‘Modern science is widely considered a purely West European creation.’¹ So Kapil Raj begins a book—Relocating Modern Science—that strongly and, more often than not, convincingly critiques the manner in which historians have tended to conceptualize and write about the histories of science. He sees two dominant strands in the writing on modern science and its purportedly Western European origins: first, a strand that seeks to find the reasons for the ‘putative emergence of modern science within the narrow boundaries of West Europe’; and, second, one that ‘takes for granted the Western origins of modern science and is instead concerned with the modalities of its spread from West Europe to the rest of the world.’² The chapters cover a wide swath of topics and practices, always with an eye toward, first, the circulation and reciprocal constitution of knowledge and practices (rather than their presumed diffusion) and, second, the points of encounter and intercultural exchange among protagonists who do not always figure prominently in histories of science: low- and mid-level bureaucrats; members of trade associations who acquired their skills and much of their knowledge in the field; and native inhabitants (in this case, of South Asia).

For historians of cartography, Raj’s book is of particular interest, not only for its broad analytical and revisionist scope regarding scientific knowledge and practice but also for the specific focus in two chapters on mapping and surveying. In Chapter Two (‘Circulation and the Emergence of Modern Mapping’), Raj examines modern mapping in South Asia as a set of practices co-constituted or co-produced by both British and South Asian subjects. In Chapter Six (‘When Human Travellers Become Instruments’) he looks at the roles of British and Indian subjects, and the use of human beings as instruments, in the surveying of central Asia. Both chapters highlight the varied practices and intercultural complexities of the development of cartographic science and practice. As such, Raj’s work constitutes a shift away from what have been a number of popular trends in writing on the history of cartography in recent years, in particular axes of domination and diffusion.

The scholarly trend in recent decades has been to view scientific activities such as surveying and mapmaking as two cogs in an imperial machine—a ‘scopic regime’—grinding across far-flung colonies and distant landscapes.³ An expanding imperial state and capitalist class, aided by an avant-garde of scientists, explorers, and agrarian bureaucrats, gradually brought purportedly peripheral places under their wing, in the process imposing new ideas of property, space, and territory on others, reducing them to landlessness, wage
labor, and colonial servitude. Here cartography appears primarily as an advanced technology of primitive accumulation and political control. In this narrative, cartography and its various routines are primarily, if not solely, technologies and discourses of power. An excavation of such ideas would very quickly strike the post-structuralist strata of a generation of French intellectuals—in particular Michel Foucault and Jacques Derrida—whose understanding of politics and ideology was shaped by the decolonization struggles of the 1950s and 1960s and the political reconfigurations of the Left that accompanied such movements. This material has served as a foundation for much subsequent writing on cartography. It was in a series of now seminal essays that J B Harley eclectically drew on Foucault (and, to an arguably lesser degree, Derrida) to rethink the history of cartography and reorient the field in a more critical direction. Harley’s oeuvre defies easy summation but it is fair to say that injunctions to read maps as texts, to deconstruct them, and to see regimes of power operating within them were pervasive in his later works for which he is best known.

The importance of such work should not be underestimated. For one, it initiated (or at least dramatically extended) a turn away from a focus on maps as generally mimetic representations, as unproblematic ‘statements of facts about the earth’s surface’: rather, it sought to situate maps within a social, cultural and political world and as products of practices that were integral to the history of cartography. In the process, authors such as Harley drew attention to how maps were inevitably laden with ideological and culturally-specific presuppositions. Objective they might be, at least according to the epistemological standards established by a given social order, but neutral they were not.

Second, such work served as a corrective to the celebratory, legitimation narratives—populated by bold explorers, objective scientists, and mimetic maps—characteristic of much of the history of cartography. Now the field was forced to contend with the unwholesome consequences and imperialist implications of the work of long-revered individuals whose bravery seemed more like wanton arrogance and their curiosity a form of aggression. This historiographical thread has matured to such a degree that scholars can in fact argue over the agency, complicity, and importance of such individuals in the histories they recount: was the white, male, bourgeois explorer largely an extension of the imperial structure, taking possession of all he saw by virtue of gazing out with his ‘imperial eyes’? Or was he a conflicted, even reluctant, agent of empire, financially dependent on his imperial sponsors but hardly a passive extension of their will? D Graham Burnett provides a useful synopsis of how far the history of cartography has come in this regard. Discussing Paul Carter’s seminal ‘spatial history’ of Australia, The Road to Botany Bay, he writes:

[A] previous generation of cartographic historians... depict[ed] the history of European expansion as a gradual ‘unrolling of the map’ over (or under?) the non-European world. After Carter such an analysis will not suffice. Within the progressive image of how colonial territory ‘took shape,’ he has identified a
tension. If before Carter European cartography had been imagined to spread over the globe like a flood of crimson paint radiating from the metropolis, after *The Road to Botany Bay* there is an obligation to recognize very distinct countercurrents in that flood, eddies and backwashes in the tide of empire.9

The summation is a powerful and important one: empires and nation-states have for too long been homogenized and constructed as monolithic and hegemonic enterprises, running under their own momentum and composed of an array of equally complicit bureaucrats, officials and scientists. Yet we should not lose sight of the fact that the object of attention is still primarily, if not solely, the structure of power identified as the impetus to the cartographic process in the first place, an issue to which I will return again shortly.

The third critical intervention was the questioning of the narrative of emancipation and progress associated with the European Enlightenment and ‘modernity,’ extending to the history of cartography the post-colonial critiques of the standard Whiggish narratives of science, progress, and modernity. Here the issue was less about agents than the very foundational categories upon which a narrative of Western European exceptionalism and progress had been built and which functioned as justifications, intellectual exculpations, for the exercise of power and imperial expansion. Taking Foucault to his logical conclusion, European explorers, mapmakers, and scientists were neither heroes nor villains but relatively irrelevant to a narrative that sought to draw our attention (not unjustly) to the fundamental ways in which historically and geographically specific practices and forms of representation were inextricably entwined with changing conceptions of property, the rise of capitalist relations, new forms of enclosure and classification, and the expansion of state power.

Still, this critical turn in the history of cartography—and in the humanities more broadly—can create a sense of unease: it was one thing to see the agents of empire put in their place; quite another to kill them off. The death of the subject threatened to devolve into a veritable slaughter, and extinction loomed large. Normalization was the norm, resistance was futile, and the panopticon was, well, . . . everywhere.10 Nowhere, or rarely, to be found were those ostensibly being mapped. The oceanic tides of Europe still washed over the inert shores of the colonies. And here lies the irony to which Raj devotes his attentions: whether to praise or to bury him (and the masculine is intentional here), it is still the European explorer or mapmaker or scientist who makes spatial history and, more broadly, ‘science.’

Raj is thus at pains, and rightfully so, to draw our attention to the roles of the colonized—their ideas as well as their labor—in the generation of geographic knowledge. He is careful: he does not do so in order to promote a kind of nationalist or chauvinist agenda but rather in order to emphasize the circulatory, dialogic and decidedly unbounded—territorially and socially—ways in which knowledge developed. Diffusion is not a means through which to understand the creation of scientific knowledge. Not only is it historically inaccurate but it is itself a discourse linked to colonial rule,
kind of cornerstone in the architectural fiction of command and control that Thomas Richards has called the ‘imperial archive.’

Diffusion appears in various guises. At its most basic it suggests that science developed in the metropole and then emanated outward to the colonies where it was imposed, with varying degrees of success, upon a dominated population. The problems with such a narrative are numerous: knowledge is developed internally, with little sense of connection, and then simply applied elsewhere; the ‘metropole’ itself is taken as self-evident and pre-existing, rather than as something constructed in the process of exchange; and the colonized are mute and monolithic, at best offering only passive acceptance or fierce resistance. It is a narrative that fits nicely with the impression colonial officials and their superiors might have had of themselves and their labors. So too our mid-twentieth-century neo-colonial officials who gave diffusion a new lease of life with the intellectual patina of Cold War modernization theory, arguing that the threat of revolution would be defused if ‘Western’ culture and technology were diffused. Locating the causes of underdevelopment as internal to the nations in question, modernization advocates cast formerly colonized populations as tradition-bound, static peoples, outside of history and trapped by an entire range of cultural ‘baggage’ that inhibited economic growth, development, productivity and scientific innovation and progress. Populations were thus ‘objects’ upon which to intervene—not only through technology transfers, capital flows and foreign investment but also through the inculcation of purportedly ‘Western’ values and attitudes (thrift, hard work, a respect for rule of law, and the other usual suspects) via literature, education, and film.

Counter-arguments to these celebratory visions of imperial diffusion can be just as problematic: authors might condemn rather than celebrate such transfers and practices but they still fetishize difference and take diffusion as a given. Raj takes a number of authors to task for privileging narratives of difference, for starting with an assumption that ‘European and Indian scientific practices were radically different at the time of colonization, and that “Western” science was imposed on Indians by the British as part of the “civilizing mission.”’ According to this view,’ he writes, ‘the spread of Western science is achieved by means of an often violent imposition of “rational” practices on “Other scientific” cultures. However, the nature of the putative “Other” scientific practices, their articulation with the social and power structures within which they are embedded, their history and encounter with European scientific practices, are questions rarely addressed in these writings.’ The irony is palpable: the persistent emphasis on radical otherness smacks of colonialism by other means; by opting for the diabolic rather than dialogic, efforts to critique colonial projects inadvertently re-inscribe them.

Just as worrisome, the very idea of a monolithic set of European scientific practices is further reified. The typically incisive and eloquent comments of Jean and John Comaroff regarding ‘European capitalism’ are just as appropriate in this instance to the idea of ‘European science’.
[it] was always less rationalized and homogeneous than its own dominant ideology allowed; always more internally diverse, more localized in its forms, more influenced by moral and material considerations beyond its control—and, finally, wrought more by its confrontation with the rest of the world than by purely endogenous forces. Despite its own self-image and its affinity for rationalization, it was shot through with the features it projected on colonial others: parochialism, syncretism, unreason, enchantment.16

In narratives of diffusion and domination, such complexity, heterogeneity, and irrationality risk being entirely overlooked, as does the fact that the ‘it’ that is European science only acquired its singularity, its cohesion, its purported universality, retrospectively when narrated as such by ‘its’ benefactors and beneficiaries.17

In other instances ideas of diffusion appear in more subtle ways, in studies that stress native agency but primarily by emphasizing local adoption, or selective appropriation, of ‘imported’ paradigms which are then rearticulated toward various and unexpected ends. This is clearly a more sympathetic and, at times, historically accurate understanding of how scientific knowledge and practice could develop. Even here, however, caution is warranted: for one, the issue of ‘importation’ begs the question of what is indigenous and what is foreign in the first place, and who makes such a determination. How far does something—a technology, a practice, an idea—have to travel to be an import? How far does the realm of the autochthonous extend geographically? Or, for that matter, temporally? An over-emphasis on importation and re-articulation—as a number of scholars have noted—runs the risk of positing too sharp a distinction between pre-colonial and colonial periods and practices.18

Raj’s own gripe with what one might call the ‘selective appropriation’ paradigm is that it does not, in many cases, go far enough: ‘non-western’ knowledges and techniques still have little place in shaping the content and practices of a purportedly ‘Western’ science or of ‘an emerging world order of knowledge.’19 They remain derivative or second-order, one step removed from a supposed European point of origin. Raj provides important counters to such positions: he notes, for example, that from the very beginning the East India Company had little choice but to rely on intermediaries from the subcontinent to do much of anything. Not only were the British vastly outnumbered but, just as importantly, they had limited experience with terrestrial surveying. In contrast, south Asians had a long tradition of conducting cadastral and route surveys that preceded the arrival of the British. ‘[F]ar from being a geographical tabula rasa, terrestrial surveying, measuring, and representation were common in South Asia ...[and] the development and uses of terrestrial surveying in South Asia were not very different from those in contemporary Britain.’20 Thus the British drew extensively on the skills, practices, and knowledge of local inhabitants in order to survey and map land, going so far as to have translated into English the existent ‘autochthonous surveying techniques and methods for determining latitude.’21

Here Raj intersects with a welcome, if long-overdue, shift in emphasis in the history of cartography in recent years: a recognition that the history of
cartography needs to pay attention to the role of people other than imperial scientists, explorers, and bureaucrats in the acquisition, circulation and creation of spatial knowledge and representations. In a 2002 volume on the histories of science in the Arctic, Michael Bravo and Sverker Sörlin noted that:

> [e]ven the field of science and colonialism, which has done so much to take the study of science and technology out of its conventional European and North American centers of gravity, is, when it comes to the agents of knowledge production, a remarkably Western intellectual endeavor. The emerging literature on the localized, or situated, character of knowledge and knowledge production share the same general features in this regard, and even studies of field practices in places and spaces where people are in abundance, can be carried out while completely ignoring the human beings who are present in the landscape. Otherwise where people are introduced into narratives of scientific practice, they tend to be passed over as mere staffage figures, acquiring their positions in the narrative by the scientists and not in any integrated account . . .

At the time their lament would have been equally appropriate for the history of cartography, a field of study that continued to privilege ‘Western’ and relatively elite protagonists carrying out ‘their’ activities on a relatively emptied landscape. Rarely was attention given to the people purportedly being ‘mapped,’ who at most would appear as fleeting mirages on the surveyor’s horizon destined to be subsumed within empire’s expanding girth. They did not, in any case, make their own spatial history. One might of course argue that their invisibility resulted from the brute fact that they were simply not part of the process in the first place. Of this I am dubious but even then it has for far too long been easy to assume, rather than demonstrate, that such was the case. The notorious difficulty of finding marginal, often illiterate, people in the archives has become an excuse for writing them out of the narrative entirely. Moreover, Raj shows quite dramatically that, at least in his cases, they are not that hard to find.

And Raj is not alone: numerous scholars in recent years, working on various periods and places, have sought to recognize (to greater or lesser degree) the historical importance of peoples in structural positions of subordination—peasants, workers, women, and most (not all) native peoples living under colonial or national regimes—to the history of cartography. In its ‘softer’ form, this has meant increased attention to local knowledge and practice in the construction of geographic knowledge and maps; efforts to ensure that the seemingly empty landscapes of empire do not remain as such; and understanding the inhabitants of those landscapes as more than one-dimensional figures in an uninspired narrative of domination and resistance (as if those two poles constituted the only possibilities for non-elite agency). In its ‘harder’ form, it has meant going beyond mere inclusion in an existing narrative in order to instead challenge the basic presumptions, the terms, of the narrative itself. Diffusion, for example, simply cannot survive intact as an explanatory paradigm—as a prime mover of a narrative—if one pays serious attention to the words and practices of historical protagonists other than
colonial officials themselves (without excluding those officials). Hence Raj’s emphasis on co-production, which both provides a means to, and arises from, an understanding of the dialogic, the dialectical, and the reciprocal, ‘mutually entangled’ processes through which scientific knowledge, cultural categories, and imperial identities were constructed. Indeed, co-production leads Raj to question more than just diffusion: he questions the very idea of ‘colonial’ knowledge (and ‘European’ categories) itself. He writes:

The currently fashionable picture paints Indians as mere ‘informants’, persuaded to reveal their traditions to the British conquerors who, in turn, reduced them to passive objects of what is termed ‘colonial knowledge’, opening the way to the imposition of European categories upon their traditional beliefs and social practices. The present appraisal points instead to an active, though asymmetrical [sic], indigenous participation both in the making of new administrative knowledge—knowledge which would not have existed but for the new context—and in the moulding of British and Indian civilities in such a way as to render them commensurable. It thus implies a radically different anthropology from that commonly espoused—which conceives of cultures as organically unified or traditionally continuous; it treats them instead as negotiated, ongoing, and mutually entangled processes.25

In other words, arguing for the importance of subaltern actors in the history of cartography is not a simple call for unthinking history from bottom up (‘proctological history,’ as Bernard Cohn wryly put it). A narrative of inclusion will hardly do and the answer is not to add a few peasants or workers or indigenous people to the traditional narrative and stir, a strategy of analytical enclosure that perpetuates rather than challenges existing narratives and their categories.26 Rather, the point is to more fully historicize the practices, categories and narratives themselves by not artificially bounding—geographically or socially—the subjects of study in the first place. More broadly and more bluntly: the history of cartographic practice needs to take a social, not solely cultural, turn.

Clearly the power asymmetries were, and continue to be, such that one cannot ignore the dominant role—the will—of the powerful in the creation of a certain kind of geographic knowledge, even if in the process of its creation it was subject to an array of local negotiations, contingencies, and so forth (and much to Raj’s credit, he does not ignore colonial bureaucrats and commercial agents who played prominent roles in the formation of scientific knowledge but rather situates them in positions of ambiguity, as part of a messy series of networks in which science is only a part of their charge). But this social turn in the history of cartography reminds us that, like most other histories, the history of cartography is empirically skewed and epistemologically constrained when viewed solely from the top down . . . or the metropole out.

Acknowledgements

I am grateful to Suman Seth for the invitation to write this essay and to Bernardo Michael and Lindsay Braun for sharing their respective works in progress. As something of a trespasser in
the history of science, I benefited greatly from comments and reading suggestions provided to me by participants in the conference “Creating Space: Across Histories, Cultures, and Disciplines”, held at Montana State University, in particular Michael Reidy and Helen Rozwadowski.

Notes


8 D Graham Burnett, Masters of All They Surveyed: Exploration, Geography and a British El Dorado, Chicago: University of Chicago Press, 2000. See also Aaron Sachs, ‘The Ultimate “Other”: Post-Colonialism and Alexander von Humboldt’s Ecological Relationship with Nature,’ History and Theory, 42(4), 2003, pp 111–135. These are not of course mutually exclusive positions but rather interpretative gradations between poles that privilege, on the one hand, cause-and-effect and, on the other, intentionality.

9 Burnett, Masters of All They Surveyed, p 11.

10 Thongchai Winichakul concludes his remarkable Siam Mapped by lamenting that perhaps we give human agents too much power in historical processes: ‘Human beings are too often given the central role in a historical narrative. They deserve a much humbler place in history—as servants of technology, perhaps, which is what is really happening now.’ Thongchai Winichakul, Siam Mapped: The History of the Geo-Body of a Nation, Honolulu: University of Hawai’i Press, 1994, p 173. Before dismissing Thongchai’s conclusion as technologically determinist, it is worth recalling that his constituted one of the first efforts in Thai historiography to refuse to situate the Thai monarchs as the central figures in the creation of Thailand.


RELOCATING CARTOGRAPHY


14 Raj, Relocating Modern Science, p 61. Raj's concerns are shared by a growing number of historians of Iberoamerica and Latin America, my own field of specialization, who have sought, first, to remind readers that the history of science is indeed a legitimate subject of study in places outside of Europe and the United States, and second, to refute the pervasive narratives that continue to see scientific knowledge as produced in an unproblematic 'West' and diffused outward to various sites around the globe. See Jorge Cañizares-Esguerra, How to Write the History of the New World: Histories, Epistemologies, and Identities in the Eighteenth-Century Atlantic World, Stanford: Stanford University Press, 2001. For an excellent sampling of new work being done on the history of science in the Spanish and Portuguese Empires, as well as an historiographical perspective on the state of the field, see Daniela Bleichmar, Paula De Vos, Kristin Huffine and Kevin Sheehan (eds), Science in the Spanish and Portuguese Empires, 1500–1800, Stanford: Stanford University Press, 2009.

15 In his How to Write the History of the New World, Cañizares-Esguerra observed that '[t]he reader of this book has most likely been socialized into constructs that assign non-Western attributes to both Latin America and Spain, where the Inquisition purportedly stifled all novelty and people have ever since been condemned to derivative and second-rate intellectual pursuits [. . .] In the case of the subjects discussed in this book, these boundaries have made it difficult for historians even to consider the possibility that voluminous and even pioneering scholarship (by Western standards) on epistemology could have been produced in Spain and Spanish America in the eighteenth century.' He additionally takes US Latin Americanists to task for ignoring intellectual history in favor of 'stories of strife and exploitation . . . [and] tales of revolutionary violence and, if socially conscious, stories of cunning peasants resisting treacherous oligarchs.' Although his critique is important, it is also a bit overstated and seems to conflate an array of very diverse perspectives into one simple vision: I suspect more than a few of the authors he may have in mind—he does not note who they are—would address very similar themes (of strife and exploitation, and so forth) if they were historians writing on the US. See Cañizares-Esguerra, How to Write the History of the New World, p 10 (the critique is reiterated on p 348).


17 Although it comes in for critique from Raj, Edney's excellent work has, more than any other, revealed just how anarchic and disorderly the seemingly 'rational' and orderly mapping of India was by the British. In the process he has much to say more broadly about the nature of British colonialism in India. See Edney, Mapping an Empire.

18 For excellent interventions on this point see K Sivaramakrishnan, Modern Forests: Statemaking and Environmental Change in Colonial Eastern India, Stanford: Stanford University Press, 1999; Rohan D'Souza, Drowned and Damned: Colonial Capitalism and Flood Control in Eastern India, Oxford: Oxford University Press, 2006; and, for a detailed spatial analysis that wrestles with the categories of pre-colonial and colonial, Bernardo Michael, Separating the Yam from the Boulder: The Anglo-Gorkha War (1814–1816) and the Organization of State Spaces in Colonial South Asia, book manuscript in progress.

19 Raj, Relocating Modern Science, p 13. Here Raj is critiquing Bernard Cohn's arguments regarding the codification and transmission of local knowledge by Europeans.

20 Raj, Relocating Modern Science, p 72.

21 Raj, Relocating Modern Science, p 80.


23 Anthropologists in many cases were well ahead of the curve in this regard. See, among others, Keith Basso, Wisdom Sits in Places: Landscape and Language among the Western Apache, Albuquerque: University of New Mexico Press, 1995; Hugh Brody, Maps and Dreams: Indians and the British

As Joan Scott has observed, narratives of inclusion tend to elide the process by which subject-positions are constituted in the first place. Her position is too discursive for my liking but the point is an important one: a history of subaltern experience that does not simultaneously challenge the foundation of the narrative itself is insufficient. Scott, ‘The Evidence of Experience,’ *Critical Inquiry*, 17(4), 1991, pp 773–797.
