

## **RITUAL POWERS OF EMPTY LANGUAGES**

This course is an attempt to understand the problem called Indian Mathematics Education. The more general purpose is to develop a method of inquiry into the evolution of Knowledge and Education in India, as we see it in its present forms. We use Mathematics specifically as a knowledge system to illustrate this method - in order to be able to pay the kind of attention that the specificities of any knowledge system deserves for such an attempt.

Through this course:

1. We start off to locate 'Mathematics as a Knowledge System' within the traditional Indian and Mathematical philosophical tenets. While doing so we also arrive at 'Mathematics as (a family of) Language(s)' formulation.
2. Through these constructs - in their historical, cultural, material, linguistic and logical aspects – we try to build a material philosophy of mathematics.
3. It is hoped that such a philosophy would enable us see the current form of Mathematics Education in India with some clarity - that is arrive at the ontology of affairs with some of the relevant conceptual ammunition.

This course is not supposed to be a philosophical query in itself, but would hopefully be a useful forum to discuss how to act in the current scenario of Mathematics Education in this country.

### ***PART I: INTRODUCTION OF THE PROBLEM (3 MEETINGS)***

The human existence has forever been torn between Material (Physical) Existence and Psychological (Metaphysical) Existence. And human philosophies have been attempts to make sense of this constant tearing apart of our existence. In this course we focus on the question of the Philosophy of Mathematics in particular, sticking to the words of Debiprasad Chattopadhyay who described the question of Materialism versus Idealism as “the fundamental question of all philosophers”. We begin with Chattopadhyay’s description of the conflict between Indian Materialism and Idealism on the question of Matter versus Consciousness. In such a context we try to locate the broad philosophical debates around Mathematics, following Hacking. We pay special attention to the journey from the Physical to the Metaphysical, and the role played in such a journey by deduction, logic and narratives. Following this we look at the history of the tearing up of the Metaphysics from the Physics, and in the light of this try to understand the ‘unreasonable effectiveness of Mathematics’ as claimed by Wigner, and discussed by Hacking and Sarukkai.

[Chattopadhyay, 2009], [Hacking], [Heidegger], [Bohros], [Font, Godino & Gallardo], [Godino & Batanero], [Radford], [Doxiadis & Mazur], [Sarukkai, 2003], [Steiner]

### ***PART II: THE INDIAN STORY***

#### **THE STORY OF LANGUAGE (2 MEETINGS)**

“What comes first, the world or language?” asks Sundar Sarukkai. In this part we dig deeper into the journey of the Physical into the Metaphysical, specifically in the context of creation of what Frits Staal describes as ‘Artificial Languages’. We focus on Staal’s (and PP Divakaran’s) work on the history of Panini’s Sanskrit, and trace its deep relation to Sanskritic Mathematics in India. We look at the knowledge politics of the (non-)development of Algebra from Arithmetic on the one hand, and that of Geometry from Construction on the other. We see this evolution as the manifestation of a history of

constant strife between contesting ideologies. In particular we see how the study of the political cultural journeys of a language could trace the journey of material politics in the country, taking help from Romila Thapar's "Early India" and Sarukkai's "Indian Philosophy and Philosophy of Science".

[Staal, \_ ], [Divakaran], [Thapar], [Sarukkai, \_ ]

### **THE STORY OF EMPTINESS (2 MEETINGS)**

Next we focus on the eventual tearing apart of the Metaphysical from the Physical – creating what we call an 'Empty Language'. We specifically trace the (pre-)histories of such emptiness in the case of the inseparable twins of Indian 'high-culture' languages – Sanskrit and Mathematics – and their eventual graduation into what has been called the 'Language of Gods'. In particular, we pay due attention to the ruins of an early proto-materialism on which such empty linguistic edifices are constructed, and locate the history of heterodox resistances in such a context. Particularly in the Indian context, we analyze the central role played in such a history of emptiness by an ideological stand against matter, calculations, criticality, deductions and writing - perpetuated by didactic principles such as *shrutis* and *smritis*, and the political techniques of surplus extraction. As critical episodes in this narrative, we look at the case of Early Indian medicine as illustrated in Chattopadhyay's 'Science and Society in Ancient India', and what we are going to call the 'Varahamihira Duality' as seen from the accounts of Albiruni and Chattopadhyay. In particular we also look at what Sarukkai calls 'Writing of Mathematics'.

[Chattopadhyaya, 1978], [Chattopadhyay, 2009], [Divakaran], [Sarukkai, \_ ]

### **THE STORY OF RITUALS (2 MEETINGS)**

In this part we trace the history of Ritualism as an essential bureaucratic mechanism to perpetuate the rupture between Physics and Metaphysics – as central to the process of surplus accumulation. We base our discussion on Frits Staal's 'Meaninglessness of Rituals', and try to understand the social economic and epistemic functions of Ritualism as an exact science. Beginning with the evolution and reification of patriarchal rituals in Brahmanic India as an ideological process, fraught with resistance from heterodox forces, we try to understand the role played by Ritualism in mathematics and mathematics education and the creation of the 'cult of secret knowledge'. We draw crucial distinctions between 'magic' and 'ritual' as a signifier of the distinction between the social realities that produce such ideas. In parts we refer to Sarukkai's 'Mathematisation of Human Sciences: Epistemological Sanskritisation?' to understand the connections between Mathematization, Ritualization and Sanskritization.

[Staal, \_ ], [Chattopadhyay, 2009], [Sarukkai, 1995]

### **THE STORY OF POWER (3 MEETINGS)**

Finally we investigate the power structure that is created by, and in turn creates such dominance of Idealist Metaphysics based on ritualistic empty languages built upon axiomatic religious foundations, on the Physical Materiality of the human subject. Specifically we follow Sheldon Pollock's description of the formation of the Sanskrit Cosmopolis through the dual instruments of social monopolization (through religio-legal principles such as *dharma*, and religious axioms such as *karma*) and discursive ritualization. We argue how 'Pen (or rather Speech) is mightier than the Sword' has actually played out to its fullest in India – in a totally cynical sense. We also discuss how such 'Power of the Word' has been central to the priestly State-formation in India built upon religio-legal banning, and necessary co-option, of criticality. Beginning from this we trace the journey till our present times, trying to

understand the deep relations between the ‘Keepers of Secret Knowledge’ and the State machineries, while specifically focusing on the central role played by high-culture Mathematics in such an endeavor of epistemic violence. For this part we follow Chattopadhyay, Thapar, Pollock, and Braj Ranjan Mani.

[Pollock], [Chattopadhyay, 2009], [Thapar], [Mani]

### ***PART III: ENCOUNTERS WITH THE WEST (4 MEETINGS)***

At this stage of the course we try to piece together (in very broad strokes) the history of encounters of Indian mathematical scene with Western cultures, and place it in the complex ecosystem of multiple epistemic realities. We focus on connections and comparisons with Babylonia, Arabic world, Greeks, and later the European colonialists. We pay special attention to the Greek-Hellenic schools as a critical comparative test case of another similar yet different story of Language Philosophy and State Power. We also critically examine various Indian nativist strands that have emerged over the recent past as an nationalist reaction to the colonial era. We base our discussions on Høyrup, Thapar, Pollock and the “History of Indian Science, Technology, and Culture. AD 1000-1800” by Rahman, Rahman and Chattopadhyay. (We ideally must also account for our intimate and crucial encounters with the East, of which there are great volumes written in recent times. But we focus on the West in this course mainly because our current pedagogy seems to have much more to do with the Western side of the planet than the Eastern.)

[Høyrup], [Thapar], [Pollock], [Rahman, Rahman & Chattopadhyay]

### ***PART IV: THE EARTH AND THE HEAVENS***

#### **GODS ON THE HILLS, AND GODS IN THE HEAVENS (2 MEETINGS)**

In this part we try to use the preceding discussions on history, to try and look forward. We recap the pre-history of the creation of totalitarian heaven-dwelling Gods in an individualist society segregated by surplus accumulation, from anthropomorphic ‘comradely’ earthy Gods of a primitive collectivist society that acknowledged human frailties. We then try to understand a similar process in the corresponding Idealisation in Mathematics. Based on this we argue for a recalibration of the philosophical discourse around Mathematics along the Materialism-Idealism axis. In particular we make a case for a Materialist Mathematics Education that views Mathematics as merely an attempted formalisation of already existing collective human linguistic narratives.

[Chattopadhyay, 2009], [Pollock]

#### **LABORING EARTH, AND LEISURELY HEAVENS (2 MEETINGS)**

Here we recap the historical material process of the construction of intellectual heavens through totalitarian didactic principles such as *guru-shishya paramparas*, spatio-temporal ruptures, epistemological meta-rules that are inward looking, and religio-spiritual criminalization of criticality. We discuss Heavens as Institutions and Institutions as Heavens – as Ideological Apparatuses, and in particular look at the question of ‘Institutional Practice in meaning making’ as raised by Godino&Batanero. We retrace the history of the emergence of the ‘leisurely class’ in Early Indian history and their solidification over a period of thousand years. We discuss how this was based on the outsourcing of manual labor to toiling castes, the deep entrenchment of the varna-jati complex, stigmatization of manual labor, religio-legal impossibility of upward social mobility, and the

establishment of the supremacy of mind over hands. We locate the construction of the Brahmanic mathematical edifice on such foundations of the labor of subjugated jatis and religious axioms, while structurally preventing them from access to Brahmanic knowledge as well as while denying them the required ownership of their own surplus labor and time, for epistemic tool developments. And based on this we investigate the inseparability of the question of Mathematics Education with that of material surplus extraction in a market society. We follow Thapar, Chattopadhyay and Mani for this discussion.

[Thapar], [Chattopadhyay, 2009], [Mani], [Hacking]

### **THE SIN OF MATERIALISM, AND FALLING FROM THE HEAVENS (2 MEETINGS)**

Here we discuss the idea of religio-epistemic ‘sin’ of the Platonic Ideal committing to the Materialistic Empirical. We follow Chattopadhyay’s description of the characterization of the Lokayata by Brahmanic texts, and the denigration of manual or material work. We begin with looking at the curious case of the Asvins - their journey from initial earthy Gods, to Heavenly Gods, and their eventual fall from the Heavens. Eventually we reach the present times of violence on medical practitioners, nurses and midwives. This is a story of the religious sanction against physical and epistemic healing, and can be taken as a glaring example of epistemic violence. In light of this we try to understand the significance of the epistemic glory attributed to ‘Pure’ Mathematics, and argue for a Materialistic Mathematics education located in the ‘Impure’ Human Material experience. We pursue Chattopadhyay and Sarukkai’s accounts for this part.

[Chattopadhyay, \_ ], [Sarukkai, \_ ]

### **PULLING THE HEAVENS DOWN (4 MEETINGS)**

In these closing parts of the course we take up the question of how a Materialist Mathematics Education might look like. We take up a somewhat thorough reading of Lakatos’s landmark ‘Proofs and Refutations’ as an example of the dialectic materialist method of pedagogy, described as “damaging or destroying the myth of the certainty of mathematical proof” by Hacking. The other book dealing with classroom pedagogy that we take up for this discussion is Georg Polya’s “How to Solve it” which has been described as a kind of predecessor to Lakatos’s book.

[Komatsu], [Lakatos], [Larsen & Zandieh], [Polya]

### **WHAT NEXT? (2 MEETINGS)**

This brings us to the end of the course. All we do in this part is to discuss possible concrete ways to act in the present situation of crisis this society (along with the rest of the planet) is faced with, with the specificities as the course intends to bring out to the discussion table. There are no references required as of now for this part, except for our standard school mathematics texts that we might want to investigate.

### **TECHNICAL DETAILS:**

4 Credit course. Total hours: 56. Participants will have to present on specific contents and lead discussions on a somewhat regular, rotational basis. Each participant will be required to write a term paper at the end of the term on a specific topic. Grades will be assigned based on participation, and the final term paper.

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