

MEETING REPORT

Looking within*

The mystery of consciousness has been sought to be unravelled by neuroscientists, psychologists, computer scientists, philosophers and quantum theorists from time immemorial. The result has been a multidisciplinary approach to this study, not excluding discussions between scientists and philosophers. The conference 'Looking within' focused on three themes: (i) Neurophysics, quantum mechanics and consciousness; (ii) Cognition to consciousness: animals to humans, and (iii) Self in neuropsychiatry, neurophenomenology and neurophilosophy. A discussion followed the lectures on each day.

While V. S. Ramamurthy (NIAS) noted that consciousness is not anti-scientific, Sangeetha Menon (NIAS) indicated that if consciousness is accepted in scientific institutions, it is called 'cognition'; if it is accepted in arts and humanities, it is called 'self'. P. Sathishchandra (NIMHANS, Bangalore) said that from the neurobiological perspective, it is the ability to extract useful information from the environment and how it is interpreted.

Stuart Hameroff (The University of Arizona, Tucson), in a recorded lecture¹, suggested that quantum events in microtubules would lead to consciousness and that ~20,000 neurons are required for each moment of conscious awareness. Mayank R. Mehta (University of California, Los Angeles) said that to study consciousness, one must find an objective way to manipulate and quantify it, for example, during sleep or anesthesia or at running speed. He showed that the entire neocortex behaves like a two-state system, switching synchronously between the 'up' and 'down' states during quite wakefulness, sleep and anesthesia.

Mani Lal Bhaumik (Dr Mani Bhaumik Educational Foundation, Kolkata) pointed out that though scientists have come up with neural correlates, we still do not know how physical processes in the

brain give rise to conscious understanding. From a physicist's point of view, Ramanath Cowsik (Washington University, St Louis) noted that consciousness is a highly ordered reflection and response; quantum fluctuations and gravitation are responsible for bringing about the cosmic dawn that provides ideal conditions for the growth of life and consciousness; quantum inscription, computing and data access may underlie various aspects of consciousness such as introspection, internal dialogues and self-non-self interaction; thermodynamic considerations such as entropy are important in understanding life and consciousness.

Anindya Sinha (NIAS) pointed out that for biologists, consciousness is rooted in the nervous system. Given that animals have similar neurophysical systems as humans, we need to extend consciousness to them. Perhaps if we do not find reflective consciousness in animals, it could mean that our science has no way of finding this out. Robert Hampton (Yerkes National Primate Research Center, Atlanta) showed – through studies on monkeys – that non-human animals have memories that they can call to mind. During trials, it was seen that these monkeys seek needed information in addition to bailing out when appropriate.

A computer whose responses cannot be distinguished from that of a human is said to have passed the Turing test, according to S. P. Arun (IISc). He showed how computers fail the Turing test for vision. If we are to create intelligent machines, understanding the object code that the brain uses is important; this code depends on a coarse image structure and drives visual search in humans and neuronal representation in the monkey inferotemporal cortex.

Shobini L. Rao (NIMHANS) drew parallels between Advaita Vedanta and cognitive neuroscience. Citations on consciousness, memory and dreams from the ancient ayurvedic paediatric text *Kashyapa Samhita* were presented by Malavika Kapur (NIAS). In this text, it is said that consciousness emerged in the third month of the foetus. Sangeetha Menon mentioned that when we talk of consciousness, it is important to under-

stand the concept of 'self' that is constantly emerging as a result of interaction with nature and nurture. In the process of emergence, boundaries change – creating havoc (psychological disorders) or peace (spiritual experiences).

Anand C. Paranjpe (Simon Fraser University, Vancouver) spoke of the co-existence of the self and ego – a self-realized person may be firmly grounded in the transcendental self, while operating with normal ego boundaries for the convenience of transacting at a practical plane. Natalie Depraz (University of Rouen, France) dealt with 'how do I see what I read and write?' from the first person and third person perspectives. Max Velmans (University of London) spoke of how the self engages in exercising free will, and on the exercise of freedom within a network of causalities and constraints (constrained free will).

Philip Clayton (Claremont Lincoln University) emphasized that co-habitation of the scientific quest and the spiritual quest is possible. The two parties should focus on their own contributions, find mutual constraints and give up absolute claims.

The best poster award (out of 33 posters) was given to Christoph D. Dahl's group (Kyoto University) for 'Nature or nurture in face perception?' Two special mention awards went to Mukesh Makwana's group (University of Allahabad) for 'Effect of emotions on time perception using an oddball paradigm' and R. Sharathchandra's group (NIMHANS) on 'Cross modal integration of facial and vocal expressions of fear'. At the end of the conference, it was announced that doctoral and postdoctoral fellowships are to be offered by NIAS based on the conference themes. Those interested can send in a write-up on their proposed plan of work.

1. Hameroff, S., Consciousness and the Universe: Current Status of the Penrose-Hameroff Orch OR Theory. Lecture at NIAS on 30 November 2011.

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*A report on the international conference on 'Looking within: interdisciplinary approaches to consciousness' organized by and held at the National Institute of Advanced Studies, Bangalore from 5 to 7 January 2012.