The Contents of Consciousness

Perception, Attention, and Phenomenology

Duke University
May 27th-30th 2001

Welcome to ASSC5, the fifth conference of the Association for the Scientific Study of Consciousness
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UPDATED MAY 25th 2001

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PROGRAMME

The fifth conference of the Association for the Scientific Study of Consciousness will bring together researchers from numerous disciplines to discuss these issues through an intensive series of workshops, plenary lectures, symposia, paper presentations and poster contributions extending over four days between May 27-May 30, 2001. The meeting will take place in Durham, North Carolina - USA, on the campus of Duke University.

USE THE 'SAVE TARGET AS' ON YOUR BROWSER TO DOWNLOAD AN RTF VERSION (printable) THE PROGRAM

The concurrent oral presentations, the workshops, the poster session and the banquet will be held at the Sanford Institute for Public Policy (map available -- the star corresponds to Sanford Institute-- at http://www.pubpol.duke.edu/welcome/maps.html also see http://map.duke.edu/campusdetail.asp?qtype=1&bldg;=152&mapid;=34)

The registration, coffee breaks, opening and closing receptions, and plenary sessions will be held at the Love Auditorium in the Levine Science Research Center (map available at http://map.duke.edu/campusdetail.asp?qtype=1&bldg;=108&mapid;=34)

~ Final Conference Programme ~

ASSC-5 Program Overview

May 27-30, 2001 – Duke University

May 26:

12:00-23:00 Check-in (dorms)

14:00-18:00 Registration *(LSRC Lobby)*

May 27:

8:00- Registration begins / check-in [all day]

This website was created by Frédéric Bouchard (design heavily inspired by Axel Cleermans' website of the ASSC4 conference)

- Abnormalities in the Contents of Consciousness: The Case of Schizophrenia (Chris Frith, University College London)

- Phenomenological Methods for Investigating Consciousness (Eduard Marbach, University of Bern)

- What can Functional MRI Tell us about the Contents of Consciousness? (Geraint Rees, University College London)

- Qualia Realism, Presentation, and Representationalism (William Robinson, Iowa State University)

- Emotion and the Nature of Emotional Qualia (Douglas F. Watt, Boston University School of Medicine)

See below for descriptions

12:00-13:00 Lunch break

13:00-16:00 Afternoon workshops (concurrent)

- Memes (Susan Blackmore, University of the West of England)

- Integration of Functional Neuroimaging with Repetitive Transcranial Magnetic Stimulation: Implications for Research on Consciousness **CANCELLED**

- Living without Touch and Proprioception: from Phenomenology to PET. (Jonathan Cole, Poole Hospital, and the University of Southampton)

- Color and Color Experience: Physicalism, Externalism, Internalism, and Projectivism (Brian McLaughlin and Zoltán Jakab)

- Emergence, Reduction and Nonreductive Interdependence: Understanding the Matter Consciousness Relation. (Robert Van Gulick, Syracuse University)

- Vision and Consciousness: Experimental Evidence and its Implications (Arash Sahraie, University of Aberdeen, and Larry Weiskrantz, University of Oxford)

See below for descriptions

16:00-16:40 Coffee Break *(LSRC Lobby)*

16:40-16:50 Welcoming Remarks **Güven Güzeldere [Duke]**

16:50-17:00 Introduction: **Ron Mangun [Duke]**

17:00-18:10 ASSC Presidential lecture: Larry Weiskrantz [Oxford]

"Prime-Sight In a Blind-Sight Subject"

(LSRC Love Auditorium)

18:00-20:00 Opening Reception

Recital: Flute-Guitar Duet -Alma Coefman and Bill Stewart- *(LSRC Lobby)*

May 28:

8:00- Registration begins / check-in [all day]

(LSRC Lobby)

8:30-9:40: Plenary Talk: Dale Purves [Duke]

"Why We See Brightness and Color the Way We Do"

Chair: **Kathleen Akins [Simon Fraser University]**

Commentator: **James A. Schirillo [Wake Forest University]**

(LSRC Love Auditorium)

9:40-10:00: Coffee Break

10:00-12:40: Plenary Symposium:

Visual Consciousness & Change/Inattentional Blindness

Speakers**:**

Ronald Rensink [University of British Columbia] "Change Blindness: Implications for the Study of Visual Consciousness"

Arien Mack [New School] "Inattentional Blindness"

Jeremy Wolfe [Harvard] "From stimulus to perception: 'Small is the gate and narrow the road' "

Chair: **Güven Güzeldere [Duke]**

Commentator: **Colin MacLeod [University of Toronto]**

12:40-14:00 Lunch break

14:00-15:30 Concurrent sessions – I *(Sanford Institute)*

I-A Functionalism, Content, and Conscious Experience (chair: Fred Adams, Univ. of Delaware)

I-B Implicit Processes, Inhibition, and Memory (chair: David Rubin, Duke)

I-C Higher Order Theories of Consciousness (chair: Alex Rosenberg, Duke)

I-D Attention and Neural Correlates of Visual Perception (chair: Gillian Einstein, NIH)

Session I-A	Session I-B	Session I-C	Session I-D
William Robinson (Iowa State University):	Michael Anderson (University of Oregon):	Robert Lurz (Indian River Community College):	John Eastwood, Smilek D., Merickle, P.M. (University of Waterloo):
Colors, Arousal, Functionalism, and Individual Differences	Inhibitory Control and the Regulation of Phenomenal Awareness	Advancing the Debate Between HO and FO	Facial Features and Attention

Sensational Properties and Nonconceptual Content	Do divisions of attention surgically reduce the likelihood of a stimulus entering consciousness while having no affect on the unconscious processing of the stimulus?	Consciousness and Meta-mental Content: an Alternative Model (HOGS)	Neural correlates of perceptual change in binocular rivalry.
Susanna Siegel (Harvard University): Information Represented by Conscious Visual States	Doug Lowe, Joordens S. (Trent University): Conscious and Unconscious Influences of Memory Following Superficial Encoding: When Do Unconscious Influences Increase Over Time?	David M. Rosenthal (CUNY Graduate Center): Unity of Consciousness and the Self	Nuwan Kurukulasuriya, Jian Mu, Justin Rawley, Steven Frank, Dwayne Godwyn (Wake Forest University): A New Role for the Reticular Activating System in the Stream Consciousness: Nitric Oxide Selectively Controls the Influence of Retinal and Coritcal Synapses Made Upon Thalamic Relay Neurons

15:30-16:00 Coffee break *(LSRC Lobby)*

16:00-18:00: Invited Colloquium:

Recent Developments in Change Blindness

Scott Huettel [Duke] "Functional Neuroimaging of Change Blindness"

Daniel Levin [Kent State University] "Relationships Among Metacognitions About Visual Attention, Change Blindness and Estimates of Picture Memory."

Luiz Pessoa [NIMH] "The Neural Substrates Of Change Detection"

Diane Beck [University College London] "The Neural Correlates of Change Detection and Change Blindness"

Chair: **John Staddon [Duke]**

18:30-20:30 BANQUET *(Sanford Institute's lawn)*

(North Carolina BBQ and the works/25$)

20:30-23:00 Poster Session (posters stay throughout conference SEE COMPLETE LIST OF PRESENTERS BELOW) *(Sanford Institute)*

May 29:

8:30-9:40 Plenary Talk: Marcus Raichle [Washington University St.Louis]

"A Default Mode of Brain Function: Finding the Neural Baseline of Consciousness"

Chair: **Marty Woldorff [Duke]**

Commentator: **Roberto Cabeza [Duke]**

George Graham [University of Alabama] "The Metaphysics of Selfhood in Disorders of Self-Consciousness and Self-Ascription"

Aysenil Belger [University of North Carolina, Chapel Hill] "Impairments Of Action Monitoring In Schizophrenia: Neuroimaging Of Sensory-Motor Regulation Deficits"

Chair: **Chris Frith [University College London]**

Commentator: **Owen Flanagan [Duke]**

12:00-14:30 Lunch break / Recreational Afternoon

Free time

13:00-14:00 concurrent tours (see flyer)

Tour of the Chapel and Organ concert at the Duke Chapel

Tour of Duke Gardens

Tour of the Primate Center

Tour of BIAC and MRI facilities

14:30-16:00 Concurrent sessions – II *(Sanford Institute)*

II-A Bodily Awareness, Expectation, and Pain (chair: Elizabeth Brannon, Duke)

II-B Visual Experience and Filling In (chair: Greg Lockhead, Duke)

II-C Functional Explanation, Experience, and Dreams (chair: Tina Williams, Duke)

II-D Phenomenal Experience, Explanatory Gap, and Zombies (chair: Brian Cantwell Smith, Duke)

Session II-A	Session II-B	Session II-C	Session II-D
Josh Weisberg (CUNY Graduate Center): Expectation, Error, and Consciousness	William Wojtach (Duke University): Filling In as an Active Process: Evidence From the Rapid Disappearance of Entoptic Images	Frédéric Bouchard (Duke University): Function and Adaptation: Providing a Bridge Between Biology and Psychology for an Evolutionary Account of Consciousness	Graham Hubbs (University of Pittsburgh): Sellars and the Content of Consciousness
Rocco Gennaro (Indiana State University): Jean-Paul Sartre and the HOT Theory of Consciousness	Steven Lehar (Schepens Eye Research Institute): A Quantitative Analysis of the Dimensions of Conscious Experience	Antti Revonsuo (Academy of Finland): The Content and Function of Dream Consciousness	Tillmann Vierkant (Max-Planck-Institute for Psychological Research): Zombie Mary

How real is the distinction between the sensory and affective dimensions of pain?	Attention and Blind-spot Phenomenology	Count	Scientists, and Floating Iron Bars

16:00-16:30 Coffee Break *(LSRC Lobby)*

16:30-18:30 Invited Colloquium:

Content of Bodily Awareness and Pain Perception

Richard Chapman and Yoshio Nakamura [University of Utah] "Measuring Pain: An Introspective Look at Introspection"

Bill Maixner [University of North Carolina, Chapel Hill] "The Effects of Barorecptor Stimulation on Pain and Consciousness - an Interaction Between the Internal and External Environment."

Donald Price [University of Florida] "Integrating an Experiential Approach with Brain Imaging to Explore the 'Hard' Problems of Pain and Consciousness"

Robert Coghill [Wake Forest University] "The Intensity of Pain and the Individual Pain Experience: Insights from Functional Brain Imaging"

Chair: **Ken Sufka [University of Mississippi]**

FREE EVENING

May 30:

8:30-10:30: Plenary symposium: **Social and Affective Contents of Perceptual Consciousness**

Speakers:

Gregory McCarthy [Duke] "Substrate for the Perception of Socially Relevant Signals"

Ralph Adolphs [University of Iowa] "Emotion and the Human Brain"

Chair: **Susan Blackmore [University of the West of England]**

Commentator: **Kevin LaBar [Duke]**

10:30-10:50: Coffee Break

10:50-12:50 **Subjectivity and the Perspectival Character of Consciousness**

William G. Lycan [University of North Carolina at Chapel Hill] Perspectival Representation and the Knowledge Argument

Chair: **David Rosenthal [City University of New York]**

Commentator: **Murat Aydede [University of Chicago]**

12:50-14:00 Lunch break

14:00-15:30 **Concurrent sessions – III** *(Sanford Institute)*

III-A Introspection and Self-Report (chair: David Sanford, Duke)

III-B Phenomenology and Disorders of Perception (chair: Yoko Arisaka, University of San Francisco)

III-C Color Perception and Representation (chair: Frédéric Bouchard, Duke)

III-D Binding and Conscious Experience (chair:Michael Platt, Duke)

Session III-A	**Session III-B**	**Session III-C**	**Session III-D**
William Seager (University of Toronto): Belief, Desire and Introspection	Ulrich Ansorge, Odmar Neumann (Bielefeld University): Direct parameter specification	Zoltan Jakab (Carleton University): Phenomenal Projection	Rick Cai (Harvard University): Slicing the stream of consciousness: how the brain connects abrupt events to continuous changes
Victoria McGeer (NYU/Simon Fraser University): Out of the Mouths of Autistics: Subjective Report and its Place in Cognitive Ttheorising	Antonio Rodriguez, Bruce Bennett, Donald Hoffman, William Shankle, Junko Hara, James Fallon (UC Irvine): EEG Signatures of Rigid Motion Perception	Thomas Polger (University of Cincinnati): True Colors, or How to Be Right About Red by Being Wrong About Color	Noam Sagiv, Patrik Vuilleumier, Robert T. Knight, Lynn C. Robertson (UC Berkeley/ University College London): Face to Face with Binding Problems
Eddy Nahmias (Florida State University): Verbal Reports About the Contents of Consciousness	Leon Deouell, Shlomo Bentin, Nachum Soroker (The Hebrew University of Jerusalem): Prerequisites of awareness to extra-personal events: Electrophysiological investigation of unilateral neglect patients	John Kulvicki (University of Chicago): Information, Isomorphism, and Perceptual Availability	Ville Ojanen, Antti Revonsuo (Helsinky University of Technology): An Electrophysiological Correlate of Visual Awareness - ERP and Behavioral Studies

15:30-15:50 Coffee Break *(LSRC Lobby)*

15:50-17:50: Plenary Symposium: Unity of Sensation and Control in Consciousness

Speakers:

Earl Miller [MIT] "Prefrontal cortex and the neural basis of cognitive control"

Barry Stein [Wake Forest University] "Multisensory Integration"

18:00-18:40 Closing Plenary Lecture: Chris Frith [University College London]
"Attention to Action and Awareness of Other Minds"

Chair: **Gregory McCarthy [Duke]**

18:45-21:00 Closing Reception

21:00-00:00 Evening at the Jazz Club

Some modifications can be made in the program,

POSTER PRESENTER LIST (posters will be on display from May 28th 20h30)

ARCAYA, Jose -Psychology Department John Jay College, CUNY: THE GENERAL VIEW OF MEMORY: A PHENOMENOLOGICAL ANALYSIS

BEECKMANS, John M. -Faculty of Engineering Science University of Western Ontario: THE CHROMATIC RICHNESS HYPOTHESIS

BRISCOE, Garry J. -University of Wisconsin Oshkosh: DUAL-PATH MODEL OF COGNITION AND CONSCIOUSNESS

BROWN, Steven Ravett -University of Oregon: STRUCTURAL PHENOMENOLOGY: A TOP-DOWN ANALYTIC METHODOLOGY

CHIU, Ming-Jang & HSIEH, Ming H. & LIU, Kristina & LIU, Shi-Kai & HWU, Hai-Gwo & CHEN, Andrew -Department of Neurology & Department of Psychiatry National Taiwan University Hospital, College of Medicine: IMPAIRMENT OF COLOR-PATTERN IMPLICIT LEARNING AND P50 PRE-PULSE INHIBITION IN SCHIZOPHRENIC PATIENTS A 2D BRAIN MAPPING STUDY

COLBURN, Mary Louise & KUIKEN, D. & MIALL, D. S. -Department of Psychology University of Alberta: FELT MEANING AND SYNAESTHETIC METAPHOR IN AESTHETIC EXPERIENCE

DELUCA, John W. & DALY, Ray -Mind Stuff SM, Livonia, MI and Wayne State University School of Medicine Neurobiofeedback Wellness Centre and University of Windsor: TRANSFORMATION OF CONSCIOUSNESS IN BUDDHIST TANTRIC MEDITATION

DEMPSEY, Liam P. -Department of Philosophy University of Western Ontario: MIND-BODY IDENTITY: TONIC FOR THE EPIPHENOMIC

DROEGE, Paula -Department of Philosophy Hartwick College: DRETSKE'S TROUBLE SPOT

FAW, Bill -Brewton-Parker College, Mt Vernon, GA: WORKING MEMORY: POSTERIOR CONTENT AND PREFRONTAL CONTROL

THOUGHTS AS CONTENTS OF CONSCIOUSNESS

IWATA, Kazuki & NAKAO, Mitsuyuki & YAMAMOTO, Mitsuaki -Lab. of Neurophysiology and Bioinformatics, Graduate School of Information Sciences, Tohoku University, Japan: DYNAMICS OF POLYGRAPHIC SIGNALS UNDER SENSORY DEPRIVATION AND THEIR RELATION TO STATES OF CONSCIOUSNESS

KALLIO, Sakari & REVONSUO, A. R. -Department of Psychology University of Skövde, Sweden and University of Turku, Finland

KIM, Hyo Eun -Department of Philosophy Duke University, Ewha Women's University, Korea. BLINDSIGHT AND THE EXPLANATORY GAP

KOENE, Randal A. -Department of Psychology McGill University: MULTIPHASE CORTICO-HIPPOCAMPAL MEMORY MODELS FOR THE LEARNING AND INTEGRATION OF EXPLICIT KNOWLEDGE WITH ATTENTIONAL GUIDANCE

KOJO, Ilpo &. LAARNI, J. -Center for Knowledge and Innovation Research Helsinki School of Economics and Business Administration

MALMGREN, Helge -Dept. of Philosophy Göteborg University, Sweden INTROSPECTION, INNER SENSIBILITY AND THE INNER-OUTER METAPHOR

MOGI, Ken -Sony Computer Science Laboratories. QUALIA AND CAUSALITY.

MURATA, Tsutomu & MATSUI, N & MIYAUCHI, S. & YANAGIDA, T. -Communications Research Laboratory, Himeji Institute of Technology, Japan DISCRETE STOCHASTIC DYNAMICS UNDERLYING SPONTANEOUS ALTERNATION OF VISUAL AWARENESS

NGUYEN, A. Minh -Rutgers University & Hofstra University BLINDSIGHT IMPLIES UNCONSCIOUS EXPERIENCE

PETRENKO, Victor -Psychological Faculty of Moscow State University CONSCIOUSNESS AS A PRODUCT OF THE SECOND SIGNAL SYSTEM

PICCININI, Gualtiero -Department of History and Philosophy of Science University of Pittsburgh MIND GAUGING: INTROSPECTION AS A PUBLIC EPISTEMIC RESOURCE

POHLMAN, Urs -Duke University THE DYNAMICAL CORRELATES OF SELF-CONSCIOUSNESS AND FIRST-PERSON PERSPECTIVE

POISSANT, Hélčne & MBEKOU, Valentin & DELISLE, Josée & LECOMTE, Sarah -Department of Ed. Science and Psychology Groupe TDAH UQAM ATTENTION AND CONSCIOUSNESS IN CHILDREN: A METACOGNITIVE AND NEUROPSYCHOLOGICAL INVESTIGATION

PYLKKÄNEN, Paavo -University of Skövde, Sweden CONSCIOUSNESS AND INFORMATION

ROSE, David -Department of Psychology University of Surrey THE COMPLEXITY GAP AND THE HARD SOLUTION

RYDER, **D**an & FAVOROV, O.V. -Department of Philosophy University of North Carolina at Chapel Hill University of Central Florida THE SINBAD THEORY OF

SEGAL, Eliaz -Department of Psychology The Hebrew University of Jerusalem. MEMORY AND THE FLOW OF TIME

SHANON, Benny -Department of Psychology The Hebrew University of Jerusalem ALTERED TEMPORALITY

SUNDQVIST, Fredrik -University of Göteborg, Sweden GESTALT THEORY AND THE CONTENT OF CONSCIOUSNESS

VAKALOPOULOS, Costa -MBBS. A SCIENTIFIC PARADIGM FOR CONSCIOUSNESS

WALLER, Sara -California State University

We also have worshops on May 27th. YOU MAY ONLY REGISTER FOR A MAXIMUM OF TWO WORKSHOPS (one in the morning and one in the afternoon). Please make sure that there aren't any schedule conflicts in your registration.

WORKSHOP DESCRIPTIONS:

1- Memes (AFTERNOON)

Susan Blackmore, University of the West of England, Bristol, UK

The aim of this workshop is to provide an introduction to the theory of memetics and explore its relevance to the nature and contents of consciousness. By the end of the workshop participants should (a) understand what is, and is not, a meme, and how memetics can be applied in several different fields (b) be familiar with the major controversies and disagreements within memetics (c) have an informed opinion on whether or not memetics is useful for the understanding of human, animal and machine consciousness.

There will be three sections, each including approximately half an hour's lecture, interspersed with group and individual exercises, and with plenty of time for discussion. Before the conference I will make available on-line (at www.memes.org.uk) information on the workshop and suggested readings, but prior preparation will not be assumed. A handout will be provided.

Part 1. Introduction to memetics.

The term 'meme', coined by Dawkins in 1976 to mean a unit of imitation or a cultural replicator. Natural selection, the theory of universal Darwinism and the roles of replicators and vehicles (Hull's alternative scheme, objections to the meme as replicator).

Selfish memes: computer and email viruses, religions as viruses, co-adapted meme-complexes and how they form.

Previous theories of cultural evolution and why memetics is different (Cloak's i- and m-culture; Wilson's culturgens; Boyd and Richerson's mathematical models). Why imitation? (Plotkin, Sperber). The problems of definition, with examples (Dawkins, Dennett, Gabora etc). Brief introduction to the major controversies in memetics. The Lamarckian objection, digital v analogue systems, agency, memes as artefacts v memes as neural information.

Human consciousness. Memes and human evolution. Memetic drive, the origins of the big brain and language. How memetics changes conventional views on the evolution of consciousness. Memes and their copying machinery co-evolve. Humans as meme machines. Examples of memetic engineering.

Dennett - "Human consciousness itself is a huge complex of memes". Blackmore - memes as distorting human consciousness. Is there consciousness without memes? Implications of these two views for the contents of consciousness. Their different predictions.

An exercise. Are these ideas testable? A group exercise and discussion of research potential.

Animal consciousness. The debate over whether other animals have memes (Laland and Dugatkin say yes, Blackmore no). The importance of imitation, examples; apes and sign language, birds and milk bottles, cetaceans and the imitation of sounds. Light shed on the relationship between language and consciousness?

Machine consciousness. Do machines have memes? Copying in artificial intelligent systems. The internet as a meme machine. Memeplexes and distributed consciousness.

Part 3. The self and self-transformation.

The theory of self as memeplex. The idea of dismantling the memeplex. Meditation and mindfulness as 'meme-weeding' techniques.

An exercise in mindfulness. An opportunity for people to try some short meditation exercises directed specifically at investigating the power of memes in awareness.

Practical and personal implications of a memetic theory of consciousness. Free will, morality, legal responsibility (criticisms by Mary Midgley and others). Dawkins's rebellion against the selfish replicators. Who rebels?

2- Current Investigations of Synaesthesia: When a 4 Just Has to be Blue
(SCHEDULE CHANGE: NOW MORNING)

Mike J. Dixon and Daniel Smilek, Department of Psychology, University of Waterloo, Waterloo, Ontario email: mjdixon@watarts.uwaterloo.ca

For people with synaesthesia ordinary stimuli elicit extraordinary conscious experiences. For example, when C, a digit-colour synaesthete, views ordinary black digits, each digit elicits a photism - a conscious experience of a highly specific colour. In this workshop we will discuss current behavioral investigations of synaesthesia. The general approach of these investigations of synaesthesia has been to test predictions based on synaesthetes' first-person descriptions of their unusual qualia. Behavioural investigations of synaesthesia provide two critical contributions to the study of synaesthesia. First, these investigations provide a common forum for describing synaesthesia. These investigations employ a scientifically agreed upon common language to precisely define key concepts used to describe synaesthetic experiences. Second, these investigations lead to a better understanding of the cognitive mechanisms underlying synaesthetic experiences. In this workshop we will discuss the empirical investigations pertaining to the following issues regarding synaesthetic experiences:

c) The intimate relationship between synaesthetic photisms and meaning.

d) The influence of synaesthetic experiences on digit perception.

e) The relationship between synaesthetic experiences and memory. These investigations of synaesthesia bring to the forefront a number of critical issues pertaining to the study of consciousness.

These issues include the following: a) The use of third-person behavioral methods for investigating conscious experiences b) The relationship between first-person and third-person methodologies in the study of conscious experiences c) The implications that current investigations of synaesthesia have on the binding problem.

3-Abnormalities in the contents of consciousness: The case of schizophrenia (MORNING)

Chris Frith, University College London email: cfrith@fil.ion.ucl.ac.uk

1: Abnormalities in the contents of consciousness

I shall describe and contrast disorders in the contents of consciousness (see list below) and argue that the disorders associated with schizophrenia are distinct in that they involve mis-attributions of agency.

a: Hallucinations Hearing voices (schizophrenia) sensory loss epilepsy and brain stimulation psychedelic drugs dreams

b: Disorders of awareness of motor control Delusions of control (schizophrenia) Phantom limbs Anarchic hand anosognosia

2: Awareness in the control of action

I shall discuss internal representations in the motor control system and link these to certain disorders of the contents of consciousness. I shall consider the physiological basis of internal representations in the motor system.

a: Representations in the motor control system

b: What are we aware of in the motor control system?

c: A framework for understanding abnormal awareness of motor control

d: Brain systems

3: The self and others I shall consider the problem of the perception of agency in schizophrenia.

Does the perception of agency derive from internal representations of the self? What is the biological basis of the perception of agency?

a: Abnormalities in the attribution of agency

b: Representing agency

c: Distinguishing between the self and others

Frith, C.D. (1992) The Cognitive Neuropsychology of Schizophrenia. Psychology Press, Hove. (translations: Spanish, Japanese, French, Italian) http://www.amazon.co.uk/exec/obidos/ASIN/0863773346/qid%3D909413784/sr%3D1-1/026 -7776402-8254032

Frith, C.D., Blakemore, S.-J. & Wolpert, D.M. (2000) Abnormalities in the awareness and control of action. Philosophical Transactions of the Royal Society of London, Series B, 355, 1771-1788. http://www.pubs.royalsoc.ac.uk/phil_bio/phil_bio.html

4- Integration of Functional Neuroimaging with repetitive Transcranial Magnetic Stimulation: Implications for Research on Consciousness

CANCELLED **(May21st2001)**

Julian Paul Keenan, PhD Harvard Medical School, Beth Israel Deaconess Medical Center email: jkeenan@caregroup.harvard.edu

Philosophical issues, including topics of consciousness, are now routinely addressed employing functional neuroimaging. Techniques now widely available including functional Magnetic Resonance Imaging (fMRI) and Positron Emission Tomography (PET) are providing fundamental answers to questions relating to consciousness. However, reliance on these techniques is problematic as the data provided by such methods reveals only correlation information, which is further complicated by the indirect measure of neuronal activity via blood oxygenation and the reliance on control tasks. Repetitive Transcranial Magnetic Stimulation (rTMS) provides a non- invasive method for establishing causal and necessary components within cortical networks. When combined with traditional functional methods such as fMRI and PET, questions as to the direct nature of cognition and consciousness can be addressed. The use of this technique is not limited, and the adaptation of rTMS employing numerous methodologies allows for a flexible and specific test of cognitive hypotheses. A description of the cortical process of self- awareness is far from complete, though networks for cognitive processes that are related (e.g., Theory of Mind) are beginning to be elucidated. The integration of rTMS with traditional neuroimaging methods addressing the cortical correlates of self-awareness provides a background in which researchers interested in consciousness may develop an understanding of rTMS. This workshop will therefore provide an introduction into the methodologies of rTMS within the context of examining higher- order cognitive processes with a specific emphasis on self- directed awareness. The topics as follows:

I Introduction to rTMS

A Why do we need TMS?

B Basic Principles of Magnetic Stimulation

C Early Historical Attempts: 19th and 20th Century D Successful Single- Pulse TMS and the advent of rTMS

II Four Relevant Methodologies

A Virtual Lesions

B Cooling and Heating

BREAK

III Integration of Functional Techniques

A Why do we need TMS, Part II?

IV Applications of rTMS in Higher- Order Cognition

A Language & Vision

B Imagery & Memory

C Self & Consciousness

5- Living without touch and proprioception: from phenomenology to PET. (SCHEDULE CHANGE: NOW AFTERNOON)

Jonathan Cole, Clinical Neurophysiology, Poole Hospital, Longfleet Road, Poole, , UK and the University of Southampton. Email: jonathan_cole@new-forest.org

The workshop will consider work from a single case study, of IW, who, over 25 years ago lost all sensation of touch and movement/joint position sense below the neck. This was due to an infection leading to an autoimmune neuronopathy affecting the sensory nerve cell bodies in the dorsal rot ganglia.

In the absence of large myelinated sensory nerve fibre function IW was completely unable to move, not because the movement nerves were affected, (they were not), but because without peripheral feedback his central motor apparatus was disabled. IW spent nearly 5 months requiring full nursing care before realising that if he looked at the moving part and willed movement cognitively he could learnt to make co-ordinated movements once more. He then spent 17 months as an in-patient in a rehabilitation hospital spending all his waking hours learning how to will movement again. He would spend 20 minutes putting on a sock, feed himself cold food rather than be fed. After round 12 months he stood and then several months later he walked.

Once released from hospital he found a job as a civil servant and for 12 years did not see a doctor, telling colleagues that he had a bad back to explain his unusual gait. He now works as a disability access audit consultant advising banks, hospitals etc how to make their built environment accessible for people with special needs of various sorts, (locomotor difficulties, visual impairment etc).

The workshop will be divided into several sessions:

1. The phenomenology/narrative history.

This will detail the sensory loss and its consequences for movement. When unable to move his body he felt most disembodied. But once able to move any such feelings retreated. He has never had true phantom experiencing arguing that small fibre sensory input, (pain, temperature, muscle fatigue) are sufficient to prevent the emergence of such 'deafferentation' phenomena. It will follow his time in rehabilitation, looking in detail at how he managed to recover movements through cognitive control and visual supervenience. This will follow IW's time in hospital and the ways in which the medical and paramedical workers assisted him, or not, in him exploring new ways of looking at movement. In addition to the obvious losses of mobility and sensation the account will also consider the effects on IW of his loss at a more personal level. For

motor programs to allow some movements to be automatic and that gesture, now, 25 years later, may be the most automatic of all.

2. The physiology of deafferentation.

Details of neurophysiological experiments will be given looking at the evidence for IW's complete loss of large sensory fibres. Further work will look at the experimental evidence for his compensatory mechanisms in terms of possible plastic change in the brain and for his use of amazingly sophisticated cognitive strategies to facilitate movements. This part will give the results of a wide variety of experiments on IW's motor abilities:

1. his ability to perceive weight, (considering the central perception of force).

2. his attentional abilities,

3. his perception of action,

4. his altered cortical activation in order to choose a selective finger movement compared with control subjects,

5. the ways in which he uses, (non-cognitive) motor programs from movement of the eye or arm to control each other, his use of external Cartesian space to calibrate his egocentric space in some situations,

6. his movement accuracy in terms of end point control or a force pulse technique,

7. the complexities of gesture he has refined and their possible consequences for views of the link between gesture and language.

8. his ability to produce accurately timed repetitive movements without feedback.

9. the mechanisms of movement in IW as revealed through PET analysis, showing possible feedforward activity without feedback as well as top-down movement control, areas of corollary discharge and the extensive cerebellar activation required.

3. The phenomenology of recovery.

IW, still, after 25 years is improving and refining movements. He is also taking a pleasure in the mental imposition of movement ideas on his passage through the world. The methods he uses are unique. Though his condition is very rare these tricks have important consequences for motor control in a variety of less rare conditions e.g. sensory loss due to neuropathy, spinal diseases and stoke. A consideration will be given for the lessons in rehabilitation that can be taken from his years of mental concentration on movement. In parallel with this consideration will be given to the phenomenological con sequences of sensory loss for his sense of self, and how the limits of having to think about movement at all times has altered his perception of the world and of day to day living. It is by a combined approach, of neuroscientific experiment and phenomenological analysis, that pictures of IW's world and of the importance of sensory return for motor control can be built up.

Sources: The talk will draw on IW's and my account of his recovery in 'Pride and Daily Marathon.' In addition there will be film of IW shot for BBC2's Horizon, 'The Man Who Lost His Body,' private video of IW and another subject with the condition discussing their condition, with IW giving a master class on how to move without feedback, video footage and IW and Peter Brook and his cast discussing the theatrical representation

file, forthcoming)

6- Phenomenological Methods for Investigating Consciousness (SCHEDULE CHANGE: NOW MORNING)

Eduard Marbach, University of Bern, Switzerland email: eduard.marbach@philo.unibe.ch

This workshop will introduce to the phenomenological study of consciousness as originally developed by the philosopher Edmund Husserl (1859-1938). Husserl considered his phenomenology to be a "science of consciousness", to be established with the help of first-person methods. Accordingly, the main emphasis will be on concretely explicating and practicing how one does phenomenology; for Husserl was particularly careful in elaborating methodical tools for the study of consciousness. Key concepts of the methodology to be discussed are:

Phenomenological reflection (as distinct from psychological introspection) and the question of intersubjective control;

Phenomenological reduction (as distinct from `theoretical reduction`) and the notion of 'pure' phenomenology;

Descriptive eidetic analysis of the contents of consciousness, regarding objective (noematic) as well as subjective (noetic) aspects of content. This is arguably the center-piece of Husserl's enterprise, and it fits very well within the overall theme of this year's ASSC Conference. In elaborating this type of analysis, Husserl has been inspired by mathematics, proceeding by way of contrasting conscious experiences of distinctly different content structures (as they obtain in, e.g., visually or otherwise perceiving something, in episodic remembering, in merely imagining something, in picturing something, or in judging about a state of affairs, etc.) in order to establish those invariant components that make up the specific content structures of conscious experiences of one kind or another;

An important further aspect of Husserl's pre-experimental, philosophical enterprise to be addressed in the context of this year's Conference concerns the question whether, and if so, to what extent, a first-person reflective clarification of content structures of conscious experiences could serve as a guide for neuroscientifically investigating possible neural correlates much more specifically than would be possible without a rigorous phenomenological content analysis preceding the scientific work. Actually, this aspect of bringing together first-person phenomenological methods and third-person scientific methods would seem to be of utmost importance for making progress in the scientific study of conscious experiences, given that a specification of the explananda can only help the elaboration of the corresponding explanantia.

Participants of the workshop should get a good grasp of the first-person phenomenological methodology, and ideally even discover ways for making good use of phenomenology in the advancement of the scientific study of consciousness.

Materials will be provided.

Recommended literature: 1) Husserl, Edmund. Ideas pertaining to a pure phenomenology and to a phenomenological philosophy. First book: General introduction to a pure phenomenology. Translated by F. Kersten. Martinus Nijhoff, The Hague 1983. Especially Part Three: Methods and problems of pure phenomenology,

Noema and Object. Kluwer Academic Publishers 1990.

3) Smith, David Woodruff and McIntyre, Ronald. Husserl and Intentionality: A Study of Mind, Meaning, and Language. D. Reidel Publishing Co. 1984.

4) Naturalizing Phenomenology. Issues in Contemporary Phenomenology and Cognitive Science, edited by Jean Petitot, Francisco J. Varela, Bernard Pachoud, Jean-Michel Roy. Stanford University Press 1999.

5) Colin McGinn. Mental Content. Basil Blackwell 1989.

6) A Companion to the Philosophy of Mind, edited by Samuel Guttenplan. Basil Blackwell 1994. Entries: Content I (Christopher Peacocke), Content II (David Papineau).

7) David J. Chalmers. What is a Neural Correlate of Consciousness? In Thomas Metzinger (ed.). Neural Correlates of Consciousness. Empirical and Conceptual Questions. The MIT Press 2000, pp. 17-39.

8) Eduard Marbach. Mental Representation and Consciousness. Towards a Phenomenological Theory of Representation and Reference. Kluwer Academic Publishers 1993.

7- Color and color experience: physicalism, externalism, internalism, and projectivism (AFTERNOON)

Brian McLaughlin and Zoltán Jakab email: zjakab@ccs.carleton.ca

We propose to assess physicalist theories of object color, two opposing views of color experience, and the problems these views raise. The workshop will be divided into two parts, the first of which will be led by Zoltán Jakab, the second by Brian McLaughlin.

The first part will begin by introducing some theories of object color: eliminativism, dispositionalism, disjunctive physicalism and type physicalism. We then introduce two opposing views of color experience. Internalism in this context is the idea that our phenomenal experiences of color are essentially constructions of our brains that are largely undetermined by the surface properties that reliably evoke those experiences. By contrast, phenomenal externalism holds that object colors do determine the phenomenal character of our experiences of them.

As a next step, we will examine physicalist theories of object color: theories according to which colors are causally effective physical properties of objects. We will present two arguments against type physicalism. Type physicalism about color implies that object colors are natural kind essences of some sort: i.e., that there is some non-disjunctive physical property that all and only red objects have, and that is causally responsible for our sensations of red on looking at such objects (mutatis mutandis for other colors). Unfortunately, given empirical knowledge about object color, it seems very difficult to maintain that object colors are natural kind essences of any sort. We will also look at the argument from individual differences in color phenomenology (in trichromat humans). According to this argument, since, in the same circumstances of perception, phenomenal color experiences vary between different trichromat subjects (due to individual physiological differences), our color experiences do not have physical correlates in the way type physicalism requires. However, these arguments do not affect the plausibility of disjunctive physicalism.

this latter argument will lead us to endorsing internalism about color experience. Accepting internalism threatens, in a subtle way, with the infamous projectivist view of color experience: the idea that color perception is a grand illusion.

In the second half of the workshop, McLaughlin will present a theory of color that attempts to capture what is right about type physicalism and what is right about projectivism. Physicalists are correct in holding that colors are physical, environmental properties; however, as Jakab argues, they are mistaken in claiming that they are natural natural physical properties. On the evidence, colors are highly disjunctive physical properties. Consider redness. Redness is disjunctive physical property, each disjunct of which is a basis for the disposition to look red to appropriate visual perceivers under appropriate viewing circumstances. What makes a physical property the property of redness is the fact that it plays a certain role vis-ŕ-vis vision: namely, the role of disposing its bearers to look red. Phenomenological similarity and difference relationships among colors are to be explained by similarities and differences among visual experiences of them. Orange is more similar to red than it is to blue not in virtue of intrinsic aspects of the colors in question, but in virtue of the fact that what it is like to see orange is more similar to what it is like to see red than it is to what it is like to see blue. What is it like to see, e.g., orange, is the phenomenological character of visual experiences of orange. Given that the phenomenological characters of color experiences come into the account of what it is for a physical property to be a certain color (e.g., redness), this physicalist account of color is incompatible with externalist intentionalist theories of color experience. We look to opponent process theory to explain the similarities and differences among the phenomenological characters of color experiences. The projectivist is right in claiming that the phenomenal structure of colors is to be explained by brain processes (in particular, opponent processes), not by physical properties of surfaces and volumes in the scenes before our eyes. However, the projectivist is mistaken in claiming that the surfaces and volumes in such scenes are not really colored. There are, for instance, surfaces that are red since there are surfaces that have a property that dispose them to look red to appropriate viewers in appropriate viewing circumstances. For redness just is the property that disposes its bearers to look red to appropriate viewers in appropriate viewing circumstances.

8- What can functional MRI tell us about the contents of consciousness? (MORNING)

Geraint Rees Institute of Cognitive Neuroscience, University College London

The use of functional MRI (fMRI) as a tool to probe cognition is rapidly maturing, with convergent methodological standards and increasing empirical agreement about the biological mechanisms underpinning Blood Oxygenation Level Dependent (BOLD) contrast. This workshop will critically consider the use of BOLD contrast fMRI in consciousness research. The workshop will be divided into two parts. First, a critical technical overview of the technique will be presented in an attempt to clarify the nature and scope of the questions that can, and cannot, be addressed by fMRI experiments. The potential relationship between fMRI and other physiological techniques used in neuroscience research will be discussed. The second part of the workshop will focus more narrowly on considering specific experiments that have investigated the neural correlates of the contents of visual awareness. Different types of experimental design will be reviewed, together with experimental findings from recent investigations of human visual awareness. Throughout the workshop emphasis will be placed on understanding both the strengths and potential weaknesses of fMRI, and how recent

9- Qualia Realism, Presentation, and Representationalism (MORNING)

William Robinson, Iowa State University

This workshop will review main motivating reasons why some philosophers are attracted to qualia realismand will consider one of the most important alternatives to it. Since the field is highly controversial, closure on the issues discussed is not a realistic goal. Instead, the aim will be to offer a framework in which the relations among a large number of questions can be clearly seen.

I. Qualia are often introduced very sketchily, as if everyone knows what one is committed to in accepting them. Jackson's justly famous knowledge argument puts the non-physicality of qualia at center stage, and this feature naturally becomes a focus of debate. But there are other, more traditional reasons that explain why qualia were introduced in the first place, and the first part of the workshop will be concerned with the theoretical work for which qualia have been supposed to be required. This section will also introduce a distinction between the phenomenon of presentation (sensory experience presents a world to us) and representationalism (the thesis that qualia may be dispensed with in favor of an analysis of sensory experience in terms of representation).

II. The second section will be devoted to representationalism. Relevant concepts of representation will be clarified, and the role of representation in cognitive science will be briefly explored. Advantages of representationalism will be presented, as will objections from the point of view of qualia realism. Participants should gain a heightened sense of the intricacies of representationalism and the questions that arise with respect to it.

III. One of the motivations behind representationalism is the thought that qualia theorists could explain only that we are presented with qualia, whereas, in fact, we are presented with a world. A key aspect of the world with which we are presented, whether in vision, audition, or somatic senses, is its spatial character. Color is seen "on the objects", even by those who believe that objects are composed of colorless particles in motion. What is this "out there-ness" of color, and how might qualia realists account for it? We say that we see a book in a bookcase and that the bookcase is in the building we are in when we see the book; but we do not see the book in the building in the same way that we see it in the bookcase. What is the difference in the way that location is presented (or, represented) in these two cases? These and related questions, and their relation to qualia realism and to the representationalist thesis will be clarified.

10- Emergence, Reduction and Nonreductive Interdependence: Understanding the Matter Consciousness Relation. (SCHEDULE CHANGE: NOW AFTERNOON)

Robert Van Gulick Syracuse University

Recent philosophical discussions of consciousness have put the mind/body problem back in play. The materialist consensus that had formed around a mainstream nonreductive materialism has been challenged from a variety of directions. Some have advocated property dualism, radical emergence, or a need to fundamentally reconconceptualize our notion of the physical. Others have criticized the nonreductive approach as materialism on the cheap and pushed for a strong neuroreductive theory of consciousness. We will review the recent debates and prospects for alternative solutions. The workshop aims to provide an overview of the current options.

Douglas F. Watt, Neuropsychology, Quincy Medical Center, Boston University School of Medicine

This workshop will focus on current state-of-the-art thinking in affective neuroscience about the nature of emotion broadly defined and its connections to consciousness. From there we will try to address basic questions about the nature of emotional experience (what are "feelings"). The workshop will contain several basic "modules."

1. The importance of understanding emotion as foundational and not orthogonal to consciousness. Emotion is not simply one qualia among many, but a global state function sitting over homeostasis, and allowing for primary valuing that interdigitates closely with other global state functions such as attentional function and executive function, both of these dependent upon a matrix of biological values, and both also clearly being essential for consciousness. These interactive global state functions of emotion, attention, and executive functions are no less than differential slices of the consciousness pie, and any neuroscience of consciousness aiming to explain the hard problem must develop a heuristic theory about these basic abilities, and their fundamental relatedness.

2. Much of this fundamental relatedness is probably mediated by various mesodiencephalic structures, particularly the upper brainstem (midbrain to pons), which contains most of the basic structures that organize homeostasis, and that differentially arouse, prime and gate the thalamocortical forebrain. These brainstem regions generate both many of the primitives for survival behaviors (supported in the cranial nerves and brainstem nuclei) and the primitives for attentional functioning also. As Damasio has pointed out, it is not a coincidence that the basic foundations for attention, emotion, cortical forebrain arousal and homeostasis are all in contiguous regions in the upper brainstem. However, the medulla is probably also contributory to these fundamental relations between homeostasis, attention, and emotion, as are the non-specific thalamic systems, the cerebellum, and the paralimbic cortices. The brainstem is a very complex set of structures that have been generally dealt with simplistically in cognitive neuroscience as some sort of homogenous arousal system, while in reality the whole brainstem is several orders of magnitude more complex than the cortex, containing roughly 40 nuclei. The devastation of homeostatic operations in the brainstem is invariably fatal. The devastation of emotion (the next level of organismic value in evolutionary terms) doesn t end life, but it does derail the organization of behavior and virtually all cognitive processing, as seen in the syndrome of severe forms of akinetic mutism.

3. Problems associated with a typology of emotion: what are the true "natural kinds" of primary or prototypical emotion? Why are typologies so important? What current research problems are confounded by inadequate typologies? What does animal research say about some of our current typologies?

4. Current understanding about the neural architectures for emotion, based on a typology emphasizing five or six basic prototype states, with distributed systems that run from paleocortex down into the upper brainstem (midbrain-pons). Review of three basic clusters of prototype emotional systems: 1) a non-specific seeking system that operates as general "gain control" for all the prototype states and is linked closely to lateral hypothalamic mediation of homeostatic needs, 2) an organismic defense system associated with fear and rage states, and 3) a social attachment system underpinning emotional bonding, play, sexuality, nurturance, and separation distress. Monoamines operate very non-specifically on these (excepting the seeking system which is heavily DA modulated), while neuropeptides offer much more affective-behavioral specificity.

conscious feelings or just affective behaviors? Is this question unanswerable in neuroscientific terms or not?

6. What is the brain doing when we have a conscious feeling vs. unconscious emotional processing?? Are there threshold issues here?? Do we need a certain amount of emotion before it can become conscious?? What are background emotions and moods? Can strong emotion be unconscious, or is unconscious strong emotion a contradiction? Distributed neural systems in the cingulate, insula, other paralimbic regions, and somatosensory cortices, that may provide "read out" of bodily and other neurological system activations in the context of primary emotion, related to the nature of emotional qualia including motor, somatosensory-visceral dimensions. Fine grained review of recent neuroimaging of prototype emotional states, questions and implications. Most crucially, what exactly is going on in the brain that makes emotions feel good or bad - the mystery of emotional valence ??

7. What is known about emotion - cognition interactions, at least in general terms: much of human consciousness once past early infancy consists of these complex emotion-cognition interactions. Positive emotions tend to expand cognitive-exploratory spaces, while negative emotions tend to constrict them, and/or make them obsessive, rigid, or phobic.

The workshop will review closely major work of Damasio, Panksepp, LeDoux, and others in affective neuroscience to addresses these fundamental questions. Reprints of relevant theoretical overview work that I've published will be distributed on CD, and work of other authors in this area also (with specific permissions) along with many brain graphics and slides used in the workshop.

Bibliography

Bandler, R., & Shipley, M. T. (1994). Columnar organization in the rat midbrain periaqueductal gray: modules for emotional expression? Trends in Neurosciences, 17 (9), 379±389.

Damasio, A. R., Grabowski, T. J., Bechara, A., Damasio, H., Ponto, L.L., Parvizi, J., & Hichwa, R. D. (2000). Distinctive patterns of subcortical and cortical brain activation associated with self-generated emotions and feelings. Nature Neuroscience, 3 (10), 1049±1056.

Damasio, A. R. (1999). The Feeling of What Happens: Body and Emotion in the Making of Consciousness, New York: Harcourt Brace.

LeDoux, J. The Emotional Brain: The Mysterious Underpinnings of Emotional Life (Simon and Schuster, New York, 1996).

Panksepp, J. Affective Neuroscience: The Foundations of Human and Animal Emotions (Oxford Univ. Press, New York, 1998).

Schiff, N., and Plum, F. The neurology of impaired consciousness. ASSC Electronic Seminar. http://athena.english.vt.edu/cgi-bin/netforum/nic/a/1

Watt, D.F. The centrencephalon and thalamocortical integration: neglected contributions of periaqueductal gray. Emotion and Consciousness. 1:1, 2000, 93-116.

Watt, D.F. Affective neuroscience, periaquaductal gray, and the extended reticular thalamic activating system. Proceedings >from the Ischia International Conference on Emotion and Consciousness. World Scientific Press. 2001, in press.

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Conscious visual experience in normal observers appears to be immediate and effortless. This conscious experience is degraded or even lost in entirety in patients with lesions of the visual pathways. In particular, cortical lesions of the posterior brain result in blindness with no phenomenal seeing, but nevertheless a number of parallel visual pathways remain open. The conscious perception of vision in these patients is replaced by either a vague awareness of a visual event or no awareness at all. Blindsight refers to the better than chance discrimination ability in such patients which may be void of any awareness (blindsight type I) or accompany some awareness of the visual events (blindsight type II). Given that the lesions are identifiable, the evidence opens the possibility of contrasting neural correlates of conscious vs. unconscious visual processing. This workshop will address the following:

(a) The experimental evidence for blindsight: objective measures of unconscious visual processing.

(b) Non-verbal and verbal roots for accessing unconscious processing, on-line vs. off-line (commentary) responding in humans and animals.

(c) Relationship between visual awareness and physical characteristics of events

(d) Responding to objections to blindsight evidence: e.g., stray light and other artifacts, incomplete V1 lesions, low incidence of cases, insensitive awareness scaling, subjects' bias and d'.

(e) Do conscious and unconscious processing of vision have identical, overlapping or separate neuronal implementations?

(f) blindsight and complex visual stimuli: faces & emotions.

We will review the literature and outline the current thinking on this topic. References will be made to the latest findings from the active laboratories in addressing the above questions. Computer simulations and videos will be used to demonstrate the paradigms applied in blindsight research.