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Ownership of Knowledge

Beyond Intellectual Property

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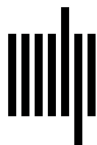
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EXCAVATIONS OF KNOWLEDGE OWNERSHIP: THEORETICAL CHAPTER

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Let us begin by restating the basics of our proposition: knowledge is an activity that always involves the body and the mind and, hence, its ownership can be authorized by manipulating the different practices of *use*, *performance*, and *naming*. This chapter builds on the preliminary thoughts outlined in the introduction and offers a theoretical framework for historians, sociologists, and anthropologists who wish to excavate the explicit effects and the subtle implications of the *mutual conditioning* of knowing and owning and to trace the many processes through which knowledge is made property.

We call our approach to the analysis of knowledge ownership an excavation, picking up from Michel Foucault's archeology of knowledge. Like Foucault, we approach knowledge as an understanding that is justified and ascertained by experience. But because our interest differs from that of Foucault, so too does our starting point. For Foucault, knowledge was inseparable from discourse. He thus started with "words" to trace the set of "things said" about knowledge in all its interrelations and transformation, defining *knowledge* as "the space in which the subject may take up a position and speak of the objects with which he deals in his discourse . . . knowledge is also the field of coordination and subordination of statements in which concepts appear, and are defined, applied and transformed . . . lastly, knowledge is defined by the possibilities of use and appropriation offered by discourse."¹ Unlike in the Foucauldian world, however, in the real world, knowledge and discourse do not entirely coincide. In the formation of knowledge ownership in the real world, power lies exactly in the processes that make knowledge a discursive matter or not: using or not using, performing or not performing, saying or not saying can all be acts of owning knowledge. Precisely because knowledge ownership is established through processes of distinction, we use the heuristics of technology studies. Or, seeing how knowledge equally concerns matter, body, and mind,² we could say that we suggest applying the methods of archeology throughout our investigations in order to see that *objects*, *bodies*, and *words* are all equally relevant *material instantiations* of knowledge ownership.

In our introduction we coined the term *kn/own/able* as the yet-to-be-distinguished knowable and ownable that marks our entry point. In this theoretical chapter we first show how to set up the excavation site, how to use tools, and the ways to investigate and identify the stratigraphy, the find and the “fill.” As we are digging into the same soil where others before us have worked, the second part of this chapter traces how we have come to understand these issues through the case studies of the book’s individual chapters. In a third section we offer a selective reading for those who are interested in seeing how technology studies and scholarship on knowledge, economy, and law have critically engaged with the quasi-ontological status that has been given to some surrogates or proxies for knowledge—as things that can be owned as “product” (in economics) or “property” (in law) in our modern world. In scholarship or scientific research, as in public speech, this quasi-ontological status pertains to the ownership of responsibility for words that is attributed to an author or subject.

THE MAKING OF THE SITE: FLAGS AND MAPS

Archaeologists follow leads. While in the early days, digs mainly targeted solid artifacts as “evidence,” researchers nowadays start by flagging pertinent points of intervention and then mapping out the field. When one is interested in the processes that make knowledge ownership possible or not, it is important to begin with a yet-to-be-opened ground that holds bodies, objects, and words, as the material instantiations of the practices for owning knowledge that guide our investigations: *performance*, *use*, and *naming*. Similar to how archeologists carefully identify the find, stratigraphy, and soil that has to be moved away as “fill,” the roles or meanings of objects, bodies, and words must be understood by a combined analysis of the properties of each trace and their relative spatial positioning. The researcher of knowledge ownership, like the archeologist-to-be, may want to be cautious about “the use of the word ‘natural’ as a synonym for the undisturbed subsoil.”³ What has perished and withered away or left an empty spot has effects; absences matter as much as presences, or different evidences have different shelf lives; some leads such as words or objects are persistent, while bodies fade, and part of knowledge can be lost; even if words and objects survive, knowledge must be regained in each body, over and over.⁴ Knowledge ownership is therefore bound to the nature of the body—and the body learns, shares, forgets, dies. This is to say, in other words, that *kn/own/ables* are socially generated and have material effects. They can be turned into other *kn/own/ables* or even *not-kn/own/ables* too, with time.

Flags are our tool of choice to mark how, in any scholarly analysis of knowledge ownership, space and time matter. Anthropology, the various historical disciplines,

and science and technology studies (STS) have all highlighted ethical concerns about the analyst's role and have studied the material manifestation of decision-making, as actants or as ontological effects with regards to the politics of knowledge.⁵ Flagging can indeed be understood as a form of "judgment" (*Urteil*) in a Kantian sense that emphasizes the ethics and effects of such an intervention by the archeologist, and hence also displays the values the archeologist holds.⁶

When taking not only knowledge but also its ownership into account, we suggest seeing flags as a decision-making tool that works in two directions: they pierce down to specific traces of moments generated by past actors and thereby elevate a specific moment of the analysts' knowledge-making. Flags set a target or define where evidence could be, even if this knowledge is intuitive or the evidence is not yet known. In our excavations, they mark how one *word* is differentiated and named as concept from the multiple others; how one *object* turns into a model when being inscribed with particular functions that determine its *use*; how one *body* becomes expert over others who mainly practice or work, in *performance*. That each flag can be moved reflects that the expectations of the analyst are not always met and that part of the analysis is to align analyst expectations with the yet-to-be-discovered fact. Despite such flexibility, however, the placement has material effects. When it pierces through layers of time, flagging moves other materials and creates new "false" layers that were not previously there. With each flag, not one but many claims are made. With many flags, a field site emerges. And at this point, we suggest that the excavator pause for a first survey of how the analyst demarcates the terrain through their intervention, thereby also determining what *can* become kn/own/able and what remains not-kn/own/able.

At the end of this book, Vivek S. Oak, Jörn Oeder, and Annapurna Mamidipudi offer a diagrammatic, hands-on guide to analyzing the different ways by which terrains have been demarcated in a global world of knowledge ownership. Here we elaborate how individuals and cultures have always designated spaces/areas and/or moments that should or could not (yet) be known and owned—not in the sense of a flat, two-dimensional dichotomizing principle; rather, there is a gradual progression in which actors (1) peel or core, (2) partition, or (3) slice through the three-dimensional globe that is knowledge ownership. Tracing these techniques further allows one to question the relative size of kn/own/able and not-kn/own/able within the globe.

The peeling and coring is about the dividing lines between the kn/own/able and what is not (yet) known. It is always possible to push the dividing lines to the extreme inner or outer rim, which reflects a world in which everything can be kn/own/able or, inversely, in which no knowledge is actually ownable at all. When that happens, we can see how, in producing the kn/own/able, actors also produce the not-kn/own/able—there is

no moment when a kn/own/able exists by itself. Lines of demarcation between such spherical layers can be blurry, leaving unclear the boundaries between that which is known as un-kn/own/able or entirely un-kn/own/ed. In cases where knowledge was not yet known but its ownability was considered relevant, it has always been expressed by individuals as uncertainty or claimed as magic. This made knowledge something owned or not ownable to all by naming it, for example, as sacred or profane. Others have asserted that knowing is mainly a human capacity (different from, e.g., nonhuman agency) and hence ownable only by individuals or social organizations. The excavator, too, causes such a distinction in demarcating their interests and what—for now—cannot or will not be touched or might be left to be found in the future (e.g., an HIV vaccine).

The partitioning addresses the fact that kn/own/ing becomes expressive through three different practices (use, performance, naming) and is instantiated through the body, object, and word as kn/own/able—and conversely, in the ways that the not-performing body, a knife not used, or a thought not named cannot be kn/own/ed. Unlike in the Foucauldian world, in the real world these three material instantiations of kn/own/ables are predominantly associated with three areas of human activity: the performing body with *society*, the naming of words with *epistemology*, and objects and their use with *economy*. Or we could say that this association of practices and instantiations of not-kn/own/ables or kn/own/ables to such areas creates what we call *domains* of knowledge ownership. Actors have always prioritized some associations between practices, instantiations, and domains over others to define what could be legitimately known and owned where and when—deciding that bodies signify social sites; or that objects portend property in markets; or that an accumulation of texts indicates archives or libraries of knowing. This fixation of a tripartite structure can also be seen as an artifact of the present intellectual formation of the social sciences and the humanities and their categories of science, law, and property. For the analyst, it is important to see that any legitimizing association between the three instantiations and three domains is variable and also not necessarily mutually exclusive: bodies can identify burial sites (social), but also markets (economic); objects can signify markets (economic) and be seen to embody knowledge (epistemological) or culture, or constitute a factor in our environment.

Other domains are therefore also possible. But inasmuch as society, economy, and epistemology are the triptych (i.e., the core and two ends) of all knowledge ownership, we suggest using them as a heuristic scaffolding to understand how the third practice of slicing is regularly employed to create flattened worlds where the kn/own/able can be split into knowable and ownable that live in different domains. To understand the power of a flattened view—of slicing through complex global worlds of knowledge

ownership—it helps to keep in mind that any denial of one practice, instantiation, or domain as kn/own/able or not-kn/own/able, or any ignorance toward the *inseparability* of knowing and owning, is an exertion of power that constitutes a new regime of knowledge ownership.

The cases in our book illustrate plural regimes of knowledge ownership, past and present. In some, actors like Cook Ding, decide to operate within a regime in which all kn/own/ables have to be synchronized; in others, only one domain can have kn/own/ables, such as the social sphere (Leach). Or we see that kn/own/ables are defined cyclically (Mamidipudi and Viren), or discontinuously (Jackson, Slaton), or in multiples (Bol). For all cases in our book such issues apply to varying degrees; yet for all cases, at one point, actors give power to one particular historical combination of peeling/coring, partitioning, and slicing. In this moment, this combination becomes central for knowledge ownership, as one moment of knowledge ownership is given power over another.

This is also where the fourth dimension—that is, the role of time—for staking knowledge ownership claims comes into play. In fixing their view on a certain moment, actors are able to highlight one or the other practice, instantiation, or domain as a case of either “knowing” or “owning,” or both. Actors can then apply a linear model of time to establish a temporal or hierarchical causality between practices, instantiations, and domains of either knowing or owning—also inasmuch as some instantiations of kn/own/ing last longer in time than others; words and objects persist, even when the body and the practice perish.

There is a wide (though not universal) acceptance across time and cultures that, because of such perishing and persistence, some relations between practice, instantiations, and domains are somewhat “natural”—more “permanent” and “stable”—and therefore “more” legitimate than others. For instance, many cultures have come to prioritize the association between words and naming, assuming that knowing persists through texts and can be more easily retrieved, whereas the knowledge of use or performance perishes with the body. Emphasis is then placed on the idea that bodily knowledge or knowing of performance and use always *needs to be* repeated/retrieved in order to be owned. In fact, though, all knowing relies on constant training—so that naming, for instance, means speaking things out, or performing reading and using writing. Others have come to identify knowing and owning as separate acts by saying that owning an object is not concerned with knowing and thus is solely about property, whereas in fact, all ownership affects knowing, as the actor can hinder other people from using and knowing this object.⁷

Such temporal distinctions hinge on the legitimizing function that domains have for certain practices of knowing and owning or their instantiations. For instance,

epistemology is the domain where words that name things or actions can be legitimately owned as knowledge; in this domain, in order to own actions performed by one's body as knowledge, the action still needs to be named. Here a distinction emerges between first- and second-order relationships that creates a space allowing/enabling knowledge ownership to be manipulated and performance to be defined as not-knowing and ownable only in society; or for objects to be owned and traded in the marketplace; or for the assumption that, in order to own the knowledge of using such objects, epistemology counts, and hence this use still has to be named. In regimes of ownership where one order of relationship is placed higher in the hierarchy than others, knowledge ownership claims are inherently less easily manipulated, even in the other domain.

Because equality in knowledge ownership matters to us as scholars, we propose approaching every step of this excavation as a process of *manipulation* that is likely to or can facilitate or impede knowledge ownership. The flags with which we began this chapter pierce through various layers of the stratigraphy by fixing a singular moment. So we, too, fix moments as scholars. Giving valence to one moment of knowing, for instance, already interferes with the example we gave in our introduction, namely Cook Ding's way of owning knowledge—that is, “the Way.” This “Way” owns knowledge invisibly through naming a word for its practice, performing it through Ding's body, and using an object—a knife. This is because “the Way” is an ongoing process of acquiring knowledge that also includes the yet-to-be-learned, the yet-to-be-known; for Ding, such a singular moment cannot exist in the first place. Rather, his knowing is always in the liminal space between the production of the kn/own/able and the not-kn/own/able.

In affixing the moment to an actor (which can be a single body or a group), the flag can also be seen as an act of enclosure or individuation. As the cases in our book exemplify, actors in the past and present have come to manipulate knowledge ownership by emphasizing the material instantiations of the three practices—word, body, object—in their first-order relation to domains, and then by acting as if all other knowing and owning comes second—or is even ill-placed or illegitimate. For example, evidence of writing and the presence of books can identify an area as a library or center of learning. As the practice is then defined depending on the domain of knowing, “writing” a text (as practice of naming)—on child-rearing, for example—is legitimized as knowable and ownable. It then becomes easier to make all other evidence for knowing by other practices look out of place—for example, in the claim that a child's crib as the *object used* for child-rearing no longer furnishes legitimate evidence for owning knowledge in the domain of epistemology, because in this domain the use of the crib has to be described in order to count as knowing. Libraries may collect formulas that have been written down, or they may only sample extractions of different chemical components.

Cultures may decide it is not the word but performance that constitutes the primary evidence creating the domain of epistemology—and thus the only legitimate order. As the cases examined in this book illustrate, actors used different temporalities, created and adhered to different orders as “our laws.” But then too, all these cases show that at some point, capitalism and Eurocentric legal frameworks have been/are interfering in how we have come to think about such knowledge ownership claims.

We can see that what historians, sociologists, and anthropologists have variously attempted to address as “ensembles” or “assemblages” or “complexities” of knowledge *do not stand outside*, but instead constitute the very core of knowledge ownership regimes. In the same way that the mutuality between knowing and owning is addressed and operationalized in the course of a dig, distinctions are not only made with regard to find, stratigraphy, and soil or fill; rather, analysts detect and interpret patterns of relationships between subjects of research interests based on spatial and temporal relations. Historians and sociologists studying knowledge, technology, and sciences do not need reminding of this; approaches such as actor-network theory (ANT) and the social construction of technology (SCOT) have emphasized the social character of all knowing—and drawn attention to the need to study the sociotechnical, sociomaterial complexes of knowledge, and so on at work.⁸

ANT, SCOT, and assemblage studies have been useful for explaining networks and how the interaction between the whole and its parts “either constrains or enables the parts that compose it to act differently.”⁹ And yet, from the viewpoint of knowledge ownership, all such research suffers from a major flaw, because its analytical starting point lies after the moment when the kn/own/able is divisible across the social, technical, and material. Such research attempts to “reassemble” what seems to have been broken apart, but in effect could not, cannot, and has not been broken apart to begin with: the kn/own/able. This creates an imbalance.

For us, it is crucial to point out that the most forceful act of manipulation is making invisible how the kn/own/able is always at work, as it allows actors to *condition* knowing by defining owning and to condition owning by defining knowing. Other concepts that attempt to address this relation in terms of simultaneity have chosen terms such as *coproduction* and *coevolution*. However, knowledge ownership regimes are constituted not because knowledge and ownership are produced simultaneously, but rather because once knowledge is defined, the conditions for ownership are determined; the process then ceases to be either open-ended or productive. In a broken world, such conditioning has substantial effects when knowing and owning are split: experimenting in a laboratory produces science, whereas tanning skins in ancient Chinese workshops primarily constitutes culture. In order to then see tanning as knowledge worth

knowing and owning individually or as a patentable process, it has to be *re*-defined, *re*-conditioned, or *re*-assembled. In this, the social constitutes the basic prerogative not only for constructing knowledge—as many studies have emphasized—but *always* for knowledge ownership as well; individuals and collectives own by deciding to “share” or not to “share” with their bodies, by way of objects, or through words. All cases in our book illustrate these concerns, and we have arranged them to highlight particular points of these dynamics. Each of the four sections contains up to three cases illustrating variations in the execution of specific techniques.

THE SITE PLAN: READING OUR CASES

In studying worlds of knowledge ownership, we suggest placing emphasis first on the *process* used—by actors and analysts—to manipulate different variables and relations. This focus is reflected in the organization of our book into four sections that highlight four such crucial strategies employed by past and present actors: (1) how actors have historically attempted to operationalize *mutual conditioning* to disable or enable knowing and owning; (2) how actors utilize different combinations of word, body, and object, thereby employing (or neglecting) these three things variously as material instantiations of owning knowledge through the *practices* of performance, use, or naming; (3) the ways in which actors prioritize one practice of knowledge ownership over another by emphasizing a relation to the *domains* of society, economy, or epistemology, in order to authorize owning; and (4) how *scholarship* inevitably manipulates knowledge ownership, inasmuch as “knowledge” is its very business—especially as we enter a world of accreted practices and domains in which science represents the highest standard of knowing and “certain” (i.e., modern, liberal, etc.) laws of property dominate ownership.

In reading through all cases, it also becomes apparent that the four strategies are mostly employed in conjunction, while no strategy is inevitable or its effects completely irreversible. As we briefly touched on in our introduction, though, past and present scholarly influences have meant that some practices—such as naming in words—have historically and regionally been given more room—or significance—than others. In unveiling actors’ views, the analytical view also often detects the emergence of knowables that *seem* to be distinct from ownables, whereas in fact, at each level and in every moment, what actually produces regimes of ownership are always kn/own/ables.

Part I: Mutual Conditioning

One way that actors, past and present, regulate the ownership of knowledge is by addressing the structural premises for knowledge ownership and “determining” the

mutual conditioning of knowing and owning. As stated earlier, we introduce mutual conditioning to show how identifying which aspect is known always presets the conditions for how it can be owned, and vice versa.

The two cases in part I of this book, “Mutual Conditioning,” tackle the history of book publishing, a topic that is at the center of past and present debates around regimes of knowledge ownership, their practices, and their technologies. These cases pinpoint two extreme ends of book publishing as such a tactic. We can imagine them as an effort to divide up the grounds and award to this partitioning the authoritative role in deciding what is only knowable or only ownable. In chapter 2, Cynthia Brokaw shows how societies decide to favor a logic that does not allow individual knowledge to be owned as economic property; she thus connects to a growing body of literature on other temporalities illustrating similar concerns.¹⁰ Chinese authors promoted an idea or piece of knowledge around what today might be called “moral rights” of ownership of the knowledge, but they were not able to claim “material” or “legal” rights as their European colleagues could in the sense of the ownership of copyright or the right to file a patent, or “profitable ownership” when printers claimed possession of the woodblocks or, in the case of a movable press, the setting up of production facilities. In elucidating how the history of teaching intellectual property in the twenty-first century is based on texts delivered by legal professionals rather than historians, Marius Buning reveals in chapter 3 how time-bound intellectual property actually is. And yet even today, historians and politicians rely on this specific moment of fixation when they chart the field of knowledge ownership. Both cases make clear the role that scholars play in manipulating these relations by fixing knowing and owning through mobilizing concepts.

Part II: The Three Practices: Performance, Use, Naming

A second important technique that is observable in different times and contexts is actors’ focusing, in their manipulations, on the authority of the three practices for knowing or owning. In our introduction to this book, we briefly outlined how those belonging to the “elite” of any given society have often prioritized naming and research from among the many possible ways of manipulating knowledge ownership throughout history, even as they engaged with varied combinations of the three techniques—naming, performance, and use.

The three cases in this second section foreground these three different practices of authorizing knowing and owning. The study by Annapurna Mamidipudi and Viren Murthy lays out the ways in which ownership is embedded in practice. Discussing four very different performers, in chapter 4 the authors exemplify how the knowledge of Carnatic music is owned in the performance practices of contemporary classical

musicians in South India who have historically used, rejected, or relied on “Western” or “colonial” standards of naming to own their performance as knowledge. Mamidipudi and Murthy emphasize that such knowledge remains valid only when performed by a particular community.

In chapter 5, Marjolijn Bol stresses the agency given to materials in their “use” as the major subject and validation of knowledge ownership. In a consumer market, discourses about what is authentic or fake condition notions of ownership and knowledge theft. Bol points to histories of “material mimesis,” such as crystals made to look like more precious gems, and Dutch batiks that were not recognized by Javanese customers as equivalent to the original resin-printed fabrics from their own island, because they ironically judged these products based on a material characteristic that local dyers had been trying to avoid. Later, these Dutch copies found new acceptance in African markets precisely because of this particular process of fabricating the cloth and using the raw materials.

A dominance of naming governs the modern educational system, which functions as a sorting mechanism, as Amy Slaton shows in chapter 6. In a classroom exercise designed to teach a scientific method, students are asked to draw on a graph paper a set of points that they can use to name the unknown object in a box as a banana. This paper bears the name of the student who produced it, who can now own that knowledge, and those who don’t have their name on such a paper cannot own that knowledge. This naming functions as a sorting mechanism for knowers and not-knowers. Once thus labeled, the two classes of students are set on markedly divergent trajectories of knowledge ownership.

In each of these three cases, actors rely on the mutual conditioning of knowing and owning through all three practices, but they regulate knowledge ownership by flagging one dominant practice.

Part III: The Three Domains: Society, Economy, Epistemology

In the third section of the book, we tackle the domains of society, economy, and epistemology, which have consequences for how knowledge ownership is enabled or disabled. Some actors, for instance, regulate knowledge ownership by using the authority that one practice has over different domains to enable ownership.

In chapter 7, James Leach describes how Reite people, in Papua New Guinea, assert kinship relations as a purpose in itself. For them, actors cannot own knowledge, but only the social relationship that allows rights of performance. Reite people use knowledge ownership not to produce property, but to create community. The dominant domain in each regime depends on which element is valued as the authoritative form, such as society valuing the body, or epistemology valuing the word. Thus, in performing their

knowledge, *knowing* Reite bodies own their knowledge authoritatively in the domain of *society*. Or we could say that in this community, kn/own/ables exist only through bodies that know and own relationships as knowledge.

While the history that Dagmar Schäfer examines in chapter 8 seems to mainly concern naming, this practice was used specifically in legal practice as a means to access and control the labor of craftspeople and their institutions—in this case, their households. It was obvious to imperial authorities in China that craftsmen's bodies owned knowing. Hence, in order to put this labor to use, imperial clerks manipulated its ownership by *naming* or *refusing to name* the craftsmen's expertise as subject to state appropriation via tax. This strategy attempted to claim dominion over *performance* as the authoritative mode of owning knowledge. In this way, Chinese literati effectively denied such expertise any visibility in their political economy *and* epistemology—and thus the scholar whose profession it is to name turns into the major gatekeeper for knowledge ownership.

Science and modern law come into the picture in chapter 9 when Myles Jackson tackles how scientists and politicians have changed possibilities of knowing and owning genes and the products that are derived from such knowledge. The case follows a shift in scientific practice—from a context in which the knowability of genes depends on laboratory practices and the “wet” science of molecular biology, to one in which describing this gene mainly happens in a computer sequence. It shows how a translation of material practices in the sciences is made into a *naming* practice in the domain of epistemology, the products of which then become property by law as “knowledge,” in the form of patents. Then law is used to operationalize owning over knowing, thereby foregrounding *economy*.

In all three cases, the kn/own/able is present as the body. Actors authorize knowledge ownership by foregrounding practices within specific domains or shifting them through domains (which we can also imagine as a slicing through layers that creates different cross sections).

Part IV: The Role of Scholarship

Our fourth and last section of the book highlights the role of our own scholarship. Given that knowledge ownership is a process and dynamic, the integrity of the kn/own/able is at stake once practices and domains have been separated and have solidified as either knowing or owning. This has consequences especially for science and law, “the two institutions that, perhaps more than any other, are responsible for making order, and guarding against disorder, in contemporary societies.”¹¹ As in archeology, we are thus left with standing ruins and fields featuring both complete vessels and shards affected by weather, water, and the surrounding soil, which constitute the hard facts of our time.

In our final case study, in chapter 10, Lissant Bolton highlights the material side of such ossifying acts and the challenges museums face in making objects of the Vanuatu “knowable.” When something becomes a public object for display, it is no longer “ownable” by the Vanuatu. She explores museums as places in which the multiple instances of regulating the relationship between knowing and owning become politically fraught. She suggests it is important to “disentangle” the political strategies inherent in reparations for colonial wrongs and identity formation through ownership from the work of acknowledging and recording the richness of human knowledge and practice.

In fact, though, all our case studies illustrate how scholarship affects and is part of ownership debates, sometimes making it, as Myles Jackson’s study illustrates, even a matter of court debates. Other cases are more subtle, such as when Amy Slaton follows how learners are sorted in the US educational system. In being named as knowers and not-knowers, these learners emerge as “underprivileged,” and thus unfit for further scholarship, or “meritorious,” defined as achieving validation of their knowledge only through a staging of “apparent” mastery. This case also elucidates how analytics matter with regard to language as the major tool that scholars use to express their knowledge. Additionally, Slaton’s case, like Bolton’s, is a sharp nod to the politics of exclusion, of constructing the not-knowable—without exposing it as problematic—in the body of the non-knower. Epistemic hierarchies reinforce social sorting, turning teaching in educational institutions from the making of knowers into its opposite: the making of people deemed to be incapable of knowing, and a class of non-knowers.

The sum of our cases shows the implication of scholarly decision-making that produces knowers and intervenes to turn people into not-knowers, in the past and present. Near to the present we can see how the topic of knowledge ownership is limited by our fixation on a particular moment dominated by the language of science and Western legal frameworks. Such cases show how deeply fragmented the shards are, as the vase can neither be recovered nor easily pieced back together again. Hence, either the ownership of knowledge remains incompletely addressed or one is left with a remainder that does not fit.

Taken together, the cases in this book show how *mutual conditioning* holds power at all times, even when actors are not aware of it. The task of the researcher/analyst is to draw attention to the application of any such strategies as acts of *manipulation*. We suggest calling these acts manipulation because of their multiple political implications, which affect possibilities of owning past, present, or future knowledge, even *when they are not meant to*. Some examples of this are museums being unable to prevent the decay of materials due to a lack of funding decades earlier; knowledge being lost because of wars, disasters, changing values, or human ignorance; and musicians in India wishing

to “protect” music as the heritage of their caste rather than as practice. Other examples are contemporary ideals reflecting on historical standards or those of one geographical region reflecting its particular experience onto the other. In the same way that our book’s chapters on underprivileged students in the United States and on Vanuatu objects lead us back into our modern world, they also especially drive home that in this reading we—the scholars and analysts—are in a position of great responsibility when dealing with questions of knowledge ownership in our analysis across time and place. Scholars act in the domain of epistemology, and thus when we identify practices and situate them in domains, as social or scientific, economic or intellectual, we draw boundaries of knowability and ownability with lasting consequences.

With this notion in mind, we now wish to shift gears and, in the final section of this chapter, offer our readers a reflection on how scholarship has both engaged with and contributed to past and current understandings of knowledge and its ownership as product or property. The following historiography is an invitation to a critical reading of this scholarship. First, we explain how debates in scholarship and knowledge politics have offered a basis to separate concerns about knowledge from its effects on owning. As both such scholarship and knowledge politics grew increasingly uncomfortable with this separation, they then attempted to fix it. Attempts were made, on the one hand, to elucidate variations of knowledge and ownership regimes across regions and times, and on the other, to address multiple disciplines such as history, sociology and anthropology, philosophy, politics, sciences, technology, and law in cross-, inter- or transdisciplinary forms.

Into the twenty-first century, these approaches have created a curious conundrum with effects in real-life politics: we have both come to *fragment* knowledge into a plurality of “kinds” of knowledge, and then also attempted to legally own these fragments, each on its own or all together. Socially and politically, we have then come to address the injustices and imbalances created by enabling the ownership of such fragments by attempting to once again validate all parts of knowing and authorize all different forms of owning—always by making them all equally legible to law and science.¹² This ultimately means acting as if throwing together all these shards into one container would restore the broken vase. A substantial number of scholars have attempted to *fix* the world by reconnecting the world epistemologically in varied pairings of coproduction, coevolution, and so on across the three sides of culture/science, individual/collective, and body/brain divides—as if the patched vase would equal the original. And as scholars ourselves, we can only pick and choose parts of the fragmented knowledge. What is called for, however, is acknowledging that what cannot be broken apart to begin with does not need to be fixed. Rather, it needs to be acknowledged—as the kn/own/able.

THE SEPARATION OF KNOWING AND OWNING: ALIENABLE AND TACIT

It is curious—even ironic—that the standpoints that have allowed us to ignore the inextricable linkage between forms of owning and knowing in legal and scientific practice, or in economic and social life, are the very ideas that have attempted to emphasize this relationship: the ideas of alienation and of tacitness.¹³ Many other terms could be noted, such as *estrangement*; or *distancing*; or *implicit*, *local*, and *indigenous*. But it is these two ideas that have become subject to a range of histories of knowing and owning and have been mobilized in new ways, and if not together, then at least with mutually constitutive effects, for a new global hegemony of the ownership of knowledge. Over the twentieth century, in an astonishingly uninterrupted line of development, the endeavor of pluralizing knowledges became a fix for what had been broken apart by debates concerned with the difference between socioeconomic orders of capitalism and communism, and thus with the general tension between private or collective owning and using.

While it would indeed be hard to pin down a starting point for the separation of knowing and owning as such, important anchoring points have been the works of Karl Marx as well as those of Michael and Karl Polanyi and their debates about capital and society, and knowledge and ownership.¹⁴ An introduction to the theoretical framework of this book can hardly do justice to the many steps of this development, or to the diverse viewpoints held in the many scholarly disciplines that have been involved in these debates, which range so widely as to encompass philosophy and engineering science. But it is possible to pinpoint some crucial junctures in these scholarly perspectives and how they have contributed to a solidification of knowledge ownership regimes.

Karl Marx is important because he connected alienation to ownership in his arguments about work, capital, and society, thus bringing economy, social order, and laws to the forefront of debates concerning knowledge. This connection paved the way for future approaches that acted *as if* the self and the fruits of one's labor—that is, the means of production and their product—were or *can* ever be fully separated, whereas in fact they *cannot*. Ownership became property. In due course, the areas to which alienation was applied expanded. Once connected mainly to “lowly” labor, its segmentation, and the loss of human autonomy to market forces, the concept became an issue of importance to various realms of knowing, including the relation of science to different political, social, and value systems. The most telling assessment here might be that of the sociologist Robert K. Merton, who was heavily engaged in debates about science and its history. In 1957, he critically noted that the “scientific worker” was subject to market forces in the same way as the blue-collar worker, “as the scientist is *separated* [our italics] from his technical equipment—after all, the physicist does not ordinarily own his cyclotron. To work at his

research, he must be employed by a bureaucracy with the laboratory resources.”¹⁵ Merton suggested that both craft labor and science were ruled by the same mechanisms of alienation and owned in economy. But this ignored that a laborer would have been unable to own their knowledge (and possess it) in the same way that a scientist of Merton’s day could have (by means of their scholarship or grants, for instance).

An important avenue leading up to such junctures over the twentieth century is found in the attempts of different groups of scholars, politicians, and entrepreneurs to reassess and upgrade work within a globalizing world and economy. Many of them did so by reconnecting work to knowledge. This group includes political figures such as the Indian lawyer and leader M. K. Gandhi (1869–1948) and his championing of hand spinning; the chairman of a committee that drafted the Japanese constitution in ordinary language, Yuzo Yamamoto, and his efforts to protect Japanese cultural heritage in 1949; and the British chemist and diplomat Joseph Needham and his interest in the Chinese roots of modern sciences.¹⁶ For scholars of the mid-twentieth century, such efforts were a motivation to refine their own analyses of knowledge, more carefully differentiating between its forms by distinguishing, for instance, between what can or cannot be abstracted. It is at this juncture that actors started to distinguish between knowledge that is inalienable and labor that is valued in the domain of economy, or between knowledge that is inalienable and science that is valued in the domain of epistemology. In the latter case, actors favored the category of “tacit.” Tacit became an epistemological value, and inalienability became inextricably linked to the economic realm, to livelihoods, and to exploitation.

The first proponent of “tacit” as a concept for understanding scientific knowledge, Michael Polanyi, suggested in the 1970s that science “is always more than we can tell.” His aim was to highlight the relation between the individual and the collective in a way that would allow the freedom and rights of the individual to trump over those of collective bodies in particular nation-states.¹⁷ Polanyi promoted the notion of “tacit” as a concept in order to emphasize the relational character of all knowing, and in making a shift from the collective to the individual to protect individual scientific freedom, he also addressed ownership. Since this implied that tacit knowledge has a social character, he associated the scientific enterprise with the master/apprentice relationship through which the neophyte becomes initiated into membership in the scientific community.

As soon as these terms—and their pairings of tacit/explicit, alienable/inalienable—entered the discourse, they were contested. New scholarship was developed aiming to show that those parts of knowing seen as “tacit” in the sense of being inseparable and inextricable from the individual body,¹⁸ or that those parts of work and labor that were seen as inalienable from bodies, had value. The conclusion was thus that they, too,

should be subjected to ownership. Over the twentieth century, tacitness took on the role of identifying the inalienable part of knowing and owning, and as a marker of how scholars, politicians, entrepreneurs, scientists, and practitioners grew uncomfortable with notions of “work” as “lowly” or science as a merely abstract intervention. Scholars increasingly pushed for an awareness of how all work and human practice entailed knowledge and was worthy of recognition, if not ownership. Building on Polanyi’s case, Harry Collins showed in 1974 how tacit knowledge can be acquired only by an individual through social membership in the scientific community.¹⁹ In other cases, as scholars showed, communities were formed that allowed collective tacit knowledge to be produced and shared. Especially historians of technology—in contrast, for instance, to those studying economic change—have brought to light how craftsmen and practitioners have protected their skills and shared them to create community, or how collectives have relied on the “sharing” of knowledge, ideas of differentiated labor, or skills, and not on individual ownership. Scholarship from this late twentieth-century period drastically shifted away from a view on the unifying features of a modern world of science and toward a growing interest in understanding differences, diversity, and variations across time and space.²⁰

There is a vast body of literature unfolding different pasts or presents from which we could quote here, but a case in point for carrying such concerns over into the analysis of knowledge and its ownership in early modern Europe is Pamela O. Long’s study, which suggested that while European guilds mobilized ideas of “‘intellectual property’ (a kind of intangible property) . . . with regard to material inventions,”²¹ the concern of many craftsmen was actually openness and the transmission of skills—not its secrecy.²² Studies about the sciences called attention to practices, showing how even the most abstract sciences in the West relied on materials, use, and performance, and not only on words and texts.²³ Approaches naturally diverged. Whereas French sociology discusses such issues as a question of political power, the study of technology more broadly attempts to empower this tacitness within the study of sociotechnical context as the power of society and materials. In all cases, analysts addressed power as *exercised* rather than possessed.²⁴ That is to say, as Philip Mirowski suggests: “Since tacit knowledge was intrinsically dispersed throughout the community, and could only be passed along piecemeal through a socialization process inculcating a particular personal commitment, there could never be any effective rationalization or codification of the process of research.”²⁵

There are other political implications that postcolonial studies have emphasized and that, again, have historical roots. One example is Indian skill and design, particularly in the field of textile production—which are now seen as having played an important role in raising the quality of European textile industries.²⁶ Attributing ignorance as the

reason for the inalienability of artisans' knowledge from their bodies, the colonial British engineer Alfred Chatterton assumed that "the ordinary artisan . . . unacquainted with principles is therefore quite unable to explain why one way of doing a thing is better than another."²⁷ Craft skills that could not be codified in text were seen as offering no actual contribution to global knowledge and as not making the grade of "genuine knowledge" on all levels.²⁸ Ownership shifted as colonial authors codified this knowledge, which had been personal property of craft groups,²⁹ into surveys, gazetteers, and monographs. This turned proprietorial knowledge into a public good or common cultural heritage. In making private knowledge public, the colonial state was seen to represent an exercise of power that intervened in not just knowledge, but its ownership.³⁰

What we can take from this survey is that scholars grew increasingly uncomfortable with such rifts between the different ways of knowing and owning and so attempted to fix them. Such efforts went beyond the colonial period and were more complex than pointing out that a powerful party is oppressing a weaker one; yet, this led to a discourse that seemed to compare or oppose sociotechnical differences as fundamental to a culture. It is no coincidence that debates around the ownership of craft were politicized in India even before Gandhi, and that the precursors of intangible cultural heritage (ICH) originate in Japan. From the East came a view on the practice of embodied craft knowledge as spiritual revelation embedded in oral and religious texts.³¹ This speculative view provided a basis for the unity of culture as national heritage, conceptually opposing such unity characteristic of the East or Orient to a more enlightened and analytic Occident—or, the rest to the West; the premodern to the modern. This again contributed to efforts that constructed (and romanticized) the scholarly and political discourse on the native craftsman as being seen to bear traditional knowledge steeped not only in "tacit" and "intangible" culture, but also in ideas about how that culture had to be owned, collectively or individually, as a public and common or commodifiable good. Preserving this knowledge meant preserving the body and bodies that inalienably carried it as unchanging culture; it meant labeling this knowledge as "traditional" knowledge as opposed to "modern" ways of knowing.³² As a result, owning knowledge tacitly meant framing the knower not only as intrinsically traditional, but also as incapable of dealing with the abstractions brought about by "knowing" as an abstraction indicative of science or of various sciences.

In this sense, any epistemic category is simultaneously always a political one. And it is because of these developments, in legal practice and in scholarship, that our contemporary world has come to differ from the world of guilds, Carnatic music, or Chinese naming-as-owning practices in its view of ownership and knowledge. In our world, the ownership facilitated by claims of tacitness—and of tacitness as a characteristic of

knowledge that should not prevent the knowledge from being ownable—has become a one-way street. Work cannot be owned as science or propositional knowledge, while when it comes to science, calling parts of knowledge “tacit” often means identifying ways of knowing that are inalienable, and that thus should not or *cannot* be owned as property. What is most important to understand, then, is that the scientist can claim tacit knowledge that is available only in the “social” domain, whereas the craftsman cannot claim explicit knowledge in the “scientific” domain because “tacit” is no longer seen as an inexplicable remainder but as the opposite of “explicit.” Once again, the notion of alienable is opposed to inalienable components of knowledge, or for that matter, propositional concepts are opposed to material conditions, commensurable to incommensurable, or textual to embodied. This leads to a separation between science and culture, with some groups, regions, or nations having sciences and others culture. Knowledge that is not explicit, and that is inalienable from communities (such as the knowledge of craftspeople), is stuck in that it cannot be framed as science and can be owned only as culture. Knowledge in the forms of arts and crafts continues to fall under the category of intangible cultural heritage, suggesting that there is a historical bias toward comprehending knowledge that is inalienable from bodies as somehow innate—inexpressible by means of words—and thus unscientific.

Scholars have directly contributed to this development. They, as analysts single out *tacitness*, *making it relevant* as a specific form of knowledge that cannot be extracted and abstracted from the body or materials and therefore needs no verbal expression. The divide is enforced paving the way for tacitness being applied as a legally acceptable category for claiming ownership (for example, as ICH), as if the nomenclature of tacitness did not manipulate ownership claims to begin with. Scholarly work contributes to such manipulations whenever it treats science and law as *the* primary categories or as preset rather than bounded and distinct technologies of social, material, or epistemic ordering. As modes of socialization or belief systems,³³ science and law cannot exist by themselves—even as they develop distinct characteristics and rules.

Historical and sociological scholarship has highlighted, for instance, how different groups own(ed) or have been disowned and how they have attempted to protect knowledge by legal methods. But there are very few studies that have successfully attempted to show *and* emphasize that actors have had different approaches to how to *keep* knowledge and *not give it away*. It is only a minority of scholars who have contributed to refining a particular nomenclature of alienable/inalienable and tacit/explicit into one that would value all knowledge—brain and body—equally while simultaneously acknowledging differences. And whenever such scholarship has emerged, it has operated with a nomenclature of distinction and in efforts to equalize the field while

emphasizing variety, thus concluding that there are different ways of knowing, such as everyday knowledge, science as practice, and so on.³⁴ Many of these efforts have critically engaged with dichotomies—local/global, indigenous/universal, traditional/modern, epistemological/ontological—and attempted to tip the balance by giving, if not more, than at least “equal” power or agency to objects, bodies, or things.³⁵ Yet, one important factor in these developments is that even in this critical engagement, scholars operate within categories that have emerged from a flattened view, in which knowing and owning have been separated. This is most evident in attempts by scholars to overcome the separation and reunite what had been broken apart, such as by emphasizing the category of technoscientific.³⁶

There is a second line of scholarship that, in the awareness of the political implications of knowledge debates, then chose to focus its analytic interest on the relation between knowledge and ownership, suggesting among other things that they are coproduced or have coevolved.³⁷ This approach, we suggest, holds particular dangers because describing knowledge in terms of “co-”s (i.e., coming together, mutually, in common) suggests an open process, whereas we wish to emphasize, for instance, that scholars *precondition* the scope of owning when they focus on knowing. Another equally crucial factor is that the efforts of analysts in fact replicate, or repeat and resemble, those of the historical actors they are examining, in identifying explication (the ability to verbalize what one knows) as the heart of this debate, and law as the dominant way to manipulate ownership of knowledge. Explication, then, has become the widely accepted silver bullet for manipulating the relation between knowing and owning knowledge. The vast body of literature dealing with or using terms such as *tacitness*, or equivalences such as *intangible*, *local*, *indigenous*, and so on, reflects this problem in the struggle of scholars and the actors that they analyze to communicate all knowing, and to explain the equal importance of bodily performance alongside cognitive, chemical, or physiological processes in the brain and the body. Accepting the deficiency or difficulty of communication, these scholars attempt to use such terms as a vehicle for negotiating ownership claims by bracketing this difficulty. But in the process, they further substantiate language as *the* determinant of knowing and owning. Conversely, we could say that the many material and embodied ways of manipulating the relation between owning and knowing, such as those described in this volume by James Leach or Cynthia Brokaw, have never entered the debate, while the field of law studies remains attached to a rather formalistic or mechanistic stance on its responsibilities for dealing with knowledge that has not yet been made explicit by way of naming.³⁸

In recent decades, philosophers, historians, sociologists, and anthropologists have begun critically reflecting on how they themselves have come to adopt an understanding

of knowing and owning as a two-step process in which two different qualities are *defined*, rather than analyze the mutual conditioning between knowing and owning. In this understanding, we can identify two major strands of arguments, with the dominant one pointing to power hierarchies between knowledge of the mind and knowledge of the body, as *knowing* in contrast to *doing*. The first is owned as intellectual property and the second as labor. It is important to add to this discussion that superficial similarities in such power hierarchies exist across space and time, and they have allowed researchers to make generalizations when they analyze the methods of owning knowledge that we addressed in our introduction. Whether they have been located in China, India, or Europe, or whether they have identified knowledge as residing in the brain, the heart-mind, or the soul, elites have favored *naming* as their vehicle of knowing and owning, rather than an individual or collective body, or a hand performing menial labor or bringing tools to use.³⁹

In the archeology of knowledge, as in attempts to dig out the material traces of human activities, it is “only too easy to invent new surfaces (and even new buildings!) halfway down a thick layer.”⁴⁰ In the case of knowledge ownership, such layers have obscured the mutual conditioning of kn/own/ables, giving primacy to modern law as a way of owning knowledge. This made the endeavor of pluralizing knowledge appear to be a fix for what debates about capitalism, science, and modernity seem to have broken apart: the relation between body and mind. Yet, even as our modern sciences tell us that all knowledge is bodily and knows no such divide,⁴¹ modern scholarship has accepted naming as a tactic to validate and own knowledge. And when knowledge is named as culture, it is a commons that cannot and must not be owned individually. Some sociologists and historians of science and knowledge, by contrast, have accepted that the relation between knowing and owning knowledge, as determined by science and law, does not consider the inalienable social and material components of knowledge—its tacit dimensions. They have thus looked into alternative practices of knowing by attempting to elevate “tacit” knowledge as knowledge worth knowing. Suggesting that visual language or material compositions can compensate for this lack of explicitness in knowledge, that they can become “things that talk,”⁴² these scholars have attempted to validate the “rest” of the relation, explicitly giving a name to what we might call inalienably tacit. And yet, even given our media-enhanced world of sonic and film records, something always remains “unsaid” and thus underrepresented, creating an imbalance in our attention between explicit and tacit. Naming the aspect of knowledge that is “tacit” thus becomes an evaluation of not only what is possible to know or own but also at the same time what is *worth* knowing and owning *at all*. What remains as fill is untranslated materials in their muteness and bodies in their labor that by definition

fall outside the scope of knowledge ownership. Tacitness—and any term that might be chosen to replace what cannot be made kn/own/able—thus always is and has been political at its core. It enhances some ownership claims and inhibits others. Epistemologically, it holds the future of knowledge ownership hostage.

IN CONCLUSION

Where then does our own scholarly analysis stand vis-à-vis this critique of the politics of epistemologies? Since equality matters in the ownership of knowledge, we suggest that the first step is to acknowledge that we, too, practice *naming*. We, too, prioritize one aspect of the kn/own/able or *how* one can kn/own it. It is our further understanding that all approaches to knowing are implicit prerogatives that *condition* owning. The use of materials entails not just knowing but also owning, and bodies that perform knowing become the means of owning knowledge. In defining categories of use, performance, and naming as ways of relating knowing and owning, we thus remain in the realm of language. The key difference is that we make visible the practice through which the relation between the two is materialized and acknowledge our responsibility in this process.

In sum, the contributions in this book suggest that as long as actors or analysts only try to fix one or the other side (i.e., knowing or owning) and ignore the conditioning, inequality will always persist within approaches to the ownership of knowledge—and in the results of these approaches. Achieving equality requires that we do more than fix the epistemic and/or legal side. We need to champion the indivisible kn/own/able. As scholars, we can contribute by making the kn/own/able visible, as it is apparent in and made available through different combinations of naming, performing, and use; by words, objects, and bodies; and in different domains such as society, economy, and epistemology. When a gene sequence is named to describe the underlying structure, it is only partially knowable. But because our modern laws consider this an acceptable form of knowledge, the use of the gene becomes completely ownable even if it is not completely knowable. As a weaver performs weaving on the loom, they own a conceptual principle through use, even if the piece of fabric is not completed yet. In bureaucracies, protocols can routinely produce particular categories of expertise. Asking why China did not produce a paper practice of codification, or intellectual property, misses the point, whereas focusing on the conditioning unveils how differently Chinese authors throughout time wished to own their knowledge by writing or were disowned from their knowledge(s) because some considered naming the key for all kn/own/ing. These kinds of questions then allow us to examine, on equal grounds, how the regimes that value

naming, such as science today, function as authoritative ownership of knowledge compared to those that value use, such as the making of printing blocks. We suggest that such comparisons require a shift in the values underlying our analytical understanding—and that pushing such ways of owning into the social or economic sphere is a manipulation of the relationship, too.

This book has brought together scholars who look beyond the ways in which boundaries have been drawn around what we have identified as kn/own/ables, in fields or concepts such as law, history, science, knowledge, and property. Taking interdisciplinary approaches, these scholars make visible the methodological values—and hence also the blind spots—that underlie individual disciplines. Such interdisciplinary encounters force methodological apparatuses that are generally stable to shift in order to accommodate what is newly learned. In a final note, we thus turn to our own trade to address the tool that historians, sociologists, and anthropologists best deploy: performing and using epistemologies. Identifying ourselves as analysts, we move our analysis along a timeline—always keeping sight of the moment in which ownership is inextricably attached to the knowable word/object/body; sometimes working forwards, other times backwards. Taking a *longue-durée* perspective on the making of epistemes and their normative effects allows us to capture moments of stabilization synchronously as moments of change, or as signified in rites of passage. Yet, transitions inevitably point to ruptures. At one moment in time, the body/object/word may constitute the relation between the knowable and the ownable. But in other moments, this relation is in a new state in which it vacillates between a new set of possible states in which the thing itself is ownable as knowledge, just as protocols and rules can both be codified in social arrangements and codified as knowledge.

Cognizant of these difficulties and their own responsibility in these power structures, some scholars have also become activists in attempting to empower those disowned by current law. Such research has aimed to widen our view of “soft” ownership, according to the standards of modern capitalism, toward further inclusion by law, representing the “hard” version of ownership. It has also paved the way for appropriating such knowledge while not always protecting those who know and own beyond the structures of *legal property rights*. In our world, *legal* knowledge ownership usually means control. And this control usually defines inclusion and exclusion of use or access, the right to exploit something for economic, professional, or any other legally recognized gain, and the right to buy and sell. Scholars inquiring about knowledge or ownership historically, sociologically, and anthropologically thus bear an enormous responsibility with their research. This is true across all these fields, whether scholars study the different ways in which genes have been known, and how this has mattered for further consideration

by courts in the United States; whether they reveal that taxing crafts during Ming-era China differs substantially from contemporary notions of crafts within intangible heritage; or whether they emphasize that, to Indonesians, batik techniques for making cloth and the use of materials have been more important than any accurate replication of a given form or aesthetic. As each of these cases shows, a history of kn/own/ability enables us to live up to the responsibility that is incumbent on scholarship to contribute to, and promote, better practices of owning knowing and sharing it in today's world.

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Notes

1. Michel Foucault, *The Archaeology of Knowledge the Discourse on Language*, trans. A. M. Sheridan Smith (New York: Pantheon Books, 1972), 182–183.
2. For discussions on materials and cognition, see, e.g., Carl Knappett, *Thinking through Material Culture* (Philadelphia: University of Pennsylvania Press, 2005). For the role of things, see Timothy J. LeCain, *The Matter of History: How Things Create the Past* (Cambridge: Cambridge University Press, 2017). The role of embodied knowledge is highlighted in Joy Parr, *Sensing Changes: Technologies, Environments, and the Everyday, 1953–2000* (Seattle: University of Washington Press, 2010).
3. Philip Barker, *Techniques of Archeological Excavation*, 3rd ed. (London: Routledge, 2015), 111
4. Research in technology studies addresses the loss and the “regaining” of embodied knowledge in terms of knowledge-in-action and knowledge-in-use. This field focuses on the historical understanding of the nature of “knowledge” and how to research past and present knowledge generation. See, e.g., David Edgerton, “From Innovation to Use: Ten Eclectic Theses on the Historiography of Technology,” *History and Technology* 16, no. 2 (1999): 1–26; Mikael Hård and Andrew Jamison, *Hubris and Hybrid* (London: Routledge, 2005), esp. part III. For related work in sociology, see John Law, ed., “Power, Action, and Belief: A New Sociology of Knowledge,” special issue, *Sociological Review* 32, no. 1 (1984).
5. See, e.g., Annemarie Mol, *The Logic of Care* (London: Routledge, 2008), and Hannah Landecker, “Antibiotic Resistance,” *New Biologies* 22, no. 4 (2016): 44. For the seat belt, see Bruno Latour,

“Where Are the Missing Masses?,” in *Shaping Technology / Building Society: Studies in Sociotechnical Change*, ed. Wiebe Bijker and John Law (Cambridge, MA: MIT Press, 1992), 225–259. For AI and decision-making as a search process, see Nathan Ensmenger, “Is Chess the Drosophila of Artificial Intelligence? A Social History of an Algorithm,” *Social Studies of Science* 42, no. 1 (2011): 16. For the critical role of the analyst, see Sheila Jasanoff, “Imagined and Invented Worlds,” in *Dreamscapes of Modernity: Sociotechnical Imageries and the Fabrication of Power*, ed. Sheila Jasanoff and Sang-Hyun Kim (Chicago: University of Chicago Press, 2015), 339.

The body of literature on this topic across several fields of research is huge. For a study of the diverging ethics of actors in the framework of colonial history, see Suzanne Moon, *Technology and Ethical Idealism—A History of Development in the Netherlands East Indies* (Leiden: CNWS, 2007).

6. Immanuel Kant, *Kritik der reinen Vernunft*, ed. Benno Erdmann (Berlin: De Gruyter, 1990). For a standard English translation, see *Critique of Pure Reason*, ed. and trans. Paul Guyer and Allen W. Wood (Cambridge: Cambridge University Press, 1998).

7. Knowing and owning can certainly be independent from each other, as when actors take ownership of an object without knowing anything about it. This we distinguish as property and possession. But there is no way that owning does not always affect the possibilities of knowing. This is why we talk about kn/own/ability, i.e., a process of facilitation. We thank the anonymous reviewers for asking us to clarify this point.

8. Wiebe E. Bijker, “Technology, Social Construction of,” in *International Encyclopedia of the Social & Behavioral Sciences*, ed. James D. Wright 2nd ed. (Amsterdam: Elsevier, 2015), 135–140. For English scholarship of sociology of knowledge, see David Bloor, “Anti-Latour,” *Studies in History and Philosophy of Science* 30, no. 1 (1999); and Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 2018).

9. See Manuel DeLanda, *Assemblage Theory* (Edinburgh: Edinburgh University Press, 2016), which takes recourse to French philosophers such as Deleuze and Guattari rather than to Henri Lefebvre’s “ensembles” in his *Critique of Everyday Life* (London: Verso, 1991), 298. For an example of how work in STS activates the notion of assemblages, see Israel Rodriguez-Giralt, *Reassembling Activism: Activating Assemblages* (London: Routledge 2020); and Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005).

10. See, e.g., David Wengrow, “Prehistories of Commodity Branding,” *Current Anthropology* 49, no. 1 (2008): 7–34.

11. Sheila Jasanoff, “Making Order: Law and Science in Action,” in *The Handbook of Science and Technology Studies*, ed. Edward J. Hackett et al., 3rd. ed. (Cambridge, MA: MIT Press, 2007), 761.

12. The reverse is also true—by declaring them illegitimate when they cannot be made legible to law and science.

13. Amy E. Wendling, *Karl Marx on Technology and Alienation* (London: Palgrave Macmillan, 2009).

14. In his 1844 manuscript, Karl Marx emphasized estrangement as a distancing from reality and the separation of work as a process of “objectification” (*Vergegenständlichung*). *Karl Marx, frühe*

Schriften, ed. Hans-Joachim Lieber (Stuttgart: Cotta, 1960). Ernst Bloch, Anne Halley, and Darko Suvin, "Entfremdung, Verfremdung: Alienation, Estrangement," *The Drama Review: TDR* 15, no. 1 (1970): 120–125, noted in the 1960s a growing misapprehension between the German and English renderings of Marx's ideas. See also Marcello Musto, "Revisiting Marx's Concept of Alienation," *Socialism and Democracy* 24, no. 3 (2010): 79–101. For Karl Polanyi's approach to Marxism, originally published in 1944, see Karl Polanyi, *The Great Transformation*, 2nd ed. (Boston: Beacon Press, 2001). See also Michael Polanyi, *The Tacit Dimension* (New York: Doubleday, 1966).

15. Robert K. Merton, *Social Theory and Social Structure* (Glencoe, IL: Free Press, 1957), 195.
16. Geoffrey R. Scott, "The Cultural Property Laws of Japan: Social, Political, and Legal Influences," *Washington International Law Journal* 12, no. 2 (2003): 315–402; Dagmar Schäfer and Florence Hsia, "History of Science, Technology, and Medicine: A Second Look at Joseph Needham," *Isis* 110, no. 1 (2019): 94–99.
17. Polanyi, *Tacit Dimension*.
18. Michael Polanyi, "Tacit Knowing: Its Bearing on Some Problems of Philosophy," *Reviews of Modern Physics* 34, no. 4 (1962): 601–616.
19. Harry Collins, "The Tea Set: Tacit Knowledge and Scientific Networks," *Science Studies* 4, no. 2 (1974): 165–185.
20. As represented by the California school or the Annales movement originating in France.
21. Pamela O. Long, "Invention, Authorship, 'Intellectual Property,' and the Origin of Patents: Notes toward a Conceptual History," *Technology and Culture* 32, no. 4 (1991): 846–884.
22. Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2004). For the social constructivist approach and its relation to the material and immaterial construction of knowledge, see Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems*, ed. Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (Cambridge, MA: MIT Press, 1999), 12–44.
23. Two examples of this growing literature are Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004), and Lissa Roberts, Simon Schaffer, and Peter Dear, *The Mindful Hand: Inquiry and Invention from the Late Renaissance to Early Industrialisation* (Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen, 2007).
24. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (New York: Vintage Books, 1995), 26.
25. Philip Mirowski, "On Playing the Economics Trump Card in the Philosophy of Science: Why It Did Not Work for Michael Polanyi," in "Proceedings of the 1996 Biennial Meetings of the Philosophy of Science Association. Part II: Symposia Papers," ed. Lindley Darden, supplement, *Philosophy of Science* 64, no. S4 (1997): S127–S138.

26. Maxine Berg, "In Pursuit of Luxury: Global History and British Consumer Goods in the Eighteenth Century," *Past and Present* 182, no. 1 (2004): 85–142.
27. Alfred Chatterton, *Agricultural and Industrial Problems in India* (Madras: G. A. Natesan, 1904).
28. Abigail McGowan, *Crafting the Nation in Colonial India* (New York: Palgrave Macmillan, 2009).
29. For a detailed discussion on the kind of ethnographic accounts of knowledge generated by the colonial state, see McGowan.
30. McGowan.
31. Ananda Kentish Coomaraswamy, *The Indian Craftsman* (London: Probsthain, 1909); Stella Kramrisch, *Exploring India's Sacred Art: Selected Writings of Stella Kramrisch*, ed. Barbara Stoler Miller, 1st Indian ed. (Delhi: IGNCA and Motilal Banarsidass, 1994); Yanagi Sōetsu, *The Unknown Craftsman: A Japanese Insight into Beauty*, ed. Bernard Leach (Tokyo: Kodansha International, 1972).
32. The commodification of craft as a marketable good certainly has much older traces. See, e.g., Peter Betjemann, *Talking Shop: The Language of Craft in an Age of Consumption* (Charlottesville: University of Virginia Press, 2011), 71–74.
33. Andreas Philippopoulos-Mihalopoulos, *Niklas Luhmann: Law, Justice, Society* (Abingdon, UK: Routledge, 2010) 71. See also Mario Biagoli and Marius Buning, "Technologies of the Law / Law as a Technology," introduction to special issue, *History of Science* 57, no. 1 (2019): 3–17, as well as the entire special issue in which this article appears.
34. John Pickstone, *Ways of Knowing: A New History of Science, Technology, and Medicine* (Chicago: University of Chicago Press, 2001); Andrew Pickering, ed., *Science as Practice and Culture* (Chicago: University of Chicago Press, 1992).
35. Such dichotomies also connected to world orders or periphery and center; see, e.g., Hyungsub Choi, "The Social Construction of Imported Technologies," *Technology and Culture* 58, no. 4 (2017): 905–920. For an approach to ontological issues, see Annemarie Mol, *The Body Multiple: Ontology in Medical Practice* (Durham, NC: Duke University Press, 2008), or Tiago Saraiva, *Fascist Pigs* (Cambridge, MA: MIT Press, 2018).
36. Such was also addressed and implemented by reuniting terms in Ursula Klein, "Technoscience avant la lettre," *Perspectives on Science* 13, no. 2 (2005): 226–266.
37. Sheila Jasanoff, ed., *States of Knowledge: The Co-Production of Science and the Social Order* (London: Routledge, 2004); Jürgen Renn, *The Evolution of Knowledge: Rethinking Science for the Anthropocene* (Princeton, NJ: Princeton University Press, 2020).
38. See Isaac Mazonde and Thomas Pradip, eds., *Indigenous Knowledge System and Intellectual Property Rights in the Twenty-First Century: Perspectives from Southern Africa* (Dakar: CODESRIA, 2007), 95–103, for an example of how such "global" regimes play out locally.
39. This is evident in Aristotelian notions of *techne* and *episteme*, as well as Chinese notions of scholarly written traditions vis-à-vis farmers' bodies, or the Indian caste hierarchy.

40. Barker, *Archeological Excavation*, 111.

41. Only recently, the shifting emphasis on diversity has also stimulated neurologists to develop new models of distributed cognition and multimodal knowing, along with research programs to address the social and cultural nature of the brain and body, and to consider that their methods must account for all kinds of knowledge, textual and embodied. Edwin Hutchins, "Cognition, Distributed," in *International Encyclopedia of the Social & Behavioral Sciences*, ed. James Wright (Oxford: Pergamon, 2001), 2068–2072.

42. Lorraine Daston, ed., *Things That Talk: Object Lessons from Art and Science* (New York: Zone Books, 2004).

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