What Can a Global Turn in Philosophy of Science Look Like?

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In recent decades, history of science has gone global. But what about philosophy of science? Taking cue from the global turn in history of science, I put forward an account of what a global turn in philosophy of science can look like. My account draws upon the hermeneutical approaches to integrated history and philosophy of science, championed by Jutta Schickore and Hasok Chang. On the way, I demonstrate – by examining the case of the Great Trigonometrical Survey of India – that much is to be gained, by both sides, from a closer integration of global history of science and philosophy of science.

I. Introduction

If you were to visit the Minneapolis Institute of Art at its McKim, Mead and White designed Beaux-Arts building on Third Avenue South, head to the second floor, pass the Ancient Art galleries, and enter the small and intimate Gallery 243, you may see – as I did just before attending the conference at which this paper was initially presented – a High Medieval gold aquamanile in the shape of a lion, a 14th century Jingdezhen porcelain dish with a peacock pattern, and an illustrated manuscript of the 15th century Persian Sufi poet Jāmī's *Baharestan*. You may also – as I was – be drawn to the imposing golden-framed painting on the far wall. That painting is *The Carpet Merchant*

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by the French painter and sculptor Jean-Léon Gérôme. In the bustling heart of a Cairo souk, men in various turbans – some white, others green – are engaged intensely in commerce. Their faces are a study in intense calculation, their gestures a silent language of negotiation. Gérôme, who was a champion of a genre of art known as *Orientalism*, lavished every brushstroke on the textures: the deep-piled wool of the rugs, the intricate stucco work on the walls, the diffused light in the covered market. He was one of the late-19th century's great purveyors of the 'Orient', a term that encompassed everything from North Africa to British India and from the Ottoman realms to Qing China, and his work was hugely popular with a Western public hungry for a glimpse of these oft-imagined worlds. His *Carpet Merchant* stands as an exemplar of the French Orientalist tradition (for a *catalogue raisonné* of Gérôme, see Ackerman 1997).

Orientalism in art was many things but it was in large part a specific response to the situation arising from the interaction between the Western and the non-Western world. This interaction, which was expedited in the 19th century by the imperial ambitions of the European powers, was asymmetric: Orientalist paintings are – unsurprisingly – infected by a Western gaze, with descriptions of the Orient stereotyped and the subjects of the painting treated as the non-Western *Other* (Said 1979; Nochlin 1989). 19th century Orientalism represents one way by which a field confronted complexities, endeavored engagement, and incorporated interactions between different cultures and different worlds.

The question I want us to think about is similar to the one faced by Gérôme and other artists some one-hundred-fifty years ago: what will the future of a discipline be if it was freed from its geographical confines? What happens when a discipline, born and raised in the West, tries to think and work on a global scale? Or: *What can a global turn in the philosophy of science look like*?

In answering this question, I start by motivating the need for a global turn in the philosophy of science. I do this by appealing to the recent global turn taken by one of our closest allies – history of science (section II). The historians, as it happens, have already set forward a path for us. I briefly note what the global turn in the history of science looks like and how it has transformed the approach of the discipline. Following which, I propose two models for a global turn in the philosophy of science: one analogous to a marriage and the other to a merger (sections III and IV). I suggest that the merger proposal is better fit for our purposes by appealing to considerations from the history and philosophy of science and post-colonial studies. I close by implementing my proposal of a global philosophy of science, showing the fruitfulness of the approach advocated here (section V).

Gérôme, Jean-Léon. (1887). *The Carpet Merchant*, Minneapolis Institute of Art, https://collections.artsmia.org/art/1036. Accessed 23 July 2025. Public domain.

II. The Global Turn in History of Science

The global turn in the history of science is best understood in the context of the wider global turn in historical scholarship, a shift in the focus of historiography which has flourished in the last three or so decades (Martone 2018). In a recent monograph about the global turn – *What is Global History?* – the historian Sebastian Conrad characterizes global history, at first-pass and rather straightforwardly if uninformatively, "as a form of historical analysis in which phenomena, events, and processes are placed in global contexts" (Conrad 2016, 5) . Conrad, in this regard, resonates with prior historiographical currents that underscored the importance of historical interactions, interdependencies, and involutions of spaces (Dirlik 2005). Much can be, and has been, said about the global turn in history, but for the aspects of the global turn I want us to pay attention in particular here, it will be good to think about it in terms of the '3Cs'':

- ***Contrast***. For many of us, our first history and philosophy course in university would have introduced us to the works of Joseph Needham and George Basalla (Needham 1969; Basalla 1967). Their works are standardly categorized as works in world or global history. But the approach taken in the global turn in history is intentionally in contrast to these earlier

approaches. While the earlier approaches focused on questions of knowledge development and dissemination in different cultures and regions (for instance the 'Needham question' or Basalla's three-stage model of the spread of science in non-European nations), the modern approach shies away from being an exclusive comparative analysis. Instead the focus is on how the interactions and connections between different actors (individuals, institutions, etc.) shape and form knowledge and how knowledge so produced travels, shedding its spatiotemporally local production context. Compare: Needham asking 'why did modern science develop in the Western world instead of China?' with contemporary historians asking 'what was the influence of nation-building in the practice of archaeology and geography in Republican China?' (Fan 2007).

- ***Complementary***. The global turn in history positions itself as complementary to other approaches in historiography that aim to tackle questions of interactions between the West and the non-West and that challenge the Eurocentric narrative of history. These approaches include those based on postcolonial, feminist, comparative, transnational, or world-systems theories (Conrad 2016, chapter 3). The global turn is not a competitor to these. Instead it travels on much of the same road as these approaches, even if differing in points of stress. As Conrad notes, all these approaches 'share a general concern with transcending narrowly national perspectives and going beyond the interpretative hegemony of the West' with the aim of exploring historical questions without being restricted within the categories of nations and empires (2016, 38). Further, all these approaches share a commitment to the aptness of global non-local explanans. For instance, in providing an explanation of the divergence between the economic development in the Yangtze Delta and Lancashire, the historian Kenneth Pomeranz appeals to global influences including Britain's access to the North American market (Pomeranz 2000).
- ***Connections***. Finally the global turn in history is characterized by its focus on connections and interactions between different actors in the global sphere. Terms like circulation, transport, exchange, entanglement, and networks are used to indicate the movement of and relations between ideas, knowledge, individuals, materials, capital, and institutions. This focus on mobility when objects are transported from one location to another is perhaps best represented by the rejection of the center-periphery model of knowledge production in favor of a circulatory model. Kapil Raj in his *Relocating Modern Science* argues against the view, exemplified by the center-periphery model, that knowledge is produced at a unique geographical location (most commonly – the West) and proposes to understand scientific knowledge production as emerging from interactions of and circulations between different knowledge bases, artifacts, and expertise (Raj 2007). Raj illustrates his position by various case studies of science in South Asia stressing the importance of networks – commercial, epistemic, and political – in the creation of knowledge.

The global turn in the history of science has been widely influential. As a data point: a couple of weeks after the Minneapolis conference where this chapter was first presented, the annual meeting of the History of Science Society (which until recently met jointly with the Philosophy of Science

Association) took place in Mérida. It was a special occasion as it was the Centennial conference for the HSS and appropriately the theme for the conference was 'Imperfect Pasts, Uncertain Futures' (HSS 2024). A look at the Call for Proposals makes clear the impact of the global turn: proposals were encouraged for sessions in 'The history of science in Latin America', 'The history of science in the Global South', 'Indigenous knowledges and practices', and 'Decolonial approaches to the history of science'.

Contrast this with the landscape in the philosophy of science: there has been little to no attention paid in the philosophy of science on transnational science (with Ludwig et al. 2022 being an exception). What, then, can a global turn in the philosophy of science look like?

III. Marriage and confrontation

Advocating to explore a new avenue is a gamble. The downsides are immediate: no canonical problems, no established lexicon, and no guarantee of a meaningful return on the investment of time and resources. But there's at least one major benefit. Yet, the very uncertainties unlock a rare opportunity. The norms and organizing questions are still unsettled, allowing us to chart a course for a global philosophy of science before its path becomes calcified. And this provides us with an opportunity to shape it in the way we see fit. In this spirit, I present two approaches to what a future global philosophy of science can look like – one which I don't like and the other which I prefer. I hope that others also see the benefits of my preferred approach and feel the excitement of the promise that it holds.

In an influential review article of a collected volume of a conference held at this very place fifty-five (!) years ago, Ronald Giere put the relation between history of science and philosophy of science as a "marriage of convenience", one that "may be better than living with one's parents, history and philosophy respectively" but which is devoid of "the passionate involvement and deep communication that one was led to expect"' (Giere 1973, 283). This led to sustained discussions with many defending the view that the relation between the two is much more intimate and essential than Giere suggested (McMullin 1976; Burian 1977). A result from these reflections on the status of history and philosophy of science was the *Scrutinizing Science* project led by Arthur Donovan, Larry Laudan, and Rachel Laudan (Donovan et al 1988). The aim of the project was to 'empirically' scrutinize philosophy of science, fashioning history and philosophy of science in the image of the sciences.

The relation between history of science and philosophy of science espoused in the Scrutinizing Science project is an *evidentiary* relation – episodes in the history of science confirm or confute philosophical theses about the nature of science. Because history of science is employed to confront philosophy of science, this model has been called the *confrontational* model. A clear parallel can be seen between data/observations and theory on one side and history of science and philosophy of science on the other. A global philosophy of science based on the confrontational model is a global philosophy of science which imitates this evidentiary characteristic, marrying global history of science with

philosophy of science. So envisioned, the relation between the global history of science and philosophy of science parallels the relation between data/observation and theory – the data generating global history of science and the theory generating philosophy of science are confronted with each other.

The advantage of such a model for the global turn in philosophy of science is two-fold. First, it can be implemented straightforwardly without requiring extensive shifts in either research methodologies or pedagogy. Philosophers of science will be doing the same kind of work most of us are engaged in right now: proffering philosophical theories of scientific activities and using episodes from the history of science or cases from contemporary science to confirm or refute our accounts. Second, including work in the global history of science in the evidential basis will lead to an expanded, more complete basis of historical evidence – one which includes a larger repertoire of scientific episodes by encompassing examples of non-Western science and scientific practices. This will result in severer tests of philosophical theories, a consequence in line with the ambitions of the confrontational model.

In recent years however the confrontational model has been subject to considerable scrutiny, particularly with regards to its evidentiary characteristic (Schickore 2011; Chang 2012; Rheinberger 2010). Jutta Schickore's criticism of the confrontation model is particularly apt and penetrating for the matters at hand here. Schickore argues that the confrontational model fails to establish the evidentiary relevance of history of science to philosophical theorizing because of two interrelated problems. First is the problem that history of science and the work that historians of science do seem inapposite to be the kind of evidence which can be used to confirm or refute philosophical theories. In the confrontational model the data generated by history is confronted by the theory generated in philosophy. But Schickore points out that contemporary historians of science and contemporary historiography are not just focused on tracing the trajectories of scientific concepts and phenomena. Instead, historians study a wide array of different historical objects and agents, often intensely indexed to their local cultural and social contexts – from the use and dissemination of Feynman diagrams in high energy physics (Kaiser 2005) to the cultivation of alchemy in Elizabethan London (Harkness 2007) and from the interaction of biblical scholars and natural philosophers in sixteenth-century Spain (Portuondo 2019) to the centrality of fascism in early breeding science (Saraiva 2018). Schickore concludes that contemporary historiographic interests do not lend themselves straightforwardly to be used as data for philosophical theses about science.

However even if there are some historical works which may serve as data for philosophical theories, they will still be unable to confirm or refute the theories. Schickore calls this the problem of the 'theory-ladenness of historical data'. The crux of the problem is straightforward: in order for historical data to bear upon philosophical theories, it is required that historical episodes be characterized manifestly. But any such characterization presuppose philosophical concepts, the very concepts to be empirically tested. (However see Scholl 2018 for a reply to Schickore on this point).

Both of the problems Schikore identifies are problems for the marriage of history of science with philosophy of science and thus also problems for a global philosophy of philosophy created in the

image of such a marriage. Global history of science, unsurprisingly after all, is history of science. It follows modern historiography in studying a wide range of historical actors and objects – often deeply intertwined in their local contexts – from looking at the development of public health policies in the eighteenth century Spanish empire (Santos 2010) to tracing the work of French entomologists through their correspondences (Terrall 2010). Similar to the general case, the theory-ladeness of historical data also infects global history of science – an apt description of (say) the activities of British naturalists in Qing China cannot be provided without any philosophical presuppositions (Fan 2018). In telling narratives like these, one already *engages* and *implicates* philosophy of science.

But the prospects of a global philosophy of science based on the confrontational model are even bleaker for it faces three novel problems of its own. The first problem concerns the issue of science/non-science demarcation but in a global context. The problem of demarcation, the problem of demarcating between science and non-science, has of course a long tradition in history and philosophy of science. Most famously, the logical positivists proposed verficationism as a demarcation criterion between science and metaphysics (Carnap 1967) and Karl Popper proposed falsificationism as a demarcation criterion between science and pseudoscience (Popper 1962). A philosophically satisfactory solution to the demarcation problem is still elusive and the problem remains vexed and unsettled (I hurry to add that, due to various factors, the demarcation problem does not occupy the same status that it did fifty-years ago and that its death has been announced by many at many times – most notably Laudan 1983; although see Pigliucci 2013).

The demarcation problem becomes more acute, and acquires renewed bite, if global philosophy of science is based on the confrontational model. The most pressing issues in this instance of the demarcation problem include questions such as whether indigenous forms of knowledge and knowing science? Or are indigenous forms of knowledge non-science? Or pseudoscience? This is a hard question to answer and has large downstream consequences in philosophy, sociology, politics, and science-at-large. For instance, the recent debate about the inclusion of mātauranga Māori in the New Zealand secondary school science curriculum can be seen as being a debate on demarcation criteria (NCEA Education; Clements et al 2021). In the confrontational model, the demarcation problem needs to be settled before engaging in a global philosophy of science based on the confrontational approach – for whether a particular historical data about science confirms or refutes a philosophical theory depends on whether the historical data is *about* science. Given the difficulties with settling the demarcation problem and the fact that the confrontational model based global philosophy of science presupposes a solution to an instance of the demarcation problem, an approach to global philosophy of science based on the confrontational model is, in my view, a non-starter.

The other problem – this one from the post-colonial tradition – interrogates the very nature of the global. An important insight from decades of scholarship in post-colonial studies highlights the persistence of extractive relationships that continue long after the flags of empire have been lowered. While former colonies may have their independence, their resources – be they mineral wealth or intellectual labor – are often still seen by the West as raw materials to be exploited, not as sources of

value-creation in their own right. The dynamic remains colonial, even if the formal structures have vanished. Perhaps the most potent expression of this idea is the *dependency theory* developed by the economist André Gunder Frank's. As Frank argued in his 1967 book, *Capitalism and Underdevelopment in Latin America*, resources flow in a single, asymmetrical direction from the impoverished peripheries to the imperial cores, a process that ensures the continued underdevelopment of the former colonies (Frank 1967).

A global philosophy of science based on the confrontational model reinforces this exploitative asymmetric structure. In this framework, the global is reduced to a supporting subservient role: a data mine to either prove or disprove philosophical theories that are conceived exclusively in the West. In parallel to the critique exemplified in the dependency theory, raw material – in this case epistemic materials – flow from the peripheries to the core. The hinterlands are seen merely as sources for extraction, while all the true intellectual labor – the value creation – happens only at the core.

This also puts into relief the third problem for a global philosophy of science based on the confrontational model: it is at odds with contemporary global history of science. A characteristic of the global turn in the history of science is its rejection of the *center-periphery* model of knowledge production in science (Raj 2013). On the center-periphery model, knowledge originates at a particular spatially delineated region ('the center') after which it disseminates outward to other regions ('the peripheries'). Much work in science studies, for instance, studies which take knowledge to originate essentially locally in a laboratory follow the center-periphery (Collins 1985; Gallison 1997). The center-periphery model also underpins much work in history of science which focuses on the spread of scientific knowledge created in the Western world ('center') to the non-Western spaces ('peripheries') and the imperialist undercurrents of that dissemination (Basalla 1967; MacLeod 2000). Rejecting the center-periphery model, an influential strand in contemporary global history of science takes knowledge production to be spatially non-circumscribed. On the *circulatory* model, knowledge originates in the interaction and circulation of (locally-specific) materials, artifacts, people, practices, and ideas in a spatially diffused network, underlining the indispensable role of movement in 'the historical contingency and mutation of scientific notions and practices' (Raj 2007, 20). The shift from the center-periphery model to the circulatory model of knowledge production is difficult to accommodate within a confrontational global philosophy of science since it rests heavily on the distinction between the center/core (usually the West) and the periphery (usually the non-West).

IV. Merger and hermeneutics

Schickore's alternative to the confrontational model is an approach to history and philosophy of science which is deeply historicist. The relation between history of science and philosophy of science is no longer considered to be an evidentiary relation – history of science does not provide evidence for theories in philosophy of science. Rather, Schickore considers the relation between history of science and philosophy of science to be *hermeneutical*. This involves mutual and iterative refinement of

philosophical and historical categories of analysis through the interaction of the two disciplines (Schickore 2011, 471). On the hermeneutical approach, the metaphor of marriage – where distinctness is preserved – is eschewed for the metaphor of merger – where distinct entities come together to create something novel.

Instead of philosophical theories being made to confront historical episodes, the hermeneutical approach, in rough outline, proposes the following:

- Starting with a provisional set of conceptual concepts and tools and depending on our goals, we approach the historical record.
- The provisional set will go some way in making sense of the historical record but we might struggle with analyzing some aspects of the historical record.
- In light of this we refine, sharpen, and modify our tools and concepts to make better sense of the record.
- We then iterate and approach the historical record with the refined tools and concepts. This may lead to new historical insights but also new historical challenges.
- In light of the new insights and challenges, we modify our tools and concepts and iterate again.
- The cycle of refinement and iteration might continue or it might lead to a state of equilibrium between our concepts and tools and the historical record.

For Schickore, at the end of this hermeneutical process, "we will have clarified our research question, created suitable tools to answer it, and – hopefully – produced a satisfying answer" (474). The iterative hermeneutical journey undertaken by our provisional concepts and tools in light of the initial goals will, at the end, result in a different set of concepts, tools, and goals, more attuned to the history of science (Hasok Chang advocates for, what I take to be, a similar view in Chang 2012).

I want to suggest that a global philosophy of science based on the hermeneutical model is a better approach than the one based on the confrontational approach because it sidesteps the problems that afflicted the confrontational model. First, the hermeneutical approach is immune to the two problems for the evidentiary relation presented above. Because historical episodes in science are not employed as evidence to confirm or refute philosophical theories, the vast diversity of historical objects and actors is not worrisome for the hermeneutical model. Furthermore, the problem of the theory-ladeness of historical data transforms from being a bug to being a feature in the hermeneutical model. No more is the historical record just a passive collection of facts to be marshaled for or against a theory; it is, instead, an active participant in an ongoing dialogue. Since we start with a provisional set of conceptual tools and concepts and expect to refine them iteratively, the spectre of the historical record being useless is diffused. We are not confirming theories; we are building a more nuanced understanding, one that evolves as we engage with the past.

In addition to those mentioned by Schikore, the hermeneutical model provides answers to the three problems I raised above. For the confrontational model the global version of the demarcation

needs to be settled before the global historical data can be used to confront philosophical theories. However no such judgement is needed for the hermeneutical model. Cases in the global history of science need not be characterized as scientific or non-scientific *before* starting an analysis. One can look into a case with a provisional set of tools and concepts and proceed iteratively. If it seems that it is not possible at all to make sense of the cases with the help of the provisional set, then that might indicate that the case can not be treated well with the tools and concepts of philosophy of science. If, however, some sense can be made, then one can refine their tools and concepts and iterate until an equilibrium is approached. For instance, a productive intervention in the debate over including indigenous bodies of knowledge in school education – such as the inclusion of mātauranga Māori in New Zealand schools – can be made using the hermeneutical model. Based on Elizabeth Anderson's account of local knowledge and institutional epistemology, I have, in other work, investigated this very situation (Anderson 2025; Bakshi forthcoming).

As I argued above, the confrontational model perpetuates an exploitative structure and runs counter to contemporary global history of science. The hermeneutical model, in contrast, does well on both these counts. By moving beyond the evidentiary relationship, it reframes global history not as a mere collection of data to be extracted and shipped to the core for analysis. Epistemic raw materials are not taken from their place of origination and transported someplace else to have value added. Instead, the local context – cultural, social, and economic – is integral to making sense of the historical record with the expectation that the provisional set of tools and concepts will be refined and in turn will refine the interpretation of the record. This focus on circulations, interactions, and mutations aligns perfectly with the circulatory model of knowledge, a framework that has become central to global history. The two, in other words, are natural allies.

What can a global philosophy of science based on the hermeneutical model look like? What can, that is, a global philosophy of science look like?

In the remainder of this paper, I embark on answering this question. Instead of providing an abstract formulation – following the mantra of *show don't tell* – I illustrate the power of the proposed global turn in philosophy of science by demonstrating how it leads to interesting and instructive results.

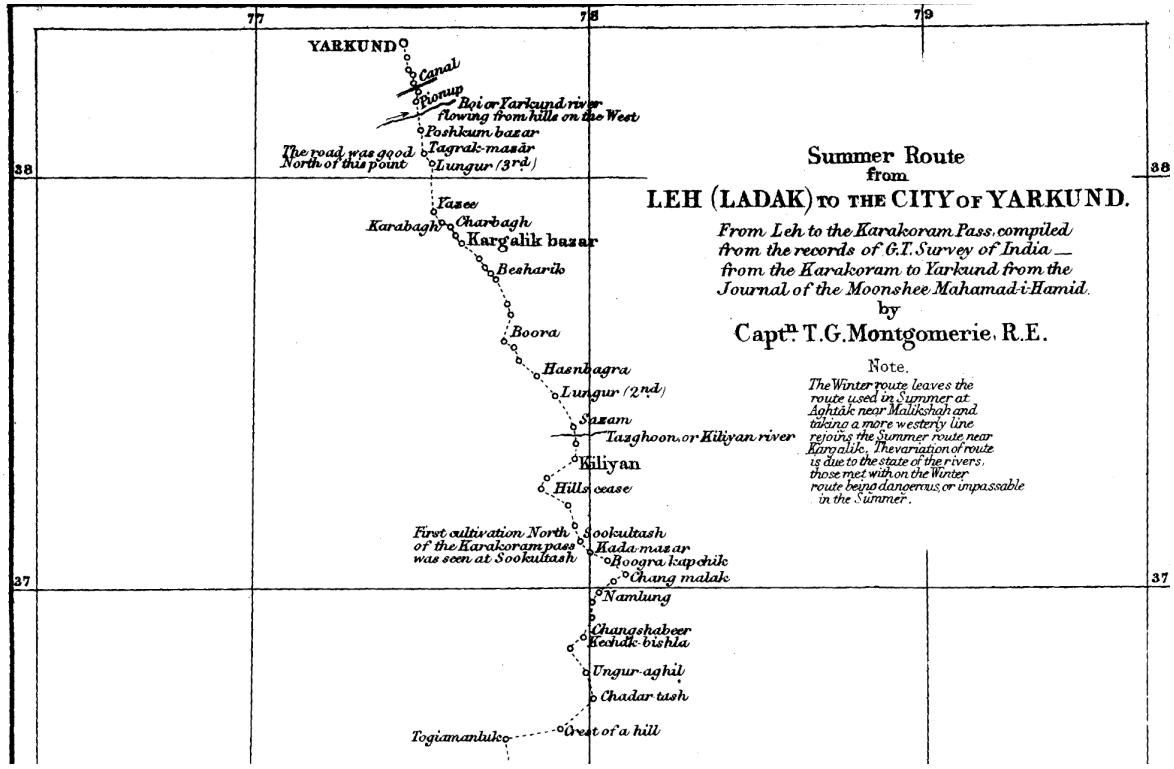
V. An illustration

A particularly illuminating application and defence of the circulatory model is the book *Relocating Modern Science* by the historian and sociologist of science Kapil Raj (Raj 2007). In *Relocating Modern Science* Raj traces the creation of scientific knowledge during the British Raj in colonial India, meticulously and emphatically detailing the various interactions between different actors and objects. He tells the story of, among others, the production of an illustrated natural history by a French surgeon who relied on local health professionals, fakirs, and artists in Bengal; the cartographical

endeavor of mapping the Indian subcontinent by the British colonial government, an endeavor which employed local guides and cartographers; the codification of traditional Indian laws by a close coalition of British jurisprudence experts and local sages – both Hindu and Muslim; and the employment of *human instruments* during the Great Trigonometrical Survey of India. One of Raj's conclusion, in keeping with the emphasis of the circulatory model, is that scientific knowledge originates 'through co-constructive processes of negotiation of skilled communities and individuals from both regions, resulting as much in the emergence of new knowledge forms as in a reconfiguration of existing knowledges and specialized practices on both sides of the encounter' (223).

Consider, for instance, an illuminating historical case discussed by Raj – the undertaking of the 19th century Great Trigonometrical Survey of India. The Survey was a monumental colonial undertaking, a massive enterprise to map the entire subcontinent, even extending into regions beyond direct British control like Tibet and Nepal. In tracing the production of knowledge in the Survey, Raj discusses the essential role of 'local intermediaries'. These intermediaries, trained by and collaborators of the British Survey officials, travelled on foot to map large regions of Kashmir, Tibet, Turkistan, and Transhimalaya, often under false identities and in hostile territories. As Raj notes, these local intermediaries became 'human instruments', developing skills and strategies to collect geodesic data without the use of massive theodolites and heliotropes. This made it possible for them to measure, with high accuracy, distances and locations of interest to the Survey. The local knowledge embodied by the local intermediaries and its circulation led to the production of the knowledge which eventually got published in scientific journals in Britain and Europe.

How are we to understand the central claim of the circulatory model, that knowledge originates from the circulation of individuals, ideas, and items? Following the hermeneutical approach let's start with a provisional set of concepts and tools. In a recent discussion of the importance of local knowledge and the harms that its neglect leads to, Elizabeth Anderson distinguishes between two kinds of knowledge: *mētis* and *technē*. Following the sociologist and political scientist James C. Scott, Anderson calls *mētis* the implicit practical knowledge implicated in a knower's interactions with particular objects of local knowledge (Scott 1998). *Mētis* is contrasted with *technē* which is a general, non-contextual, and propositional kind of scientific knowledge (Anderson 2025, 7). Rejecting as false the dichotomy that a body of knowledge is either universal and scientific or local and non-scientific (Horsthemke 2008, 340), Anderson defends the claim that *mētis* is scientific knowledge, despite being inherently local knowledge. This informs her position that both *mētis* and *technē* are necessary for scientific knowledge and its application. For Anderson the localness and value-parochiality of *mētis* also informs how indigenous knowledge should be taught in classrooms – fieldwork focussed and community collaborative.



A portion of the route traversed by a local intermediary – Mahomed-i-Hameed – in determining the location of Yarkund (now Yarkant). Published in Montgomerie (1866) from Raj (2007, 191).

Anderson's analysis of *mētis* and *technē* prove to be insightful in understanding the circulatory model of knowledge production. The knowledge of locally-specific epistemic objects – ideas, individuals, and items – can be fruitfully identified as Andersonian *mētis* as they satisfy the characteristic properties of mētis. The circulation of different *mētis* which results in their mutation and refinement then leads to the emergence of a general and articulable knowledge – *technē*. The Andersonian framework provides the conceptual underpinning of the circulatory model: different *mētis* in networks of circulations, interactions, negotiations, and trades get refined and mutated to produce *technē* which is a kind of knowledge that can travel through various contexts and regions. In the episode of the Great Trigonometrical Survey, the *mētis* embodied by the local intermediaries (for example the knowledge of how long each their step is or the knowledge of interacting with hostile actors or the knowledge of how to traverse unforgiving – and potentially deadly – terrains) produced the *technē* which eventually got presented at scientific societies and published in journals.

Moreover, in the spirit of the hermeneutical model of global philosophy of science, we can take a step further, modifying our initial tools and concepts *in light of* the historical record. For Anderson, *mētis* and *technē* are two sides of the same coin and a complete picture of science and science pedagogy must include both. I have elsewhere called this the **Complementarity** thesis (Bakshi forthcoming):

> **Complementarity** Both *mētis* and *technē* are necessary for scientific knowledge, its application, and science pedagogy.

But interacting with the circulatory model of global history of science and the episodes of knowledge creation in colonial India suggests a stronger relationship between mētis and technē:

> **Dependency** *Mētis* is necessary for the production of *technē*.

In other words, **Dependency** says that given a body of *technē*, there exists a body of *mētis* without which the production of *technē* would not have been possible. The role of the local intermediaries in the Great Trigonometrical Survey illustrates the point that **Dependency** is a better characterization of the relation between *mētis* and *technē* than **Complementarity** . And so: in *light* of the historical record, we refine our Andersonian framework and iterate, looking at the historical record once more but with adjusted lenses.

VI. The future is bright and global

In *The Carpet Merchant*, as in all of his orientalist works, Gérôme's attention to detail is evident and the richness of the visual diet offered by him to the viewer is irresistible – the elaborateness of rugs filled with intricate patterns; the exquisiteness of the beautifully draped outfits; and the faithfulness of the authentic floors and walls of the rug market. The photographic realism of Gérôme's painting was characterized by contemporaneous art critics as scientific, with Gérôme himself compared to a scientist:

> Of Gérôme, it is alleged that he never paints a picture without the most patient and exhaustive preliminary studies of every matter connected with his subject. In the accessories of costume, furniture, etc. it is invariably his aim to attain the utmost possible exactness. It is this trait in which some declare an excess, that has caused him to be spoken of as a "scientific picture maker." (Christies and also quoted in Nochlin 1989, 37)

In her influential essay, "The Imaginary Orient", the art historian Linda Nochlin critically evaluates the Orientalism movement in 19th century art, showing how orientalist works – including those by Gérôme – are products of imperialist distortion and projection. The practitioners were not simply disinterested objective ethnographers, but were architects of an imperialist fantasy, their canvases less a window onto the Orient than a mirror of Western desires (Nochlin 1989).

In particular, Nochlin highlights the absences which are characteristic of orientalist paintings. These include the absence of history – the people and vistas are depicted as a "world of timeless, atemporal customs and rituals" – and the absence of the Western-centric perspective – with no explicit presence of Western characters in the paintings it becomes easy to forget that the Western gaze is "necessarily the controlling gaze" (Nochlin 1989, 35). What was sold to the public as a window into

another world was, in fact, a reflection of the one looking through it. The canvases of Gérôme and his peers were a colonial mirror, reflecting a Western gaze that stereotyped its subjects as exotic and unchanging, perpetually engaged in the same timeless rituals. The world they painted was not a complex society in flux, but a backdrop against which Western power could be exercised. This was Orientalism: not a faithful transcription of the world, but a specific, powerful way that one world came to see – and, in so doing, to define and control – another.

It is no surprise then that a model of global philosophy of science founded in the image of science exhibits similar absences, similar failures, and similar faults. In proposing the hermeneutical model of global philosophy of science, I have proposed a way to practice global philosophy of science which is not just sensitive to these absences but actively engages with them, recognizing that what is on the periphery, just outside the frame, is often the most important part of the story.

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