

BOOK REVIEWS

Science and Metaphysics – A Discussion on Consciousness and Genetics. Sangeetha Menon *et al.* (eds). Philosophy of Science Unit, National Institute of Advanced Studies, Bangalore 560 012. 2002. 482 pp. Price: Rs 500.

There is increasing awareness about the importance of interfaces and interdisciplinary dialogues in the scientific culture. A major theme of enquiry where the coming together of different disciplines, methods and beliefs is essential, is the study of the nature and essence of consciousness. The book under review is the result of a multidisciplinary dialogue organized at the National Institute of Advanced Studies (NIAS), Bangalore. This volume is a 'collection of invited papers on the frontiers of science and metaphysics, with special reference to the themes of consciousness and genetics'. The topics discussed in this volume are not limited to, or dominated by the ideas relating genetics and consciousness. In fact, one gets the impression that the term 'genetics' should be seen as a wide perspective when one relates it to consciousness studies – genetics as a discernable lineage, encoded or otherwise, defining the development of consciousness. This then includes lineage of language, culture, religion and science.

I realized the enormous scale of the task of reviewing this book only after glancing through a few articles. The task turned out to be difficult and stimulating because of my unfamiliarity with the vast variety of topics discussed. Though the topics were not of everyday familiarity, I knew many of the authors personally, and this helped in making a start. Before I make comments on some of the articles in this book, I should mention that this collection is unique in bringing together thoughts and arguments, and also doubts from so many knowledge systems. There are many well-written and well-argued articles; some even convincing despite the difficulties in defining and defending relevant ideas. The editors deserve to be congratulated in putting together a well-structured document which I consider as a useful introduction to consciousness studies, and as a reference volume. It is more appropriate to classify this as resource book to which one likes to keep going back.

My first problem was to decide on what to read and where to start – from

about 28 articles divided into six themes, and two panel discussion summaries. I had the hesitation akin to that of a swimmer used to pools but not the seas, trying to cross a large river. Fortunately, I found my starting points in the two articles, 'The biology of laughter' by Renee Borges, and 'What is it like to be a monkey' by Anindya Sinha. I thought that I had a general idea regarding the second topic, and started with the one on laughter.

There is much to think about both technical and mental aspects of laughter. A technical matter that I am still thinking about is regarding the statement that while chimps vocalize (in relation to laughter-like sounds) during inhalation and exhalation, humans do so during exhalation. I know many humans who laugh in inhalation (even the genetics of their conscious laugh is visible, since the samples include my brother and some of my uncles). Of course, I have not seen a human who laughs during both inhalation and exhalation. Laughter seems to be related to a higher-level cognitive function. In any case, I found this a good starting point to follow up a bit on laughter and its function as a measure of development of consciousness. Treating laughter as a possible window to the higher level of consciousness fits in well with the common-sense view on correlation between wisdom and sense of humour.

Finishing this article in one go naturally leads to the next one on monkeys by Sinha. Has there been a progressive evolution of the primate mind culminating in the human mind? His point is that the social pressures faced by primates, monkeys and humans in the social matrix, could play a significant role in the progressive evolution of the consciousness. This article discusses in some detail and with great clarity, various levels of intentionality in conscious behaviour, and also stresses on the concept of attribution, whereby an individual is capable of attributing desires, thoughts and emotions to another individual. Then, it goes on to explore whether primates who cannot express themselves verbally (children, for example) are able to recognize and react to mental states of another individual or they simply react to behavioural patterns. This is a hard problem, and there is a readable discussion on this issue analysing the social knowledge and intentional tactical deception among monkeys. A gem from a passionate observer of animal behaviour.

The opening article by D. P. Chattopadhyaya explores the role of myths in pursuit of scientific knowledge and makes a convincing case for taking myths seriously, while exploring interface areas in science. He quotes Popper, 'science must begin with myth and with a criticism of myth'. This article, apart from the wide knowledge base it touches, is an apt introduction and even a guideline for exploration of the enigmatic consciousness. It also stresses on the role of intuition, which perhaps bridges myth, logic and discovery. I have gained much from reading this article.

The second section of the book has several articles that deal directly with the question of characterization and identification of consciousness. Ilya Farber defends, and defends well, that the neural correlates of consciousness – the fundamental observables in the consciousness-brain connection – would in fact play an important and useful role in the study of consciousness. The issue is extremely interesting, not only for the study of consciousness but for all scientific studies; can one completely or even satisfactorily characterize an object of study by investigating its observable correlates? Is understanding the correlates equivalent to understanding and explaining the fundamental entity? This is an exceptionally clear article. It points out that there is lack of overlapping disciplines to bridge, in an uninterrupted way, from correlates to causation – neural activity to subjective experience. This point really struck me. Farber stresses rightly on the role of evolving metaphors in these studies. An interesting analogy is built up between developments in genetics and science of heredity.

The next article by R. C. Pradhan takes the diametrically opposite view and asserts that consciousness can be understood independent of the material world with which it is associated. Personally, I think that such assertions are empty, and not really defensible, especially since language is very much a part of the material world. More than such prejudices, I think that the neural correlate route will lead to progress, whether or not a successful and acceptable theory emerges.

There is a general classification of the problem of consciousness, as the 'easy problem' and the 'hard problem'. I find such a classification prejudiced. It presupposes that the neural correlates of consciousness are going to be inadequate

even when fully mapped and understood. 'Why consciousness in a material world?' This sounds like a hard problem when consciousness is perceived to be different from 'material'. Otherwise, the problem disappears. Of course, it may turn out that consciousness is not at all understandable in terms of all material constituents and their properties. But there is no justification in presupposing that this is going to be the case, especially since we know of surprising collective behaviour and organization in the purely material world that can be derived from first principles and physical laws, yet resembling non-material emergent complexity.

If subjective experience can be reproducibly correlated with neural activity, then it might be reasonable to equate one with the other, and insisting on further explanation might lead to endless enquiries. Note that the question we ask is exactly the kind we ask about the material world: why this? What is that? How is this possible? etc. Why are we asking a very material question and then insisting that a non-material answer should emerge – I find this difficult to understand.

There are several mentions of the role of first-person methodology. There are vague and unproven claims in the field of consciousness studies, and perhaps this may have led to severe confusion. Finally, most first-person attempts are observations of physical correlates – the only difference is that the observer and observed are closely related. One cannot claim that they are identical, since that problem is open. For most of the studies this is not a relevant restriction and when it seems to matter, the results are inadequate and often vaguely stated. Does the hard problem exist?

The article on vivid experiences – 'consciousness expanded' by Wesley Wildman – was mostly some classification and general remarks. While it started a train of thoughts on levels of first-person experiences, I did not find new insights.

H. N. Shankar makes a forced effort to 'prove' that 'I am consciousness'. He is knowledgeable about Indian traditions and works from original sources in Sanskrit. But there are no new ideas here, and the arguments are covered in a language resembling mathematical and logical proofs, but are hardly so. This route does not address either the easy or the hard problem, and perhaps gives the au-

thor the happy illusion of having solved the full problem.

Glancing through Swami Harshanda's critique of science and scientists, I found it superficial. Perhaps, Swamiji does not realize that pursuit of science is as much concerning 'within' as 'external' (since I do not like the often used 'without').

Deep and penetrating studies and writings on the issue of knowledge and consciousness by Aurobindo seem to be a rich source for anybody who is interested in consciousness studies. Even a cursory reading of Cornelissen's article on 'Integral epistemology of consciousness' reinforces this thought, and I felt thoroughly inadequate having not read Aurobindo's works. I will certainly get back to this article based on Aurobindo's work.

Purushottam Bilimoria explores certain 'limit-questions' – 'bounds of discourse, beyond which it would be fruitless to speculate'. He explores the issue of intentionality; consciousness as a directed entity. Right at the outset I wanted to disagree with this, but I went along to see where it leads. It is an article with many ideas, and the depth of his enquiry and presentation indicate that the article required study rather than reading. He advocates getting rid of localization of consciousness – even gross localization. This is interesting since localization within the brain or even within the body is rejected. One sees the possibility that even individual consciousness is collective, extending to the ends of the universe in some way – material yet unlocalized.

I started reading Sangeetha Menon's article with some hesitation – just the outsider's difficulty of correct reading of a professional philosopher's arguments. Earlier, when I was reading the excellent compilation of dialogues (in the form of questions by Sangeetha and answers by Swami Bodhananda on the issues of science and metaphysics: 'Philosopher meets the seer'), I had noticed that the questions that she asks in those dialogues were difficult to understand, whereas the answers to all those questions by the Swamiji were crystal clear! But, I had no difficulty with this article, since it uses metaphors and reasonably jargon-free language. The article deals with the conflict between the 'intention' to know and the integration of the knowledge into the knower. The difficulties in the dual-

ism are proposed to be cured by introducing I-ness. She argues well for self-exploration and first-person enquiries.

The article by the senior-most biologist Obaid Siddiqi was disappointing. There are some obvious statements about genetics and brain circuits, and the article does not measure up to what one expects from an experienced senior citizen.

I have a slightly different complaint about Roddam Narasimha's article which I started reading with enthusiasm. This article, that freely interprets some passages from the *Yoga Vasistha*, contained occasional catchy remarks but somehow lost its focus on the way and became a set of listings, not relevant to the topics discussed in the conference.

As an experimental physicist, all studies that deal with the mind – body connection revealed in observations are of interest to me – from simple alteration of metabolism by meditation to experiments on neural correlates, and even experiments on psycho-kinesis. Ever since I acquired an electronic BP monitoring machine, my favourite mind control quickie is to start a fast TM session and bring down the BP by 20% or so within a minute. But the article by Shirley Telles on neural plasticity and yoga lacked the breadth that I would have liked to see. Perhaps a longer article with more details on experiments, data and results would have been useful and more interesting.

Nanjundiah's article, 'Genes and social behaviour' addresses the important question whether there is a genetic basis for social behaviour, and what is the relative importance of genes of behaviour and environmental conditioning in shaping social behaviour. In the context of the genome project, this has become an issue of debate. In conclusion he states, 'genes and gene products merely enable the behaviour to occur. But, exceptional cases apart, they do not in any meaningful sense cause it, much less programme or direct it'. If measures of level of consciousness have anything to do with behavioural patterns in the social matrix, this conclusion clearly points to how much of a genetic basis could be attributed to the level of consciousness.

Philip Clayton is a dramatic speaker, and efficient in conveying ideas. His article in this volume is no exception. It strongly advocates the need for a dialogue and rejects extreme positions. It challenges the sufficiency theory, accor-

ding to which neuroscientific explanations will finally be sufficient to fully explain human behaviour. His supervenience theory seems almost convincing to me. In fact, I think that any theory that is not along these lines – that mental events are dependent on their physical substrata but not reducible to them – is bound to fail. But this is perhaps the nature of any theory of complexity. (The editors missed the fact that his abstract is also the first part of the article, and it is printed twice.) There is much more material in this article than mentioned here, especially the interesting ideas on monism.

B. V. Sreekantan has been one of those few physicists who have been following developments in neural sciences and theories of mind and consciousness. He makes the interesting point that to understand the mind in terms of neural correlates and other observables, transcending some of the present ideas in physics and biology might be required. He gives examples from established physics to show that even within the rigorous physical theories, some of the concepts that originated in common experience have been elevated to the transcended concept that is beyond human experience and intuition. This again is an article that rightly argues that emergent properties can transcend the underlying material properties.

I skipped a serious reading of Manoj Samal's speculations on a unified theory of mind and matter, since the first reading gave the impression that it is full of speculations on speculations. Perhaps, I will discuss with him some of those points when I meet him next.

The panel discussion on metaphysical implication of modern science contained a provocative article by N. Kumar, with the thesis that the free-willed self-consciousness might not interact with the will-free neuronal brain. A fundamental problem with this assertion might be the unprovable statement that the self-consciousness is free-willed!

The second panel discussion deals with 'science and religion'. A more complete resource on this topic would be the proceedings of the 'Science and Spiritual Quest' conference held at IAS in January 2003.

A volume that contains such a large variety of ideas and thoughts could have been compiled only from an international meeting organized in India by a reputed institute, since otherwise it would have been difficult to bring together many

serious scholars familiar with the Indian knowledge and writings on consciousness studies. This alone highlights the uniqueness and value of this volume.

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General Lattice Theory. George Grätzer. Birkhauser Verlag, P. O. 133, CH-4010 Basel, Switzerland. 2003. 2nd edn. 663 pp. Price: Euro 73.

Mathematicians realized the significance of lattice theory only about seventy years ago. Since then, the theory has been developing rapidly. It was Garrett Birkhoff's (1911–96) pioneering work during 1930s which led to the general development of the subject. He established the importance of lattice theory in unifying seemingly unrelated developments in different mathematical disciplines. His three editions of the book *Lattice Theory* appeared in 1940, 1948 and 1967, respectively, have inspired many mathematicians to work in the field of lattice theory.

The first edition of the book under review appeared in 1978, and it surveyed most of the significant developments that took place in general lattice theory up to 1975. The only change in the present edition is the inclusion of eight new appendices along with an extensive, new bibliography.

The book is self-contained, starts from the basic concepts and proceeds quickly to reach the latest in the field. It is not an elementary, introductory book and a beginner would require much guidance to study the book. The book mainly intends to highlight major achievements in general lattice theory. The book does not cover all aspects of lattice theory. In fact, many of the areas of lattice theory like orthomodular lattices, continuous lattices, lattice-ordered algebraic structures, applications to logic, topology, analysis,

etc. are not included in the book. Also, the theory of semimodular lattices is briefly touched upon to prove some representation theorems for general lattices. The book contains around 150 diagrams that are helpful in understanding the concepts (of course, figure III.3.2 on p. 199 is to be rotated clockwise by 90° to make it meaningful). About 900 exercises given in the book supplement the topics covered in each section and a list of more than 100 research problems posed are useful for researchers in the field.

The theory of distributive lattices and Boolean algebra is developed by an interaction of lattice theory, axiomatic set theory, logic, topology and ring theory. The book discusses basic characterization and representation theorems for distributive lattices, Boolean lattices and Stone lattices, including topological representation theorems for distributive and Boolean lattices.

Congruences and ideals are not directly related to each other in general lattices. However, these two are related naturally in a one-to-one manner only in generalized Boolean lattices due to a result of Hashimoto. Generalized Boolean lattices are Boolean rings in disguise, according to Stone. The congruence lattice of any lattice is known to be a distributive algebraic lattice. The converse of this statement is a long-standing conjecture of lattice theory. The author discusses some latest work in this direction in some special cases in one of the appendices.

Dilworth has successfully employed the notion of weak projectivity in characterizing principal congruence relations in arbitrary lattices. This enables the description of congruence relations generated by arbitrary subsets and of ideals that are kernels of some congruence relations. The notions of distributive, standard and neutral elements (and ideals respectively) defined by Ore, Grätzer and Birkhoff, respectively, play a significant role in general lattices. These can be defined by distributive identities and they carry properties of elements (and ideals respectively) of distributive lattices. The author, jointly with Schmidt, had developed the theory of standard ideals in lattices similar to the theory of normal subgroups in groups. Neutral elements and ideals play an important role in direct decomposition of lattices. The chapter on congruences and ideals discusses some aspects of these interesting facts.