

Seminar SAW Rethinking Practice and Culture in the History of Science

organized by Koen Vermeir and the SAW project's group
Université Paris Diderot, Condorcet Building - room 646A - 9:30 am to 5:30 pm
<http://sawerc.hypotheses.org/seminars/practices>

Programme November 2015 - June 2016

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Presentation

The seminar organised under the auspices of SPHERE is dedicated to the concept of practice and culture in today's history and philosophy of science.

A growing number of philosophers, philologists, sociologists, anthropologists and historians of science agree on the importance of studying not only scientific knowledge as such, but also scientific "practices" and scientific "cultures." However, approaches vary. Some scholars use the word practice in singular, others prefer practices, in plural. Do the two groups imply the same thing? Similarly, the variety of meanings attached to the term of "culture" in HPS publications calls for clarification. It is part of the objectives of the SAW project to examine in a critical way uses of these concepts in HPS today. We also intend to confront this theoretical discussion with analyses of case studies, presented in a dialogical form. These case studies will systematically cover analyses of mathematical practices and cultures in the ancient world, and analyses of early modern and modern scholarly practices and cultures.

Programme

Session 1 - December 3rd, 2015

Readers and Speakers

Justin Smith, *How Can the Anthropology of Culture Help Us to Overcome the Bias of 'Civilisation' in Intellectual History?* Lecture de Marshall Sahlins, Adam Kuper and Jack Goody

Koen Vermeir, Lecture de Koen Vermeir “Historicizing Culture. A Revaluation of Early Modern Science and Culture”

Jonardon Ganeri, *Pluralism about Epistemic Cultures: Reflecting on the Sanskrit Knowledge Systems*

Karine Chemla, *Mathematical cultures in ancient China. Previous views and new insights*

Justin Smith (Université Paris Diderot, SPHERE)

How Can the Anthropology of Culture Help Us to Overcome the Bias of 'Civilisation' in Intellectual History?

Text readings of

Marshall Sahlins, “Goodbye to Tristes Tropes: Ethnography in the Context of Modern World History.” *Journal of Modern History* 65 (1993): 3–4.

Adam Kuper, *Culture: The Anthropologists' Account*, Harvard University Press, 1999.

Jack Goody, *The Eurasian Miracle*, Wiley, 2010.

Koen Vermeir (SPHERE, CNRS & Université Paris Diderot)

Text reading of Koen Vermeir “Historicizing Culture. A Revaluation of Early Modern Science and Culture”

Jonardon Ganeri (New York University)

Pluralism about Epistemic Cultures: Reflecting on the Sanskrit Knowledge Systems

Abstract - “Epistemic cultures”, says Karin Cetina in her seminal study of knowledge societies, are “cultures that create and warrant knowledge, and the premier knowledge institution throughout the world is, still, science”. Although a pluralist about epistemic cultures Cetina is not a relativist or social constructivist about the world they explore. In my own work too I have sought to inhabit the elusive ground that respects

epistemic pluralism but denies social constructivism. I have investigated the plurality of classical Indian philosophical *śāstras*, a *śāstra* being not merely a systematic representation of a network of ideas but a fluid disciplinary practice for the production of knowledge of a certain sort in a certain domain. They have been described as “Sanskrit knowledge systems”, and since their concern is not only with the manufacture of a body of belief but with how such beliefs are warranted—how beliefs are argued for and what kinds of evidence can be provided—it seems entirely correct to describe them also as “epistemic cultures” in Cetina’s sense. I will draw upon materials from within the tradition to defend a “plural realism”: pluralism about epistemic cultures combined with realism about the world they investigate. I will argue that there is a convergence between this defence and recent work by Geoffrey Lloyd, Charles Taylor and Hubert Dreyfus, and I will show why the argument against epistemic pluralism put forward by Paul Boghossian in his influential book *Fear of Knowledge* does not succeed.

Karine Chemla (ERC Project SAW & SPHERE UMR 7219, CNRS & Université Paris Diderot)

Mathematical cultures in ancient China. Previous views and new insights

Abstract - In (Chemla 2016 Forthcoming, 2010, 2009), I have suggested an approach to “mathematical cultures”, based on last decades of research on the history of mathematics in ancient China. I have also emphasized how these mathematical cultures changed over time, and suggested how these changes were characterized by a mixture of breaks and continuities. After four years of collective work in the context of SAW, my views on the phenomenon of mathematical cultures, and on the form it took in ancient China, have been transformed. In this talk, I intend to offer a sketch of both a general framework I suggest to approach mathematical cultures, and new insights I have gained over the last four years with respect to the mathematical documents written in China.

References

- Chemla, Karine. 2009. "Mathématiques et culture. Une approche appuyée sur les sources chinoises les plus anciennes (revision and translation of "Matematica e cultura nella Cina antica" by Delphine Vernerey)." In *La mathématique. 1. Les lieux et les temps*, edited by Claudio Bartocci and Piergiorgio Odifreddi, 103–152. Paris: Editions du CNRS.
- Chemla, Karine. 2010. "從古代中國數學的觀點探討知識論文化 (An approach to epistemological cultures from the vantage point of some mathematics of ancient China)." In *中國史新論科技史分冊：科技與中國社會 (New views on Chinese history)*, edited by 祝平—Chu Pingyi, 181-270. Taipei 台北: 聯經出版社 Lianjing Publisher.
- Chemla, Karine. 2016 Forthcoming. "Changing mathematical cultures, conceptual history and the circulation of knowledge. A case study based on mathematical sources from ancient China." In *Cultures without culturalism*, edited by K. Chemla and Evelyn Fox-Keller.

Session 2 - February 3rd, 2016

Readers and Speakers

Guillaume Lachenal, *Texts reading*

Claude-Olivier Doron, *Texts reading*

Matthieu Husson, *Mathematical Practices/ Mathematical cultures: perspectives from late medieval Europe*

François Lê, *Geometrical equations: a "cultural system"*

Guillaume Lachenal, Texts reading of

◆ Fa-ti Fan, "The Global Turn in the History of Science", *East Asian Science, Technology and Society* (2012) 6(2) : 249-258

◆ Romain Bertrand, "Politiques du moment colonial. Historicités indigènes et rapports vernaculaires au politique en « situation coloniale »", *Questions de Recherche / Research in Question* N°26 - Octobre 2008

◆ Introduction de Kapil Raj, *Relocating Modern Science*.

Claude-Olivier Doron, Texts reading of

◆ Hans-Joerg Rheinberger, Chapter "Historicity, Narration, and Reflection", in *Towards a History of Epistemic Things*, Stanford University Press, 1997, pp.176-186

◆ "Cultures of experimentation", in Karine Chemla and Evelyn Fox Keller, *Cultures without culturalism in scientific practice*, Duke University Press, 2016

Matthieu Husson (CNRS -SYRTE, Observatoire de Paris, SAW project)

Mathematical Practices/ Mathematical cultures: perspectives from late medieval Europe

Abstract: During the last 2 years in the context of the SAW project I have explored through different cases studies the notions of mathematical practices and mathematical culture as methodological tools. These case studies include:

- a work on practice with coins in different contexts, in collaboration with Marc Bompaire (EPHE) ;
- a work on practice with numbers in astronomical and related mathematical treatises;
- a work on practice with diagrams and instruments, in collaboration with Sho Hirose (Saw project), Agathe Keller (SAW project) and Clemency Montelle (University of Canterbury, New Zealand);

- a work on practice with numerical tables -in collaboration with Richard Kremer (Dartmouth College, USA).

On the basis of these research works I will focus on two specific questions: How is a set of practices framed and described as a mathematical culture? How to describe different relations and links between mathematical cultures? In this discussion I will pay attention to the type of corpus on which these case studies were built as well as to the homogeneity/heterogeneity of the elements and the diversity of practices found in these corpus.

François Lê (Laboratoire de mathématiques de Lens - Université d'Artois)
Geometrical equations: a "cultural system"

Abstract - Geometrical equations are mathematical objects which played a crucial role in the mechanisms of encounters between group theory and geometry in the second half of the 19th century. A striking fact about these equations is that they were no well-defined objects, although they were shared by a group of famous mathematicians (including Alfred Clebsch, Camille Jordan, Felix Klein, and Max Noether) who deployed very precise ways of doing to study them. The aim of my talk is to describe the special organization of knowledge associated to geometrical equations at the light of the definition of "culture" due to the sociologist Guy Rocher. More specifically, I will show how this definition actually led me to characterize that organization of knowledge as a "cultural system." To bring things into perspective, I will also suggest that this cultural system may be interpreted as the product of an acculturation process between parts of an algebraic culture and a geometric culture of the 19th century.

Session 3 - March 2nd, 2016

Readers and Speakers

Ivahn Smadja, *Texts reading of Matti Bunzl and Andrew Zimmerman*

Nadine de Courtenay, *Texts reading of Hasok Chang*

Christine Proust, *Cultures of quantification: multiple ways of evaluating surfaces in Mesopotamia*

Hans-Joerg Rheinberger, *Glimpses into the Space Between Laboratory and Discipline*

Ivahn Smadja, *Texts reading of*

♦ Matti Bunzl, "Franz Boas and the Humboldtian Tradition : From Volksgeist and Nationalcharakter to an Anthropological Concept of Culture", in *Volksgeist as Method and Ethic. Essays on Boasian Ethnography and the German Anthropological Tradition*, George W. Stocking Jr (ed), The University of Wisconsin Press, 1996.

♦ Andrew Zimmerman, Anthropology and Antihumanism in *Imperial Germany*, The University of Chicago Press, 2001, chap. 2. "Kultur and Kulturkampf : the Studia Humanitas and the People without History", pp. 38-61.

Nadine de Courtenay, *Texts reading of*

♦ Hasok Chang, Pluralism in science : a call to action, in *H. Chang, Is water H₂O? Evidence, realism and pluralism*, pp. 253-301. Springer, 2012.

Christine Proust (Laboratoire SPHERE, SAW project - CNRS & Université Paris Diderot)

Cultures of quantification: multiple ways of evaluating surfaces in Mesopotamia

Abstract - Calculating the area of a rectangular surface seems at first glance to be such a simple operation that it does not deserve much attention. Yet the ancient Mesopotamian sources testify to very different practices, and show, for instance, that the assessment of a surface is not always a calculation, or that large surfaces of royal lands were not evaluated in the same way as small surfaces, such as houses or brick faces. What are the elements that vary from one text to another, from one milieu to another, from one period to another in the process of evaluating a rectangular surface? This question will lead me to identify mathematical and metrological tools that were used in the evaluation of surfaces in different contexts, and to perceive the variability of the very concept of surface. I will show that the notion of surface for a provincial

governor of the pre-sargonic periods (2900-2300 BCE) was not the same as that of a teacher in charge of teaching mathematics in an Old Babylonian school (2000-1600 BCE), or as that of a priest of the Hellenistic period (323-63 BCE) involved in real estate transactions. Motivations, knowledge or innovation capabilities of these different types of actors were very different. The presentation aims to discuss how the analysis of the perception of surfaces by different types of actors allows to detect "cultures" of quantification which are specific to given communities.

Résumé : Le calcul de l'aire d'une surface rectangulaire semble à première vue une opération simple, qui ne mérite pas une grande attention. Pourtant, les sources anciennes de Mésopotamie témoignent de pratiques très diverses, et montrent par exemple que l'évaluation d'une surface n'est pas toujours un calcul, ou que les grandes surfaces des domaines royaux n'étaient pas évaluées de la même façon que les petites surfaces, comme celles des maisons ou des faces des briques. Quels sont les éléments qui varient d'un texte à l'autre, d'un milieu à l'autre, d'une période à l'autre dans le processus d'évaluation d'une surface rectangulaire ? Cette question m'amènera à identifier les outils mathématiques et métrologiques mobilisés dans l'évaluation des surfaces dans différents contextes, et à percevoir la variabilité de la notion même de surface. Je montrerai que la notion de surface pour un gouverneur de province des époques pré-sargoniques (2900-2300) n'était pas la même que pour un maître chargé de l'enseignement des mathématiques dans une école paléo-babylonienne (2000-1600), ou pour un prêtre de l'époque hellénistique (323-63) se livrant à la promotion immobilière. Les motivations, les savoirs ou les capacités d'innovation de ces différents types d'acteurs étaient très différents. L'exposé a pour but de discuter en quoi l'analyse de la perception des surfaces par différents types d'acteurs permet de détecter des « cultures » de quantification spécifiques à des communautés données.

Hans-Joerg Rheinberger (Max Planck Institute fuer Wissenschaftsgeschichte)

Glimpses into the Space Between Laboratory and Discipline

Abstract - For a long time, scientific disciplines were the structures that were of particular interest to historians of science and sociologists of science alike. With the practice turn, laboratories moved into the focus of science studies, history of science, and anthropology of science. This paper focuses on the space between these macro- and micro-levels, respectively. I will treat a number of historical attempts to conceptualize this meso-space, and try to concretize its characteristics through examples taken from the history of molecular biology.

Session 4 - May 4th, 2016

Readers and Speakers

Eric Vandendriessche, *Texts reading of E. Tyler, Primitive culture, Chapters I and VII*

Marc Vander Linden, *Archaeological culture, material culture or culture? Material and anthropological dimensions of a debated concept, and Texts reading*

Diana Solares Pineda, *Calculation and numerical writings : a space of conflict between agricultural workers. Le calcul et les nombres écrits : un espace de tension entre des travailleurs agricoles*

Agathe Keller et HIROSE Sho, *On schools, traditions or cultures in Sanskrit mathematical and astral sciences: some considerations.*

Eric Vandendriessche, texts reading

E. Tyler, 1871, *Primitive Culture: Researches Into the Development of Mythology, Philosophy, Religion, Languages, Art and Customs*, Fourth edition revised 1903, Volume 1, London, John Murray, Albemarle Street.

- ◆ Chapter I “the science of culture”
- ◆ Chapter VII “the art of counting”

Marc Vander Linden (Institute of archaeology, University College London)
Archaeological culture, material culture or culture? Material and anthropological dimensions of a debated concept

Abstract - Archaeologists stand alone in the field of humanities and social sciences in the sense that, at least in prehistory, material remains constitute their sole source of information regarding the human past. At the turn of the 19th and 20th century AD, pioneers of the discipline developed the concept of ‘archaeological culture’ to classify the growing amount of data available to them. Its definition remains Gordon Childe’s iconic formulation of “certain types of remains - pots, implements, ornaments, burial sites, house forms, constantly recurring together”. Following the wider intellectual spirit of the time, these typological constructs were interpreted as the material productions of past tribes of which birth, movement and fate could be traced back. From the 1960s onwards, archaeological cultures were criticised, especially in Anglo-American archaeology, because of the naivety of such culture-historical readings and because the defining categories of data rarely overlap as implied in the original definition. Subsequent theoretical schools shifted the focus towards paradigms influenced firstly by natural sciences, and later by philosophy and anthropology. This gradual move was

accompanied by a denial of archaeological culture, and a growing emphasis upon material culture as a factor shaped by and shaping human agency. Yet, archaeological cultures still remain a frequent feature of the literature and are routinely accepted in numerous traditions of research across the globe. The success of this longevity partly rests in the existence of material patterns in the archeological record and the lack of convincing theoretical and methodological alternatives to explain this empirical reality.

Through a review of the history of archaeological cultures and their underlying assumptions, this presentation will review their past, present and future role in archaeological reasoning. Their wider relevance will be discussed, especially the intimate, but far from straightforward, relationship between archaeological culture, material culture and culture (as viewed in other social sciences).

Suggested reading

- ◆ Roberts B. & Vander Linden M. 2011. Introduction. In Roberts B. & Vander Linden M. (eds.) Investigating archaeological cultures. Material culture variability and transmission. New-York, Springer: 1-21.
- ◆ Vander Linden M. & Roberts B. 2011. A tale of two countries: contrasting culture-history in British and French archaeology. In Roberts B. & Vander Linden M. (eds.) Investigating archaeological cultures. Material culture variability and transmission. New-York, Springer: 23-40.

Diana Solares Pineda, (Universidad Autónoma de Querétaro, México)
Calculation and numerical writings : a space of conflict between agricultural workers.

Abstract - Calculating will present an analysis of current agricultural activities in which numerical writing and calculation are mobilized by people involved in the agricultural work in Mexico. This analysis comes from a larger study that aims to determine the mathematical knowledge of migrant agricultural families.

For identifying this knowledge, the agricultural activities are analyzed in terms of “praxeology” by considering:

- ◆ What is the specific task to be done and what is its purpose?
- ◆ Who is involved and what are the goals of the participants?
- ◆ How are tasks solved and what tools are used?
- ◆ What is the discourse elaborated for supporting the performance of tasks?

Consideration of these aspects show that the techniques used by the workers in the fields to write and calculate with numerical information depend on the purpose of the task and the workers’ function and hierarchy. This consideration is implicit in the discourses of the different workers who talk about the techniques; such discourses appear in

moments of teaching and particularly when there are conflicts between workers. The capability of recognizing numbers and calculations written by someone else is fundamental, but this is not limited to the use of a writing code nor the correct performance of an algorithm; it is equally necessary to know why the document was written, who wrote it and why he/she wrote it.

In addition, I will briefly present a dialog between different theoretical perspectives that allow to construct the analysis tools used.

The purpose is to contribute to the research that aims to identify links (or breaks) between the mathematical knowledge that these immigrant children use in their work activities and the one they are taught at their schools.

Le calcul et les nombres écrits : un espace de tension entre des travailleurs agricoles

Résumé - Je présenterai l'analyse des activités agricoles d'aujourd'hui qui impliquent l'utilisation de l'écriture et du calcul numérique de différents acteurs du travail agricole au Mexique. Cette analyse provient d'une étude plus large cherchant à identifier les connaissances mathématiques des familles immigrantes de travailleurs agricoles. Pour identifier ces connaissances, les activités agricoles ont été analysées en termes de "praxéologie", en considérant :

- En quoi consistent les tâches spécifiques et quels sont leurs objectifs ?
- Qui participent à ces tâches et quels sont leurs intérêts ?
- Comment ces tâches sont effectuées et avec quels outils ?
- Quels sont les discours concernant la manière de réaliser les tâches ?

La prise en compte de ces aspects montre que les techniques des travailleurs agricoles pour écrire des informations numériques ou pour faire du calcul numérique sont conditionnées par l'objectif de la tâche, par la fonction et la hiérarchie des travailleurs. Cela est implicite dans les discours des différents travailleurs qui s'expriment sur les techniques; ces discours apparaissent dans des moments d'enseignement et particulièrement quand il y a des conflits entre des travailleurs. Être capable de reconnaître les nombres et les calculs que l'autre a écrit devient fondamental, mais cela ne se limite pas à une codification de l'écriture ni à l'exécution correcte d'algorithmes ; il faut également savoir à quoi sert le document qui contient ces nombres, qui l'écrit et pour quoi faire.

De plus, je présenterai d'une manière succincte le dialogue entre les perspectives théoriques qui ont permis de construire les outils d'analyse utilisés.

L'objectif final est de contribuer à l'identification des relations -ou les distances- entre les connaissances mathématiques extrascolaires des enfants des familles immigrantes et les connaissances qui leur sont enseignées à l'école primaire.

Agathe Keller et **HIROSE Sho**, (SAW project & SPHERE , CNRS – Université Paris Diderot)

On schools, traditions or cultures in Sanskrit mathematical and astral sciences: some considerations.

Abstract – The mathematics and astral science found in Sanskrit texts have more often than not been considered as a homogenous, ahistorical whole, both from within this scholarly tradition as by those who have studied it. Little has then been reflected on what notions of « culture » could be applied within it. We suggest here to critically re-open the notion of « school », and « tradition » categories that exist within the Sanskrit scholarly sources themselves, to see if they help us describe different sets of practices and associated values, by a group of people. In the background we will wonder: when does a system with a set of practices and values become a culture? When are we describing variations within a same culture? Should we apply to actors categories that do not belong to them? To do so, we will take two case studies: one on the sharing and transformations of proofs between commentators [Bhāskara (fl. 629), Pṛthūdaka (fl. 850) and Amarāja (fl.12th century)], the other to critically re-open the idea of « Kerala school ».

Session 5 - June 20th, 2016

Readers and Speakers

Florence Bretelle-Establet, *Texts reading of LEI Hsiang-Lin Sean*

Ludovic Coupaye, *Texts reading of Clifford Geertz, Philippe Descola, Michael Carrithers and Haudricourt*

Reviel Netz, *The Mathematical Cultures of Greek Cultures*

LEE Eunsoo, *Makers, Readers, and Translators of Mathematical Diagrams*

Florence Bretelle-Establet, (ERC Project SAW & SPHERE, CNRS -Université Paris Diderot)

Texts reading of

◆ Sean Hsiang-Lin LEI, *Neither Monkey nor Horse, Medicine in the Struggle over China's modernity*, chapter 8, "The Germ Theory and the Prehistory of "Pattern Differentiation and Treatment Determination", pp. 167-192

Ludovic Coupaye, (University College London, United Kingdom)

Texts reading, of

◆ Clifford Geertz: *The Impact of the Concept of Culture on the Concept of Man in The Interpretation of Culture*, Chapter 2, 35-54

◆ Philippe Descola: *The Great Divide in Beyond Nature and Culture*, Chapter 3, 57-85

◆ Michael Carrithers (ed.): *Ontology is just another word for Culture in Critique of Anthropology*

online: <http://coa.sagepub.com/content/30/2/152>. Not all texts, but people should choose one text and at least read the introduction and the debate at the end.

◆ Haudricourt, André-Georges 1987[1962]: "Domestication des animaux, culture des plantes et traitement d'autrui" in *La Technologie, science humaine. Recherches d'histoire et d'ethnologie des techniques*. Paris, Editions de la Maison des Sciences de l'Homme, 277-285.

Reviel Netz, (Stanford University, USA)

The Mathematical Cultures of Greek Culture

Abstract – The practices of Greek mathematics were, in some ways, stable throughout antiquity. In other ways, we can note specific practices typical to the various eras such as the Hellenistic world, or Late Antiquity. In this talk I account for such features – both stability as well as transformation – as responses to wider features of ancient Greek culture.

LEE Eunsoo, (Stanford University, USA)

Makers, Readers, and Translators of Mathematical Diagrams

Abstract – In general, classical philology is a discipline that studies transcribed texts. Philologists compare various readings of transcribed texts in order to reconstruct the archetypal text. Besides the text, diagrams are drawn in geometrical treatises. Shared diagrammatic errors found across manuscripts reveal that diagrams were also transcribed. Considering the plethora of studies on the scribal practices of copyists, it is surprising that diagrams are rarely studied in a similar manner as transcribed objects. The makers, readers, and translators who partake in the transmission of diagrams are shrouded in obscurity.

My talk will present preliminary research analyzing the practices of transcribing diagrams. In particular, my research investigates manuscript diagrams in Euclid's Elements, and discusses the features of the transcribed diagrams. Based on the analysis of the transcribed diagrams, several questions will be discussed: Who copies the diagrams; who has access to them; who reads and uses them; who translates them? How are the transcription, transmission, and dissemination of diagrams done? Can we find a common rule between the textual transcription and diagrammatic transcription? Through these questions, this talk aims at exploring the complex transmission of visual knowledge.
