

Science and Cultural Diversity: Integrating Historical and Philosophical Aspects

Proposal for a Symposium at CLMPS XV

Organizer. Kenji Ito, President IASCUD

Description of the Symposium

The International Association for Science and Cultural Diversity (IASCUD) was founded in the year 2000 and became a commission of the Division for the History of Science (DHS) in the following year. It has set itself the task of developing a critical analysis of culturalist trends that gain momentum in the field of the history of knowledge. By contrast, IASCUD seeks to promote a new understanding of what may be conceived as “cultural diversity” in relation to science. This requires bringing a global approach to the study of science and scientific practice, and taking into account the diversity of scientific cultures across the globe. IASCUD aims at bringing together all those who are convinced that a global approach to the history of knowledge provides the right framework for a fully theoretical approach to science and technology.

Until recently, the work of IASCUD has been focused on the history of science. However, philosophical and methodological issues also prove vital to fulfill the goals IASCUD has set itself. Accordingly, IASCUD aims to become an inter-division commission of both of the divisions of the International Union of History and Philosophy of Science (IUHPS). The request to be commissioned by DLMPS will be discussed during this year's DLMPS General Assembly in Helsinki.

Our symposium aims at highlighting the relevance of conjoining historical and philosophical work to approach cultural diversity in the study of science. It will bring together members of the IASCUD Council reporting on IASCUD activities and researchers who represent the confluence of philosophy and history of science in the study of cultural diversity.

Program

Session One

- "The role of (visual) representations in mathematics," by Jessica Carter (University of Southern Denmark, Odense, Denmark)
- "An appraisal of presenting mathematics in metrical form from a socio-cultural perspective," by Krishnamurthi Ramasubramanian (Indian Institute of Technology, Bombay, India)
- "On the project 'Culture of Mathematical Research Training'," by Benedikt Löwe (Universiteit van Amsterdam, The Netherlands & Universität Hamburg, Germany & University of Cambridge, England; Assessor of IASCUD)

Session Two

- "Science and cultural diversity: the problem of Orientalism," by Kenji Ito (The Graduate University for Advanced Studies, Hayama, Japan; President of IASCUD)
- "Same ascriptions, different methods?" by Smita Sirker (Jadavpur University, Kolkata, India)

ABSTRACTS

The Role of (Visual) Representations in Mathematics

Jessica Carter, Department of Mathematics and Computer Science, University of Southern Denmark, Denmark

The use of diagrams (or more broadly visualisation) in mathematics has recently attracted a lot of attention, and scholars have pointed to the many different roles they play. It has been shown that visual tools may further students' understanding when teaching mathematics, and that diagrams can function as tools for discovery. In addition it has been debated whether diagrams can be used to obtain rigorous proofs. In this talk I wish to discuss issues related to the second role, that is, the roles diagrams play in relation to reasoning in mathematics and in particular in discovery. I will start by noting some of the roles scholars have attributed to the diagrams in Euclid and show that one may also find similar uses of diagrams in contemporary mathematics. Furthermore I wish to stress the capacity of diagrams to display relations. In order to address the question why diagrams are fruitful in mathematical reasoning, I wish to draw on Peirce's semiotics. Peirce stresses the importance of icons (i.e., signs representing because of likeness) in mathematics, saying that: "For a great distinguishing property of the icon is that by the direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction" (CP 2.279). A diagram, according to Peirce, is a particular icon, namely an icon representing a relation. Because of this usage, Peirce characterises mathematical reasoning as diagrammatic reasoning. Combining this usage with Peirce's statement concerning the fruitfulness of icons, it would seem that the fruitfulness lies in the possibility to display relevant relations rather than the stress on visualisation.

An Appraisal of Presenting Mathematics in Metrical Form from a Socio-Cultural Perspective

Krishnamurthi Ramasubramanian, Indian Institute of Technology, Bombay, India

In this era of e-learning and m-learning, when mobile phones, MP4 players, notebooks and tablets, are gaining currency as educational aids, it may sound quite weird to think of learning mathematics through metrical verses, which is completely devoid of symbols and notations. However bizarre and weird it may sound, from time immemorial, this has been 'the-mode' of learning in India for several millennia, till recent times. The savants of the past had mastered the technique of effectively communicating their ideas, without facing any constraints in the form of beautiful metrical compositions in Sanskrit, irrespective of the branch of learning---art, architecture, astronomy, law, logic, philosophy, music, medicine or mathematics.

The art of blending mathematics with poetry, had been in place in India at least from the time of Vedanga Jyotisha (c.~1400BCE) of Lagadha. One of the primary reasons (while there could be others) for taking recourse to poetry, is to make the medium of communication, as beautiful as the message. The ancient Indians also chose to be brief in their style of writing, and certainly avoided excessive verbiage. It is said of Indian grammarians, that even if they could manage to save half a mora or syllable from one of

their rules, they celebrated it like the birth of a son. Of course, enough care was taken to see that brevity does not mar the clarity or accuracy.

The ignorance about a particular tradition, clubbed with inappropriate appraisals in the literature has resulted in a critical failure to appreciate the fact that there could be 'varied' approaches that are equally 'valid' to arrive at the same truth. This made some of the historians of mathematics, decry other approaches. During our talk, we intend to highlight some of these issues and features described above. We will also try to touch upon the fact that mathematics, as well as other scientific theories in general are socially constructed principles---and not mind independent entities---and hence are bound to have cultural variations.

The Project “Culture of Mathematical Research Training”

Benedikt Löwe, Universiteit van Amsterdam, The Netherlands & Universität Hamburg, Germany & University of Cambridge, England, Assessor of IASCUD

This talk will report on the project Cultures of Mathematical Research Training which was run by the International Union for History and Philosophy of Sciences and funded by the International Council for Science (ICSU). This project brought together researchers from the field of Studies of Mathematical Research Practice and representatives of the society stakeholders, e.g., funding agencies, to discuss important research questions in the study of mathematical research training (i.e., in particular the doctoral training of future Ph.D.s in mathematics)."

Science and Cultural Diversity: The Problem of Orientalism

Kenji Ito, The Graduate University for Advanced Studies, Hayama, Japan, President of IASCUD

This talk discusses one of the issues that the International Association for Science and Cultural Diversity (IASCUD) has been tackling with: the issue of Orientalism. In recent decades, the international community of the history of science has greatly expanded its geographical scope by producing many studies on regions outside Europe and North America. If, however, a study on science in such a region, aims to get much attention from the majority of historians of science, who do not studies that region, it is often advantageous for such a study to emphasise that the region in question is different from Europe or North America. Since novelty is one of the important measures of the value of research, if a study finds that something is different from what is already known, the study tends to be considered more interesting. This encourages a tendency of Orientalism, because if a study receives attention from a larger scholarly audience, it becomes more visible. Such Orientalistic studies can be highly problematic, because they overemphasise and essentialise cultural differences. They sacrifice scholarly integrity for the sake of appeal to a larger audience and, by so doing, overshadow more careful studies that try to draw more nuanced pictures of different cultures in science. Thus, the very expansion of the geographical scope of the international community of the history of science, which should be in principle a good thing for cultural diversity, can make it more Orientalistic. In this talk, I will discuss how to deal with this problem.

Same Ascriptions, Different Methods?

Smita Sirker, Department of Philosophy, Jadavpur University, India

What is more desirable for a cognitive scientist, a cognitive psychologist, or a philosopher? Do we implicitly harbour the belief that any cognitive theory, say a theory on reasoning in general or theory on moral reasoning, fits with any randomly given cognitive agent, irrespective of cultural and social variations that are empirically observable to us. What is the core assumption(s) that have led philosophers and many others adhere to the conviction that theories are universal in their application. More importantly, theories that commit on the internal cognitive processes of our cognitive system – rests on the conjecture that there is an extensive sharing of our cognitive architecture and system, across any given culture and history. Thus, the core cognitive processes are taken to overlap if not merge in their various aspects. Honestly, it is very difficult to disprove such assumptions, given the nature of the issue.

However, we are increasingly becoming aware that theories must entertain a scope for liberal interpretation. Theorists must be ready to grant the possibility that any given theoretical posit bears a chance of variation – when they are applied empirically by us. Experimental philosophy is gaining credible grounds over the last decade, as it is trying to lessen the gap between the claims of theory and data from practise. They are trying to build bridges and test whether, say our metaphysical, epistemological or moral theories are reflective of our folk intuitions regarding metaphysical, epistemological or moral issues. For example, experiments have been conducted to test - whether folk moral intuitions do converge with posits of moral theories.

Such studies have led to very interesting results. Recent empirical studies have begun to focus not just on theories and folk intuitions; but also whether there are any differences in folk intuitions across cultures. In this paper, I would like to present and discuss some core issues regarding such empirical research and their significance in theory building. Furthermore, how far are we justified in our cognitive ascriptions and judgements pertaining to any random cognitive agent, of any cultural background?