



Università
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Consciousness and its Descriptors

Advanced Workshop
in the framework of COST
Action B27 "ENOC"



March, 27-28, 2009

Crotone

Italy

Hotel Lido degli Scogli

Consciousness and its Descriptors

Advanced Workshop

in the framework of COST Action B27

“ELECTRIC NEURONAL OSCILLATIONS AND COGNITION (ENOC)”

VENUE: Hotel Lido degli Scogli, Crotone, Italy.

DATE: March, 27-28, 2009

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Rationale and aims

Consciousness is a key issue in science. Today, it attracts growing interest from scientists in neuroscience, medicine, physics, artificial intelligence, robotics, etc.; it is topical, mainly due to the rapid progress in the neuroscience of higher brain function, the advance in artificial intelligence, and the diffusely perceived inadequacy of the traditional dualistic separation of mind and body. The issue is also crucial in methodological and bioethical controversies pertaining medicine and public health. Much is known about the brain structures that appear to sustain consciousness and the damage of which results in severe impairment. However, consciousness and the terms related to it remain ambiguously defined and inadequately characterized. Understanding has been often restricted by the selected methodological approach.

That theory and scientific observation will ever yield a comprehensive and complete account of consciousness remains a live issue. The scenario has been made more complex by the observed conditions with wakefulness in the pathological absence of awareness. Advanced functional (e.g. electrophysiology, neuroimaging) techniques allow scientific investigation overarching a wide variety of conditions, from normal subjects to the severely brain damaged to coma, minimal conscious state of vegetative state. Several studies help disentangling the neuronal correlates of consciousness and pathological unconsciousness. The electrophysiological approach allows research on basic neuronal functions related to higher-order brain processes and expressed by signals recorded in man on functional processes (synchronization, spiking accuracy, modulation of spiking rate, and spatiotemporal coherent patterning related to oscillatory activities that represent partially distinct, but functionally interacting computational codes). The approach is privileged.

In this context, a proper definition of consciousness and an up-to-date scrutiny of its descriptors are due. The workshop will take the form of an event promoting access to information and full discussion of a “think tank” including both early stage scientists indicated by the Management Committee and senior scientists participating in the COST B27 project (ENOC);

Purposes of the Advanced Workshop are:

1. to focus on the conditions characterizing consciousness and its impairment;
2. to identify possible descriptors of these conditions;
3. to scrutinize in full detail the possible role of electrophysiology in this field of research;
4. to set research guidelines for research; and
5. to disseminate cultural and research know-how in the framework of the COST B27 project (ENOC).

PROGRAM of the WORKSHOP

March 26

arrival at the hotel and welcome
buffet dinner

March 27:

8.30 Registration

9.00 Opening

J Pop-Jordanov (Skopje):

The COST Action B27 "ENOC"

WG Sannita (Genova/New York):

Purposes of a workshop on consciousness

SESSION 1

Chairs: FT Arecchi (Firenze), F Babiloni (Roma)

9.30 GG Celesia (Chicago):

Consciousness and the neurosciences: facts and theories

10.30 - 11.00 coffee break

11.00 S Laureys (Liege):

Coma and disorders of consciousness

12.00 MM Monti (Cambridge):

Functional neuroimaging, brain function and impaired consciousness

Lunch

SESSION 2

Chairs: GG Celesia (Chicago), MM Monti (Cambridge)

15.00 F Babiloni (Roma):

Electrophysiological estimation of cortical activity and connectivity

16.00 AK Seth (Brighton):

Measures of consciousness

17.00-17.20 coffee break

17.20 WG Sannita (Genova/New York):

Oscillatory gamma activities and conscious perception

18.00 J Jordanova, V Kolev, U Wagemann, R Verleger (Sophia):

Bringing implicit knowledge to consciousness: Different roles of early- and late-night sleep

Dinner

March 28

SESSION 3

Chairs: AK Seth (Brighton), P Morasso (Genova)

9.00 FT Arecchi (Firenze):

Dynamics of conscious brain processes

10.00 P Morasso (Genova):

Consciousness as the emergent property of the interaction between brain, body and environment

11.00-11.30 coffee break

11.30 J Pop-Jordanov (Skopje):

Substrates of attention and consciousness

12.30 G. Dolce (Crotone):

The vegetative state: a model?

Lunch

SESSION 4

Chairs: FT Arecchi (Firenze), R Meucci (Firenze)

15.00 Contributions

W Klonowski (Poland):

Complexity measures of brain electrophysiological activity in consciousness and physiological sleep

P Lanteri (Italy):

Neurophysiological assessment of vegetative and minimally conscious states

F Nijboer (Germany):

Do complete locked-in patients fail to use a BCI because of extinction of thought?

F Riganello, M Quintieri, A Candelieri (Italy):

Heart rate variability: an index of brain processing in vegetative state?

S Kouider (France):

The behavioral and neural determinants of unconscious perception

17.00-17.30 coffee break

17.30 Round table

Farewell dinner



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Research in
Advanced
Neurorehabilitation
Istituto S. Anna

POSTER PRESENTATION

SOME SPECIFIC QEEG APPLICATIONS RELATED TO NEUROCOGNITIVE DYSFUNCTIONS

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Quantitative EEG assessment (QEEG) is a neuroinformatic tool, implying the following main steps: recording of multichannel EEG, signal processing and extraction of features such as mean spectral amplitude or power for multiple frequency bands and comparison of subject's data with a normative database corrected for time-of-day variations. To this date, QEEG has proved to be useful additional tool in the estimation and treatment of many disorders with underlying organic pathology. However, the full QEEG capacity for successful estimation of neurocognitive dysfunctions is still poorly investigated. This is an attempt to shed light over this problem by giving summary of three studies, each of which exploring QEEG patterns in various conditions that are often associated with cognitive dysfunctions.

The aim of the first study was to investigate the alpha rhythm parameters (8 - 12 Hz) in cystic fibrosis (CF) patients in order to distinguish eventual features that differ from healthy individuals. The second study deals with the existence of different qEEG subtypes in ADHD children associated with specific neurocognitive profiles. The third study is a meta-analysis of papers, published over period of 13 years across 3 continents, which were examining the potential influence of extremely low frequency (ELF) electromagnetic field (EMF) components over human EEG patterns which are in the same range of frequencies.

Finally, a comparative QEEG investigation of neurocognitive parameters in healthy population will be presented, with introduction of the brain-rate parameter as an integral brain state indicator.

