency? Carruthers
31	Postdictive Generation of Subjective Intentions: New Experiments on Free Will and Their Technological Applications. Jacobson

Sensation & Perception

32	MIND in a museum - past and present work on developing new demonstrations and presenting the science of the mind to the public Brown
33	Is Phenomenal World an Illusion? Hsu
34	The real and illusory in phoneme perception Omata, and Mogi
35	Beauty of artworks depends on who created them: Aesthetic responses involve more of the brain than the visual system Isham, and Banks
36	How actively does the sleeping brain process auditory stimuli? Brain reactivity to sound duration deviance assessed in all sleep stages Morlet, Caclin, Delpuech, Boulet, and Ruby

Sensorymotor

37	Perceptual categorization based on the prototype effect Sudo, and Mogi
38	A Transformed Environment and the Conscious Hashimoto
39	Agency' and prior conscious thought Moore, Wegner, and Haggard
40	Developmental learning in non-markovian processes: premises of a biologically plausible cognitive architecture Pasquali, Castellini, Gaillard, Orabona, Metta, and Cleeremans
41	Temporality in voluntarily initiated movements. Nozawa, and Mogi

Temporality

42	Illusions of time and what they tell us about the brain Pariyadath, and Eagleman
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Tutorials

Tutorial 1: The Scope and Limits of Brain Imaging in Consciousness Research

Hakwan Lau *Department of Experimental Psychology, Oxford University Wellcome Department of Imaging Neuroscience, University College London*

Brain imaging has gained a lot of attention within the consciousness research community. The aim of this workshop is to give a non-technical (i.e. no equations) introduction to brain imaging, allowing non-experts to be able to read and understand experimental reports critically. First I explain the basic procedures and mechanisms of how a typical fMRI or PET study is done, and how the data are analyzed. I then focus on the methodological problems that are often found in published articles, such as statistical errors and anatomical mis-localization. The results in imaging often depend on how the data were analyzed, and therefore a cautious reading of the methodology is necessary. I then move on to discuss issues of interpretation using examples from the consciousness research literature. I particularly pick out cases where theoretical interpretations of brain imaging results were misguided, and explain why some forms of arguments are fallacious. For example, the fact that two tasks reveal similar activations in the same brain region does not necessarily mean that they are fundamentally related; there are only so many brain regions defined by conventional labels. I then describe some more advanced methods that bypass the problems discussed. These include repetitional priming, connectivity analyses, high-resolution imaging and multivariate approaches. Finally I also describe other relatively new techniques such as MEG and fMRI-guided TMS and discuss how they might contribute to consciousness research in the future.

Tutorial 2: Representing and misrepresenting the body

Frederique de Vignemont *Institut of Cognitive Science*
Roblin Meeks *Princeton University*

What neural subsystems are implicated in representing one's body? Do we draw upon the same subsystem to represent the bodies of others? How sensitive are such representations to input from different sensory modalities? What underwrites or

constitutes our sense of bodily ownership, the feeling we have that we experience a particular body "from the inside"? In this workshop we investigate the central questions surrounding the ways in which we represent and misrepresent our bodies in thought and action. We canvas recent work in both philosophy and psychology, paying particular attention to neuropsychological data concerning disruptions in body representations such as asomatognosia and autotopagnosia and the susceptibility of normal subjects to illusions of limb ownership. We end with considerations as to how philosophical theories of conscious experience of our bodies can both inform and be informed by empirical data.

Tutorial 3: Reading conscious and unconscious mental states from human brain activity

John-Dylan Haynes *Bernstein Center for Computational Neuroscience Berlin*

Recent advances in human neuroimaging have shown that it is possible to accurately "read" or "decode" a person's conscious experience from non-invasive measurements of their brain activity. Such decoding is based on the idea that each thought is associated with a unique spatial pattern of brain activity. By training a computer to recognize these unique patterns it is possible to reliably read many different thoughts from a person's brain activity. This tutorial will give a broad overview of the emerging field of "brain reading", as well as an in-depth discussion of its implications for research on consciousness. The first section will provide a historical overview of brain reading with a special focus on EEG. The second section will concisely present the main brain imaging techniques used for brain reading (EEG, single- and multi-cell recordings, fMRI). The third section will introduce the key concepts of information theory and pattern recognition in an easily accessible form. The fourth section will present an overview of the current "state of the art" in the field including many examples. The fifth section will show in-depth all steps involved in a typical brain-reading study. For this purpose a study will be presented step-by-step that tracks a dynamically changing "stream of consciousness" using fMRI. A sixth section will demonstrate how decoding-based research can provide important clues about conscious and unconscious information processing, and how it is a useful framework for studying neural "representation" in general. Finally, the current challenges and limitations of brain

reading techniques will be discussed along with perspectives for future research.

Tutorial 4: Can inner experience be faithfully described?

Russell T. Hurlburt *Psychology, University of Nevada, Las Vegas*

Eric Schwitzgebel *Philosophy, University of California, Riverside*

Psychologist Russell Hurlburt is known for his innovative methods of exploring inner experience. Philosopher Eric Schwitzgebel is known for his skepticism about such methods. Hurlburt and Schwitzgebel will team up (perhaps “square off” would be a better term) and interview two subjects selected from the ASSC membership about the details of their inner experience. That interview will follow Hurlburt’s Descriptive Experience Sampling (DES) method: the subjects will have taken DES random beepers into their natural environments and paid attention to whatever experiences were ongoing at the moments of a half-dozen random beeps. Hurlburt, Schwitzgebel, and the tutorial attendees will question the subjects about those beeps during what DES calls the “expositional interview.” During these interviews, we (all tutorial participants) will conduct “sidebar” discussions about: what are the characteristics of good and bad questions; how believable are the subjects’ reports; to what extent do we “lead the witness”; etc.

Tutorial 5: The Pharmacology of Perception

Olivia Carter *Vision Sciences Lab, Psychology Dept, Harvard University*

Michael Silver *Helen Wills Neuroscience Institute and School of Optometry, University of California, Berkeley*

Pharmacological studies have proven to be invaluable to molecular, cellular, and systems neuroscientists in the study of neurons and neural networks. The benefits of being able to experimentally manipulate complex systems in a biochemically-specific manner are well-established in these fields. However, pharmacology has rarely been employed in the study of perception, cognition, or consciousness. This tutorial will show how pharmacological research can provide critical information regarding the neurotransmitters that modulate consciousness as well as providing insights into the neural correlates of consciousness

itself. Specifically, we will explore the pharmacology of perception in three sections that will be accessible to nonscientists but also be detailed enough to give the most experienced neuroscientist plenty to think about. The three sections will include 1) Introduction to neuropharmacology, from receptor biochemistry to the cognitive functions of the major neurotransmitter systems. 2) The role of serotonin (5-HT) in visual perception. We will review a number of experiments indicating a special role for the cortical 5-HT_{2A} receptor in the action of hallucinogenic drugs. Data will also be presented from human behavioral studies examining the effects of psilocybin (the 5-HT_{2A} activating drug found in magic mushrooms) on visual perception and attention. 3) The role of acetylcholine in cognition, including learning, memory, and attention. Behavioral and neuroimaging results from cholinergic pharmacology studies in humans will be discussed, including studies of attention and visual perception.

Tutorial 6: What is self-specific? A tutorial questioning the cerebral correlates of the self

Dorothee Legrand (Chair) *CREA, Centre de Recherche en Epistémologie Appliquée.*

Perrine Ruby (Chair) *Centre hospitalier Le Vinatier*

The self is increasingly investigated empirically. However, reviews show that the self still lacks both consensual definition and specific cerebral correlates. This tutorial intends to better understand and overcome this critical situation.

First (Dorothee Legrand), two criteria for self-specificity will be determined: Exclusivity (X applies only to the self) and Collinearity (Any change of X entails a change of the self). These criteria are met neither by evaluative processing nor by self-attributed contents, but by first-person perspective. The latter relates represented objects to the representing subject without depending on any representation of the self. It is proposed that such relation is made possible at a basic level thanks to a sensori-motor integration i.e. the matching of efference with re-efference (efference issuing from the subject's own action) Self-specificity will thus be accounted for in functional terms, in a framework integrating a dynamic sensorimotor approach and a phenomenological account of bodily self-consciousness. Second (Perrine Ruby), a review of the neuroimaging literature will come in support to this theoretical proposal. A synthesis of a wide range

of neuroimaging studies tackling self, mind reading, memory, reasoning and resting state issues will serve to demonstrate that the cerebral activations repeatedly reported in self-related studies are also recruited for others-related tasks. It is argued that such common cerebral network can thus not subserve any self-specific component, but would rather subserve a general cognitive processing of evaluation using information recalled from memory, which would explain its recruitment in all the aforementioned tasks. The search of the self is thus re-oriented toward the self-specific first-person perspective. Results of the literature showing increased activity in somatosensory-related cortices for first (vs third) person perspective coheres with the theoretical proposal that the first-person perspective is grounded on sensorimotor integration and encourage further investigations in this direction.

Tutorial 7: The relationship between top-down attention and consciousness

Naotsugu Tsuchiya *California Institute of Technology*

Christof Koch *California Institute of Technology*

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. Building upon the successful tutorial at ASSC10, we review and update the recent evidence showing 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.

Tutorial 8: “Measuring consciousness”: Combining objective and subjective data, and what it may all mean

Axel Cleeremans *Department of Psychology, Université Libre de Bruxelles*

Morten Overgaard *Neuropsychological Laboratory, Hammel Neurorehabilitation and Research Centre*

Andreas K. Engel *Dept. of Neurophysiology and Pathophysiology, University Medical Center Hamburg-Eppendorf*

Can we measure consciousness? Does the question even make sense? On the one hand, any empirical approach to consciousness would seem to require that the concept be sufficiently well defined that we can indeed measure it, just as we can measure energy, mass, or reaction time. On the other, many would disagree with the very idea that consciousness is something that one can “measure”, as we have no direct way of assessing its presence in others. In light of this quandary, it has been pointed out that consciousness presents unique methodological challenges for its study requires that one combines subjective (“first-person”) and objective (“third-person”) data. While some of these methods are familiar, many others have been proposed recently, and some have not been thoroughly explored yet. The main goal of this tutorial is to overview the different methods one can deploy to contrast information processing with and without consciousness. Many such methods are inherently interdisciplinary, and the tutorial will therefore highlight complementary methods ranging (1) from neuroimaging to introspection, (2) from methods appropriate to study normal cognition to methods best applied to patients, (3) from methods aimed at characterizing states or levels of consciousness to methods aimed at appreciating its contents and dynamics. In all three cases, we will focus specifically on how to best combine subjective and objective data, as well as on metatheoretical issues, such as the problem of bias in subjective methods or the problem of spurious correlations between performance and consciousness in imaging studies. The tutorial will be illustrated with recent experimental data.

Conference Abstracts

Abstracts

Listed alphabetically by author

Royal Halls C

Towards a mathematical psychiatry: Modeling repetition compulsion with game theory

Lawrence V Amsel Psychiatry, Columbia University, New York, NY, USA (lva2@columbia.edu)

Obsessive Compulsive Disorder (OCD) is an Anxiety Disorder with a lifetime prevalence of 1.9% - 2.5%, worldwide. Compulsive repetition of stereotyped behaviors is a debilitating part of OCD. Psychoanalysis and neuropsychology have failed to develop satisfactory explanatory models for these apparently peculiar symptoms. Using concepts from applied mathematics we treat repetition compulsion as a problem in information acquisition and processing. By taking an informational approach and adopting ideas from Decision Science, Game Theory, and Self Regulation Theory, we hope to improve on the modeling of these phenomena. We suggest three alternative mathematical models to explain the anomalous information acquisition/processing of OCD: Bayesian Updating, Markov Chain Stochastic Updating, and a Regulatory Self-Signaling Game. These models make different, and empirically testable, predictions about OCD behavior. They should therefore lead to alternative research approaches to this disorder. Moreover, these models might also throw light on the normal functioning of the mind in its dealings with the informational content of perceived risk, and the resulting anxiety.

Session: Philosophy II

Poster Board: 25, Attended: Sunday June 24, 11:00-13:00

Peeking at the function of perceptual suppression during binocular rivalry.

Derek Henry Arnold The University of Queensland, Australia (darnold@psy.uq.edu.au ; <http://www2.psy.uq.edu.au/~darnold/>)

Philip Grove The University of Queensland, Australia

Thomas Wallis The University of Queensland, Australia

Presenting different images to either eye can induce alternating disappearances of each image: binocular rivalry. Despite persistent popularity in consciousness research, this phenomenon remains poorly understood. We suggest that disappearances during rivalry are driven by a functional adaptation promoting visibility near fixation in cluttered environments. This could facilitate seeing, without being seen, when peeking around corners. As the fixation point is tied neither to a particular stimulus nor to a specific eye, indifference to both would be essential: a surprising suggestion given both factors have previously been considered integral to determining perceptual dominance during rivalry. We demonstrated the predicted indifference by breaking links between cued distance in depth from fixation (blur) and both eye of origin and stimulus type. We found that perceptual dominance can track a better focused image as it is swapped between the eyes and that perceptual switches can be driven by alternating the focus of images fixed in each eye. We also found that small physical differences in distance in depth from fixation are sufficient to bias perceptual dominance during rivalry. These data suggest that binocular rivalry is not an irrelevant laboratory curiosity; rather it is a product of a functional adaptation prevalent in daily life.

<http://www2.psy.uq.edu.au/~darnold/>

Session: Sensation & Perception

Presentation Time: Monday June 25, 15:00-15:30

The magical number 10 --- Hertz, that is.

Bernard J Baars NSI, San Diego, CA, USA (baars@nsi.edu ; www.nsi.edu/users/baars)

Stan Franklin Institute for Intelligent Systems - Cognitive Software Research Group, University of Memphis, Memphis, TN, USA (franklin@memphis.edu ; <http://www.cs.memphis.edu/~franklin/>)

The 100 ms time domain is important for sensory integration, reaction time, and a possible conscious "cycle time." (Baars, 1988; Baars and Franklin, 2003, Franklin et al, 2005). Three brain rhythms oscillate near 10 Hz in different brain regions: alpha, theta and mu. Theta appears to coordinate hippocampal-neocortical memory retrieval, and mu involves frontal motor planning, preparation and control. Alpha was long believed to signal posterior "brain idling," but more recent work shows that its amplitude increases with endogenous conscious mentation, like visual imagery and working memory. (Palva and Palva, 2007). In the LIDA model of Global Workspace Theory (GWT), Franklin and Baars have proposed a 10 Hz "cognitive cycle" in which a conscious global "broadcast" occurs to widely distributed cell populations (Baars and Franklin, 2003, Franklin et al, 2005). More converging evidence comes from EEG microstates (Koenig et al, 2002), spatial decomposition of the EEG (Freeman, 2003), event-related potentials, single-cell recordings in humans (Halgren et al, 2002) and neuron-to-neuron MEG synchrony. The near-10 Hz cognitive cycle may coordinate fast gamma oscillations among cortical and subcortical regions.

<http://ccrg.cs.memphis.edu/tutorial/index.html>

Session: NCC

Poster Board: 14, Attended: Saturday June 23, 11:00-13:00

Characterizing Hallucinogen Effects using Quantitative Semantic Analysis of Internet 'Trip Reports'

Matthew J. Baggott Helen Wills Neuroscience Institute, University of California, Berkeley, CA, 94720, USA (mattbagg@berkeley.edu)

Jeremy Coyle UC Berkeley, Cognitive Science, Berkeley, CA, USA (shoemonkey@gmx.net)

Juan Carlos Lopez Addiction Pharmacology Research Laboratory, California Pacific Medical Center Research Institute, San Francisco, CA, USA (lopezjc@cpmcri.org)

David E. Presti Molecular and Cell Biology, UC Berkeley, Berkeley, CA, USA (presti@berkeley.edu)

Hallucinogens profoundly alter consciousness and different hallucinogens are reported to produce different effects. Yet these alterations are relatively unstudied by science. 'Trip reports' describing experiences with hallucinogens can be found online. We hypothesized that a state-space analytical approach could identify characteristic effects of hallucinogens. We obtained one hundred descriptions each of putatively hallucinogenic drugs (2-CE, 2-CT-2, 2-CT-7, 5-MeO-DMT, 5-MeO-DIPT, AMT, DMT, DPT, dextromethorphan, ketamine, LSD, MDMA, Morning glory seeds, Psilocybin-containing mushrooms, and Salvia divinorum). Independent component analysis and dimensionality reduction approaches were applied to a term-document matrix to identify prototypical experiences associated with each drug. Dimensions along which drugs significantly varied included ones relating to changes in perception and awareness of surroundings. Results suggest that different hallucinogens may have different underlying pharmacological activity profiles. This approach may be useful for development of quantitative models of the effects of hallucinogens on consciousness.

Session: Phenomenology

Poster Board: 15, Attended: Saturday June 23, 11:00-13:00

Phenomenology and Intentionality

Andrew R Bailey Philosophy, University of Guelph, Guelph, ON, Canada
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T. Brad Richards Philosophy, University of Guelph, Guelph, ON, Canada
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Horgan and Tienson (2002) argue that some intentional content is constitutively determined by phenomenology alone. We argue that this would require a certain kind of covariation of phenomenal states and intentional states which is not established by Horgan and Tienson's arguments. We make the case that there is inadequate reason to think phenomenology determines perceptual belief, and that there is reason to doubt that phenomenology determines any species of non-perceptual intentionality. We also raise worries about the capacity of phenomenology to map onto intentionality in a way that would be appropriate for any determiner of content / fixer of truth conditions.

Session: Philosophy II

Poster Board: 16, Attended: Sunday June 24, 11:00-13:00

Attentional binding and the root of visual illusions

Marcus Baldo Physiology and Biophysics, University of São Paulo, São Paulo, SP, Brazil (baldo@icb.usp.br)

The need to identify a specific feature of an object at an exact instant in time is an element of vital perceptual tasks. A hotly debated example is the flash-lag effect (FLE): A moving object appears to lead a briefly flashed object, even when the two are aligned. Also, in the perceptual asynchrony illusion (PAI), observers misjudge the synchrony between one cyclically alternating attribute (e.g., color: red versus blue) and another alternating feature (e.g., orientation: horizontal versus vertical). Considerable empirical support indicates that processing streams in the visual pathways are segregated, so that perceptual dimensions such as location, motion, color, and object identity are processed in separate brain areas. The attributes of an object, from local features to abstract properties, have to be bound together into a coherent representation by means of a coordinated activity taking place across widespread neuronal populations. Hence, a model was built up on the principle that the time-consuming process involved in attentionally binding multiple objects (or different parts of a single extended object) is at the core of the FLE. The present framework accommodates in a unifying perspective various empirical findings regarding not only the FLE but other perceptual phenomena as well.

Session: Visual Approaches

Poster Board: 35, Attended: Saturday June 23, 11:00-13:00

Electroencephalography correlates of momentary mindfulness

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Despite widespread interest, few experiments have studied neural correlates of momentary mindfulness. To address this, electroencephalography with respirometry was collected from two groups trained in "focused attention": mindfulness meditators and rowing athletes. Participants engaged in 1) a 50-minute task involving sustained attention to and counting of breath and 2) a "mind-wandering" control condition. Randomly-spaced tones interrupted the tasks and prompted participants to report their momentary attentional state (i.e., either focused on the breath or "mind wandering"). Reported breath count from trials was compared to respirometer data, allowing classification of trials into three conservative conditions for analysis: a) focused attention on breath with correct respiration count b) "mind wandering" from breath; and c) "mind wandering" during control condition. Analysis of pre-tone spectral power data suggests that momentary mindfulness is associated with alterations in alpha power over parietal electrodes, with different participants displaying different directions of power change.

Session: NCC

Poster Board: 11, Attended: Saturday June 23, 11:00-13:00

Creature consciousness and state consciousness: An explanatory framework

Tim Bayne Philosophy, University of Oxford, Oxford, UK
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In this paper I examine the relationship between creature consciousness and state consciousness. I begin by distinguishing various uses for the term 'creature consciousness' that are current in the literature. By 'creature consciousness' I mean the property that an organism has of being phenomenally conscious. There are two very different approaches one can take to the relationship between state consciousness and creature consciousness (so understood): one can take state consciousness as one's primary explanatory notion, and leave to one side the question of what it takes for a creature to be phenomenally conscious, or one can focus on creature consciousness, and leave to one side the question of what it takes for a mental state to be phenomenally conscious. Although both strategies can be found in the literature, the former tends to predominate. I argue for the superiority of a third approach, on which one looks to how creature consciousness and state consciousness interact. By exploring the interface between the mechanisms of creature consciousness and state consciousness we are likely to learn more about the mechanisms of consciousness than can be learnt from focusing exclusively on either state consciousness or creature consciousness.

Session: Philosophy II

Presentation Time: Sunday June 24, 09:00-09:30

A Zombie's View of 'What it's Like'

Dave Beisecker Philosophy, University of Nevada, Las Vegas, Las Vegas, NV, USA (beiseckd@unlv.nevada.edu)

As the very embodiments of the explanatory gap, it has been argued that the apparent conceivability of philosophical zombies demonstrates that the distribution of physical, functional, intentional, or otherwise mundane material properties in a world cannot settle that world's phenomenal character. Phenomenal properties, if they exist at all, would have to occupy an additional stratum of reality above and beyond the mundane material.

I suspect that the correct materialist response to zombie attacks has gone missing in the long, dreary exchange between zombie lovers and haters. The position I try to defend as actual is the one that is envisioned and granted to be possible by zombie-lovers: that an explanatory gap between the phenomenal and the material exists and nevertheless there could be creatures who talk about consciousness much like we do yet turn out to lack "genuine" consciousness as they understand it. In effect, my claim is that whatever it is like to be me is equivalent to whatever it is like to be one of those things zombie lovers call a "zombie." As such, I have learned how to embrace explanatory gap intuitions, yet without any acquaintance with extra-material phenomenal properties. In this presentation, I'll demonstrate how.

www.unlv.edu/faculty3/beisecker/research

Session: Philosophy I

Poster Board: 34, Attended: Saturday June 23, 11:00-13:00

Misrepresentation and Consciousness

Jared Blank philosophy, CUNY, New York, NY, USA
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A persistent criticism of the higher-order thought (HOT) theory of consciousness concerns the misrepresentation of a target thought by a HOT. This issue has been the central motivation towards the development of the same-order theory (SOT) of consciousness which denies that misrepresentation is possible. I show both that the SOT faces serious objections and also that the significance of the misrepresentation problem for higher order theorists is overblown.

While there may be a legitimate conceptual distinction between the notion of a self-representing system versus that of an external-representing system, its application in the present context is entirely unclear. Further, even if one could make out the distinction properly the SOT does not do the work it advertises. If misrepresentation is possible between a higher order thought and a target, it's also possible with a single state.

I next consider the idea that the problem of misrepresenting HOTs is less significant than many think. The focus on misrepresentation has its source in a different issue: naturalistic theories of intentional content. In that context, the problem of misrepresentation is a crucial issue, but I argue that in the context of representational theories of consciousness the issue is much less serious.

Session: Philosophy II

Presentation Time: Sunday June 24, 08:30-09:00

MIND in a museum - past and present work on developing new demonstrations and presenting the science of the mind to the public

Richard O'Reilly Brown Exploratorium, San Francisco, CA, USA
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Science museums have made important contributions in the field of perception, both through presenting perceptual phenomena and research to the public, and in developing novel demonstrations which have become subjects of subsequent research in the field. The Exploratorium, a "Museum of Science, Art and Human Perception", has been particularly influential in raising the public visibility of perception as a scientific field, and in contributing to the development and exchange of ideas among leading scientists, artists, teachers and others interested in the field. Several examples of exhibits which have stimulated perception research will be discussed, including "Cheshire Cat", "Mirrorly A Window", and Leviant's "Enigma".

In addition, the Exploratorium is now developing a new collection of exhibits about "The MIND", including exhibits on attention, emotions, and consciousness. We also now feature ongoing demonstrations of simple magic tricks, with discussions of their relation to scientific research on attention and cognition. It is expected that these new exhibits and programs will raise public awareness of the scientific study of the mind, and influence other museums and educational institutions to recognize this as an important part of science education. Some examples of these new MIND demonstrations, and the public responses, will be described and discussed.

Session: Sensation & Perception

Poster Board: 32, Attended: Sunday June 24, 11:00-13:00

Consciousness, Higher-order Thoughts, and What It Is Like

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It has been 20 years since David Rosenthal first introduced the higher-order-thought-theory-of-consciousness. Though there is no consensus as to the merit of the theory, it has passed one major hurdle. It is not obviously wrong and so is on the short list of theories of consciousness which may actually turn out to be true. There is one small problem. On one hand Rosenthal maintains that thoughts lack qualitative properties. Thoughts exhibit intentionality, not phenomenality. On the other, he argues that having a higher-order-thought is sufficient for there to be something-that-it-is-like-for an organism to have any given sensory state. I argue that if this second claim is true then it must be the case that a higher-order-thought about, say, a belief will ensure that there is something that is like for the organism to have the belief. In fact it turns out that all higher-order theories of consciousness entail that thoughts have qualitative character. I first give the argument that Rosenthal is committed and then show why anyone who accepts the higher-order strategy is also committed. Finally I suggest a model of the qualitative component of thought that fits nicely with the account of sensory qualitative properties that Rosenthal gives.

Session: Philosophy I

Presentation Time: Saturday June 23, 18:00-18:30

Two intuitions about Mary

Steven Ravett Brown Neurology, U Rochester, Rochester, NY, USA
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Jackson's knowledge argument about Mary is based on the intuition (I) by Jackson that Mary knows all physical facts (i.e., possesses all knowledge of the physical world, an epistemological claim), but has no phenomenal

experiences of color ("color qualia"). However, there are actually two competing intuitions in this well-known scenario: Jackson's, above, and a physicalists' (P), which claims that without the experiences of color, Mary cannot know all physical facts. I will show in this essay that (P) can in fact be supported though a combination of logic and empirical data, and more strongly than (I).

Session: Philosophy I

Poster Board: 33, Attended: Saturday June 23, 11:00-13:00

An inference to the sense of agency?

Glenn Carruthers Philosophy, The University of Adelaide, Australia
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A vital component of self consciousness is the sense of agency over one's bodily actions. Despite a veritable explosion of research on this topic recently there is no consensus as to the nature of this sense or how it arises. I critically evaluate the claim of Wegner and colleagues that this sense arises from an inference to mental states as the cause of one's bodily actions. I argue that this is inconsistent with data from developmental psychology which shows that children can identify the agent behind an action before they can say anything about the relationship between their mental states and their actions. Furthermore, I argue that Wegner and colleagues own analysis of 'automatisms' and experiments such as 'helping hands' cannot establish that the sense of agency arises from an inference. Instead I will argue that we should take the sense of agency to be a representation that arises from a constructive process.

Session: Self

Poster Board: 30, Attended: Sunday June 24, 11:00-13:00

Pupil Dilation precedes and predicts perceptual rivalry switches: Suggesting perceptual selection shares the same noradrenergic mechanisms implicated in behavioral selection.

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In behavior, evidence suggests that the locus coeruleus(LC) – the brainstem nucleus responsible for synthesis and release of noradrenaline(NA) throughout the cortex – may play a crucial role in both the selection of a behavioral response and ensuring continual reassessment of the available alternatives. We hypothesized that the LC-NA system may play a similar role in perceptual decision making. Because pupil dilation is known to reflect LC activation levels (pupil dilator muscles are controlled exclusively by NA), this study used pupil diameter as a surrogate measure of LC-NA activity. In accordance with predictions, pupil dilation was seen prior to perceptual transition for all four ambiguous visual and auditory stimuli tested. Not only did pupil diameter increase reliably across subjects and stimulus types, but dilation 600ms prior to the perceptual switch was a significant predictor of the subsequent duration of perceptual stability. This pupil dilation could not be explained by blink/saccade artifacts, motor response or stimulus driven changes in retinal input. These results demonstrate strong links between pupil dilation and perceptual switches induced by ambiguous stimuli. We interpret these findings as evidence that perceptual selection during rivalry is influenced by similar LC-NA mediated processes as those believed to underlie behavioral selection.

Session: Visual Approaches

Presentation Time: Sunday June 24, 09:00-09:30

The Problem of mental causation and how to solve it

Bo-Ching Chen NTU Philosophy Department, Taipei, Taiwan
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Most of us believe that the world is made of material things, and also believe that we have real mental life. The real mental life means that mental states or properties have real causal powers to cause other states or properties. So, we have to ask in a physical world how do the mental interact with the physical? If the mental have real causal power then it will violate the causal closure of the physical world. Be a physicalist, we should obey the physical causal closure principle, or ghosts, angels and any other non-physical thing will play roles in our physics.

Jaegwon Kim claims that the only way to solve the mental causation problem is to be a reductionist. The mental supervenes on the physical, and the causal power of the mental is nothing but the causal power of the physical. So the physical world maintains its causal closure. But I think that this is not the only way to solve the mental causation problem. Emergentism and levels of analysis can make the mental or other special sciences have its autonomy. This is the real world picture that we want to have.

Session: Philosophy II

Poster Board: 15, Attended: Sunday June 24, 11:00-13:00

The self of subjectivity: you have to first be somebody to have a perspective

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Allen Y. Hough Neuroscience, National Yang Ming University, Taipei, Taiwan (yhhough@ym.edu.tw)

Subjectivity, the “what it is like to be” of a conscious being, constitutes a point of view that compartmentalizes the world into a point center to phenomenal experience, and what stands relative to it. Discussions working on naturalizing this “self” reconcile the conflict between abandonment of subjectivity in objective theories with apparent behavioral and phenomenal “point of view-ness” by proposing models for the “perspectivalness” of consciousness. These models ground point of view into a self-representation model with intentional contents about system state, relations of objects and system, or of the representational system itself. However, I argue that “the point of view” of subjectivity is a transcendental subject that is not captured by these perspectivalness models. Existence of subjective consciousness necessarily assumes a subject that owns the experience (there can't be pain existing by itself, belonging to nobody), however it doesn't require the existence of intentional contents that represents this ownership. The intentionality of those models that explain away “point of view” in subjectivity by substituting with objective “point of view”—perspectivalness, have confused what I purpose the distinction between physical core self and psychological core self, missing the real anchoring self of subjective experience.

Session: Self

Poster Board: 27, Attended: Sunday June 24, 11:00-13:00

Probing Unconscious Perception and Memory with Functional Brain Imaging

Marvin M Chun Yale, USA (marvin.chun@yale.edu)

Recent advances in brain imaging have given psychologists and neuroscientists unprecedented access to the inner workings of the human mind. Because brain imaging techniques can probe representations without relying on verbal report or overt behavior, they can reveal the unconscious percepts, thoughts, memories, and emotions that influence our thoughts and actions. My lab has used such techniques to characterize high-level perceptual processing without awareness. We are also interested in the factors that govern when perceived events become encoded into conscious and unconscious memory.

Session: Keynote Lecture

Presentation Time: Sunday June 24, 16:00-17:00

Synaptic Activity Underlies Cognition and the Action Potential Underlies Subjective Awareness

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An unusual property of the neuron is its capability for cell-to-cell communication via synapses – known since the 1950s to be the cellular-level “protophenomenon” underlying the brain-level “real phenomenon” of cognition. The temporal synchronization of such synaptic activity is the leading candidate for explaining “cognitive binding” and therefore the unity of mind. An equally-unusual property of the neuron is the action potential - the means by which the neuron sends a signal down the axon toward the synapse. Although rarely noted in the consciousness literature, signal propagation entails the momentary permeability of the normally-closed neuronal membrane – allowing a massive influx of charged ions into the neuron. I maintain that such openness to the external world is the protophenomenon of cellular-level “sentience” – literally, feeling the charge-state of the electrostatic environment. Synchronization of the action potentials of the same neurons that are involved in cognitive binding is the likely mechanism by which the sentience of individual neurons is coordinated into the brain-level phenomenon of subjective awareness.

Session: NCC

Poster Board: 9, Attended: Saturday June 23, 11:00-13:00

Imaging subliminal and supraliminal speech priming using MEG and fMRI

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Although it is of crucial interest for dissociating conscious and unconscious processes, especially in the language domain, subliminal priming was until recently restricted to the visual modality. In a recent study, Kouider & Dupoux (2005) proposed a new masked priming technique in the auditory modality and provided evidences for reliable subliminal speech priming effects. As in subliminal priming studies using written words, subliminal speech priming was found to involve abstract lexical representations: repetition priming was restricted to words (i.e., no repetition effect for pseudowords), and it was not affected by a speaker change. Here, we investigate the neural bases of this effect using magnetoencephalography (MEG) and functional magnetic resonance imaging (fMRI). In the MEG experiment, using the same masking method, we contrasted the priming effects yielded by subliminal vs. supraliminal primes. In a subsequent fMRI experiment, we focused on the repetition suppression associated with repetition priming, voice effects, and their interaction. Results are discussed in light of current anatomo-functional models of speech perception, as well as in relation to the neural correlates of consciousness.

Session: Implicit Processing

Poster Board: 3, Attended: Sunday June 24, 11:00-13:00

Sense of agency: Inference and the role of contingency

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Previous research suggests that the sense of agency is generated by both predictive and inferential processes. This study investigates the cues used by the inferential process. Wegner (2002) suggested that an appropriate temporal relation between action and effect is, in part, sufficient for the experience of agency. Here we investigate the contribution of another important cue to causality, namely contingency, in sense of agency.

We used the shift in the perceived time of a voluntary action towards a subsequent effect as an implicit measure of the sense of agency. On each trial participants chose to press a key or not. In a contingent condition a tone occurred only on half the trials at random. However, when the tone occurred, it always followed 250 ms after the keypress. In a non-

contingent condition, the tone occurred with 0.5 probability, but could occur independently of the key press. On trials where subjects pressed the key, they judged the time at which they did so using a rotating clock. A shift of the perceived time of action towards the time of the tone was found only in contingent blocks. This suggests the inferential process is sensitive to contingency structure of external effects.

Session: Self

Poster Board: 26, Attended: Sunday June 24, 11:00-13:00

UNCC: The Cure for Chronic 'Zombie Blues'

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A classical mechanistic explanation of consciousness is impossible in principle. This is because classical deterministic 'zombie' mechanisms operate without need for qualitative sensations or consciousness. This approach dies hard because causal mechanisms are still the benchmark of scientific explanation. A quantum mechanical explanation alone is likewise doomed because one cannot explain a mystery with an ad hoc conceptual morass that is itself poorly understood.

The UNCC metaphor explained here and motivated by cognitive neuroscience views brains as 'meaning interpreters.' Using memory brains fill in sensations with past associated sensations to construct implied objects in our perceived world. That world is a theoretical interpretation of the meaning of our immediately sensed qualitative contrasts (qualia). Conscious perception involves associatively filling in implications. We likewise fill in implications of morphemes to interpret linguistic meanings. This is a conceptual extension of the same associative perceptual process.

Brainless systems also embody this process with varying complexity. All have memory (state) that constrains state changes and channels reactions (interprets) to current environmental proxies encountered (sensed). All sense environmental signals and interpret them by memory reference (self-reference), memory update and action. Universal Correlates of Consciousness are 'scale invariant' self-organizing panpsychic processes that interpret ubiquitous qualitative sensations.

www.appliedneuro.com/UNCC_Talk.ppt

Session: Philosophy I

Poster Board: 21, Attended: Saturday June 23, 11:00-13:00

Assumed Existence

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Man has the ability to affirm himself and his environment.

Without that ability he would not be able to experience anything, there would be no question of an "I" or of a world. Just as undeniable is the human Will, which rises whenever the situation does not satisfy the individual. If such a situation arrives unannounced, there is no question of Will; something outside Will is a condition of the situation arising and is also a condition for the simultaneous rising of (self)-affirmation, except that this latter can be confirmed which distinguishes it in some way from that which is considered the basic situation.

As soon as an object itself presents to a subject and distinguishes itself from the surroundings, it is confirmed as something that did not exist for the subject until then and his Will validates it. Only after it has distinguished itself from the surroundings does it exist; only then can the individual 'see' it. That which man experiences has meaning because of Will.

Without (self)-affirmation man would not be able to experience, but without Will, the experience would have no meaning. Both are responsible for full experience and one cannot exist without the other.

www.frimisme.nl

Session: Philosophy I

Poster Board: 22, Attended: Saturday June 23, 11:00-13:00

Cognitive Phenomenology and Cyrillic Texts

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Intuitively, there is a difference between the overall phenomenological experience that we have when viewing a page of Cyrillic text if we do read versus if we don't read Russian. What kind of phenomenological difference is this? Susanna Siegel has argued that it is a difference in sensory phenomenology. Siegel argues that some properties – e.g., semantic properties of texts – that aren't usually thought of as represented by perceptual experience in fact are so represented.

I argue that the phenomenological difference in the Cyrillic text-type cases is a difference in cognitive phenomenology. I describe a cognitive phenomenological analysis of the Cyrillic text-type cases that meets Siegel's two objections to cognitive phenomenological analyses. I argue that this analysis is sufficient to defend the intuition that Cyrillic text-type cases involve a difference in cognitive phenomenology.

Session: Phenomenology

Poster Board: 16, Attended: Saturday June 23, 11:00-13:00

Memory and Consciousness

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In considering the relation between memory and consciousness, we can begin with three questions: 1. What is common among memories? 2. How does representation figure in memory? 3. Is memory representationally higher-order, and if so, is this evidence in favor of a higher-order theory of consciousness?

Drawing on psychological literature about memory, we can identify four types of memory: skill-based, semantic, declarative and episodic. Only the last form, episodic memory, is interestingly related to consciousness, and only this form is representationally higher-order. This connection seems to favor a higher-order theory of consciousness. However, episodic memory involves a representation of past mental states within a conscious mental state; that is, the higher-order structure is internal to the conscious state. Since the higher-order thoughts that explain conscious states are external to them, the coincidence between episodic memory and higher-order representation does not constitute a reason to adopt higher-order theories of consciousness. A temporal representation theory of consciousness provides a better account. Thinking about how we utilize past information in the present illuminates the role of temporal information in conscious representation and the ways in which temporal information may be irrelevant and so unrepresented, and so unconscious.

Session: Memory

Poster Board: 10, Attended: Sunday June 24, 11:00-13:00

Awareness and Novelty in Explicit (Deliberative) and Implicit (Evocative) Learning and Memory of Artificial Grammar

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Contrary to standard theories of unconscious implicit learning, a mentalistic theory (Dulany, 1997, 2004) holds that implicit learning establishes associative-activational links between conscious sub-propositional contents (evocative mental episodes), in FSG linking aspects of a string with its grammatical classification. With this specificity, transfer should be limited to old sequences within old letter sets. Explicit learning, however, through testing consciously represented propositional hypotheses (deliberative mental episodes), should inferentially transfer to novel sequences within old letter sets, and to new letter strings with conscious insight into novel-old letter relations.

Learning trials presented either a grammatical or non-grammatical string, with feedback after grammatical judgment. Conditions optimal for explicit learning were provided with instruction to hypothesis test within 3s trials. Conditions optimal for implicit learning were provided with instruction to

say what first comes to mind within 1.5s trials--but twice the number of trials. Memory conditions provided these time constraints and comparable instructions. Explicit and implicit learning were equal. Transfer to novel sequences of old letters occurred only after explicit learning, however, and to novel letter strings only with explicit memory and awareness of novel-old relations. With evocative episodes represented in meta-awareness, rules in awareness predicted judgments without significant residual in both conditions.

Session: Implicit Processing

Poster Board: 5, Attended: Sunday June 24, 11:00-13:00

Spatial Dynamics of Cognitive Orienting Systems: Attentional Momentum and Inhibition

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Attention is often defined by information that receives further processing. But the guidance of visual orienting remains obscure. There are known links between overt orienting (eye-movements) and covert orienting (movements of attention). Covert orienting of attention is often so covert that even the subject is not explicitly aware that attention has moved (Lachter et al., 2004). Overt orienting is also largely unconscious, though typically goal directed (Yarbus, 1967). By examining gaze and attention patterns during verbally guided cognitive tasks, we have found evidence of static and dynamic spatial biases in the allocation of gaze and attention. For example, a peripheral cue followed by a central cue leads not only to an inhibition of return (Posner et al., 1985), but also to orienting toward the opposite location (attentional momentum, Pratt et al., 1999), reflected both in cognitive decision time and in spatial biases in the inadvertent redistribution of gaze. Spatial inhibition is surprisingly resistant to spatial target probability manipulations even after a long delay. Similarly, in visual search tasks, upper-left biases we have discovered in gaze distribution can lead to striking asymmetries in response to experimental manipulations of spatial target probabilities. We have exploited these biases experimentally to probe information flow.

Session: Attention

Presentation Time: Saturday June 23, 16:00-16:30

Illusions of time and what they tell us about the brain

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Events can sometimes appear longer or shorter in duration than other events of equal length. For example, repeated stimuli are perceived to be shorter in duration compared to novel stimuli. These illusions beg an important question of time representation: when durations dilate or contract, does time in general slow down or speed up during that moment? In other words, what entailments do duration distortions have with respect to other timing judgments? To address this, we induced duration distortions in a series of experiments involving a repeated presentation of visual stimuli with a randomly embedded unexpected stimulus. When a sound or visual flicker was presented in conjunction with the visual stimuli, neither the pitch of the sound nor the frequency of the flicker was affected by the apparent duration dilation. This indicates that subjective time in general is not slowed; instead, duration judgments can be manipulated with no concurrent impact on other temporal judgments. Like spatial vision, time perception appears to be underpinned by a collaboration of separate neural mechanisms that usually work in concert but are separable. We suggest these duration distortions can be understood in terms of repetition suppression, wherein neural responses to repeated stimuli are diminished.

Session: Temporality

Poster Board: 42, Attended: Sunday June 24, 11:00-13:00

The experimental induction of out-of-body experiences

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Out-of-body experiences have fascinated mankind for millennia. Their existence has raised fundamental questions about the relationship between human consciousness and the body, and has been much discussed in theology, philosophy, and psychology. Although out-of-body experiences have been reported in a number of conditions where the normal functioning of the brain is disturbed, the neuroscientific basis of this phenomenon remains unclear. Here I report that this illusory experience can be induced in healthy participants. In the experiments the participants wear head-mounted-displays that are connected to two video cameras that are placed at some distance behind the back of the participant. The experimenter then uses two rods to touch the person's actual chest, which is out-of-view, and the chest of the "virtual body" by moving one rod at a location just below the cameras. This elicits a vivid illusion that their "self", or center of awareness, is located outside their physical body, and that they look at their body from the perspective of another person ("out-of-body illusion"). This illusion demonstrates that the sense of being localized within the physical body is fully determined by perceptual processes, i.e. by the visual perspective in conjunction with multisensory stimulation on the body.

Session: Self

Presentation Time: Monday June 25, 17:30-18:00

Battlefield "Mind": can scientific study of human consciousness help save lives?

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Adverse circumstances of risk, emergencies, crises and disasters (natural and manmade) are influenced/partially-shaped by human consciousness. Insights into neuro-psychosocial correlates of adversity-consciousness may support emergency policymakers as they conduct strategic risk assessment, decision-making, mass-communication, crisis management and tactical operations.

State and dynamics of human systems are described in terms of space, time, matter and psyche (STMP) as interactive domains of strategic and operational matrices. Adversity-related managerial processes are analyzable as STMP systems, where "dP" constitutes "change in properties" alongside "dS; dM; dT".

Organizational and technical specialization compound comprehensive "all hazard preparedness" approaches that are multi-phase, cross disciplinary and trans-jurisdictional in nature. These opposing imperatives are partially controlled by attitudinal and behavioral heuristics that emanate from universal process that underlie human consciousness

Emergency management ("homeland security") efforts conducted by USA local, state and federal governments provide practical backdrop for discussion. Intentionally-induced adversities (crime, terrorism) are special cases where one consciousness adversely interacts with another through the agency of carefully-designed physical stimuli. Incident case studies illustrate main points.

Finally, ethical, social, and economical implications of such research obviate tradeoffs between benefits and dangers that inhere in this approach. How can the ASSC community contribute to and benefit from this discourse?

Session: Philosophy I

Poster Board: 30, Attended: Saturday June 23, 11:00-13:00

Beyond the special case: applying neural theories of consciousness to non-human animals

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Neural theorists of consciousness are prone to a strange agnosticism about non-human phenomenal consciousness, often allowing that animals which lack the relevant structures might still be "conscious" in some alien sense. I argue that there are no good reasons to be so cautious, and several good reasons not to be. Using neuroscience to draw conclusions about animal consciousness is no more presumptuous (or chauvinistic, or reductionist)

than doing so via behavioral or philosophical criteria. At the same time, it lets us describe species differences with greater precision and nuance, and suggests criteria for line-drawing that are more naturalistic and less arbitrary.

In addition to laying the conceptual foundations for such applications, I will provide a concrete illustration by answering a question which neither historical intuition nor recent science have been able to resolve: whether fish "feel pain" in the phenomenal sense. The answer is no; as it turns out, the reasons are surprisingly straightforward, and do not depend on any particularly controversial details of philosophy or neuroscience. In closing, I will suggest where some additional lines might be drawn, and will look at a few cases where different NCC theories might lead to different conclusions about particular species.

Session: Philosophy II

Poster Board: 23, Attended: Sunday June 24, 11:00-13:00

Modern Consciousness Science as Fechner's "Inner Psychophysics"

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Gustav Fechner (1860) wanted to study "constant or lawful relationships" between the "material world" and the "mental world", which "has up to now remained merely a field for philosophical argument without solid foundation and without sure principles and methods for the progress of inquiry". He called his techniques "outer psycho-physics": deriving bridge laws between physics (presenting tones) and psyche (reporting which has a higher pitch), but, for then, ignoring mediating physiology. Fechner anticipated a later "inner psychophysics" to develop bridge laws between physics and physiology (brain processing of stimulus energy), and bridge laws between physiology and psyche. Subsequent psychophysiology works on bridging physics and physiology while physiological psychology works on bridging physiology and psyche. Recent technologies in brain scanning represent a sophisticated development of psychophysiology, creating the new field of Consciousness Science, which uses all of the techniques of outer and inner psychophysics to understand very specific parts of the "psyche" – differentiating among conscious, pre-conscious, subliminal, and non-conscious: perceptual, mental, emotional, and motor functioning -- precisely the science that fulfills Fechner's projection for an "inner psychophysics"! Dominant paradigms in modern Consciousness Studies include Perceptual-, Cognitive-, Interpersonal, Animal-, Infant-, Machine-, Altered-, Expanded, Transpersonal-, Motivational-, and Quantum-Consciousness/ Unconsciousness.

Session: Philosophy I

Poster Board: 20, Attended: Saturday June 23, 11:00-13:00

The 'octopus' cognition: reality or dreams of scientists

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The cephalopod mollusc, *Octopus vulgaris*, an invertebrate, has been long considered a learning animal exhibiting an enriched behavioral repertoire of comparable complexity with the one recognizable in higher vertebrates up to humans. I will review briefly almost a century of research effort dedicated to the understanding of its learning capabilities and the underlying neural correlates. In reviewing this history we will be faced with limits in the capabilities of octopuses such as the lack of kinaesthetics. I will try to show that these "limits" are weak and that the octopus should be considered a model to test properties such as parallel processing, sensorial independence and hierarchical organization of motor control, "self perception".

This with the aim to show that the octopus, an invertebrate, is an experiment in the phylogeny that may allow us to ask questions on consciousness in animals.

Session: Plenary Symposium - Animal Consciousness: Towards a Scientific Description and Natural History

Presentation Time: Monday June 25, 11:30-12:00

On the Embryology of Consciousness

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An embryologic approach is proposed concerning the emergence of Consciousness. The model views Consciousness initially as a widely distributed non-sentient homeostatic operator function. It initially functions to preserve adequate information flows between Parts (e.g., cells) and the Whole as the organism grows and develops. It later is involved with homeostatically integrating sensory, perceptual, linguistic, affective, memory and higher cognitive mechanisms as they develop. The model suggests that Consciousness is a robust mechanism supporting at least 6 computational modes. The model also suggests that the mechanism develops a variety of abstractions, including the abstraction of Self, which may serve as interfaces for interactions between itself and other mental functions as they develop. The existence of symmetry relationships between biologic and mental dimensions is posited as critical to allowing seamless interfacing between the Consciousness operator function and these other functions. The theory rests on four critical substrates: Information, Communication, Morphology and a recognized biologic (Morphogenetic) Field. The model is generalizable to phyla that are brain-based and perhaps also to those that do not have central nervous systems.

Session: NCC

Poster Board: 6, Attended: Saturday June 23, 11:00-13:00

The Myth of Superior Intelligence

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Even before John Searle coined the term "strong AI" in 1980, its proponents have been moving towards bigger (and presumably better) manifestations of artificial intelligence, such as superbrains and ultra-intelligent computers. In the 1990's, the investigation of consciousness became a growth industry and many researchers realized that artificial intelligence would not be achieved without artificial consciousness. Now, some are concerned that creating an artificial conscious intelligence will give rise to an artificial person—rife with legal, moral, and social problems.

Despite this changing focus, many of the pursuers of strong AI still ignore the implied aspects of both consciousness and self. Still others believe that artificial superior intelligence should rule the world. And that their creation is inevitable.

This paper explores the fallacies inherent in strong AI and the dangers of believing in superior intelligence. It seeks to redefine intelligence, e.g., by distinguishing between problem solving and problem selecting. Finally, it offers an alternative goal of practical machine intelligence, a badly needed commodity in our PC-dependent world.

<http://www.leefrank.com/inquiry/papers/myth/index.html>

Session: Philosophy I

Poster Board: 28, Attended: Saturday June 23, 11:00-13:00

Cueing can cure crowding

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Crowding occurs when nearby flankers jumble the appearance of a target object, making it hard to identify. Crowding is feature integration over an inappropriately large region, but what determines the size of that region? According to bottom-up proposals, the size is that of an anatomically determined isolation field. According to top-down proposals, the size is that of the spotlight of attention. Here we investigate the role of attention in crowding using the change blindness paradigm. We measure capacity for widely and narrowly spaced letters during a change detection task, with or without an inter-stimulus cue. We find that standard crowding manipulations – reducing spacing and adding flankers – severely impair uncued change detection, but have no effect on cued change detection. The cue relieves crowding, as predicted by a top-down account. However, our most parsimonious account is bottom-up: Cued change detection is so easy that the observer needs only one feature to do it. Not needing to integrate

features, the observer is immune to crowding. The change-detection task enhances the classic partial-report paradigm by making the test easier (same/different instead of identifying one of many possible targets), which increases its sensitivity, so it can reveal weaker memory traces.

Session: Attention

Presentation Time: Saturday June 23, 15:30-16:00

The Structure of Human Consciousness

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An ever-growing body of literature indicates that the segregation of neural processing into specialized neural regions is an essential aspect of cerebral organization. However, the integrative, multi-modal nature of cognitive processes which occur within the realm of conscious awareness appear to require a functional architecture which overcomes this modular segregation of function. We present a model which attempts to span this dichotomy, proposing that conscious experience emerges from the dynamic interactions of specialized component processes via a distributed neuronal network. Such a model offers a promising mechanism to explain a variety of empirical observations of the neural correlates of perceptual awareness, cognitive function, and symptoms of neurological damage.

Session: Presidential Address

Presentation Time: Friday June 22, 18:00-19:30

Visual Agnosia and Higher-Order Thought Theory

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Abstract: The higher-order thought (HOT) theory of consciousness says that what makes a mental state conscious is the presence of a HOT directed at the mental state. One way to characterize HOT theory is that some kind of higher-order conceptual activity (or understanding) must be directed at passively received sensory input in order to produce a conscious state. The case of visual agnosia seems to be odds with such a characterization. More specifically, HOT theory would seem to have difficulty accounting for "associative" visual agnosia, i.e. cases where visual perception seems adequate to allow for recognition, and yet no object recognition takes place. Thus, it seems possible to have conscious experience in the absence of higher-order conceptual representation. I will first argue that HOT theory is indeed consistent with associative agnosia. Secondly, I explain a related objection to HOT theory; namely, how (if at all) it can account for the possibility of misrepresentation between the HOT and the lower-order (world-directed) state. I argue that associative agnosia can be seen as an unusual kind of misrepresentation between a HOT and a lower-order state, but in a way that leaves HOT theory undamaged and sheds light on associative agnosia.

Session: Philosophy I

Presentation Time: Saturday June 23, 15:30-16:00

Why Babies Are More Conscious Than We are

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What is it like to be a baby? I will suggest that neurological and psychological findings can provide insight into infant phenomenology. In adults we see an association between vivid consciousness, plasticity and attention. In the adult system this attention is typically focused on a small part of the external or internal world and involves inhibition of consciousness of other parts of the world. I will suggest that infants have a similar vivid phenomenology, also associated with plasticity, but that it is distributed across their entire field and does not lead to inhibition. This state may be similar to certain meditative states.

Session: Keynote Lecture

Presentation Time: Saturday June 23, 18:30-19:30

Mice have a prefrontal cortex and they use it

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In the attempt to evaluate the potential use of the mouse as a model of human cognitive functions and their pathologies, we investigated the contribution of the mouse prefrontal cortex and, more specifically, the prelimbic area, in a series of behavioral paradigms of increasing difficulty up to the ability to show flexible oriented behaviors, a highly adaptive function exhibited by mammals when confronted to changing environments. Using behavioral tasks that emphasized different aspects of conflict management and flexible decision making, we show that mice with prelimbic lesions exhibit sustained difficulties in adapting their behavior when the rule is changing repeatedly or when a highly motivated reinforcement—social interaction after social deprivation—is confronted with exploratory activity. Prelimbic lesion, however, did not prevent a normal exploratory behavior towards novelty per se. Thus, we show that in mice, as in other mammals, the prelimbic cortex controls the flexible behavioral switch between routine actions and novel actions. These results open the way to the study of genetic aspects of such high cognitive control, known to be seriously compromised in numerous psychiatric conditions.

Session: Techniques

Presentation Time: Monday June 25, 17:30-18:00

Dimensions of Mind Perception

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How do people decide what sorts of entities have minds? To date, it has generally been assumed that mind perception occurs on one dimension—things simply have more or less mind—and the dimensions of mind perception have remained unexamined. We studied the structure of mind perception through 2,399 completed online surveys. Participants were asked to compare the mental capacities of various human and non-human characters and to respond to hypothetical moral situations. Factor analyses revealed two dimensions of mind perception: Experience (e.g., capacity for hunger, fear, and pain), and Agency (e.g., capacity for self-control, morality, and memory). In other words, from a perceiver's perspective, there exists a broad distinction between phenomenal consciousness (our Experience factor) and the capacity to exert control. In addition, these dimensions were differentially related to ethical questions; only perceptions of Experience were correlated with a desire to provide protection from harm.

Session: Plenary Symposium - The Cognitive Basis of Intuitions about Consciousness

Presentation Time: Monday June 25, 09:00-09:30

Face value: What we get from a crowd of faces

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Our visual system is inundated with information from the outside world, so our brain uses heuristics to cope with the influx of data. We examine one such heuristic: the automatic extraction of summary statistics from complex scenes, such as crowds of faces. Observers were instructed to indicate whether a test face was a member of a preceding set of emotionally varying faces—a 'yes' response indicated that the test face was a set member. Contrary to the predicted behavior of an ideal observer, we obtained a Gaussian distribution of 'yes' responses that peaked when the test face was the mean emotion of the preceding set. This suggests that observers implicitly extracted the mean emotion from a set of faces, but lost or lacked the representation of the individual constituents of the set. Mean extraction was very fast—as low as 500 ms for set size up to 16

faces. This same pattern of results occurred across multiple emotions, and even for gender. Summary statistics may be used to represent large amounts of information elegantly and succinctly. These computations, although below our threshold for consciousness, support our conscious perception that we have an accurate representation of the visual world.

Session: Visual Approaches
Poster Board: 37, Attended: Saturday June 23, 11:00-13:00

Are dendritic webs the functional architecture of consciousness?

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In the early 1990s both John Eccles and Karl Pribram proposed that consciousness occurred in dendritic-dendritic networks (dendritic webs); evidence suggests they were correct. In standard neurocomputation, dendrites of individual neurons receive and integrate multiple input-generated post-synaptic potentials, and when threshold is met, "fire", i.e. trigger axonal spikes as outputs ("integrate and fire"). Axonal firings are seen as the currency of consciousness, but gamma synchrony EEG (the best NCC candidate) occurs among dendrites connected and synchronized by gap junctions (dendritic webs) which may extend widely throughout cortex and brain. In neural network terms, dendritic webs are laterally-connected inputs in hidden layers. It appears that consciousness occurs in these layers/dendritic webs during collective integration phases of gamma-synchronized integrate-and-fire cycles. Dendritic webs are also the site of action of general anesthetic gases which selectively erase consciousness (and gamma synchrony), sparing other brain activities, axonal firing capabilities and sub-gamma EEG which persist during anesthesia in the absence of consciousness. (The Orch OR model also places consciousness in dendritic webs, via gamma-synchronized quantum computations in dendritic microtubules.) Dendritic webs are collective input layers within axo-dendritic neurocomputational networks. Within this cognitive structure, dendritic webs represent the most likely functional architecture for consciousness.

<http://www.quantumconsciousness.org/cogsci.htm>
http://www.quantumconsciousness.org/documents/twined_000.pdf

www.quantumconsciousness.org/ASSCabstract

Session: NCC
Poster Board: 10, Attended: Saturday June 23, 11:00-13:00

A Transformed Environment and the Conscious

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We have discussed from the view of philosophy and the view of experimental psychology. Our problem is how our perception will transform or stabilize through transformed environment in which our body exists.

From the philosophical view, it is clear that we cannot consider separately our perception from our environment of the body. And moreover, we have to distinguish the state of us which the subjects (observed person) move in their environment or not when we treat our perception.

And our psychological experiments reveal that this philosophical result is true.

First, we have experiment using left-right reversing glass so as to transform the subject's environment. We observe subject's behavior in detail with many days. The records of this experiment tell us our perception grow with our motion of body in our (new) environment. The motion is required.

Second, we operated our pre-prioceptual environment. The subjects required simple calculation and their results of calculation had changed according to their pre-prioceptual environment.

Session: Sensorymotor
Poster Board: 38, Attended: Sunday June 24, 11:00-13:00

The Structuring, Capture, Distillation, and Report of Subjective Experience: Methodological Issues

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A central aspect of consciousness is subjective experience, that which we are aware of or experiencing at a given moment. In this paper we present a conceptual model of methodological issues involved in investigating subjective experience. The first facet of our model involves the structuring of the target of inquiry. This structuring comprises two continua, the first addressing the specificity of the experience being examined, ranging from unrestricted experience to a predetermined subset of experience (e.g., pain), and the second addressing the specificity of the situation, ranging from naturally occurring to controlled situations. The remainder of the model involves six stages of the apprehension of subjective experience: processes of capture, distillation, and reporting as undertaken by the subject and subsequently by the researcher. Issues relevant at different stages are discussed. For example, subjects can be asked to capture and report on experience in real time using think aloud methods or to retrospect on experience from the recent or distant past. The impact of many of these issues is moderated by the specificity of the target of inquiry. Each strategy for capturing experience has a unique profile of advantages and challenges and ultimately some methods can be judged superior to others.

Session: Philosophy I
Poster Board: 32, Attended: Saturday June 23, 11:00-13:00

Laterality and modality in simultaneity judgment

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The integration of the sensory and motor information in space and time is an essential element of consciousness and the sense of agency. The auditory and visual stimuli are perceived simultaneously when they occur within a certain temporal extent. This subjective simultaneity is affected by various factors. 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. 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. Finally, we discuss how simultaneity judgment extends over different sensory modalities, contributing to the coherent conscious experience.

Session: Temporality
Presentation Time: Monday June 25, 16:00-16:30

Development and Application of Real-Time fMRI

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One of the applications we are currently focusing on is to provide feedback of fMRI signal in real-time from a specific brain region (e.g. anterior cingulate) to healthy individuals and patients with chronic pain and anxiety disorders to investigate whether people can learn to control the activation of a localized brain region and whether there is a corresponding change in cognition and behavior. In addition, in patients, we are investigating whether there is a resultant change in their symptoms (e.g. pain).

ACKNOWLEDGEMENT: This ongoing project is funded by NIH/NINDS 9R44NS050642-03, NIH/NIDA N43DA-4-7748, and NIH/NIDA N44DA and the Mind Science Foundation.

Session: Plenary Symposium - 2006 Tom Slick Research Award in Consciousness

Presentation Time: Sunday June 23, 10:00-10:30

Energetic consideration on evolutionary analysis of unified consciousness in working memory

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Hirota Ohashi University of Tokyo, Japan

Little is known about how information is coded in neural activity and how unified consciousness is realized in addition to distributed information processing. In order to study this problem from the viewpoint of energetics, we focus on the intrinsic function of working memory which is considered to be related to consciousness [Baddeley A., Working memory, Oxford Univ. Press 1986, Goldman-Rakic P.S., Sci. Am. 267(3) 111-117, 1992], and propose a simple theoretical model to examine the performance of memory activity. By analyzing both equilibrium states and dynamical properties in writing, reading, and deleting processes using this model, we discuss the progress of fundamental function such as retention and selection of memory in decision making in the sight of theory of probability. We also discuss the role of recursion restriction in working memory as a driving force of the progress of brain systems. These results may suggest that the process of optimization of memory systems promotes the development of sophisticated information processing based on unified consciousness.

Session: Memory

Poster Board: 8, Attended: Sunday June 24, 11:00-13:00

Effects of word recognition learned in a context

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Context dependent processing is important in conscious perception, as is demonstrated e.g., in the judgment of colors. Humans are capable of identifying previously learned objects even if one views the object from a novel visual angle. It is considered that the view-invariant object representation is formed quickly and unconsciously (Harris (2005)). Our previous study has revealed that such an object representation is established better when the object is displayed within a scene, compared to the presentation in a context-poor monochromatic background. An analogy has been suggested between such a context-dependent object memory and semantic memory (Buzsaki (2005)).

Here we investigate effects of context on the recognition of words with multiple possible meanings. The words were presented within or without a sentence. Participants were instructed to remember a tagged word in conditions encouraging conscious or unconscious encoding. In the test phase, recognition of words were examined in contexts either the same as, similar to, or different from the original context. Based on the results, we discuss the nature of context dependent cognitive processes in conscious and unconscious perception.

Session: Implicit Processing

Poster Board: 1, Attended: Sunday June 24, 11:00-13:00

Is Phenomenal World an Illusion?

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I argue that perception provides accurate representations for organisms, and that empirical findings showing mismatch between phenomenology and the physical world are based on a misleading assumption that forces us to take the phenomenal world as an illusion, such as the mismatch between actual spectrum of wavelength and phenomenal color space. But, I argue that the concept of illusion has been based on comparisons between contents of perceptual experience and the outer world, and the world compared in these experiments presupposed to be one that is described by physics. However, information that is relevant for biological survival

exceeds the information explained solely by physics, perception itself had evolved to gather crucial aspects and levels of the world that enable the survival of the organism. Therefore, the point is not that perception is about relevant physical properties, but that there are higher levels of the world that perception had evolved to and is about. We have compared perception with only one aspect of the world, but the world is multiple-leveled. So, perception provides accurate representations about evolutionary regularities that exist in higher levels of the world.

Session: Sensation & Perception

Poster Board: 33, Attended: Sunday June 24, 11:00-13:00

Some Suggestive Correspondences and Similarities Between Shamanism and Cognitive Science

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Correspondences and similarities between ideas in shamanism and ideas in contemporary cognitive science are considered. The importance of interconnectedness in the web of life worldview characteristic of shamanism and in connectionist models of semantic memory in cognitive science, and the extension of meaning to elements of the natural world in shamanism and in distributed cognition, are considered. Cognitive consequences of such an extension (e.g., use of representativeness and intentional stance heuristics, magical thinking, social attribution errors, and social in-group/out-group differences) are discussed. It is suggested that attributions of mental states, beliefs, and desires to a computer on the basis of behavioral measures (e.g., the Turing test) is consistent with the extension of meaning and intentionality to nonhuman elements of the natural world in shamanism. Possible roles of implicit processes in shamanic cognition, and the idea that shamanic experience may involve normally unconscious information becoming temporarily available to consciousness, are also considered. In general, the existence of such correspondences and similarities suggests that elements of shamanism may reflect cognitive structures and processes that are also used by nonshamans and in nonshamanic settings, and this further suggests that shamanic and nonshamanic cognition may not be fundamentally different.

Session: Philosophy II

Poster Board: 17, Attended: Sunday June 24, 11:00-13:00

Descriptive Experience Sampling compared to validity-based and analytically coherent approaches

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Descriptive Experience Sampling (DES) is a method that aims at obtaining faithful reports of randomly selected moments of inner experience. This paper describes DES and shows how its faithful reporting aim is distinctly different from the aim of validity-based approaches and the aim of analytically coherent approaches. Two examples: 1. concerning individual differences: the aim of obtaining faithful reports accepts that individuals may be (or may not be) fundamentally different from each other; the validity-based way investigates the extent to which individuals differ from each other on predefined dimensions; the analytically coherent way assumes that people are fundamentally the same. 2. Concerning the details of experience: faithful reporting values apprehending with fidelity the main characteristics of experience and overlooks the fact that it might get a few of the details of experience wrong; the validity-based way isn't so much concerned about accurate apprehension of experience as about whether its measurements are correlated in predictable ways; the analytically coherent way is not so much interested in the size of the details as it is in the extent to which a detail impacts a presumed structure of consciousness. Discriminating among the three aims may clarify important methodological issues in consciousness studies.

Session: Techniques

Presentation Time: Monday June 25, 18:00-18:30

The power of successful experience: Immediate change in learning strategy for visuomotor sequences

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Skill learning occurs gradually. Yet, people sometimes feel differently after successful completions of to-be-learned skill. In this study, we examined a possibility that learning strategy might change after a few successful trials in visuomotor sequence learning. In a sequential button-press task (2x10 task), subjects learned to press 2 out of 16 LED buttons in correct order. Ten different pairs were presented in a fixed order, which subjects learned by trial and error. The number of errors decreased rapidly just after the first successful trial. In order to examine whether the immediate reduction of error rate could be explained by errors that inevitably occurred due to the trial-and-error character of the task, the number of 'genuine' errors was calculated by subtracting unavoidable errors from total errors. Based on the genuine error rates for the first few successful trials, predicted error rates were estimated for the subsequent trials. The actual error rates in the subsequent trials were significantly lower than the error rates predicted by the genuine errors for the preceding (one or two) successful trials. These results suggest that the learning strategy changes immediately after the successful completion of visuomotor sequence, most likely from unstable memorization to stable consolidation processes.

Session: Memory

Poster Board: 9, Attended: Sunday June 24, 11:00-13:00

The Exclusion-Failure Paradigm and Signal Detection Theory - P without A consciousness?

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Block states that there is at least a conceptual distinction between the what-it-is-likeness of an experience (P consciousness), and its information processing counterpart (A consciousness). Snodgrass (2006) and Block (2005) both claim that Snodgrass's signal detection theory (SDT) approach to perception provides 1) a method of operationalising P consciousness, and 2) an example of P without A consciousness via the exclusion-failure paradigm. It will be argued on several grounds that this claim is illegitimate. First, Block has no grounds for preferring an 'enable' over an 'endow' account, and is unable to satisfactorily distinguish them in his writing. Second, it will be argued that the 'weakly conscious' percepts which Block and Snodgrass claim are P but not A conscious, are in fact functional (hence also A conscious) according to Block's own definition. Finally, and most importantly, it will be argued that 'weakly conscious' percepts in an SDT account are defined as low-grade percepts that exhibit qualities of both A and P consciousness. SDT is essentially concerned with graded conscious experience; to interpret low-grade perception as P but not A conscious is antithetical to the core of SDT.

Session: Philosophy I

Presentation Time: Saturday June 23, 16:00-16:30

Faces, Cortical Networks and Effective Connectivity

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Face perception elicits activation within a distributed cortical network that includes visual ('core') regions, as well as limbic and prefrontal ('extended') regions, which process invariant and changeable facial features, respectively. Using fMRI and Dynamic Causal Modeling, we investigated effective connectivity and functional organization between and within the core and the extended systems. We found that the core system is hierarchically organized in a predominantly feed-forward fashion, and that the fusiform gyrus exerts the dominant influence on the extended system. Moreover, emotional faces increased the coupling between the fusiform gyrus and the amygdala, whereas famous faces increased the connectivity between the fusiform gyrus and the orbitofrontal cortex. Implications of these findings will be discussed in the context of

conscious awareness, mental imagery, and face recognition deficits in prosopagnosic patients.

Session: Plenary Symposium - Cortical Networks and Conscious Awareness

Presentation Time: Sunday June 24, 14:30-15:00

Beauty of artworks depends on who created them: Aesthetic responses involve more of the brain than the visual system

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One of the goals in neuroaesthetics is to determine whether there is a neural basis for aesthetic responses. Past studies have examined visual arts and correlated subjective aesthetic preferences with activations of specific brain regions (e.g. Kawabata & Zeki, 2004). These results have been taken to imply that the configurations presented in the artworks determine the responses. Here we asked whether aesthetic preferences would be determined as well by beliefs about the origin of the artwork. In two experiments, our results show that beliefs about the presumptive artist in fact strongly affect judgments. Without attribution of authorship, ratings favored works produced by celebrated and professional artists over those produced by amateur artists. However, when the paintings were ascribed to a famous artist, a fictitious modern artist, or a fictitious youth artist, the label had a strong effect. Paradoxically, participants showed greater aesthetic preferences for artworks actually by famous artists when attributed to youth artists than when attributed to famous or fictitious modern artists, $p < .005$. These results indicate that there is more to an aesthetic response than the visual processing of the image.

Session: Sensation & Perception

Poster Board: 35, Attended: Sunday June 24, 11:00-13:00

Dynamics of cognitive irreversibility in one-shot learning--beyond oneness.

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Among the varied phases of human cognition, the very moment when an idea flashes into one's mind is one of the most dramatic perceptual changes, involving a transition from the unconscious to conscious state. Throughout human history, there has been a rich accumulation of episodes of such insightful moments. For instance, the story about Archimedes exclaiming "Eureka!" when he took a bath and found a new principle is well known (Vitruvius, ca. 27 B.C.). These are special cases of learning where the learning process occurs suddenly and is completed in a very short time (one-shot learning). Synchronous activities spread over a wide area in the brain have been found to correlate with the subject's perception (Varela et al, 1999). Here we study the cognitive process of visual one-shot learning using a combination of hidden figure perception presented in a binocular rivalry condition. By examining the temporality involved, we reveal the nature of reversible and irreversible dynamics characterizing these phenomena. We argue that in spite of the striking differences in the phenomenology, binocular rivalry and hidden figure perception share common features involving a matching between top-down and bottom up processes.

Session: Temporality

Presentation Time: Monday June 25, 14:30-15:00

Postdictive Generation of Subjective Intentions: New Experiments on Free Will and Their Technological Applications.

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Undefeatable Rock, Paper, Scissors beats human players even while the computer appears to move before the human player. In reality, the computer displays its move after the human, and a temporal order

judgment reversal illusion produces the bizarre appearance. We've studied this illusions in detail and deploy a similar trick to retroactively modulate subjective intentions (subjects' reported intentions). Aesop's Fables and contemporary research tell that we confabulate intentions—make them up, after executing their action—but our paradigm catches us in the act, over 400ms time intervals. Our experiments concretize a Free Will problem, and delivers technical applications. According to the folk notion, 'volitions' are 1) picked out by subjective intentions, 2) the causes of intentional actions, 3) what we are morally responsible for, and 4) that which learning responds to. These experiments show that 'volitions' do not have both properties 1 & 2 and discern how the other properties associate. And, since subjective intentions depend on the results of our actions, not only the past determines our intentions, but, paradoxically, our intentions arise from both our past and future. Interactive feedback systems, such as spell-checkers, interrupt work-flow. We apply our techniques to merge alerts after actions into a seamless, cyborg volition.

Session: Self

Poster Board: 31, Attended: Sunday June 24, 11:00-13:00

(Proto-) Consciousness as a Contextually Emergent Property of Self-Sustaining Systems

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The concept of contextual emergence was introduced as a specific kind of emergence in which some, but not all of the necessary conditions for a higher-level phenomenon exist at a lower level. Further necessary conditions exist in contingent contexts that provide stability conditions at the lower level, which, simultaneously afford the emergence of novelty at the higher level. The purpose of the present paper is to propose that (proto-) consciousness constitutes a contextually emergent property of self-sustaining systems. The core assumption of our position is that living organisms constitute self-sustaining embodiments of the contingent contexts that afford their emergence. We propose the emergence of such systems constituted the emergence of content-bearing systems because the lower-level processes of such systems give rise to and sustain the macro-level whole (i.e., body) in which they are nested, while the emergent macro-level whole constitutes the context in which the lower-level processes can be for something (i.e., be functional). Such embodied functionality is necessarily and naturally about the contexts it has embodied. It is this notion of self-sustaining embodied aboutness that we propose, constituted a type of content capable of evolving into consciousness.

<http://www.ilstu.edu/~jsjorda>

Session: Philosophy I

Poster Board: 26, Attended: Saturday June 23, 11:00-13:00

Acuity in the Grand Illusion

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Research on the grand illusion focuses on the edges of the visual field, e.g. the illusion of high-resolution across the field, and in time, e.g. change-blindness etc. Here we identify and study illusory acuity, right, dead center, within foveal vision. It appears that foveal acuity is a property independent of what we are looking at, particularly if what we are looking at is not colored or moving. But this is false. We have gotten the phenomenology wrong. We investigate how acuity depends on what we are looking at; graphemes of different kinds or faces. Following the research of Majaj et al. (2002), we identify the filters which determine acuity in our visual field, show that these filters vary with the object examined, and then show that once this phenomenological illusion is identified, we can design systems which apply appropriate filters to enhance the identification of foveal objects—that is we have made systems which enhance the legibility of letters, and with operations that depend on recognizing that acuity is not independent of the object seen.

Session: Visual Approaches

Poster Board: 41, Attended: Saturday June 23, 11:00-13:00

A dogma about consciousness?

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Many take 'state consciousness' - the property in virtue of which a mental state is conscious as opposed to being non-conscious - as a proper explanandum, the explanans of which might help us understand phenomenal consciousness.

By focusing on how three representational approaches to consciousness conceive the relation between 'state consciousness' and 'transitive creature consciousness' I reason to the effect that 'state consciousness' is a not a proper explanandum. Those theories are the higher-order theory, the first-order theory and the same-order theory.

The central argument evolves around a simple consideration, agreed upon by all three theories: 'state consciousness' and 'creature consciousness' denote different properties. Since mental states are states of creatures, the properties of such states cannot be the same as the properties of creatures. Hence the property of a state's being conscious is different from that of a creature's being conscious of something.

But acceptance of this simple argument raises conceptual difficulties for the representational theories concerning their respective accounts of how transitive creature consciousness is involved in the explanation of state consciousness.

These difficulties leads to my tentative conclusion that the very idea of consciousness as a property of certain mental states might simply be mistaken.

Session: Philosophy II

Poster Board: 12, Attended: Sunday June 24, 11:00-13:00

Intuitions about Consciousness: Experimental Studies

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People's understanding of an entity's mental states can be influenced both by functional considerations and by strictly physical considerations. We conducted a series of studies to determine how each of these kinds of considerations impact people's mental state ascriptions. The results point to a striking difference between two kinds of states — those that involve phenomenal consciousness and those that do not. Specifically, it appears that ascriptions of states that involve phenomenal consciousness show a special sort of sensitivity to purely physical factors.

Session: Plenary Symposium - The Cognitive Basis of Intuitions about Consciousness

Presentation Time: Monday June 25, 08:30-09:00

A neural perspective on the levels of processing associated with unconscious perception

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Defining the extent of unconscious processing is an important step for our understanding of consciousness. It is usually assumed that conscious and unconscious perception should be explicitly distinguished. However, several studies suggest that this distinction should be abolished. In particular, studies of subliminal priming have argued that a masked stimulus can reach the highest levels of processing. In this talk, I will focus on whether there are limits to unconscious perception. I will present several behavioral and brain imaging studies aimed at characterizing the depth of processing associated with unconscious stimuli. I will present the patterns of neural activity associated with subliminal priming in several domains (written words, faces, speech) and how they differ from those induced by visible stimuli. In addition, I will present evidence for an intermediate, preconscious level of processing in which stimuli receive deeper processing compared to subliminal perception, but remain unavailable for conscious report. I will argue not only that the distinction between conscious and unconscious processing should be maintained, but also that it should include an intermediate preconscious step. I will explain why maintaining this taxonomy is essential in order to make sense of the growing neuroimaging data on the neural correlates of consciousness.

Session: William James Prize

Presentation Time: Monday June 25, 12:00-13:00

Chaos and Complexity in the Dreaming Brain

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Both chaos theory and complexity theory can be applied to the study of nighttime dreams. The latter allows an examination of the self-organizing properties of the brain, while the former can investigate how this complex self-organized brain can, in dreaming, respond to subtle influences such as residual feelings, wishes, and memories, especially (but not exclusively) in rapid eye movement (REM) sleep. "Organizational resilience," a term borrowed from the business world, can be used as a metaphor to describe the "teamwork" that characterizes the coordination of dreaming brain's component parts, such as neural networks, to create dream narratives. The term also can be used as a descriptor for the experiential dream group, a collaborative process that acknowledges the dream's complexity and uses non-authoritarian dialogue to help dreamers derive meaning from dream reports.

Session: Philosophy II

Poster Board: 20, Attended: Sunday June 24, 11:00-13:00

The magic of conscious perception. How immediate experience affects the vanishing ball illusion

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Much of what we know about the visual system stems from empirical investigations into our susceptibility to visual illusions. Whilst scientists have used this knowledge to further our understanding of the mind, magicians have learnt to master the art of deception for entertainment purposes. Using a magic trick, Kuhn and Land (2006, Current Biology) showed that when a magician pretended to throw a ball up in the air, 68% of observers perceived a ball leave his hand, move upwards, and disappear; this despite the fact that the ball did not leave the magician's hand. In this earlier study participants saw the ball being thrown up in the air for real twice prior to the pretend throw. Data is presented showing that the vanishing ball illusion is more effective if participants see the ball being thrown up on a previous occasion rather than if it is made to disappear immediately, suggesting that the illusion is affected by previous experience. However, the fact that 32% of participants perceived the imaginary ball even without having seen it being thrown for real suggests

that the immediate context is sufficient for people to perceive an imaginary event that is merely implied by a person's action.

Session: Visual Approaches

Presentation Time: Sunday June 24, 08:30-09:00

Sleepwalking Around the Contemporary Consciousness Debate

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Dan Zahavi has consistently argued that the contemporary consciousness debate, as it is being played out in the analytic field, stands to benefit from a dialogue with the phenomenological tradition. As an example, Zahavi argues that the analytic debate should recognize the importance of time-consciousness and the role it plays in normal, everyday consciousness. Our presentation will take Zahavi's assertion seriously and will carry out an analysis of normal consciousness in terms of time-consciousness. We shall argue that while it is likely that time-consciousness is a necessary feature of normal consciousness, time-consciousness cannot be sufficient for normal consciousness. To illustrate this, we shall show how time-consciousness, and not normal consciousness, can plausibly be attributed to a certain kind of sleepwalker. We will conclude with considerations showing the plausibility of time-consciousness being a necessary condition for everyday consciousness, a thesis seldom heard in the contemporary analytic arguments about consciousness, but one which is familiar to nearly all phenomenologists.

Session: Phenomenology

Poster Board: 19, Attended: Saturday June 23, 11:00-13:00

Bodily self-consciousness: neuroscientific results in light of philosophical considerations.

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Self-recognition is by and large considered as the landmark of self-consciousness. In particular, recent cognitive sciences intend to investigate subtle forms of bodily self-consciousness, beyond limitations of explicit measures of self-recognition (verbal reports). For that, they introduce various implicit measures (behavioural and neurophysiological states). Here, I intend to bypass limitations of these two standard approaches. Indeed, both explicit and implicit forms of self-recognition involve a reflexive stance that cannot account for the specificity of bodily self-consciousness. In the light of considerations issued from phenomenological and clinical research, I will describe a pre-reflexive form of self-consciousness that constitutes bodily experience in its core by avoiding any explicit or implicit reflexive stance on the bodily subject. Even though this fundamental form of self-consciousness remains neglected in cognitive sciences, I will argue that both theoretical and scientific studies of consciousness would particularly benefit from considering pre-reflexive self-consciousness at the empirical level. Several methodologies and techniques are appropriate to do so and will be discussed. Such operationalization of the notion of pre-reflective self-consciousness in functional and empirical terms will allow a reconsideration of the role of sensorimotor integrative processes in grounding bodily self-consciousness.

Session: Self

Poster Board: 29, Attended: Sunday June 24, 11:00-13:00

Replicated inhibition of unpleasant word identification under objective threshold conditions

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Previous results in the unconscious perception literature demonstrate that under certain experimental conditions participants perform below chance at identifying words (Snodgrass, Shevrin, & Kopka, 1993). Winer, Lepisto, Snodgrass, and Shevrin (2005) obtained preliminary evidence that the approach participants take to an identification task affects how accurately they identify pleasant and unpleasant words. This effect was obtained at the objective threshold (d' does not significantly differ from zero) and the subjective threshold (stimulus durations in which participants report seeing nothing but have higher than chance d'). Importantly, only at the objective threshold, participants who approached the task with an analytic strategy performed below chance when identifying unpleasant words. The present study assessed the reliability of findings obtained by Winer et al. (2005). Results replicated the finding of below chance identification of unpleasant words. Like Winer et al., the approach participants took to the task affected how accurately they identified pleasant and unpleasant words. However, this effect interacted with threshold such that the original pattern was obtained at the objective threshold but not the subjective threshold. These results establish the reliability of the below chance effect at the objective threshold, but the presence of a three-way interaction including threshold warrants further investigation.

Session: Implicit Processing

Poster Board: 2, Attended: Sunday June 24, 11:00-13:00

The Shifting Streams of Consciousness: an fMRI study of consciousness in a simulated driving task

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The stream of consciousness flows in two principal tributaries. Occurrent acts/percepts fill the *_exogenous_* stream (of William James). Less pressing "task unrelated thoughts" meander in the *_endogenous_* stream (of, e.g., James Joyce). Most neuroimaging considers the exogenous stream, imagining brains as task-driven systems. However, imaging of between-task "rest" reveals a robust "default mode network," active when subjects are off duty, their bodies off line – a more endogenous (Joycean) stream. However, functional neuroimaging of both types assumes that task-driven and non-task states are binary opposites, that subjects are "task on" and "task off" on exactly the schedule of the experimental conditions. In this presentation, we explore a more phenomenologically plausible hypothesis: over time, the Jamesian and the Joycean streams intermingle. A novel neural-network method of data analysis combined fMRI images with nine continuously recorded behavioral/perceptual variables collected during simulated driving, to assess to what extent each image could be predicted from the previous brain image (endogenous determination), compared to its prediction based on the immediately preceding behavioral/environmental variables (exogenous determination). Beginnings and ends of runs are relatively exogenous (Jamesian), flanking endogenous (Joycean) passages – regardless of the structure of task conditions. Different distributed brain networks support the two streams.

www.trincoll.edu/~dlloyd

Session: NCC

Poster Board: 8, Attended: Saturday June 23, 11:00-13:00

The role of feedback in visual masking, visual awareness and attention

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We discuss the role of feedback in visual masking, visual awareness and attention. Our analysis reveals constraints for feedback mechanisms that limit their potential role in visual masking, and in other general brain functions. We propose a feedforward model of visual masking, and provide a hypothesis to explain the role of feedback in visual masking and general visual processing. We review the anatomy and physiology of feedback mechanisms, and propose that the massive ratio of feedback versus feedforward connections in the visual system may be explained solely by the critical need for top-down attentional modulation. We discuss the merits of visual masking as a tool to discover the neural correlates of consciousness, especially as compared to other popular illusions, such as binocular rivalry. Finally, we propose a new set of neurophysiological standards needed to establish whether any given neuron or brain circuit may be the neural substrate of awareness.

Session: Visual Approaches

Presentation Time: Sunday June 24, 10:00-10:30

AWAREness: A framework for conceptualizing the varying components of consciousness.

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With the proliferation of theoretical and experimental advances in consciousness there have been a corresponding number of divergent views. Here, we present a general framework of consciousness called AWAREness (Solso, 2003) which incorporates some central themes as well as some new ideas. The main features of the framework include Attention, Wakefulness, Architecture, Recall of knowledge, and the Emotive. In addition, there are several secondary attributes included. These are novelty, emergence, selectivity, and subjectivity. The five elements of consciousness in the AWAREness framework are an attempt to reduce the variance in defining the subjective experience we call consciousness. Only one of the elements, architecture, deals with a physiological process; the rest deal with psychological processes. All contribute to consciousness and many interact. Each of these aspects can be measured on a continuum and can be combined to evaluate something's level of consciousness. This makes sense as we live in a multidimensional world and for eons have exhibited patterns of wide biodiversity. To impose a rigidly dichotomous classification of consciousness not only fails to grasp the complex nature of the term but also misrepresents human and animal consciousness.

Session: Philosophy II

Poster Board: 14, Attended: Sunday June 24, 11:00-13:00

Stimulus invisibility uncouples the fMRI bold response from neuronal spiking activity in V1

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Animal experiments suggested that neurons in cortical area V1 respond primarily to the physical structure of a stimulus, while functional neuroimaging studies in humans demonstrated that activity in this area is strongly correlated with perception. This discrepancy has provoked controversy regarding the role of V1 neurons in shaping the contents of our conscious experience. Here we demonstrate, by combining microelectrode recordings and fMRI in monkeys, that these techniques measure fundamentally different quantities in V1 with regard to perception.

We used the Generalized Flash Suppression paradigm, in which salient visual patterns were induced to subjectively disappear, while remaining physically present. We measured both neural and fMRI BOLD responses, comparing perceptual suppression to continuous visibility and physical removal.

We found that most LFP power bands and spikes remained as high in the condition where the target remained visible as in the condition where it was prone to perceptual suppression. Conversely, there was a marked decrease of the BOLD response corresponding to periods in which the stimulus disappeared, paralleled by a decrease in low frequency power of the LFP. We conclude that the perception of a stimulus is represented in V1, but only minimally influences the spiking rate of feature selective neurons

<http://www.alex-maier.info>

Session: NCC

Poster Board: 13, Attended: Saturday June 23, 11:00-13:00

Fundamental antagonistic networks in the human cortex: implication to neuronal models of subjective awareness.

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Could it be that activity in a small, isolated cortical network is sufficient for perceptual awareness? It may seem that besides being extremely counter-intuitive this conjecture can never be tested experimentally. Indeed how can we ever find out if some cortical network in our brain develops a subjective awareness of its own? Fortunately, there is at least one mental state that may allow us to 'peak' into such an independent cortical activity. This mental state is paradoxically associated with moments of a particularly heightened perception, where we have the intuitive sense of 'losing our selves'. I will review data, obtained from fMRI research, showing that during such intense moments, cortical regions associated with introspection are shut-off, leaving sensory cortex to be active on its own. Furthermore, this behavior reflects a more fundamental antagonistic relationship between 'extrinsic' networks engaged in perception, and more 'intrinsic' oriented cortical systems. While these experiments are far from proving that isolated network activity suffices for perceptual awareness- they provide a first step in this direction, and illustrate that such 'minimal' models of awareness are experimentally tractable.

Session: Plenary Symposium - Cortical Networks and Conscious Awareness

Presentation Time: Sunday June 24, 15:00-15:30

Resolving the "Hard Problem" Within the Circuitry of a Philosopher's Brain: Creating a Phenomenal Link Between Qualia and Neural Activity

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The "hard problem of consciousness" arises from the perception that neural activity is categorically different from the experiential qualities of the contents of consciousness (qualia), EVEN IF ultimately shown to be 100% correlated. Argument and experiential demonstration will show that the hard problem is ONLY perceptual (and illusory). It cannot be resolved by neuroscientific experiment or philosophical analysis, but may be resolved individually using a proposed psychocognitive process. Consider that qualia are isodynamic and isostructural with neural activity; their spatial, temporal, and relational qualities correlate with specific neural activity. Nevertheless, uncovering all correlations won't resolve the perception of a categorical difference because brains require multi-modal qualia to co-occur to integrate them. The co-occurring visual imagery and sounds of a ringing bell are inherently different, yet they are associatively bound into one occurring reality – the ringing bell. No "sight-sound dualism" is ever proposed! However, qualia never co-occur with any perception of their associated neural activity (e.g., seeing/hearing neurons firing), so they occur as disparate realities. Consider an individual perceiving neural activity (by any technical means) while experiencing correlated qualia. It is suggested that the brain can bind them into one occurring reality, with the apparent hard problem then experientially resolved.

Session: Philosophy II

Poster Board: 21, Attended: Sunday June 24, 11:00-13:00

Inverse Zombies, General Anesthesia, and the Hard Problem of Unconsciousness

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Philosophical (p-) zombies are constructs that possess all of the behavioral features and responses of a sentient human being, yet are not conscious. P-zombies are intimately linked to the hard problem of consciousness and have been invoked as arguments against physicalist approaches. But what if we were to invert the characteristics of p-zombies? Such an inverse (i-) zombie would possess all of the behavioral features and responses of an insensate being, yet would nonetheless be conscious.

While p-zombies are logically possible but naturally improbable, an approximation of i-zombies actually exists: individuals experiencing what is referred to as "anesthesia awareness." Patients under general anesthesia may be intubated (preventing speech), paralyzed (preventing movement), and narcotized (minimizing response to nociceptive stimuli). Thus, they appear—and typically are—unconscious. In 1-2 cases/1000, however, patients may be aware of intraoperative events without any objective indices.

P-zombies confront us with the hard problem of consciousness—how do we explain the presence of qualia? I-zombies present a more practical problem—how do we ensure the absence of qualia? The current investigation compares p-zombies to i-zombies, exploring the multiple dimensions of this "hard problem" of unconsciousness with a focus on anesthesia awareness and persistent vegetative states.

Session: Clinical Insights

Presentation Time: Saturday June 23, 18:00-18:30

Consciousness Mediated by Neural Transition States: How Invisibly Rapid Motions Can Become Visible

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Robert Fendrich Neurological Clinic II, University Magdeburg, Germany

A ring of dots was rotated so rapidly subjects could not discriminate the direction of rotation when it was presented alone, and reported seeing only an unbroken outline circle. However, when this spinning ring was

preceded or followed by a stationary ring of dots, subjects could tell the direction of motion with substantial accuracy. This occurred because the spinning ring appeared to visibly accelerate from a standstill (when preceded by the stationary ring) or slow to a halt (when followed by the stationary ring). We investigated the dynamics of this hitherto unreported effect by varying the speed of rotation and ISI between the spinning and stationary stimuli. The phenomenon demonstrates that the visual system can encode motions too rapid to be consciously visible. We propose that there is a neural level at which the representation of moving stimuli is updated in a smooth and continuous manner, and the motion becomes visible as it passes through a transitional state in which the represented velocity is slow enough to reach consciousness.

Session: Temporality

Presentation Time: Monday June 25, 15:00-15:30

Origins of I and Thou: Developmental and neurobiological substrates

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Accumulating evidence suggests that human beings do not develop their full potential unless early caregivers attune with infants as subjective beings. The ability to go beyond the sensory "It" and to see the other's subjectivity is a sine qua non of normative development (Schore, 2003). Other mammals have partial abilities to tune into the psychological states of their conspecifics. They can perceive aspects of posture, vocalization, and facial expression as signs and take action based on those signs. Some primates have "mirror neurons" that appear to allow them to register the commonality between actions of others and their own actions (Rizzolatti et al., 1996). Yet, no other animal has been shown to understand, to make use of, or to depend on the subjectivity of other members of its species (Emory, 2000). In particular, humans have the ability to go beyond imitation of actions to understanding of intentions (Iacoboni et al., 2005). Findings from neurobiology suggest that activity in the fronto-parietal mirror neuron system together with associated areas accounts for these different stances vis a vis the other. Some aspects of autism may be accounted for by deficits in these mentalizing circuits (Dapretto et al., 2006).

Session: Philosophy I

Poster Board: 23, Attended: Saturday June 23, 11:00-13:00

Properties of prolonged interocular suppression of awareness

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A popular approach to investigate the cognitive processes and neural mechanisms associated with consciousness consists of studying visual awareness using psychophysical techniques that allow the presentation of a visual stimulus under complete unawareness. Tsuchiya & Koch (2005) reported that continuously flashing monochromatic patterns to one eye suppresses from awareness salient visual stimuli presented to the other eye, for periods of up to 3 minutes. Using this technique, they showed that the afterimage of a suppressed visual adaptor is weaker than that of an unsuppressed adaptor, suggesting that suppression partially disrupts afterimage formation. In the present study, we show that presenting visual patterns in constant motion to one eye causes complete unawareness of stimuli presented to the other eye, for periods comparable to those in continuous flash suppression. We also show that the duration of both continuous flash suppression and motion-induced interocular suppression is strongly dependent on the spatial frequency and luminance contrast of the suppressed stimulus. In a second experiment, we present evidence that afterimage reduction by continuous flash suppression is not due to a disruption of afterimage formation caused by adaptor suppression per se, but rather to an effect of suppressor exposure on subsequent afterimage perception.

Session: Sensation & Perception

Presentation Time: Monday June 25, 16:00-16:30

Is there a vertebrate mechanism of consciousness, and how would we recognize it if we saw it?

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The general plan of the vertebrate brain is highly conserved in phylogeny, such that its principal subdivisions and fiber tract circuitry can be homologized across widely different species throughout the vertebrate clade. An issue of fundamental importance for our understanding of animal consciousness is accordingly whether a "mechanism of consciousness" might be implemented as part of this conserved circuitry – which would mean that all vertebrates are conscious creatures – or whether consciousness is a matter of specializations added to this circuitry in some species – say the mammalian novelty of a neocortex – but absent in others. In my presentation I will outline conceptual approaches to this question drawing on a characterization of minimal requirements for conscious function on the one hand, and on conjectures regarding the role and organization of such a functional mode within the over-all economy of brain macrosystems on the other. Implications of this perspective for the larger issue of the possibility of consciousness in invertebrate animals will also be considered.

Session: Plenary Symposium - Animal Consciousness: Towards a Scientific Description and Natural History

Presentation Time: Monday June 25, 11:00-11:30

The calculus of anomalies and the origin of consciousness

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The existence of consciousness is a marked anomaly in modern science. Science as it stands today does not need its existence. The conventional scientific description appears to be causally closed, and there seems to be no real necessity to invoke consciousness, making the exorcising of philosophical zombies (Chalmers 1996) a hard problem. Meanwhile, there remain anomalies in the physical description of the world, sometimes patched up by ad hoc procedures (e.g. renormalization). The relevance of some of these anomalies to the problem of consciousness have been suggested (e.g. the measurement problem (Wigner 1970), quantum gravity (Penrose 1989)). Here I examine how a set of anomalies in physical theories can in principle relate to the anomaly of consciousness. The empirical evidences on the neural correlates of consciousness (Crick and Koch 1995) puts certain constraints on the candidates of relevant physical anomalies. Since some anomalies can go unnoticed until the new theoretical framework has been made (Lightman & Gingerich 1991), we potentially need to take these "hidden anomalies" into consideration. Based on a review on our present knowledge about this "calculus among anomalies", I propose some key concepts in the search of "coherence" and "annihilation" between anomalies including that of consciousness.

Session: Philosophy II

Poster Board: 18, Attended: Sunday June 24, 11:00-13:00

Consciousness, Complexity and Testability

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This talk consists of two parts: the first presents a philosophical argument about the nature of the mind; the second takes in consideration case studies that exemplify my thesis. The theoretical part is concerned with an approach to properties that will be an alternative option to eliminativist, identity and dualist accounts. The dichotomy represented by the pair of words physical-mental is misleading and misguiding and impairs an effective interdisciplinary debate between philosophy and science. Thus, rather than accepting the false opposition between physical and mental properties we must put forward an ontology that is able to deal with

different emergent levels within our purely physical world. Systemic properties are responsible for determination but not causation, meaning emergent properties are subtractive conditions rather than triggering mechanisms. This is a substantial difference between the traditional view of emergence and the account forwarded here.

The second part of this talk briefly discusses empirical evidences that exemplify emergence as defined in the first part. Experiments testing decision-making, conflict monitoring, conscious/unconscious evaluation in perception and adaptive behavior in computational neuroethology will constitute my epistemic credentials.

Session: Philosophy II

Poster Board: 13, Attended: Sunday June 24, 11:00-13:00

The Pernicious Underdetermination of the NCC

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Any neural process that correlates with consciousness will also correlate with the causes and effects of consciousness, presenting the researcher with a number of possible NCCs. Moreover, any attempt to test for the "true" NCC by isolating the candidate and testing for consciousness can be systematically confounded. The problem cannot be solved by abandoning "Cartesian" models of the mind - as suggested by Dennett and Kinsbourne - and the most plausible countermeasures threaten realism about phenomenal consciousness.

Session: Philosophy II

Poster Board: 19, Attended: Sunday June 24, 11:00-13:00

'Agency' and prior conscious thought

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Two current theories make different predictions about whether sense of agency can be modulated by external factors. Forward model views suggest sense of agency is intrinsically informed by the motor control system, and should not be modulated by external information. Conversely, inference-based models suggest sense of agency involves causal inferences that rely heavily on extrinsic sources of information. Consequently, sense of agency should be modulated by external influences.

We report three experiments comparing these theories directly, using priming to modulate sense of agency for active and passive movements. We used the perceived interval between movements (key presses) and effects (tones) as an implicit measure of sense of agency. Lower interval estimates indicate stronger action-effect binding, and thus enhanced sense of agency. The first two experiments showed that primes modulate the sense of agency for passive but not active movements. The third experiment replicated previous findings showing that the inference of agency is supported only when the prime and the movement are sufficiently close in time. Priming is an experimental method for inducing prior conscious thoughts that may be relevant to agency.

We conclude that the competing theories of agency are not mutually exclusive, but instead operate under different contexts.

Session: Sensorymotor

Poster Board: 39, Attended: Sunday June 24, 11:00-13:00

How actively does the sleeping brain process auditory stimuli? Brain reactivity to sound duration deviance assessed in all sleep stages

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How does the sleeping brain process external stimuli, and in particular, up to which extent does the sleeping brain detect and process modifications of its sensory environment? In order to address this issue, we investigated brain reactivity to simple auditory stimulations during sleep in young healthy subjects. EEG signal was acquired continuously during a whole night of sleep while a classical oddball paradigm with duration deviance was applied. In all sleep stages except sleep stage 4, a mismatch negativity was unquestionably found in response to deviant tones, revealing for the first time preserved sensory memory processing during almost the whole night. Surprisingly, during sleep stage 2 and paradoxical sleep, both P3a and P3b-like components were identified after the MMN, whereas a P3a alone followed the MMN in wakefulness and in sleep stage 1. This totally new result suggests elaborated processing of external stimulation during sleep. We propose that the P3b-like response could be associated to an active processing of the deviant tone in the dream's consciousness, which could subserve the incorporation of external stimuli into dream.

Session: Sensation & Perception

Poster Board: 36, Attended: Sunday June 24, 11:00-13:00

Individual Differences in the Capacity of Consciousness: Handedness and Openness to Experience

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Niebauer, Aselage and Schutte (2002) proposed a connection between hand preference and the likelihood to modify or update one's beliefs. This was based on previous research that had shown that ambidextrous individuals had a larger corpus callosum (Witelson, 1985), the largest structure connecting the two cerebral hemispheres. This theory was extended to individual differences in metacognition (Niebauer & Garvey, 2004) and individual differences in self-reflection (Niebauer, 2004). In each case, greater connections between the hemispheres was thought to improve the capacity of consciousness such that these individual differences resulted in experiential differences in consciousness, in particular what William James called "the fringe of consciousness". In personality theory, McCrae and Costa (1999) proposed that individuals vary along five separate dimensions. One dimension is called Openness to Experience and has been characterized as the capacity to have a high tolerance for ambiguity and the ability to hold multiple ideas, feelings and perceptions simultaneously in consciousness (McCrae & Costa, 1997). In the current study, handedness along with Openness to Experience was measured. Those most ambidextrous measured higher on Openness to Experience, $r(303) = -.17, p = .002$. These results may reflect individual differences in the capacity of consciousness.

Session: Phenomenology

Poster Board: 18, Attended: Saturday June 23, 11:00-13:00

Conscious experience as explained by the frontal feedback model

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The frontal feedback model asserts that the entire panoply of human mental faculties, including consciousness, arose in the hominid brain when

the great relative expansion of the frontal lobe versus posterior sensory regions effectively reversed the preferred direction of information flow in the neocortex from a caudo-rostral bias to a rostro-caudal bias. The principle effect of reversing this information flow in the neocortex was in the creation a dynamic entity known as the central character, or "self," in posterior sensory association cortices along with an internally created virtual world within which that central character was embedded, located in earlier sensory cortices. Conscious experience in the hominid brain arose through the necessity of this central character to exploit objects in its created virtual world in order to better survive in the "real" world. In order to do that, the central character had to "experience" the qualitative nature of each of these objects as distinct from one another. Thus, conscious experience is best understood as an evolutionary adaptation in hominids that conferred a biologically significant advantage in those species rather than simply as an emergent property of biophysical interactions which is the stance of most modern reductionist accounts.

Session: NCC

Poster Board: 5, Attended: Saturday June 23, 11:00-13:00

Temporality in voluntarily initiated movements.

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Benjamin Libet showed in the 1980s that characteristic brain activities preceded the conscious perception of intentionality, revealing aspects of the rich neurocognitive processes involved. Studying the basis of the cognitive processes of voluntary movements and the accompanying conscious perception is important in elucidating the nature of the stream of consciousness.

Here we study the cognitive processes involved in action timing. Subjects participated in two types of button-tapping tasks. In the "spontaneous condition", subjects were instructed to tap once in their own time within the time limit of twenty seconds to receive a fixed reward. In the "gambling condition", subjects were instructed to hit within a "strike zone" of two seconds placed randomly in the twenty seconds time window. A correct "guess" and successful hitting was rewarded with a larger reward (10 times the fixed reward in the spontaneous condition). Each task consisted of 50 trials. The results reveal differences in the mechanisms behind goal-directed as opposed to spontaneously initiated actions, and gives some interesting constraints in the temporal "book keeping" of sensori-motor coordination involved in voluntary action.

Session: Sensorymotor

Poster Board: 41, Attended: Sunday June 24, 11:00-13:00

When to encode implicit contextual cue

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When spatial layouts of displays are invariant in a visual search task, they are implicitly learned as contextual cue for a target location, resulting in improvement of performance (contextual cueing). We aimed to clarify how and when relevant information (i.e., a target location) is associated with contextual cue (i.e., spatial layouts). One possibility is that a target location is associated with representation formed during active visual search. Alternatively, a target location may be associated with spatial layouts at the moment when the target is detected. To examine these two possibilities, in a contextual-cueing task, immediately after participants made a saccade to a target, the searched layout was replaced by a different layout with the same target position. Thus, the layout in which participants had searched for the target (searched layout) and the layout presented at the moment of target detection (unsearched layout) differed. Both the searched and unsearched layouts were made invariant during a training session. The contextual-cueing effect was observed for unsearched layouts as well as searched layouts. These results indicate that both spatial layout

during active search and spatial layouts at the moment of target detection were used as contextual cue.

Session: Visual Approaches

Poster Board: 40, Attended: Saturday June 23, 11:00-13:00

The real and illusory in phoneme perception

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Phonemes are building blocks of linguistic conscious perception. The McGurk effect is a striking phenomenon in the integration of audio-visual signals in speech perception, involving a marked change in auditory qualia. For example, when the acoustical syllable /ba/ is dubbed with the visual articulation of /ga/, subjects frequently perceive the syllable /da/. This effect suggests that visual articulation can affect the phoneme perception. Recently, brain imaging studies have suggested that the McGurk effect is due to activities in the posterior part of the left superior temporal sulcus and gyrus, where neurons responding to both auditory and visual information are found.

Here we formulate a model of the McGurk effect by means of the Self-organizing map (SOM). We examined whether putting the SOM in a series of learning process of phonemes would naturally induce a McGurk effect-like activities. We report the reconstruction of the McGurk effect in a manner consistent with the experimentally observed phenomenology of phoneme perception. Our results suggest a common mechanism underlying real and illusory perceptions in the conscious domain.

Session: Sensation & Perception

Poster Board: 34, Attended: Sunday June 24, 11:00-13:00

Brain beyond ensembles

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Modern science has been heavily dependent on statistical approaches, in cases where the complexity involved exceeds the limit expected by the relevant empirical or theoretical framework. In cognitive neurosciences, statistics have been also oversubscribed, in the treatment of various phenomena ranging from neural coding to the foundations of the robust handling of uncertainty by brain's emotional system studied in neuroeconomics.

Here we argue that the statistical approach in general is severely inadequate in explaining the origins of consciousness and the nature of cognitive processes in general both in the theoretical and empirical domain. On the empirical front, various commonly observed phenomena such as one-shot learning and decision making reveal the failure of statistical reasoning. In trying to come to terms with the richness of the connectivity-based dynamics of neural circuits, statistical approach is found wanting as the theoretical foundation to account for human cognition. Based on the results of our own empirical and theoretical works, we propose here an alternative paradigm based on the connectivity in the brain, encompassing a wide range of phenomena from the hard problem of consciousness to the practically important subject of the "click economy".

Session: Philosophy II

Poster Board: 24, Attended: Sunday June 24, 11:00-13:00

Sense of agency and alienated agency: a two-tiered account

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Agents normally have a 'sense of agency' for their actions, i.e. a sense that these actions are self-caused, that they themselves are their authors. In contrast, patients with delusions of alien control don't have a sense of agency for their own actions and attribute them to some alien agency. Existing accounts of the sense of agency and its impairments tend to fall into two categories. Top-down accounts view the sense of agency as the

result of an inferential process: an action is self-attributed if it coheres with one's intentions, thoughts or self-conception more generally. In contrast, according to bottom-up accounts the sense of agency belongs to a first-order phenomenology and is generated by neurological processes responsible for the control of action. I will argue in favor of a hybrid two-tiered account that distinguishes between a level of agentive experience and a level of agentive judgment. I will also argue that alien control should not be understood as solely the result of a mistaken agentive judgment but has its roots in a first-order experience of alienation. Finally, I will discuss the nature of the relationship between the phenomenal properties of our agentive experiences and their intentional properties.

<http://pacherie.free.fr/ascc11/>

Session: Philosophy I

Presentation Time: Saturday June 23, 17:30-18:00

Getting to the Heart of the Concept Concept

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Jerry Fodor has written, "the heart of a cognitive science is its theory of concepts." By modest extension, the heart of a science of consciousness is its theory of concepts as well. Most, or to some accounts all, of our conscious experience is conceptualized, to greater or lesser extent. Fodor believes that cognitive science has historically gotten its theory of concepts wrong. Consciousness studies have, arguably, taken their theory of concepts for granted. How one answers the question "what is a concept?" will have significant consequences for how one answers "what is consciousness?"

This paper considers standard and less standard answers to the question, "what is a concept?": sub-propositional entities, constituents of mental states, constituents of mental representations, proxies in simulations, and, borrowing a page from autopoiesis theory, reliably recurring perturbations of the system caused by some internal or external stimulus. It gives extended consideration to the approach taken by the CYC project: its benefits and limitations; and it shows how two competing theories of concepts, Fodor's informational atomism and Prinz's proxytypes theory, are not as irreconcilable as they may at first appear. Finally, it addresses why consciousness researchers should take account of these discussions.

Session: Philosophy I

Poster Board: 27, Attended: Saturday June 23, 11:00-13:00

Developmental learning in non-markovian processes: premises of a biologically plausible cognitive architecture

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During development, perception and action are in constant interaction through mechanisms still largely unexplained. In the domain of vision, anatomical studies describe a separation of left and right receptive fields into modular channels for the processing of colors, forms, depths and motions. At the same time, the motor system is innately able to build new action plans and make them controllable. Representations are also shared by the two structures, as suggested by neurobiological studies having brought evidence in area F5 of goals' representations endowed with strong sensorimotor characteristics. Supporting our investigation of a computational cognitive architecture, experiments have been carried out in simulation and on robotic platform to capture the developmental learning

of reaching behavior. Visual processing takes place through recurrent activations in a multi-layer neural network adapted from the Interactive Activation Model. The model localizes objects separately for each eye. Binocular information is merged by triangulation so that object's 3d position characterizes the goal of the interaction, thereafter provided as input to a Forward Model. Development occurs in two phases: The agent first predicts the consequences of its arm movements while localizing its hand. Second, it infers actions that are appropriate to reach any position in its surrounding space.

<http://video.google.com/videoplay?docid=-4487025762771680332>

Session: Sensorymotor

Poster Board: 40, Attended: Sunday June 24, 11:00-13:00

The functional impact of mental imagery on conscious perception

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It is debated whether mental imagery relies on the same sensory representations as perception, and if so, what functional consequences such an overlap might have on perception itself. Here, we utilized binocular rivalry as a tool to reveal the perceptual and mnemonic contents of mental imagery. Observers were either shown or instructed to imagine one of two oriented patterns, several seconds prior to the presentation of an ambiguous rivalry display. The presentation of low luminance patterns strongly biased the perception of subsequent rivalry displays, in favor of the previously seen pattern. Remarkably, mental imagery of a specific pattern led to equally potent bias effects. The effects of both imagery and perception were highly orientation-specific, with bias effects showing peak tuning for matching orientations. Longer periods of imagery led to progressively stronger bias effects, mimicking the effects of prolonged viewing of a physical pattern. In addition, the top-down effects of imagery could be distinguished from manipulations of visual attention. These results demonstrate that imagery leads to the formation of a short-term sensory trace that can bias future perception, suggesting a means by which high-level processes such as memory and cognition could shape low-level sensory representations.

Session: Sensation & Perception

Presentation Time: Monday June 25, 14:30-15:00

Cognition and Communication in Grey Parrots

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For almost 30 years I have studied cognitive and communicative abilities of Grey parrots. Although I do not examine consciousness directly, my research seeks to answer questions related to consciousness: (1) To what extent can a nonhuman, nonprimate (with a brain the size of a shelled walnut) share mental capacities, representations, and comprehension with humans? (2) To what extent, and at what level, do mechanisms of cognition and communication exhibited by this avian species resemble those operating in humans? (3) To what extent, and for what innate purpose, have such avian abilities been developed? (4) Can the study of mechanisms for vocal learning in the laboratory help us understand human vocal learning; that is, can an avian subject be a model for human processes? My data, showing that, on some tasks, Grey parrot abilities match those of young children, suggest that these birds are viable candidates for more advanced study.

Session: Plenary Symposium - Animal Consciousness: Towards a Scientific Description and Natural History

Presentation Time: Monday June 25, 10:30-11:00

Conscious Awareness of Objects in Indeterminate Art

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Indeterminate art invokes a perceptual dilemma in which apparently detailed and vivid images resist identification. We used event-related fMRI to study perception of representational, indeterminate and abstract paintings. We hypothesized increased activation along a gradient of posterior-to-anterior ventral visual areas with increased object resolution. Moreover, we postulated that in order to identify ambiguous or indeterminate paintings, subjects would invoke visual mental imagery. Behaviorally, subjects were faster to recognize familiar objects in representational than both indeterminate and abstract paintings. We found activation within a distributed cortical network that includes visual, parietal, limbic and prefrontal regions. Representational paintings, which depict scenes cluttered with familiar objects, evoked stronger activation than indeterminate and abstract paintings in higher-tier visual areas. Perception of meaningless scrambled paintings was associated with imagery-related activation in the precuneus and prefrontal cortex. Finally, representational paintings evoked stronger activation than indeterminate paintings in the temporoparietal junction, a region that mediates the binding of object form and spatial location within scenes. Our results suggest that the human brain is a compulsory object viewer that automatically segments indeterminate visual input into coherent images. The perception of familiar objects in art compositions is mediated by top-down processes, namely memory recall and mental imagery.

Session: Visual Approaches

Poster Board: 39, Attended: Saturday June 23, 11:00-13:00

Sensory discrimination and awareness in patients with severe brain damage

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One of the most important clinical challenges in patients with severe brain damage is to estimate different aspects of their actual state of consciousness and, in particular, their residual sensory awareness. It is very difficult to measure objectively sensory awareness, but many studies suggest that it is dependant to the synchronization of the structures involving in sensory perception (Engel and Singer, 2001). Sensory awareness would require global coordination of widely distributed neural activity by long distance synchronization (Dehaene et al., 2006).

We have recorded the electroencephalographic responses to the patient's own name and to other first names in 15 brain-damaged patients. A P300 component was observed in response to the patient's name and not to the other names in all patients with locked-in syndrome or in a minimally conscious state and in a majority of patients in a vegetative state. Moreover, specific time-frequency patterns have been observed for each clinical diagnosis. These data respectively suggest that (a) partially preserved sensory discrimination could be observed in non-communicative brain-damaged patients and that (b) the structures involving in the stimulus discrimination are differentially synchronized. These results will be discussed in the context of sensory awareness.

Session: Clinical Insights

Presentation Time: Saturday June 23, 17:30-18:00

Affective vision: Prioritization does not imply automaticity

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The processing of emotion-laden information is often described as "automatic", namely, independent of attention and even visual awareness. In a series of studies we have sought to carefully test this idea with both behavioral and fMRI methods. Our findings do not favor the "automaticity" assumption and, instead, reveal that both attention and task relevance (whether a stimulus was a target or a distractor) strongly modulate responses evoked by emotional faces. In more recent studies we have investigated the neural correlates of near-threshold emotional perception. Unlike previous studies, we did not find evidence for differential responses to masked fearful faces. In addition, responses were reliably driven by the subject's percept, and less so by the physical stimulus per se – this was the case even in the amygdala. Finally, we will present recent results on the neural correlates of perceptual decision making while subjects performed difficult detection and discrimination tasks. Collectively, these studies show that while emotional stimuli may comprise a privileged stimulus category, their processing is highly dynamic and depends on the interplay of a host of factors that sculpt the associated neural responses, including task context, attention, awareness, and perceptual interpretation.

http://www.indiana.edu/~lceiub/

Session: Keynote Lecture

Presentation Time: Saturday June 23, 14:30-15:30

The Introspective Availability of Intentional Content

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I have defended the thesis that there's "something it's like" to consciously think a thought, which is qualitatively different from what it's like to be in other kinds of conscious mental states and what it's like to think other thoughts, and which constitutes the thought's intentional content. (The "intentional phenomenology thesis.") One objection to this thesis is this: If it's true that phenomenology constitutes intentional content, and that conscious phenomenology is introspectively available, it ought to be true that the content of any concept consciously entertained is introspectively available. But it is not (e.g., one can know introspectively that one is thinking that one knows that p without knowing introspectively what the content of the concept of knowledge is).

I develop three responses. (1) It is not implausible that the resolving power of introspection might be insufficient to discern all of the fine-grained details of conscious experience. (2) It is possible that in cases of incomplete accessibility one is entertaining only part of a concept. (3) It is possible that in such cases one is consciously entertaining only part of a concept (the rest being unconsciously entertained). I conclude that the objection is not decisive against the intentional phenomenology thesis.

Session: Philosophy II

Presentation Time: Sunday June 24, 10:00-10:30

The genuine problem of consciousness

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Those who are optimistic about the prospects of a science of consciousness, and those who believe that it lies beyond the reach of standard scientific methods, have something in common: both groups see consciousness as posing a special challenge for science. In this talk, we view this challenge through the lens of social neuroscience. We show that popular conceptions of the problem of consciousness, epitomized by David Chalmers' formulation of the "hard problem", can be best explained as a cognitive illusion, which arises as a by-product of our cognitive architecture. We present evidence from numerous sources to support our claim that we have a specialized system for thinking about phenomenal states, and that an inhibitory relationship exists between this system and

the system we use to think about physical mechanisms. Even though the hard problem is an illusion, unfortunately it appears that our cognitive architecture forces a closely related problem upon us. The "genuine problem" of consciousness shares many features with the hard problem, and it also represents a special challenge for psychology.

Session: Plenary Symposium - The Cognitive Basis of Intuitions about Consciousness

Presentation Time: Monday June 25, 09:30-10:00

ADHD children perform better than normal children in an Artificial Grammar Implicit Learning Task: ERP and RT evidence

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We present evidence supporting the occurrence of Implicit Learning in children with ADHD. The evidence is based on direct and indirect indicators. The study is relevant for three reasons: a) IL can be considered as an alternative way of learning, which requires less attentional resources than Explicit Learning, b) a scarce number of IL studies has been performed with children and has not been assessed in children with ADHD, and c) there is little evidence that demonstrates IL with direct indicators. Based on an adaptation of Reber's (1993) AG paradigm, this experiment found that, compared with normal children, those with ADHD exhibit higher performance levels in IL tasks, reaction times that are consistent with a higher implicit learning rate and a differential pattern in the ERP's. This supports the initial hypothesis of this study. The importance of our results is based on three general reasons: (a) it constitutes solid proof that this cognitive process is independent from others, such as attention; (b) it is a contribution to the emerging debate on IL and attention, giving insight into human cognition and (c) it opens new paths towards ADHD management in the classroom.

Session: Implicit Processing

Poster Board: 6, Attended: Sunday June 24, 11:00-13:00

Qualitative investigations into the phenomenology of self-awareness: two methods applied to the brain-injured

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We present two methods for qualitative analysis of self awareness, which we illustrate with studies on how a person's sense of self recovers following brain injury.

First is an interview schedule that uses indirect questioning to elicit unbiased information about the topic under study (here, oneself) that is spontaneously salient to the interviewee. The responses of our participants were Content Analysed, revealing three central topics in their conversation: their difficulties, reflecting on these, and maintaining their selves. Within the first of these categories, awareness of their altered physical condition was most salient, followed by their cognitive

difficulties, while emotional disturbances were the most subject to anosognosic deficits.

For each interviewee, their previous answers were used to formulate a second interview which asked questions now known to be of direct relevance to individual participants. The responses were then subjected to Interpretative Phenomenological Analysis, a technique which reveals the constructs underlying their world-view. This process showed three themes central to their concerns: finding the missing bits of the puzzle, filling the holes in memory and redefining the self.

It was concluded the course of recovery and the reconstruction of the self depend at least partially on social mechanisms of interpersonal interaction.

Session: Self

Poster Board: 28, Attended: Sunday June 24, 11:00-13:00

The Turing machine revisited: The computational complexity of a visually conscious machine. Does a conscious machine exist?

Alan Rosen Robotic neurobiology, MCon Inc, USA (arosen@mcon.org ; www.mcon.org)

Alan Turing, in his 1950 paper (Mind 59:433-460) demonstrated with calculations the infeasibility of cognitive machines when explicit programming was their only knowledge acquisition tool (cognition could be achieved only with the addition of an interpreter and humanized interfaces). A design of a tactile-visual humanoid robotic machine has been presented in the peer-reviewed literature (Rosen & Rosen, www.mcon.org and ASSC E-archive). The visual system, that simulates human visual cognition, is designed with explicit programming as the only knowledge acquisition tool. All the explicit programming of the machine is performed with a finite, non-exponential number of steps and according to physical-optical laws. Furthermore, the machine may experience "seeing" or "feeling" the objects that it interacts with. The authors show that Turing's main principles, the addition of an interpreter and humanized interfaces, may be replaced by sequential algorithmic programming when the modalities of receptors are taken into consideration. These modalities lead to a fundamental law in biology, the law of specific nerve energy, which relates consciousness to explicit neuronal activity (Neuronal Correlate of Modality). This law may be used to prove that "conscious" machines exist, and that they exhibit forms of consciousness that are similar to human consciousness.

Session: Phenomenology

Poster Board: 17, Attended: Saturday June 23, 11:00-13:00

Consciousness and Its Function

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It is plain that an individual's being conscious and an individual's being conscious of various things are both crucial for successful functioning. But it is far less clear how, if at all, it is also useful for an individual's psychological states to occur consciously, as against their occurring but without being conscious. Restricting attention to cognitive and desiderative states, a number of suggestions are current about how the consciousness of those states may be useful. It has been thought that such consciousness enhances processes of rational thought and planning, intentional action, executive function, and the correction of complex reasoning. I examine these proposals in the light of various empirical findings and theoretical considerations, and conclude that the consciousness of cognitive and desiderative states is unlikely to be useful in these or related ways. This undermines a reliance on evolutionary selection pressures in explaining why such states so often occur consciously in humans. I briefly conclude with an alternative explanation, on which cognitive and desiderative states come to be conscious as a result of other highly useful psychological developments involving language use. But on this explanation the consciousness of these states adds no significant functionality to that of those other developments.

Session: Keynote Lecture

Presentation Time: Monday June 25, 18:30-19:30

Anosognosia for personality changes in AD: A combination of memory and perspective taking deficits ?

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We explored the cerebral correlates of self personality assessment and perspective-taking ability in 14 patients with mild Alzheimer's disease and 17 healthy elderly subjects. All subjects assessed the relevance of personality trait adjectives for themselves and a close relative, taking either their own or their relative's perspective, during a fMRI experiment. The self-judgment accuracy score (irrespective of the perspective taken) was lower in AD patients than in healthy elderly subjects. FMRI results revealed that when mild AD patients assessed adjectives for relevance to themselves (versus their relatives), they predominantly activated bilateral IPS, unlike the healthy subjects. This results suggest that AD patients used familiarity more than episodic recall to assess their own personality. When taking a third-person (versus first-person) perspective, patients made more mistakes and activated the posterior dorsomedial prefrontal and orbitofrontal cortices more than healthy elderly subjects. The engagement of prefrontal regions suggests that mild AD patients relied more on inferring and reasoning processes than healthy elderly subjects to take their relative's perspective. This modified strategy in AD may reflect a need to compensate for memory deficits. Overall, this study suggests that a combination of familiarity-driven memory and perspective-taking deficits may explain AD patients' anosognosia concerning self personality changes.

Session: Memory

Poster Board: 7, Attended: Sunday June 24, 11:00-13:00

Cross-modal Plasticity

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Much of the human brain cortex is devoted to visual processing, leading to the question of what happens to the visual cortex in people who are blind? Brain imaging studies have shown that the visual cortex of people who became blind early in life responds to a variety of non-visual auditory, tactile, and verbal tasks. This sensory reorganization is called cross-modal plasticity. It is still unknown how the cross-modal responses map onto the normal functional subdivisions of the visual cortex. I am currently conducting neuroimaging (fMRI) experiments to address this question. My experiments also study the long-term effects of cross-modal plasticity in formerly blind individuals with sight recovery.

Session: Plenary Symposium - 2006 Tom Slick Research Award in Consciousness

Presentation Time: Saturday June 23, 9:30-10:00

Emergence, Color and the Knowledge Argument

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One of the strongest and most problematic intuitions we have concerning consciousness is that the only way to know what an experience is like is to have the experience. It seems obvious that the blind person does not know

what it is like to see red. In this paper I argue that this "knowledge intuition" is compatible with materialism. In particular I suggest that facts that can be known only via experience can be accommodated in the proper scientific metaphysics. This argument has three parts: a) the development of an account of the facts that are known in color experience; b) a characterisation of the emergentist metaphysics that captures what well established sciences such as physics, chemistry and biology have already told us about the world; and c) the development of an account of scientific explanation which can account for how the scientist can explain phenomena that they do not, strictly speaking, know. We will see that what is required to put consciousness on a par with other obviously physical phenomena is not a denial of our intuitions about consciousness, but rather a proper understanding of the metaphysics and epistemology of other obviously physical phenomena.

Session: Philosophy I

Poster Board: 29, Attended: Saturday June 23, 11:00-13:00

Varieties of Intentionality

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An interdisciplinary approach to intentionality (directedness towards objects) is introduced that treats intentionality primarily as a feature of goal-directed behaviour rather than of mental states. Within a hierarchical framework, four levels of intentionality with increasing complexity are distinguished, which accord to cognitive capacities human beings acquire during ontogenetic development, i.e. the framework proceeds "from the beginning onward rather than from the bottom up or the top down" (Gallagher 2005). Recent work in neurophysiology and developmental psychology shall be integrated in the philosophical descriptions of the varieties of directedness. The most basic and "biologically primitive" (Searle 1983) forms of intentionality are (non-epistemic) perception and motor intentional activities such as grasping an object. In order to characterize this basic level, the "dual model" of human visual processing is incorporated (Milner & Goodale 1995, Jacob & Jeannerod 2003). Among the essential features of such intentional behaviour is embodiment (Clark 1997). The second level is characterized by the infant's capacity for joint attention. On a third level, the infant can make partial use of the imagination and become partially independent from current perceptual contexts (e.g. pretend play), and interpret others as intentional agents. Finally, the child can explicitly represent other people's mental representations (theory-of-mind).

Session: Philosophy I

Poster Board: 24, Attended: Saturday June 23, 11:00-13:00

Transactional Cognition: Building a reliable Post-Chomsky Model for Human Language and Cognition.

Henry Schwarz Spanish & Portuguese, UCLA, Los Angeles, California, USA (zrawhcs@post.harvard.edu)

An improved model of the relationship between language and human cognition has become critical to a wide spectrum of research, from neuroscience to new concepts in both literature and philosophy. In recent decades linguistics research has yielded very positive results. But an almost exclusive focus on the analysis of language rules and structures has neglected other perspectives from which our understanding of the function of language in cognition might be materially advanced. This review offers a new baseline for understanding human language through a series of transaction-based models that specifically illustrate its use and nature both today and at its point of origin, as a method to assess more accurately underconsidered features in both our individual and social cognitive natures, reconcile features from other research that are explained by these models, and uncover one or more intriguing new hypotheses for further investigation. A model for evolutionary development offers concepts open to experimental verification. A model for transactional cognition suggests that silent, language-based thinking or intelligent consciousness may be a very recent development. A two-tier, cross-domain neurological model for grammar and language function similar to reading may resolve, finally, the question of an innate vs. learned grammar

Session: Philosophy II

Poster Board: 22, Attended: Sunday June 24, 11:00-13:00

Do you know what you see when your eyes are closed?

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Psychologists of the 19th century generally said we see "light chaos" or "the self-light of the eye" when our eyes are closed -- but they differed in their views about the nature of this light: Is it afterimages from across the spectrum of color and brightness (Hering)? Fluctuations of dark gray (Aubert)? Latticework or bands (Purkinje)? In informal polling, some people also claim to have visual experience of faces or other objects. Contemporary "thin" views of consciousness (e.g., Dennett, Mack and Rock) invite the possibility that ordinarily when our eyes are closed, and we aren't attending to our field of view, we have no visual experience at all.

Do people simply diverge in their experience? Are some of us mistaken? Neuroscience, beeper methodologies, and structured introspection offer some further hints – but those hints don't point in a uniform direction.

This issue is not, considered by itself, a very important one. But both in the glib confidence with which people are inclined to reach opinions and in its stubborn resistance to straightforward resolution, the issue is symptomatic of the state of consciousness studies.

Session: Philosophy I

Presentation Time: Saturday June 23, 16:30-17:00

Brain-Reading of Mental Activity is Impossible: The History-Dependence Hypothesis

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Igor Aristegi Urkia Department of Logic and Philosophy of Science, University of the Basque Country, Spain (ylbaruri@ehu.es)

There have been several reports demonstrating the capability to read the mental state of a subject using fMRI. Here we argue that these abilities will never reach the ultimate point of a priori mind-reading capability. The development of the brain into an organ capable of consciousness requires genetic specification of neuronal function, epigenetic specification of wiring, and history-dependent modification of connection patterns and wiring: learning. This path-dependent, non-state function process ensures that the firing patterns of a particular brain capable of generating a particular mental content will be highly variable even across similar brains. This severely limits the ability to a priori read the details of a mental state from brain information. Because of this history-dependent process, it is clear that information about activation patterns severely underdetermines the information required to read the mental state; a particular activation pattern is meaningless outside of its neural context. When history-dependence is combined with the concept that deterministic chaos governs the behavior of complex neural systems, it is clear that any imperfections in information about brain connectivity, wiring, and activation patterns will cause potentially important variances in our prediction of how particular activation patterns relate to mental states versus the true relationship.

Session: NCC

Poster Board: 2, Attended: Saturday June 23, 11:00-13:00

Scanning for Happiness

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Hedonism in theories of well-being is the claim that what is best for someone is what makes her life happiest. Included in "narrow" or "inner" versions of hedonism is the idea that there is a particular "intrinsic and unanalyzable quality of pleasantness" (Crisp forthcoming) that is present in all positive experiences and likewise an intrinsic and unanalyzable quality of unpleasantness in all forms of suffering. Throughout the history of philosophy, introspective intuitions have differed as to whether this aspect of inner hedonism could possibly be true; some theorists claim it is obviously true that all pleasant experiences have some phenomenology in common, and some theorists claim that the same view is obviously false. I propose that modern brain imaging techniques have put us in a position where we can operationalize the notion of inner

hedonism to answer this age-old debate. In particular, I will argue that evidence suggests that all "negative" states do appear to have a common affective phenomenology, whereas "positive" states do not.

Session: Philosophy I

Poster Board: 31, Attended: Saturday June 23, 11:00-13:00

Modulation of synchronizations with auditory conscious and non-conscious perception

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The neural signature of conscious perception is defined by the synchronization of neuronal assemblies taking part in the perceptive processes (Engel and Singer, 2001). A very recent study suggests that both conscious and unconscious perception of visual words cause a similar increase of gamma oscillations, but that only conscious perception induces a transient long-distance synchronization across widely separated regions of brain (Melloni et al., 2007). We investigated conscious and unconscious perception in the auditory modality, in 10 participants with no hearing problems, who listened to words, pseudo-words and complex sounds. Two levels of intensity were used for stimuli presentation: one involving a conscious perception and the other one an unconscious perception (on the basis of a previous behavioral study). During the randomly presented control condition, no auditory stimulation was presented. The participants were asked to categorize stimulations which were randomly presented (word, pseudo-word, complex sound or silence). While only conscious perception evoked the classical N100 and P200 potentials, both conscious and unconscious perception induced a similar increase of oscillations. Furthermore, our data confirms that conscious perceived stimuli induced long-distance synchronization.

Session: NCC

Poster Board: 4, Attended: Saturday June 23, 11:00-13:00

Detecting subliminally presented phobic stimuli: Evidence for bidirectional unconscious inhibition and facilitation

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Consciousness is operationalized using either: 1) Subjective threshold methods, wherein stimulus intensity is reduced until visibility is denied; or 2) Objective threshold methods, wherein stimuli are further degraded until discrimination performance no longer exceeds chance. Many investigators assume that both methods are valid, with objective methods simply yielding weaker effects (Merikle, Smilek, & Eastwood, 2001).

Instead, we argue that objective and subjective methods index qualitatively distinct unconscious processes: Subjective methods produce unidirectional (overall above-chance) effects, whereas objective methods yield exclusively bidirectional effects (Snodgrass & Shevrin, 2006). That is, despite overall chance performance, individual differences mediate whether facilitation (above-chance) or inhibition (dramatic below-chance performance) occurs.

Here, spider and snake phobics viewed spider (vs. neutral) drawings under objectively undetectable (overall $d' = 0$) conditions. Nonetheless, trait anxiety negatively predicted spider detection (high anxious Ss inhibited, low anxious facilitated). Moreover, for spider phobics only: 1) Defensiveness negatively predicted spider detection (high defensives inhibited, low defensives facilitated), and, notably, 2) SCR paralleled spider detection—that is, although detection facilitators also produced higher SCR, detection inhibitors actually suppressed SCR. Neutral stimuli

yielded no effects. Implications for both subjective threshold and evolutionary models, which predict only facilitative effects, are discussed.

Session: Sensation & Perception

Presentation Time: Monday June 25, 15:30-16:00

Cueless Blindsight

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The constant use of visible or audible cues in forced-choice demonstrations of blindsight has led to the assumption that sight and blindsight differ in that only blindsight requires cueing. As such a difference impacts upon the function of stimulus awareness, and implies that sight and blindsight can be non-verbally distinguished by comparing performance with and without cues, we here studied detection of un-cued visual stimuli in three hemianopic patients. Performance in response to stimuli presented to the photosensitive retina of the absolutely blind field was compared to a condition where stimuli fell onto the optic disc, and, in one of the patients, into a region where it evokes some stimulus awareness. Detection was excellent in this relatively blind region, but at chance in the blind spot control. Remarkably, in the absolutely blind field performance was significantly better than expected by random guessing, and reflected the extent of practise the patients had acquired in cued blindsight testing. This first demonstration of cueless detection in fields of absolute cortical blindness shows that blindsight-practised patients can initiate visually-informed responses to blind-field stimuli even without being prompted by consciously accessible signals. Stimulus awareness is thus not necessary for statistically significant performance in un-cued tasks.

Session: Visual Approaches

Presentation Time: Sunday June 24, 09:30-10:00

Perceptual categorization based on the prototype effect

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The development of conscious experience in humans is tightly coupled with that of language and conceptualization. It's known that children at only one year after birth are able to recognize the various objects as belonging to a single category (Sudo and Mogi, 2005). Within the field of cognitive linguistics, categorization based on the "prototype effect" is intensively studied as a characteristic feature of categorization (Rosch and Mervis, 1975).

Here we report a series of experiments investigating how humans perceive the environment in terms of categorization. We focused on two major parameters, "typicality" (how typical an example of category is) and "similarity" (how similar a prototypical member of category is) in perceptual categorization. Using the direct rating paradigm and categorical judgment tasks, we derived a continuous parameter measures for the "typicality" and "similarity" of objects based on the subject's estimation. 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 judgments in the interaction with the environment. Finally, we point out some constraints our results put on the general relationship between consciousness and language.

Session: Sensorymotor

Poster Board: 37, Attended: Sunday June 24, 11:00-13:00

Acme Corporation Eats a Burrito: Reconsidering our Intuitions about Consciousness

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Do the folk possess the concept of phenomenal consciousness? Or is it merely a philosophical notion, developed by philosophers to tackle specific philosophical problems? Joshua Knobe and Jess Prinz attempt to answer this question in their article Intuitions About Consciousness: Experimental Studies (forthcoming). Their conclusion is that ordinary people (the folk) have an implicit concept of phenomenal consciousness. We charge that their studies do not establish this conclusion. Their

methodology implicitly compares group agents to individuals. The problem is that group agents and individuals differ in some significant ways in terms of function and behavior. This difference introduces a confounding variable into the experiments which undermines Knobe and Prinz's conclusion. We draw a positive moral from this: A review of their work leads to two criteria that an experiment on folk conceptions of phenomenal consciousness should meet. These criteria guide a series of alternative studies. Probes are developed that compare a human with a relatively simple robot; while the agents are described in functionally/behaviorally identical ways, ordinary people are willing to ascribe some "phenomenal" states to the human that they are unwilling to ascribe to the robot. The results of these studies will be discussed and some philosophical implications drawn.

Session: Self

Presentation Time: Monday June 25, 18:00-18:30

Stability of human declarative memory studied by EEG

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The encoding and retrieval of memory are essential elements in conscious and unconscious perception. A newly formed memory is initially labile and becomes stabilized through a process of consolidation, which depends on gene expressions. Stable memories, however, can again become labile if reactivated by recall and require process of reconsolidation to be maintained (Nader 2003). This phenomenon has been reported in variety of species, including in case of human declarative memory (Tanabe and Mogi 2006)

Here we report a series of psychological experiments in which the electroencephalographic (EEG) oscillations (i.e., event-related desynchronization/synchronization or ERD/ERS) were recorded during a serial long-term episodic memory task. The task was designed to reproduce in the declarative memory domain the results of Walker and his colleagues on the temporal reconsolidation of procedural memory (Walker et al. 2003).

Based on the results, we discuss the stability of memory from the point of view of system level interactions between processes of encoding and storing, retrieval and editing of memory associated with hemispheric encoding and retrieval asymmetry (HERA) theory (Tulving et al. 1994).

Session: Memory

Poster Board: 11, Attended: Sunday June 24, 11:00-13:00

Neural correlates of changes in visual awareness

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In the comparison of two images either separated spatially or temporarily, only differences can be perceived in principle. It cannot be known in the absolute sense whether the images are same. Change blindness, where subjects feel difficulties in finding a difference between two images presented sequentially and separated by blanks, has been studied in the context of visual short-term memory (vSTM). It is interesting to consider changes in conscious perception after knowing the difference in the images, as dramatic changes in visual awareness accompany the change detection.

Here we study changes in visual awareness during the search for differences between two visual images. We recorded the brain activities using electroencephalography (EEG) and compared activities elicited when subjects are unaware of differences with those activities invoked

when the subjects are aware. By using temporal signatures tagged by the stimuli, we found that activities in frontal regions were correlated with state of subjective perception. Based on the results, we discuss the changes of brain states induced by the changes in visual awareness.

Session: Visual Approaches

Poster Board: 38, Attended: Saturday June 23, 11:00-13:00

Do I see it or do I think I do? Distinguishing perception and memory influences of implicit sequence learning on perceptual consciousness of the learned stimuli.

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This experiment combines implicit sequence learning (ISL) with assessment of perceptual consciousness (PC). Its aim is to assess the influence of ISL on subjects' PC of the sequence items by varying sequence item visibility during a transfer phase that follows learning. This makes it possible to dissociate the respective influences of perception and of memory on both ISL performance and on PC of the sequence items. Subjects perform a classic ISL task (SRT) over 15 blocks, during which they press one of four keys in response to one of four shapes presented centrally. Unknown to subjects, the shapes follow a certain sequence. In the subsequent transfer block, subjects see either an identical or a different sequence. During the transfer block all sequence items are masked to one of four different degrees. With stimuli highly visible, subjects can rely on both perception and memory of the sequence, whereas with less visible stimuli, subjects have to rely more on memory. PC of stimuli is assessed using a number of different dichotomous and continuous measures (Perceptual Awareness Scale, Confidence Judgments, and Wagering). Results will be presented at the conference.

Session: Implicit Processing

Poster Board: 4, Attended: Sunday June 24, 11:00-13:00

Consciousness and effective connectivity in wakefulness and sleep

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According to a theoretical prediction (Tononi, 2004), consciousness depends critically not so much on firing rates, synchronization at specific frequency bands, or sensory input per se, but rather on the brain's ability to integrate information. This is contingent on the effective connectivity among functionally specialized regions of the thalamocortical system. In a series of experiments we used a combination of TMS and EEG to measure directly the changes in effective connectivity that occur in the human brain when consciousness fluctuates across the sleep-wake cycle.

We observed that, as vigilance drops, from light drowsiness to deep NREM sleep, the response of the brain to a direct cortical perturbation becomes larger and larger, while specific patterns of long-range activation are progressively impaired. During REM sleep, effective connectivity partially recovers. Further experiments suggested that the breakdown of effective connectivity observed during NREM sleep may be due to intrinsic bistability in thalamocortical networks between up- and down states.

Session: Plenary Symposium - Cortical Networks and Conscious Awareness

Presentation Time: Sunday June 24, 15:30-16:00

The N170 ERP Component Reflects Conscious Perception of Familiar Shape

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This presentation presents event-related potential (ERP) evidence that the N170, a negative ERP (~170 ms) reflecting visual cortex activity, is sensitive to the difference between conscious and unconscious processing

of familiar shape. In an initial task, human observers viewed control (CON) and experimental (EXP) silhouettes in which the balance of cues along an edge biased the inner, bounded, region to be seen as a novel figure. EXP silhouettes suggested familiar objects on the outside of their edges, which nonetheless appeared as shapeless grounds; CON silhouettes suggested novel shapes on the outside. Observers categorized masked EXP and CON silhouettes as "novel" versus a third group of silhouettes depicting "familiar" objects on the inside. Signal detection measures verified that observers were unconscious of the familiar shapes within the EXP stimuli. In a second task, observers were informed about the EXP familiar shapes before viewing unmasked EXP and CON silhouettes to report if they saw familiar shapes on the outside. The N170 significantly differentiated between the unconscious (Task 1) and conscious (Task 2) processing of familiar shape along the outside edges of the silhouettes. Thus according to Baars' (1997) method of contrastive analysis, the N170 may reflect a neural correlate of consciousness (NCC).

Session: NCC

Poster Board: 1, Attended: Saturday June 23, 11:00-13:00

Contribution of ipRGC to conscious visual perception

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A recent study has shown that retinal ganglion cells containing the photopigment melanopsin, which are intrinsically photosensitive (ipRGCs) in primates, project to the lateral geniculate nucleus, suggesting that these cells might contribute to conscious visual perception. However, the role of ipRGCs to conscious visual perception is not clear. The aim of this study was to investigate how ipRGCs and the other photoreceptors contribute to conscious visual perception. To understand the interaction between ipRGCs and the other photoreceptors we developed a novel multi-primary stimulation system that stimulated ipRGCs independently of the other photoreceptors. We calculated excitations of test stimulus on the ipRGCs and the other photoreceptors, expressed as a relative modulation or contrast between the background and the test stimulus. We measured thresholds for test stimuli that consisted of a combination of ipRGC and luminance (LUM) stimuli with variable amplitude ratios. The ipRGC stimuli modulate ipRGC alone and the luminance stimuli modulate luminance alone, respectively. Observers had to report whether the test stimulus appeared or not after each stimulus presentation. It was shown that onset/offset of ipRGC and offset/onset of luminance signals are linearly combined (i.e. +ipRGC-LUM and -ipRGC+LUM) and contribute to detection of test stimuli.

Session: Visual Approaches

Poster Board: 36, Attended: Saturday June 23, 11:00-13:00

Rethinking Qualia

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In a recent prominent paper (Phil Review 2006) Michael Tye claims to have shown the conceptual impossibility of non-qualia systems that are functionally equivalent to qualia systems. Moreover, Tye takes that result to prove that qualia are essentially functional in nature. I show that Tye's basic argument is unsound, and that even if it were correct, it would not support his claim about the essential nature of qualia. However, consideration of where the argument goes wrong can provide some important insight into the prospects for thinking about qualia in functional terms. In particular, it reveals the need to embed one's functional account of qualia within a larger functional account of the conscious phenomenal self. Qualia need to be thought of not as properties of mental states but as properties of experienced objects present from the perspective of the

phenomenal self. Thus any account of the NCs of qualia must be set within the context of an account of the NCs of the phenomenal self and its experienced world.

<http://web.syr.edu/%7Ernvangul/>

Session: Philosophy II

Presentation Time: Sunday June 24, 09:30-10:00

Behavioral speed contagion: Automatic modulation of movement timing by observation of body movements

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To coordinate our actions with those of others, it is crucial to not only choose an appropriate category of action but also to execute it at an appropriate timing. It is widely documented that people tend to unconsciously mimic others' behavior. The present study show that people also tend to modify their movement timing according to others' movements even when the observed and the to-be-executed movements are unrelated. Observers viewed either point-light biological motion, scrambled biological motion, or solid object motion. The stimulus sequence was presented at three different (half, normal, and double) rates. After a 300 to 2400-ms blank period, the observers performed a simple choice reaction-time task that was unrelated to the presented stimulus sequence. The observation of the biological motion produced a negative correlation between reaction time and stimulus speed, whereas no such trend was observed with the scrambled or solid object motion. Furthermore, speed-dependent modulation occurred only when the task was imposed within approximately 1 s after the offset of the biological motion. These results suggest that behavioral tempo may be contagious; the speed of others' movements may automatically influence the timing of movement execution by the observer.

Session: Temporality

Presentation Time: Monday June 25, 16:30-17:00

Do Worms Feel Hungry? : Simulating Behavior Transitions in *C. Elegans*

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Humans use conscious awareness of the environment and themselves to help choose between voluntary behaviors. In simple animal models, the circuits that map sensory input to behaviors may contain the precursors to consciousness. This study models a neural network of the worm *Caenorhabditis (C.) elegans* implicated in navigation by Gray, Hill, and Bargmann in PNAS March, 2005. *C. elegans* switches between several exploratory behaviors depending on the abundance of food in the environment and whether it is well fed. The worm neural system chooses a single strategy and pursues it while inhibiting others. This simulation uses a system of Java web servers to represent neurons that connect to each other to imitate neural stimulation. Modifications to the model system in a simulated environment were tested against results of laser ablations and mutant deficiencies in real worms. The strength of connections required was not always proportional to the number of synapses between neurons. Also, non-synaptic (neuroendocrine) signaling was necessary to explain some behavioral transitions. The interneuron AIY in particular requires non-synaptic activation to initiate dispersal after starvation. Identifying similar activation in more sophisticated animals could indicate analogous systems for more complex sensory integration and behavioral strategies.

Session: NCC

Poster Board: 7, Attended: Saturday June 23, 11:00-13:00

Visual processing without awareness during eye movements

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Prior to an eye movement a reduction in visual awareness known as saccadic suppression occurs. Most studies of saccadic suppression have assumed that an early process within the visual system essentially removes visual input during eye movements.

We hypothesized that input during eye movements enters the visual system and is processed, but without entering into awareness. This mechanism could be adaptive, as it would allow processing of potentially useful visual information without continuous distractions of awareness.

To test this, we measured the effect of an oriented stimulus presented before an eye movement on the perceived orientation of a stimulus appearing after the eye movement. Participants fixated a position at which the inducing stimulus would appear; then made an eye movement to the position where the test stimulus appeared. Both stimuli appeared at the same retinal location, the time between presentation of inducing and test stimuli was constant.

Supporting our hypothesis, a pre-saccadic inducing stimulus- presented within the time of maximal perceptual suppression and, importantly, reported as unseen -changed the perceived orientation of a post-saccadic test stimulus. We conclude that saccadic suppression does not entail the total removal of a stimulus from visual consideration; processing occurs despite a lack of awareness.

<http://vision.rutgers.edu/klab/>

Session: Sensation & Perception

Presentation Time: Monday June 25, 16:30-17:00

Describing the Unimaginable

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Thomas Nagel (1974) contends that facts about what it's like to be a conscious creature are subjective facts, only accessible from a particular type of point of view. Our knowledge of such facts is intimately linked to our ability to imagine what it's like to be that type of creature. Furthermore, our inability to imagine what it's like, despite knowing physicalist theory, shows us that physicalist theory is radically incomplete.

However, sometimes in science we accept theoretical explanations as complete even though we cannot imagine everything the theory posits. Modern physics, for example, posits more spatial dimensions than we can imagine. However, we accept such theories as complete, in principle. We cannot imagine this space, but we can completely describe it.

In this talk, I'll argue that there are no purely subjective facts, and that we can completely describe subjects' points of view, despite our inability to imagine what it's like to be those subjects. I will argue that Nagel's worry is a byproduct of our limited access to the mechanisms of first-person awareness. Once we have a clear model of access and imagination, there is no reason to deny that physicalist theory can completely describe unimaginable points of view.

Session: Philosophy I

Poster Board: 25, Attended: Saturday June 23, 11:00-13:00

Distinct mechanisms for attention and awareness revealed by confidence judgments and reaction times

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The effect of attention as an increase in performance and a decrease of reaction times is well known. Here we investigate the effect of attention on

more direct measures of awareness - confidence judgments. The interest of this is two-fold. First, the classic forced-choice paradigm does not give any insights whether subjects are aware of the attention-related performance increase. Second, since confidence has a well-known influence on reaction time with increasing reaction times for decreasing confidence, the increase in reaction time for non-attended stimuli could just reflect a shift toward more guessed responses.

Using two different psychophysical tasks, an orientation and a spatial frequency discrimination tasks, we show that varying the amount of attention through cuing does not induce significant changes in the reported levels of confidence (3 in our experiments). Equalizing attended and non-attended stimuli for correctness and confidence level shows that for similar levels of confidence, reaction times for non-attended stimuli still increase by a very significant 15-30%, corresponding to 100-250msec. Hence, the reaction time disadvantage in the (near) absence of spatial attention cannot be explained by a shift toward less confidence but instead reveals a signature of an attentional mechanism not related to awareness of the stimulus.

Session: Attention

Presentation Time: Saturday June 23, 16:30-17:00

Neuronal underpinnings of subjective visibility

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What kind of neural processes underlie our basic subjective impression of a sensory stimulus? To understand the neuronal mechanisms of subjective visibility, we have previously developed a paradigm ("Generalized Flash Suppression" (GFS)), by which salient objects can be induced to subjectively disappear following the presentation of a surrounding pattern. We first asked whether neurons in retinotopic areas V1, V2 and V4 and in the thalamus would decrease their firing rate whenever a stimulus becomes subjectively invisible.

We simultaneously recorded spiking and local field potentials (LFP) in V1, V2 and V4 and in two visual thalamic nuclei, LGN and Pulvinar, while monkeys reported the subjective visibility of visual patterns.

We found that firing rates in LGN, V1 and V2 were unaffected by the subjective disappearance, while area V4 and Pulvinar showed significant perceptual modulation (17.9% and 44% of all sites, respectively).

In contrast, LFP power in the lower frequency range (9 to 30 Hz) significantly decreased in all visual areas and both thalamic nuclei whenever monkeys reported subjective target disappearance. Taken together, these results show that visual awareness is reflected in a widespread decrease of subthreshold activity combined with locally restricted spiking rate changes at higher levels of visual processing.

Session: NCC

Poster Board: 12, Attended: Saturday June 23, 11:00-13:00

Neural correlate of residual vision in monkey with blindsight

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Human blindsight patients can discriminate the target positions while they deny awareness of the targets. To examine whether monkeys have blindsight, two macaque monkeys with unilateral V1 lesion were tested with two saccade tasks. 1) A forced-choice (FC) task, in which the saccadic target comes on one of two possible positions, requires discrimination of target positions. 2) A yes-no (YN) task, in which the monkeys have to maintain fixation when the saccadic target is absent, requires detection of presence/absence of the target. When the target was presented in the contralesional hemifield, the monkeys had a better performance in the FC task than in the YN task. This suggests that the monkeys exhibited behavior that parallels to the human blindsight patients. Then we recorded from the superior colliculus (SC) in the ipsilesional hemisphere of the monkey performing a delayed saccade type of the two tasks and found that the response to the visual target is larger when the monkey successfully discriminate or detect the target than when it failed. Such modulation was not found in the contralesional SC. We conclude that the target-related activity in the ipsilesional SC comprises a part of neural correlate of residual vision.

Session: NCC

Poster Board: 3, Attended: Saturday June 23, 11:00-13:00

Neural correlates of the motion consciousness from two-stroke apparent motion and real motion

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Visual consciousness sometimes makes misjudgments of the actually displayed scenes. One example is the illusion of two-stroke apparent motion (Mather, 2005), which is induced by two-pattern frames from a motion sequence and a blank inter-stimulus interval (ISI) inserted after the second frame. When the two frames are presented in alternation, only a back-and-forth motion is perceived. When the blank ISI is introduced, it reverses the backward motion to make the motion sequence appear unidirectional. The blank ISI between the successive frames is supposed to act as a noise to the real images to trigger the brain visual system to create a consistent representation during the whole observation (Zhang & Mogi, 2006). Here we study this phenomenon by using EEG measurement. We recorded the brain activities when subjects observed the stimuli of the two-stroke apparent motion, and compared them with that of the observations of real motion stimuli and static images. We show the different dynamic brain activity patterns of these perceptions and discuss about their neural correlates. These results provide clues to the understanding of human visual mechanism on motion consciousness which is based on the construction of continuous motion sequences.

Session: Temporality

Presentation Time: Monday June 25, 15:30-16:00

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