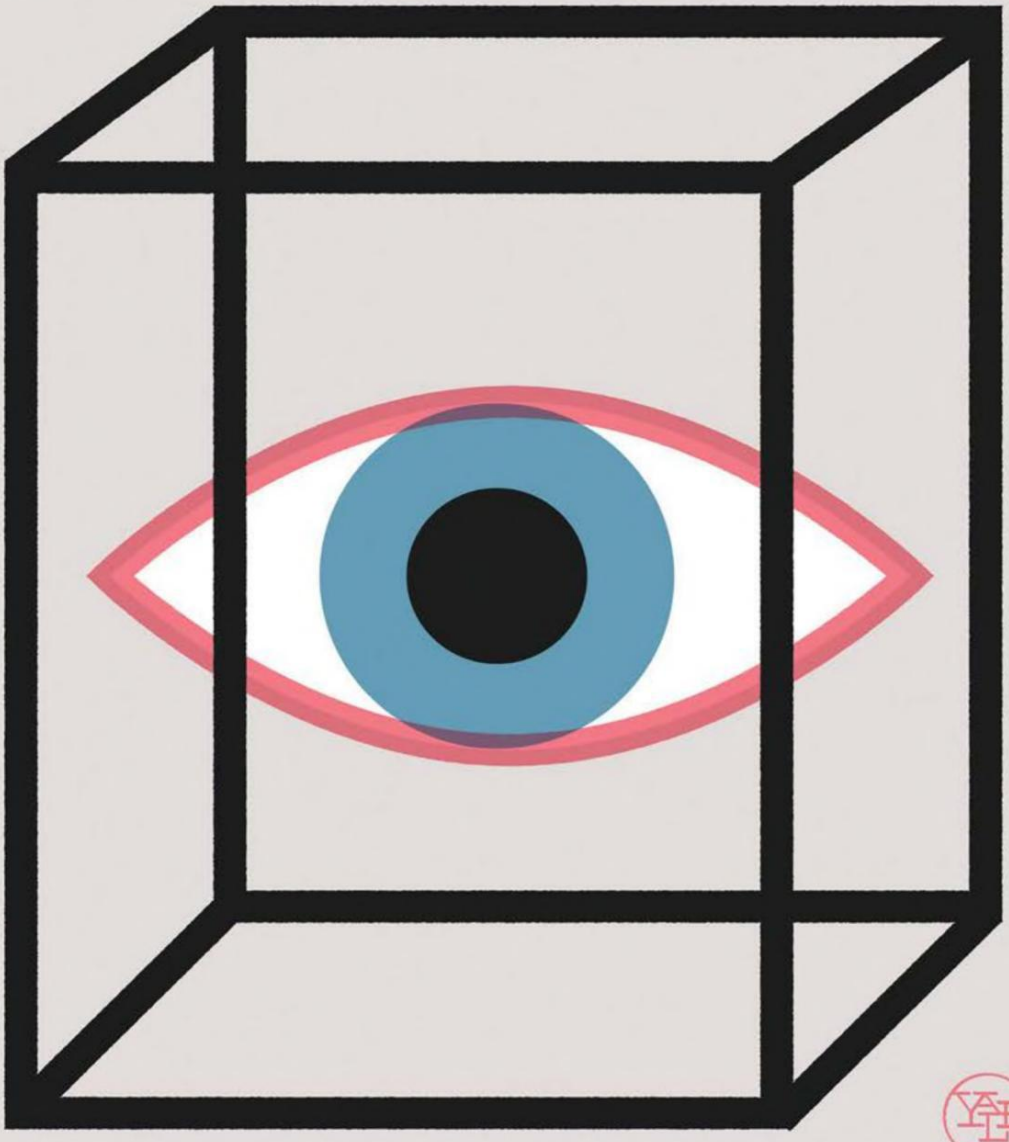
Seeing Like a State

How Certain Schemes to Improve the Human Condition Have Failed

James C. Scott



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Acknowledgments

This book has been longer in the making than I would care to admit. It would be nice to be able to claim that it just took that long to think it through. Nice, but not truthful. A nearly fatal combination of malingering and administrative chores accounts for part of the delay. For the rest, the scope of the book simply expanded, in an academic version of Parkinson's Law, to fill all the space that I would give to it. Finally, I had to call an arbitrary halt or else start thinking of it as a life's work.

The scope of the book together with the time it took to complete it explain the long list of intellectual debts I have accumulated along the way. A full accounting of them would be interminable except for the fact that I realize some of my creditors would just as soon not be associated with the final product. Though I shall not implicate them here, I owe them nonetheless. Instead of turning my argument in the direction they urged, I took their criticisms to heart by fortifying my case so that it would better answer their objections. My other intellectual creditors, having failed to disavow the final product in advance, will be named here and, it is to be hoped, implicated.

Some of my debts are to institutions. I spent the 1990–91 academic year at the Wissenschaftskolleg zu Berlin as a recipient of their hospitality and largesse. The temptation of living for a time in Berlin, just a year after the Wall came down, proved irresistible. After physically laboring for six weeks on an ex-collective farm on the Mecklenburg Plain in eastern Germany (an alternative that I dreamed up to avoid sitting for six weeks in Goethe Institute classes with pimply teenagers), I hurled myself at the German language, Berlin, and my German col-

leagues. My research hardly advanced in any formal sense, but I realize that many fruitful lines of inquiry opened up then. I want particularly to thank Wolf Lepenies, Reinhard Prasser, Joachim Nettlebeck, Barbara Sanders, Barbara Golf, Christine Klohn, and Gerhard Riedel for their many kindnesses. The intellectual boon companionship of Georg Elwert, my local patron saint, as well as that of Shalini Randeria, Gabor Klaniczay, Christoph Harbsmeier, Barbara Lane, Mitchell Ash, Juan Linz, Jochen Blaschke, Arthur von Mehren, Akim von Oppen, Hans Luther, Carola Lenz, Gerd Spittler, Hans Medick, and Alf Lüdke opened my eyes to lines of inquiry that proved formative. Only the great efforts and unfailing friendship of Heinz Lechleiter and Ursula Hess brought my German to a (barely) tolerable level.

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Tololyan mark this work in many ways. Thanks also to Bill Cohen, Peter Rutland, and Judith Goldstein.

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Marglin and I had, unbeknownst to one another, been taking separate trains to roughly the same destination. Thanks to the Rockefeller Foundation, Marglin organized a conference, "The Greening of Economics," in Bellagio, Italy, where I had my first opportunity to present some of my initial ideas, and Marglin's work on episteme and techne as well as his work on agriculture have influenced my thinking. Stephen Gudeman's perceptive comments, Frédérique Apffel Marglin's work on "variolation," and Arun Agrawal's work and commentary have helped to shape my sense of practical knowledge. Chapter 8, which is about agriculture, bears the distinct marks of all that I have learned from the work of Paul Richards and from Jan Douwe van der Ploeg. I am an amateur as an Africanist, and the chapter on *ujamaa* villages in Tanzania owes a great deal to Joel Gao Hiza, who wrote a brilliant senior honors thesis on the subject while at Yale University and who generously shared his voluminous research materials. (He is now finishing a thesis in anthropology at the University of California at Berkeley.) Bruce McKim, Ron Aminzade, Goran Hyden, David Sperling, and Allen Isaacman read the chapter on Tanzania and saved me from some blunders; some undoubtedly remain despite their efforts. Birgit Müller's fine analysis of the role of "fixers and traders" in the East German factory economy before unification helped me to understand the symbiotic relationship between planned order and informal arrangements.

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For the past five years the Program in Agrarian Studies at Yale has been for me the site of a broad, interdisciplinary education in rural life and a major source of intellectual companionship. The program has given me more that I can imagine ever giving back. Virtually every page of this book can be traced to one or another of the wide-ranging encounters fostered by the program. I will forgo mentioning fifty or so postdoctoral fellows who have visited for a year, but all of them have contributed in large and small ways to this enterprise. We invited them to join us because we admired their work, and they have never disappointed us. The chief of the Program in Agrarian Studies, Marvel Kay Mansfield, has been the heart and soul of the success of Agrarian Studies and every other enterprise with which I have been associated at Yale. This is not the first occasion I have acknowledged my debt to her; it has only grown with time. Nor could Agrarian Studies have thrived as it has without the initiative of K. Sivaramakrishnan, Rick Rheingans, Donna Perry, Bruce McKim, Nina Bhatt, and Linda Lee.

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I have been blessed with research assistants who turned what began as wild goose chases into serious quests. Without their imagination and work I would have learned little about the invention of permanent last names, the physical layout of new villages, and language planning. Here is my chance to thank Kate Stanton, Cassandra Moseley, Meredith Weiss, John Tehranian, and Allan Carlson for their superb work. I owe Cassandra Moseley not only thanks but an apology,

because all her fine work on the Tennessee Valley Authority resulted in a chapter that I reluctantly cut in order to keep the book within reasonable bounds. It will find another home, I trust.

Yale University Press has been good to me in more ways than one. I want to thank particularly John Ryden; Judy Metro; my editor, Charles Grench; and the best manuscript editor I have ever worked with, Brenda Kolb.

Several variants of chapter 1, each with some material from later chapters, have appeared elsewhere: "State Simplifications: Nature, Space, and People," Occasional Paper No. 1, Department of History, University of Saskatchewan, Canada, November 1994; "State Simplifications," *Journal of Political Philosophy* 4, no. 2 (1995): 1–42; "State Simplifications: Nature, Space, and People," in Ian Shapiro and Russell Hardin, eds., *Political Order*, vol. 38 of *Nomos* (New York: New York University Press, 1996): 42–85; "Freedom *Contra* Freehold: State Simplification, Space, and People in Southeast Asia," in David Kelly and Anthony Reid, eds., *Freedom in Asia* (forthcoming); "State Simplifications: Some Applications to Southeast Asia," Sixth Annual W. F. Wertheim Lecture, Centre for Asian Studies, Amsterdam, June 1995; and "State Simplifications and Practical Knowledge," in Stephen Marglin and Stephen Gudeman, eds., *People's Economy, People's Ecology* (forthcoming).

I'd like to kick the habit of writing books, at least for a while. If there were a detox unit or an analog to the nicotine patch for serial offenders, I think I would sign up for treatment. My habit has already cost me more precious time than I care to admit. The problem with book writing and other addictions is that the resolve to quit is greatest during withdrawal, but as the painful symptoms recede, the craving is apt to return. Louise and our children, Mia, Aaron, and Noah, would, I know, be only too happy to have me committed until I was "clean." I'm trying. God knows I'm trying.

Seeing Like a State

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Introduction

This book grew out of an intellectual detour that became so gripping that I decided to abandon my original itinerary altogether. After I had made what appeared to be an ill-considered turn, the surprising new scenery and the sense that I was headed for a more satisfying destination persuaded me to change my plans. The new itinerary, I think, has a logic of its own. It might even have been a more elegant trip had I possessed the wit to conceive of it at the outset. What does seem clear to me is that the detour, although along roads that were bumpier and more circuitous than I had foreseen, has led to a more substantial place. It goes without saying that the reader might have found a more experienced guide, but the itinerary is so peculiarly off the beaten track that, if you're headed this way, you have to settle for whatever local tracker you can find.

A word about the road not taken. Originally, I set out to understand why the state has always seemed to be the enemy of "people who move around," to put it crudely. In the context of Southeast Asia, this promised to be a fruitful way of addressing the perennial tensions between mobile, slash-and-burn hill peoples on one hand and wet-rice, valley kingdoms on the other. The question, however, transcended regional geography. Nomads and pastoralists (such as Berbers and Bedouins), hunter-gatherers, Gypsies, vagrants, homeless people, itinerants, runaway slaves, and serfs have always been a thorn in the side of states. Efforts to permanently settle these mobile peoples (sedentarization) seemed to be a perennial state project—perennial, in part, because it so seldom succeeded.

The more I examined these efforts at sedentarization, the more I came to see them as a state's attempt to make a society legible, to arrange the population in ways that simplified the classic state functions of taxation, conscription, and prevention of rebellion. Having begun to think in these terms, I began to see legibility as a central problem in statecraft. The premodern state was, in many crucial respects, partially blind; it knew precious little about its subjects, their wealth, their landholdings and yields, their location, their very identity. It lacked anything like a detailed "map" of its terrain and its people. It lacked, for the most part, a measure, a metric, that would allow it to "translate" what it knew into a common standard necessary for a synoptic view. As a result, its interventions were often crude and self-defeating.

It is at this point that the detour began. How did the state gradually get a handle on its subjects and their environment? Suddenly, processes as disparate as the creation of permanent last names, the standardization of weights and measures, the establishment of cadastral surveys and population registers, the invention of freehold tenure, the standardization of language and legal discourse, the design of cities, and the organization of transportation seemed comprehensible as attempts at legibility and simplification. In each case, officials took exceptionally complex, illegible, and local social practices, such as land tenure customs or naming customs, and created a standard grid whereby it could be centrally recorded and monitored.

The organization of the natural world was no exception. Agriculture is, after all, a radical reorganization and simplification of flora to suit man's goals. Whatever their other purposes, the designs of scientific forestry and agriculture and the layouts of plantations, collective farms, ujamaa villages, and strategic hamlets all seemed calculated to make the terrain, its products, and its workforce more legible —and hence manipulable—from above and from the center.

A homely analogy from beekeeping may be helpful here. In premodern times the gathering of honey was a difficult affair. Even if bees were housed in straw hives, harvesting the honey usually meant driving off the bees and often destroying the colony. The arrangement of brood chambers and honey cells followed complex patterns that varied from hive to hive—patterns that did not allow for neat extractions. The modern beehive, in contrast, is designed to solve the beekeeper's problem. With a device called a "queen excluder," it separates the brood chambers below from the honey supplies above, preventing the queen from laying eggs above a certain level. Furthermore, the wax cells are arranged neatly in vertical frames, nine or ten to a box, which enable the easy extraction of honey, wax, and propolis. Extraction is made

possible by observing "bee space"—the precise distance between the frames that the bees will leave open as passages rather than bridging the frames by building intervening honeycomb. From the beekeeper's point of view, the modern hive is an orderly, "legible" hive allowing the beekeeper to inspect the condition of the colony and the queen, judge its honey production (by weight), enlarge or contract the size of the hive by standard units, move it to a new location, and, above all, extract just enough honey (in temperate climates) to ensure that the colony will overwinter successfully.

I do not wish to push the analogy further than it will go, but much of early modern European statecraft seemed similarly devoted to rationalizing and standardizing what was a social hieroglyph into a legible and administratively more convenient format. The social simplifications thus introduced not only permitted a more finely tuned system of taxation and conscription but also greatly enhanced state capacity. They made possible quite discriminating interventions of every kind, such as public-health measures, political surveillance, and relief for the poor.

These state simplifications, the basic givens of modern statecraft, were, I began to realize, rather like abridged maps. They did not successfully represent the actual activity of the society they depicted, nor were they intended to; they represented only that slice of it that interested the official observer. They were, moreover, not just maps. Rather, they were maps that, when allied with state power, would enable much of the reality they depicted to be remade. Thus a state cadastral map created to designate taxable property-holders does not merely describe a system of land tenure; it creates such a system through its ability to give its categories the force of law. Much of the first chapter is intended to convey how thoroughly society and the environment have been refashioned by state maps of legibility.

This view of early modern statecraft is not particularly original. Suitably modified, however, it can provide a distinctive optic through which a number of huge development fiascoes in poorer Third World nations and Eastern Europe can be usefully viewed.

But "fiasco" is too lighthearted a word for the disasters I have in mind. The Great Leap Forward in China, collectivization in Russia, and compulsory villagization in Tanzania, Mozambique, and Ethiopia are among the great human tragedies of the twentieth century, in terms of both lives lost and lives irretrievably disrupted. At a less dramatic but far more common level, the history of Third World development is littered with the debris of huge agricultural schemes and new cities (think of Brasília or Chandigarh) that have failed their residents.

It is not so difficult, alas, to understand why so many human lives have been destroyed by mobilized violence between ethnic groups, religious sects, or linguistic communities. But it is harder to grasp why so many well-intended schemes to improve the human condition have gone so tragically awry. I aim, in what follows, to provide a convincing account of the logic behind the failure of some of the great utopian social engineering schemes of the twentieth century.

I shall argue that the most tragic episodes of state-initiated social engineering originate in a pernicious combination of four elements. All four are necessary for a full-fledged disaster. The first element is the administrative ordering of nature and society—the transformative state simplifications described above. By themselves, they are the unremarkable tools of modern statecraft; they are as vital to the maintenance of our welfare and freedom as they are to the designs of a would-be modern despot. They undergird the concept of citizenship and the provision of social welfare just as they might undergird a policy of rounding up undesirable minorities.

The second element is what I call a high-modernist ideology. It is best conceived as a strong, one might even say muscle-bound, version of the self-confidence about scientific and technical progress, the expansion of production, the growing satisfaction of human needs, the mastery of nature (including human nature), and, above all, the rational design of social order commensurate with the scientific understanding of natural laws. It originated, of course, in the West, as a by-product of unprecedented progress in science and industry.

High modernism must not be confused with scientific practice. It was fundamentally, as the term "ideology" implies, a faith that borrowed, as it were, the legitimacy of science and technology. It was, accordingly, uncritical, unskeptical, and thus unscientifically optimistic about the possibilities for the comprehensive planning of human settlement and production. The carriers of high modernism tended to see rational order in remarkably visual aesthetic terms. For them, an efficient, rationally organized city, village, or farm was a city that *looked* regimented and orderly in a geometrical sense. The carriers of high modernism, once their plans miscarried or were thwarted, tended to retreat to what I call miniaturization: the creation of a more easily controlled micro-order in model cities, model villages, and model farms.

High modernism was about "interests" as well as faith. Its carriers, even when they were capitalist entrepreneurs, required state action to realize their plans. In most cases, they were powerful officials and heads of state. They tended to prefer certain forms of planning and so-

cial organization (such as huge dams, centralized communication and transportation hubs, large factories and farms, and grid cities), because these forms fit snugly into a high-modernist view and also answered their political interests as state officials. There was, to put it mildly, an elective affinity between high modernism and the interests of many state officials.

Like any ideology, high modernism had a particular temporal and social context. The feats of national economic mobilization of the belligerents (especially Germany) in World War I seem to mark its high tide. Not surprisingly, its most fertile social soil was to be found among planners, engineers, architects, scientists, and technicians whose skills and status it celebrated as the designers of the new order. High-modernist faith was no respecter of traditional political boundaries; it could be found across the political spectrum from left to right but particularly among those who wanted to use state power to bring about huge, utopian changes in people's work habits, living patterns, moral conduct, and worldview. Nor was this utopian vision dangerous in and of itself. Where it animated plans in liberal parliamentary societies and where the planners therefore had to negotiate with organized citizens, it could spur reform.

Only when these first two elements are joined to a third does the combination become potentially lethal. The third element is an authoritarian state that is willing and able to use the full weight of its coercive power to bring these high-modernist designs into being. The most fertile soil for this element has typically been times of war, revolution, depression, and struggle for national liberation. In such situations, emergency conditions foster the seizure of emergency powers and frequently delegitimize the previous regime. They also tend to give rise to elites who repudiate the past and who have revolutionary designs for their people.

A fourth element is closely linked to the third: a prostrate civil society that lacks the capacity to resist these plans. War, revolution, and economic collapse often radically weaken civil society as well as make the populace more receptive to a new dispensation. Late colonial rule, with its social engineering aspirations and ability to run roughshod over popular opposition, occasionally met this last condition.

In sum, the legibility of a society provides the capacity for large-scale social engineering, high-modernist ideology provides the desire, the authoritarian state provides the determination to act on that desire, and an incapacitated civil society provides the leveled social terrain on which to build.

I have not yet explained, the reader will have noted, why such high-

modernist plans, backed by authoritarian power, actually failed. Accounting for their failure is my second purpose here.

Designed or planned social order is necessarily schematic; it always ignores essential features of any real, functioning social order. This truth is best illustrated in a work-to-rule strike, which turns on the fact that any production process depends on a host of informal practices and improvisations that could never be codified. By merely following the rules meticulously, the workforce can virtually halt production. In the same fashion, the simplified rules animating plans for, say, a city, a village, or a collective farm were inadequate as a set of instructions for creating a functioning social order. The formal scheme was parasitic on informal processes that, alone, it could not create or maintain. To the degree that the formal scheme made no allowance for these processes or actually suppressed them, it failed both its intended beneficiaries and ultimately its designers as well.

Much of this book can be read as a case against the *imperialism* of high-modernist, planned social order. I stress the word "imperialism" here because I am emphatically not making a blanket case against either bureaucratic planning or high-modernist ideology. I am, however, making a case against an imperial or hegemonic planning mentality that excludes the necessary role of local knowledge and know-how.

Throughout the book I make the case for the indispensable role of practical knowledge, informal processes, and improvisation in the face of unpredictability. In chapters 4 and 5, I contrast the high-modernist views and practices of city planners and revolutionaries with critical views emphasizing process, complexity, and open-endedness. Le Corbusier and Lenin are the protagonists, with Jane Jacobs and Rosa Luxemburg cast as their formidable critics. Chapters 6 and 7 contain accounts of Soviet collectivization and Tanzanian forced villagization, which illustrate how schematic, authoritarian solutions to production and social order inevitably fail when they exclude the fund of valuable knowledge embodied in local practices. (An early draft contained a case study of the Tennessee Valley Authority, the United States' high-modernist experiment and the granddaddy of all regional development projects. It was reluctantly swept aside to shorten what is still a long book.)

Finally, in chapter 9 I attempt to conceptualize the nature of practical knowledge and to contrast it with more formal, deductive, epistemic knowledge. The term *mētis*, which descends from classical Greek and denotes the knowledge that can come only from practical experience, serves as a useful portmanteau word for what I have in mind.

Here I should also acknowledge my debt to anarchist writers (Kropotkin, Bakunin, Malatesta, Proudhon) who consistently emphasize the role of mutuality as opposed to imperative, hierarchical coordination in the creation of social order. Their understanding of the term "mutuality" covers some, but not all, of the same ground that I mean to cover with "mētis."

Radically simplified designs for social organization seem to court the same risks of failure courted by radically simplified designs for natural environments. The failures and vulnerability of monocrop commercial forests and genetically engineered, mechanized monocropping mimic the failures of collective farms and planned cities. At this level, I am making a case for the resilience of both social and natural diversity and a strong case about the limits, in principle, of what we are likely to know about complex, functioning order. One could, I think, successfully turn this argument against a certain kind of reductive social science. Having already taken on more than I could chew, I leave this additional detour to others, with my blessing.

In trying to make a strong, paradigmatic case, I realize that I have risked displaying the hubris of which high modernists are justly accused. Once you have crafted lenses that change your perspective, it is a great temptation to look at everything through the same spectacles. I do, however, want to plead innocent to two charges that I do not think a careful reading would sustain. The first charge is that my argument is uncritically admiring of the local, the traditional, and the customary. I understand that the practical knowledge I describe is often inseparable from the practices of domination, monopoly, and exclusion that offend the modern liberal sensibility. My point is not that practical knowledge is the product of some mythical, egalitarian state of nature. Rather, my point is that formal schemes of order are untenable without some elements of the practical knowledge that they tend to dismiss. The second charge is that my argument is an anarchist case against the state itself. The state, as I make abundantly clear, is the vexed institution that is the ground of both our freedoms and our unfreedoms. My case is that certain kinds of states, driven by utopian plans and an authoritarian disregard for the values, desires, and objections of their subjects, are indeed a mortal threat to human well-being. Short of that draconian but all too common situation, we are left to weigh judiciously the benefits of certain state interventions against their costs.

As I finished this book, I realized that its critique of certain forms of state action might seem, from the post–1989 perspective of capitalist triumphalism, like a kind of quaint archaeology. States with the pretensions and power that I criticize have for the most part vanished or

have drastically curbed their ambitions. And yet, as I make clear in examining scientific farming, industrial agriculture, and capitalist markets in general, large-scale capitalism is just as much an agency of homogenization, uniformity, grids, and heroic simplification as the state is, with the difference being that, for capitalists, simplification must pay. A market necessarily reduces quality to quantity via the price mechanism and promotes standardization; in markets, money talks, not people. Today, global capitalism is perhaps the most powerful force for homogenization, whereas the state may in some instances be the defender of local difference and variety. (In *Enlightenment's Wake*, John Gray makes a similar case for liberalism, which he regards as self-limiting because it rests on cultural and institutional capital that it is bound to undermine.) The "interruption," forced by widespread strikes, of France's structural adjustments to accommodate a common European currency is perhaps a straw in the wind. Put bluntly, my bill of particulars against a certain kind of state is by no means a case for politically unfettered market coordination as urged by Friedrich Hayek and Milton Friedman. As we shall see, the conclusions that can be drawn from the failures of modern projects of social engineering are as applicable to market-driven standardization as they are to bureaucratic homogeneity.

Part 1

State Projects of Legibility and Simplification

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1 Nature and Space

> Would it not be a great satisfaction to the king to know at a designated moment every year the number of his subjects, in total and by region, with all the resources, wealth & poverty of each place; [the number] of his nobility and ecclesiastics of all kinds, of men of the robe, of Catholics and of those of the other religion, all separated according to the place of their residence? . . . [Would it not be] a useful and necessary pleasure for him to be able, in his own office, to review in an hour's time the present and past condition of a great realm of which he is the head, and be able himself to know with certitude in what consists his grandeur, his wealth, and his strengths?
> —Marquis de Vauban, *proposing an annual census to Louis XIV in 1686*

Certain forms of knowledge and control require a narrowing of vision. The great advantage of such tunnel vision is that it brings into sharp focus certain limited aspects of an otherwise far more complex and unwieldy reality. This very simplification, in turn, makes the phenomenon at the center of the field of vision more legible and hence more susceptible to careful measurement and calculation. Combined with similar observations, an overall, aggregate, synoptic view of a selective reality is achieved, making possible a high degree of schematic knowledge, control, and manipulation.

The invention of scientific forestry in late eighteenth-century Prussia and Saxony serves as something of a model of this process.[1] Although the history of scientific forestry is important in its own right, it is used here as a metaphor for the forms of knowledge and manipulation characteristic of powerful institutions with sharply defined interests, of which state bureaucracies and large commercial firms are perhaps the outstanding examples. Once we have seen how simplification, legibility, and manipulation operate in forest management, we can then explore how the modern state applies a similar lens to urban planning, rural settlement, land administration, and agriculture.

The State and Scientific Forestry: A Parable

> I [Gilgamesh] would conquer in the Cedar Forest. . . . I will set my hand to it and will chop down the Cedar.
> —*Epic of Gilgamesh*

The early modern European state, even before the development of scientific forestry, viewed its forests primarily through the fiscal lens of

revenue needs. To be sure, other concerns—such as timber for shipbuilding, state construction, and fuel for the economic security of its subjects—were not entirely absent from official management. These concerns also had heavy implications for state revenue and security.[2] Exaggerating only slightly, one might say that the crown's interest in forests was resolved through its fiscal lens into a single number: the revenue yield of the timber that might be extracted annually.

The best way to appreciate how heroic was this constriction of vision is to notice what fell outside its field of vision. Lurking behind the number indicating revenue yield were not so much forests as commercial wood, representing so many thousands of board feet of saleable timber and so many cords of firewood fetching a certain price. Missing, of course, were all those trees, bushes, and plants holding little or no potential for state revenue. Missing as well were all those parts of trees, even revenue-bearing trees, which might have been useful to the population but whose value could not be converted into fiscal receipts. Here I have in mind foliage and its uses as fodder and thatch; fruits, as food for people and domestic animals; twigs and branches, as bedding, fencing, hop poles, and kindling; bark and roots, for making medicines and for tanning; sap, for making resins; and so forth. Each species of tree—indeed, each part or growth stage of each species—had its unique properties and uses. A fragment of the entry under "elm" in a popular seventeenth-century encyclopedia on aboriculture conveys something of the vast range of practical uses to which the tree could be put.

> Elm is a timber of most singular use, especially whereby it may be continually dry, or wet, in extremes; therefore proper for water works, mills, the ladles and soles of the wheel, pumps, aqueducts, ship planks below the water line, . . . also for wheelwrights, handles for the single handsaw, rails and gates. Elm is not so apt to rive [split] . . . and is used for chopping blocks, blocks for the hat maker, trunks and boxes to be covered with leather, coffins and dressers and shovelboard tables of great length; also for the carver and those curious workers of fruitage, foliage, shields, statues and most of the ornaments appertaining to the orders of architecture. . . . And finally . . . the use of the very leaves of this tree, especially the female, is not to be despised, . . . for they will prove of great relief to cattle in the winter and scorching summers when hay and fodder is dear. . . . The green leaf of the elms contused heals a green wound or cut, and boiled with the bark, consolidates bone fractures.[3]

In state "fiscal forestry," however, the actual tree with its vast number of possible uses was replaced by an abstract tree representing a volume of lumber or firewood. If the princely conception of the forest was still utilitarian, it was surely a utilitarianism confined to the direct needs of the state.

From a naturalist's perspective, nearly everything was missing from

the state's narrow frame of reference. Gone was the vast majority of flora: grasses, flowers, lichens, ferns, mosses, shrubs, and vines. Gone, too, were reptiles, birds, amphibians, and innumerable species of insects. Gone were most species of fauna, except those that interested the crown's gamekeepers.

From an anthropologist's perspective, nearly everything touching on human interaction with the forest was also missing from the state's tunnel vision. The state did pay attention to poaching, which impinged on its claim to revenue in wood or its claim to royal game, but otherwise it typically ignored the vast, complex, and negotiated social uses of the forest for hunting and gathering, pasturage, fishing, charcoal making, trapping, and collecting food and valuable minerals as well as the forest's significance for magic, worship, refuge, and so on.[4]

If the utilitarian state could not see the real, existing forest for the (commercial) trees, if its view of its forests was abstract and partial, it was hardly unique in this respect. Some level of abstraction is necessary for virtually all forms of analysis, and it is not at all surprising that the abstractions of state officials should have reflected the paramount fiscal interests of their employer. The entry under "forest" in Diderot's *Encyclopédie* is almost exclusively concerned with the *utilité publique* of forest products and the taxes, revenues, and profits that they can be made to yield. The forest as a habitat disappears and is replaced by the forest as an economic resource to be managed efficiently and profitably.[5] Here, fiscal and commercial logics coincide; they are both resolutely fixed on the bottom line.

The vocabulary used to organize nature typically betrays the overriding interests of its human users. In fact, utilitarian discourse replaces the term "nature" with the term "natural resources," focusing on those aspects of nature that can be appropriated for human use. A comparable logic extracts from a more generalized natural world those flora or fauna that are of utilitarian value (usually marketable commodities) and, in turn, reclassifies those species that compete with, prey on, or otherwise diminish the yields of the valued species. Thus, plants that are valued become "crops," the species that compete with them are stigmatized as "weeds," and the insects that ingest them are stigmatized as "pests." Thus, trees that are valued become "timber," while species that compete with them become "trash" trees or "underbrush." The same logic applies to fauna. Highly valued animals become "game" or "livestock," while those animals that compete with or prey upon them become "predators" or "varmints."

The kind of abstracting, utilitarian logic that the state, through its officials, applied to the forest is thus not entirely distinctive. What is distinctive about this logic, however, is the narrowness of its field of vision, the degree of elaboration to which it can be subjected, and above

all, as we shall see, the degree to which it allowed the state to impose that logic on the very reality that was observed.[6]

Scientific forestry was originally developed from about 1765 to 1800, largely in Prussia and Saxony. Eventually, it would become the basis of forest management techniques in France, England, and the United States and throughout the Third World. Its emergence cannot be understood outside the larger context of the centralized state-making initiatives of the period. In fact, the new forestry science was a subdiscipline of what was called cameral science, an effort to reduce the fiscal management of a kingdom to scientific principles that would allow systematic planning.[7] Traditional domainal forestry had hitherto simply divided the forest into roughly equal plots, with the number of plots coinciding with the number of years in the assumed growth cycle.[8] One plot was cut each year on the assumption of equal yields (and value) from plots of equal size. Because of poor maps, the uneven distribution of the most valuable large trees (*Hochwald*), and very approximate cordwood (*Bruststaerke*) measures, the results were unsatisfactory for fiscal planning.

Careful exploitation of domainal forests was all the more imperative in the late eighteenth century, when fiscal officials became aware of a growing shortage of wood. Many of the old-growth forests of oak, beech, hornbeam, and linden had been severely degraded by planned and unplanned felling, while the regrowth was not as robust as hoped. The prospect of declining yields was alarming, not merely because it threatened revenue flows but also because it might provoke massive poaching by a peasantry in search of firewood. One sign of this concern were the numerous state-sponsored competitions for designs of more efficient woodstoves.

The first attempt at more precise measurements of forests was made by Johann Gottlieb Beckmann on a carefully surveyed sample plot. Walking abreast, several assistants carried compartmentalized boxes with color-coded nails corresponding to five categories of tree sizes, which they had been trained to identify. Each tree was tagged with the appropriate nail until the sample plot had been covered. Because each assistant had begun with a certain number of nails, it was a simple matter to subtract the remaining nails from the initial total and arrive at an inventory of trees by class for the entire plot. The sample plot had been carefully chosen for its representativeness, allowing the foresters to then calculate the timber and, given certain price assumptions, the revenue yield of the whole forest. For the forest scientists (*Forstwissenschaftler*) the goal was always to "deliver the greatest possible *constant* volume of wood."[9]

The effort at precision was pushed further as mathematicians worked from the cone-volume principle to specify the volume of saleable wood contained by a standardized tree (*Normalbaum*) of a given

size-class. Their calculations were checked empirically against the actual volume of wood in sample trees.[10] The final result of such calculations was the development of elaborate tables with data organized by tree size and age under specified conditions of normal growth and maturation. By radically narrowing his vision to commercial wood, the state forester had, with his tables, paradoxically achieved a synoptic view of the entire forest.[11] This restriction of focus reflected in the tables was in fact the only way in which the whole forest could be taken in by a single optic. Reference to these tables coupled with field tests allowed the forester to estimate closely the inventory, growth, and yield of a given forest. In the regulated, abstract forest of the forstwissenschaftler, calculation and measurement prevailed, and the three watchwords, in modern parlance, were "minimum diversity," the "balance sheet," and "sustained yield." The logic of the state-managed forest science was virtually identical with the logic of commercial exploitation.[12]

The achievement of German forestry science in standardizing techniques for calculating the sustainable yield of commercial timber and hence revenue was impressive enough. What is decisive for our purposes, however, was the next logical step in forest management. That step was to attempt to create, through careful seeding, planting, and cutting, a forest that was easier for state foresters to count, manipulate, measure, and assess. The fact is that forest science and geometry, backed by state power, had the capacity to transform the real, diverse, and chaotic old-growth forest into a new, more uniform forest that closely resembled the administrative grid of its techniques. To this end, the underbrush was cleared, the number of species was reduced (often to monoculture), and plantings were done simultaneously and in straight rows on large tracts. These management practices, as Henry Lowood observes, "produced the monocultural, even-age forests that eventually transformed the Normalbaum from abstraction to reality. The German forest became the archetype for imposing on disorderly nature the neatly arranged constructs of science. Practical goals had encouraged mathematical utilitarianism, which seemed, in turn, to promote geometric perfection as the outward sign of the well-managed forest; in turn the rationally ordered arrangements of trees offered new possibilities for controlling nature."[13]

The tendency was toward regimentation, in the strict sense of the word. The forest trees were drawn up into serried, uniform ranks, as it were, to be measured, counted off, felled, and replaced by a new rank and file of lookalike conscripts. As an army, it was also designed hierarchically from above to fulfill a unique purpose and to be at the disposition of a single commander. At the limit, the forest itself would not even have to be seen; it could be "read" accurately from the tables and maps in the forester's office.

1. Mixed temperate forest, part managed, part natural regeneration

2. One aisle of a managed poplar forest in Tuscany

How much easier it was to manage the new, stripped-down forest. With stands of same-age trees arranged in linear alleys, clearing the underbrush, felling, extraction, and new planting became a far more routine process. Increasing order in the forest made it possible for forest workers to use written training protocols that could be widely applied. A relatively unskilled and inexperienced labor crew could adequately carry out its tasks by following a few standard rules in the new forest environment. Harvesting logs of relatively uniform width and length not only made it possible to forecast yields successfully but also to market homogeneous product units to logging contractors and timber merchants.[14] Commercial logic and bureaucratic logic were, in this instance, synonymous; it was a system that promised to maximize the return of a single commodity over the long haul and at the same time lent itself to a centralized scheme of management.

The new legible forest was also easier to manipulate experimentally. Now that the more complex old-growth forest had been replaced by a forest in which many variables were held constant, it was a far simpler matter to examine the effects of such variables as fertilizer applications, rainfall, and weeding, on same-age, single-species stands. It was the closest thing to a forest laboratory one could imagine at the time.[15] The very simplicity of the forest made it possible, for the first time, to assess novel regimens of forest management under nearly experimental conditions.

Although the geometric, uniform forest was intended to facilitate management and extraction, it quickly became a powerful aesthetic as well. The visual sign of the well-managed forest, in Germany and in the many settings where German scientific forestry took hold, came to be the regularity and neatness of its appearance. Forests might be inspected in much the same way as a commanding officer might review his troops on parade, and woe to the forest guard whose "beat" was not sufficiently trim or "dressed." This aboveground order required that underbrush be removed and that fallen trees and branches be gathered and hauled off. Unauthorized disturbances—whether by fire or by local populations—were seen as implicit threats to management routines. The more uniform the forest, the greater the possibilities for centralized management; the routines that could be applied minimized the need for the discretion necessary in the management of diverse old-growth forests.

The controlled environment of the redesigned, scientific forest promised many striking advantages.[16] It could be synoptically surveyed by the chief forester; it could be more easily supervised and harvested according to centralized, long-range plans; it provided a steady, uniform commodity, thereby eliminating one major source of revenue fluctuation; and it created a legible natural terrain that facilitated manipulation and experimentation.

This utopian dream of scientific forestry was, of course, only the *immanent* logic of its techniques. It was not and could not ever be realized in practice. Both nature and the human factor intervened. The existing topography of the landscape and the vagaries of fire, storms, blights, climatic changes, insect populations, and disease conspired to thwart foresters and to shape the actual forest. Also, given the insurmountable difficulties of policing large forests, people living nearby typically continued to graze animals, poach firewood and kindling, make charcoal, and use the forest in other ways that prevented the foresters' management plan from being fully realized.[17] Although, like all utopian schemes, it fell well short of attaining its goal, the critical fact is that it did partly succeed in stamping the actual forest with the imprint of its designs.

The principles of scientific forestry were applied as rigorously as was practicable to most large German forests throughout much of the nineteenth century. The Norway spruce, known for its hardiness, rapid growth, and valuable wood, became the bread-and-butter tree of commercial forestry. Originally, the Norway spruce was seen as a restoration crop that might revive overexploited mixed forests, but the commercial profits from the first rotation were so stunning that there was little effort to return to mixed forests. The monocropped forest was a disaster for peasants who were now deprived of all the grazing, food, raw materials, and medicines that the earlier forest ecology had afforded. Diverse old-growth forests, about three-fourths of which were broadleaf (deciduous) species, were replaced by largely coniferous forests in which Norway spruce or Scotch pine were the dominant or often only species.

In the short run, this experiment in the radical simplification of the forest to a single commodity was a resounding success. It was a rather long short run, in the sense that a single crop rotation of trees might take eighty years to mature. The productivity of the new forests reversed the decline in the domestic wood supply, provided more uniform stands and more usable wood fiber, raised the economic return of forest land, and appreciably shortened rotation times (the time it took to harvest a stand and plant another).[18] Like row crops in a field, the new softwood forests were prodigious producers of a single commodity. Little wonder that the German model of intensive commercial forestry became standard throughout the world.[19] Gifford Pinchot, the second chief forester of the United States, was trained at the French forestry school at Nancy, which followed a German-style curriculum, as did most U.S. and European forestry schools.[20] The first forester hired by the British to assess and manage the great forest resources of India and Burma was Dietrich Brandes, a German.[21] By the end of the nineteenth century, German forestry science was hegemonic.

The great simplification of the forest into a "one-commodity ma-

chine" was precisely the step that allowed German forestry science to become a rigorous technical and commercial discipline that could be codified and taught. A condition of its rigor was that it severely bracketed, or assumed to be constant, all variables except those bearing directly on the yield of the selected species and on the cost of growing and extracting them. As we shall see with urban planning, revolutionary theory, collectivization, and rural resettlement, a whole world lying "outside the brackets" returned to haunt this technical vision.

In the German case, the negative biological and ultimately commercial consequences of the stripped-down forest became painfully obvious only after the *second* rotation of conifers had been planted. "It took about one century for them [the negative consequences] to show up clearly. Many of the pure stands grew excellently in the first generation but already showed an amazing retrogression in the second generation. The reason for this is a very complex one and only a simplified explanation can be given. . . . Then the whole nutrient cycle got out of order and eventually was nearly stopped. . . . Anyway, the drop of one or two site classes [used for grading the quality of timber] during two or three generations of pure spruce is a well known and frequently observed fact. This represents a production loss of 20 to 30 percent."[22]

A new term, *Waldsterben* (forest death), entered the German vocabulary to describe the worst cases. An exceptionally complex process involving soil building, nutrient uptake, and symbiotic relations among fungi, insects, mammals, and flora—which were, and still are, not entirely understood—was apparently disrupted, with serious consequences. Most of these consequences can be traced to the radical simplicity of the scientific forest.

Only an elaborate treatise in ecology could do justice to the subject of what went wrong, but mentioning a few of the major effects of simplification will illustrate how vital many of the factors bracketed by scientific forestry turned out to be. German forestry's attention to formal order and ease of access for management and extraction led to the clearing of underbrush, deadfalls, and snags (standing dead trees), greatly reducing the diversity of insect, mammal, and bird populations so essential to soil-building processes.[23] The absence of litter and woody biomass on the new forest floor is now seen as a major factor leading to thinner and less nutritious soils.[24] Same-age, same-species forests not only created a far less diverse habitat but were also more vulnerable to massive storm-felling. The very uniformity of species and age among, say, Norway spruce also provided a favorable habitat to all the "pests" which were specialized to that species. Populations of these pests built up to epidemic proportions, inflicting losses in yields and large outlays for fertilizers, insecticides, fungicides, or rodenticides.[25] Apparently the first rotation of Norway spruce had grown exceptionally well in large part because it was living off (or mining) the long-accumulated

soil capital of the diverse old-growth forest that it had replaced. Once that capital was depleted, the steep decline in growth rates began.

As pioneers in scientific forestry, the Germans also became pioneers in recognizing and attempting to remedy many of its undesirable consequences. To this end, they invented the science of what they called "forest hygiene." In place of hollow trees that had been home to woodpeckers, owls, and other tree-nesting birds, the foresters provided specially designed boxes. Ant colonies were artificially raised and implanted in the forest, their nests tended by local schoolchildren. Several species of spiders, which had disappeared from the monocropped forest, were reintroduced.[26] What is striking about these endeavors is that they are attempts to work around an impoverished habitat still planted with a single species of conifers for production purposes.[27] In this case, "restoration forestry" attempted with mixed results to create a *virtual* ecology, while denying its chief sustaining condition: diversity.

The metaphorical value of this brief account of scientific production forestry is that it illustrates the dangers of dismembering an exceptionally complex and poorly understood set of relations and processes in order to isolate a single element of instrumental value. The instrument, the knife, that carved out the new, rudimentary forest was the razor-sharp interest in the production of a single commodity. Everything that interfered with the efficient production of the key commodity was implacably eliminated. Everything that seemed unrelated to efficient production was ignored. Having come to see the forest as a commodity, scientific forestry set about refashioning it as a commodity machine.[28] Utilitarian simplification in the forest was an effective way of maximizing wood production in the short and intermediate term. Ultimately, however, its emphasis on yield and paper profits, its relatively short time horizon, and, above all, the vast array of consequences it had resolutely bracketed came back to haunt it.[29]

Even in the realm of greatest interest—namely, the production of wood fiber—the consequences of not seeing the forest for the trees sooner or later became glaring. Many were directly traceable to the basic simplification imposed in the interest of ease of management and economic return: monoculture. Monocultures are, as a rule, more fragile and hence more vulnerable to the stress of disease and weather than polycultures are. As Richard Plochmann expresses it, "One further drawback, which is typical of all pure plantations, is that the ecology of the natural plant associations became unbalanced. Outside of the natural habitat, and when planted in pure stands, the physical condition of the single tree weakens and resistance against enemies decreases."[30] Any unmanaged forest may experience stress from storms, disease, drought, fragile soil, or severe cold. A diverse, complex forest, however, with its many species of trees, its full complement of birds, insects, and

mammals, is far more resilient—far more able to withstand and recover from such injuries—than pure stands. Its very diversity and complexity help to inoculate it against devastation: a windstorm that fells large, old trees of one species will typically spare large trees of other species as well as small trees of the same species; a blight or insect attack that threatens, say, oaks may leave lindens and hornbeams unscathed. Just as a merchant who, not knowing what conditions her ships will face at sea, sends out scores of vessels with different designs, weights, sails, and navigational aids stands a better chance of having much of her fleet make it to port, while a merchant who stakes everything on a single ship design and size runs a higher risk of losing everything, forest biodiversity acts like an insurance policy. Like the enterprise run by the second merchant, the simplified forest is a more vulnerable system, especially over the long haul, as its effects on soil, water, and "pest" populations become manifest. Such dangers can only partly be checked by the use of artificial fertilizers, insecticides, and fungicides. Given the fragility of the simplified production forest, the massive outside intervention that was required to establish it—we might call it the administrators' forest—is increasingly necessary in order to sustain it as well.[31]

Social Facts, Raw and Cooked

> Society must be remade before it can be the object of quantification. Categories of people and things must be defined, measures must be interchangeable; land and commodities must be conceived as represented by an equivalent in money. There is much of what Weber called rationalization in this, and also a good deal of centralization.
> —Theodore M. Porter, *"Objectivity as Standardization"*

The administrators' forest cannot be the naturalists' forest. Even if the ecological interactions at play in the forest were known, they would constitute a reality so complex and variegated as to defy easy shorthand description. The intellectual filter necessary to reduce the complexity to manageable dimensions was provided by the state's interest in commercial timber and revenue.

If the natural world, however shaped by human use, is too unwieldy in its "raw" form for administrative manipulation, so too are the actual social patterns of human interaction with nature bureaucratically indigestible in their raw form. No administrative system is capable of representing *any* existing social community except through a heroic and greatly schematized process of abstraction and simplification. It is not simply a question of capacity, although, like a forest, a human community is surely far too complicated and variable to easily yield its secrets to bureaucratic formulae. It is also a question of purpose. State agents have no interest—nor should they—in describ-

ing an entire social reality, any more than the scientific forester has an interest in describing the ecology of a forest in detail. Their abstractions and simplifications are disciplined by a small number of objectives, and until the nineteenth century the most prominent of these were typically taxation, political control, and conscription. They needed only the techniques and understanding that were adequate to these tasks. As we shall see, here are some instructive parallels between the development of modern "fiscal forestry" and modern forms of taxable property in land. Premodern states were no less concerned with tax receipts than are modern states. But, as with premodern state forestry, the taxation techniques and reach of the premodern state left much to be desired.

Absolutist France in the seventeenth century is a case in point.[32] Indirect taxes—excise levies on salt and tobacco, tolls, license fees, and the sale of offices and titles—were favored forms of taxation; they were easy to administer and required little or nothing in the way of information about landholding and income. The tax-exempt status of the nobility and clergy meant that a good deal of the landed property was not taxed at all, transferring much of the burden to wealthy commoner farmers and the peasantry. Common land, although it was a vitally important subsistence resource for the rural poor, yielded no revenue either. In the eighteenth century, the physiocrats would condemn all common property on two presumptive grounds: it was inefficiently exploited, and it was fiscally barren.[33]

What must strike any observer of absolutist taxation is how wildly variable and unsystematic it was. James Collins has found that the main direct land tax, the *taille*, was frequently not paid at all and that no community paid more than one-third of what they were assessed.[34] The result was that the state routinely relied on exceptional measures to overcome shortfalls in revenue or to pay for new expenses, particularly military campaigns. The crown exacted "forced loans" (*rentes, droits aliénés*) in return for annuities that it might or might not honor; it sold offices and titles (*vénalités d'offices*); it levied exceptional hearth taxes (*fouages extraordinaires*); and, worst of all, it billeted troops directly in communities, often ruining the towns in the process.[35]

The billeting of troops, a common form of fiscal punishment, is to modern forms of systematic taxation as the drawing and quartering of would-be regicides (so strikingly described by Michel Foucault at the beginning of *Discipline and Punish*) is to modern forms of systematic incarceration of criminals. Not that there was a great deal of choice involved. The state simply lacked both the information and the administrative grid that would have allowed it to exact from its subjects a reliable revenue that was more closely tied to their actual capacity to pay. As with forest revenue, there was no alternative to rough-and-ready calculations and their corresponding fluctuations in yields. Fiscally,

the premodern state was, to use Charles Lindblom's felicitous phrase, "all thumbs and no fingers"; it was incapable of fine tuning.

Here is where the rough analogy between forest management and taxation begins to break down. In the absence of reliable information about sustainable timber yield, the state might either inadvertently overexploit its resources and threaten future supply or else fail to realize the level of proceeds the forest might sustain.[36] The trees themselves, however, were not political actors, whereas the taxable subjects of the crown most certainly were. They signaled their dissatisfaction by flight, by various forms of quiet resistance and evasion, and, in extremis, by outright revolt. A reliable format for taxation of subjects thus depended not just on discovering what their economic conditions were but also on trying to judge what exactions they would vigorously resist.

How were the agents of the state to begin measuring and codifying, throughout each region of an entire kingdom, its population, their landholdings, their harvests, their wealth, the volume of commerce, and so on? The obstacles in the path of even the most rudimentary knowledge of these matters were enormous. The struggle to establish uniform weights and measures and to carry out a cadastral mapping of landholdings can serve as diagnostic examples. Each required a large, costly, long-term campaign against determined resistance. Resistance came not only from the general population but also from local power-holders; they were frequently able to take advantage of the administrative incoherence produced by differing interests and missions within the ranks of officialdom. But in spite of the ebbs and flows of the various campaigns and their national peculiarities, a pattern of adopting uniform measurements and charting cadastral maps ultimately prevailed.

Each undertaking also exemplified a pattern of relations between local knowledge and practices on one hand and state administrative routines on the other, a pattern that will find echoes throughout this book. In each case, local practices of measurement and landholding were "illegible" to the state in their raw form. They exhibited a diversity and intricacy that reflected a great variety of purely local, not state, interests. That is to say, they could not be assimilated into an administrative grid without being either transformed or reduced to a convenient, if partly fictional, shorthand. The logic behind the required shorthand was provided, as in scientific forestry, by the pressing material interests of rulers: fiscal receipts, military manpower, and state security. In turn, this shorthand functioned, as did Beckmann's Normalbäume, as not just a description, however inadequate. Backed by state power through records, courts, and ultimately coercion, these state fictions transformed the reality they presumed to observe, although never so thoroughly as to precisely fit the grid.

Forging the Tools of Legibility: Popular Measures, State Measures

Nonstate forms of measurement grew from the logic of local practice. As such, they shared some generic features despite their bewildering variety—features that made them an impediment to administrative uniformity. Thanks to the synthesis of the medievalist Witold Kula, the reasoning that animated local practices of measurement may be set out fairly succinctly.[37]

Most early measures were human in scale. One sees this logic at work in such surviving expressions as a "stone's throw" or "within earshot" for distances and a "cartload," a "basketful," or a "handful" for volume. Given that the size of a cart or basket might vary from place to place and that a stone's throw might not be precisely uniform from person to person, these units of measurement varied geographically and temporally. Even measures that were apparently fixed might be deceptive. The *pinte* in eighteenth-century Paris, for example, was equivalent to .93 liters, whereas in Seine-en-Montagne it was 1.99 liters and in Precy-sous-Thil, an astounding 3.33 liters. The *aune*, a measure of length used for cloth, varied depending on the material (the unit for silk, for instance, was smaller than that for linen), and across France there were at least seventeen different aunes.[38]

Local measures were also relational or "commensurable."[39] Virtually any request for a judgment of measure allows a range of responses depending on the context of the request. In the part of Malaysia with which I am most familiar, if one were to ask "How far is it to the next village?" a likely response would be "Three rice-cookings." The answer assumes that the questioner is interested in how much time it will take to get there, not how many miles away it is. In varied terrain, of course, distance in miles is an utterly unreliable guide to travel time, especially when the traveler is on foot or riding a bicycle. The answer also expresses time not in minutes—until recently, wristwatches were rare—but in units that are locally meaningful. Everyone knows how long it takes to cook the local rice. Thus an Ethiopian response to a query about how much salt is required for a dish might be "Half as much as to cook a chicken." The reply refers back to a standard that everyone is expected to know. Such measurement practices are irreducibly local, inasmuch as regional differences in, say, the type of rice eaten or the preferred way of cooking chicken will give different results.

Many local units of measurement are tied practically to particular activities. Marathi peasants, as Arjun Appadurai notes, express the desired distance between the onion sets they plant in terms of handbreadths. When one is moving along a field row, the hand is, well, the most handy gauge. In similar fashion, a common measure for twine or rope is the distance between the thumb and elbow because this corresponds with how it is wrapped and stored. As with setting onions, the

process of measuring is embedded in the activity itself and requires no separate operation. Such measurements, moreover, are often approximate; they are only as exact as the task at hand requires.[40] Rainfall may be said to be abundant or inadequate if the context of the query implies an interest in a particular crop. And a reply in terms of inches of rainfall, however accurate, would also fail to convey the desired information; it ignores such vital matters as the timing of the rain. For many purposes, an apparently vague measurement may communicate more valuable information than a statistically exact figure. The cultivator who reports that his rice yield from a plot is anywhere between four and seven baskets is conveying more accurate information, when the focus of attention is on the variability of the yield, than if he reported a ten-year statistical average of 5.6 baskets.

There is, then, no single, all-purpose, correct answer to a question implying measurement unless we specify the relevant local concerns that give rise to the question. Particular customs of measurement are thus situationally, temporally, and geographically bound.

Nowhere is the particularity of customary measurement more evident than with cultivated land. Modern abstract measures of land by surface area—so many hectares or acres—are singularly uninformative figures to a family that proposes to make its living from these acres. Telling a farmer only that he is leasing twenty acres of land is about as helpful as telling a scholar that he has bought six kilograms of books. Customary measures of land have therefore taken a variety of forms corresponding to those aspects of the land that are of greatest practical interest. Where land was abundant and manpower or draftpower scarce, the most meaningful gauge of land was often the number of days required to plow or to weed it. A plot of land in nineteenth-century France, for example, would be described as representing so many *morgen* or *journals* (days of work) and as requiring a specific kind of work (*homée, bechée, fauchée*). How many morgen were represented by a field of, say, ten acres could vary greatly; if the land were rocky and steeply pitched, it might require twice as much labor to work than if it were rich bottomland. The morgen would also differ from place to place depending on the strength of local draftpower and the crops sown, and it would differ from time to time as technology (plow tips, yokes, harnesses) affected the work a man could accomplish in a day.

Land might also be evaluated according to the amount of seed required to sow it. If the soil were very good, a field would be densely sown, whereas poor land would be more lightly seeded. The amount of seed sown to a field is in fact a relatively good proxy for average yield, as the sowing is done in anticipation of average growing conditions, while the actual seasonal yield would be more variable. Given a particular crop regimen, the amount of seed sown would indicate roughly

how productive a field had been, although it would reveal little about how arduous the land was to cultivate or how variable the harvests were. But the average yield from a plot of land is itself a rather abstract figure. What most farmers near the subsistence margin want to know above all is whether a particular farm will meet their basic needs reliably. Thus small farms in Ireland were described as a "farm of one cow" or a "farm of two cows" to indicate their grazing capacity to those who lived largely by milk products and potatoes. The physical area a farm might comprise was of little interest compared to whether it would feed a particular family.[41]

To grasp the prodigious variety of customary ways of measuring land, we would have to imagine literally scores of "maps" constructed along very different lines than mere surface area. I have in mind the sorts of maps devised to capture our attention with a kind of fun-house effect in which, say, the size of a country is made proportional to its population rather than its geographical size, with China and India looming menacingly over Russia, Brazil, and the United States, while Libya, Australia, and Greenland virtually disappear. These types of customary maps (for there would be a great many) would construct the landscape according to units of work and yield, type of soil, accessibility, and ability to provide subsistence, none of which would necessarily accord with surface area. The measurements are decidedly *local, interested, contextual,* and *historically specific*. What meets the subsistence needs of one family may not meet the subsistence needs of another. Factors such as local crop regimens, labor supply, agricultural technology, and weather ensure that the standards of evaluation vary from place to place and over time. Directly apprehended by the state, so many maps would represent a hopelessly bewildering welter of local standards. They definitely would not lend themselves to aggregation into a single statistical series that would allow state officials to make meaningful comparisons.

The Politics of Measurement

Thus far, this account of local measurement practices risks giving the impression that, although local conceptions of distance, area, volume, and so on were different from and more varied than the unitary abstract standards a state might favor, they were nevertheless aiming at objective accuracy. That impression would be false. Every act of measurement was an act marked by the play of power relations. To understand measurement practices in early modern Europe, as Kula demonstrates, one must relate them to the contending interests of the major estates: aristocrats, clergy, merchants, artisans, and serfs.

A good part of the politics of measurement sprang from what a contemporary economist might call the "stickiness" of feudal rents. Noble

and clerical claimants often found it difficult to increase feudal dues directly; the levels set for various charges were the result of long struggle, and even a small increase above the customary level was viewed as a threatening breach of tradition.[42] Adjusting the measure, however, represented a roundabout way of achieving the same end. The local lord might, for example, lend grain to peasants in smaller baskets and insist on repayment in larger baskets. He might surreptitiously or even boldly enlarge the size of the grain sacks accepted for milling (a monopoly of the domain lord) and reduce the size of the sacks used for measuring out flour; he might also collect feudal dues in larger baskets and pay wages in kind in smaller baskets. While the formal custom governing feudal dues and wages would thus remain intact (requiring, for example, the same number of sacks of wheat from the harvest of a given holding), the actual transaction might increasingly favor the lord.[43] The results of such fiddling were far from trivial. Kula estimates that the size of the bushel (*boisseau*) used to collect the main feudal rent (taille) increased by one-third between 1674 and 1716 as part of what was called the *réaction féodale*.[44]

Even when the unit of measurement—say, the bushel—was apparently agreed upon by all, the fun had just begun. Virtually everywhere in early modern Europe were endless micropolitics about how baskets might be adjusted through wear, bulging, tricks of weaving, moisture, the thickness of the rim, and so on. In some areas the local standards for the bushel and other units of measurement were kept in metallic form and placed in the care of a trusted official or else literally carved into the stone of a church or the town hall.[45] Nor did it end there. How the grain was to be poured (from shoulder height, which packed it somewhat, or from waist height?), how damp it could be, whether the container could be shaken down, and, finally, if and how it was to be leveled off when full were subjects of long and bitter controversy. Some arrangements called for the grain to be heaped, some for a "half-heap," and still others for it to be leveled or "striked" (*ras*). These were not trivial matters. A feudal lord could increase his rents by 25 percent by insisting on receiving wheat and rye in heaped bushels.[46] If, by custom, the bushel of grain was to be striked, then a further micropolitics erupted over the strickle. Was it to be round, thereby packing in grain as it was rolled across the rim, or was it to be sharp-edged? Who would apply the strickle? Who could be trusted to keep it?

A comparable micropolitics, as one might expect, swirled around the unit of land measurement. A common measure of length, the ell, was used to mark off the area to be plowed or weeded as a part of feudal labor dues. Once again, the lengths and widths in ells were "sticky," having been established through long struggle. It was tempting for a lord or overseer to try raising labor dues indirectly by increasing the length of the ell. If the attempt were successful, the formal rules of

corvée labor would not be violated, but the amount of work extracted would increase. Perhaps the stickiest of all measures before the nineteenth century was the price of bread. As the most vital subsistence good of premodern times, it served as a kind of cost-of-living index, and its cost was the subject of deeply held popular customs about its relationship to the typical urban wage. Kula shows in remarkable detail how bakers, afraid to provoke a riot by directly violating the "just price," managed nevertheless to manipulate the size and weight of the loaf to compensate to some degree for changes in the price of wheat and rye flour.[47]

Statecraft and the Hieroglyphics of Measurement

Because local standards of measurement were tied to practical needs, because they reflected particular cropping patterns and agricultural technology, because they varied with climate and ecology, because they were "an attribute of power and an instrument of asserting class privilege," and because they were "at the center of bitter class struggle," they represented a mind-boggling problem for statecraft.[48] Efforts to simplify or standardize measures recur like a leitmotif throughout French history—their reappearance a sure sign of previous failure. More modest attempts to simply codify local practices and create conversion tables were quickly overtaken and rendered obsolete by changes on the ground. The king's ministers were confronted, in effect, with a patchwork of local measurement codes, each of which had to be cracked. It was as if each district spoke its own dialect, one that was unintelligible to outsiders and at the same time liable to change without notice. Either the state risked making large and potentially damaging miscalculations about local conditions, or it relied heavily on the advice of local trackers—the nobles and clergy in the Crown's confidence—who, in turn, were not slow to take full advantage of their power.

The illegibility of local measurement practices was more than an administrative headache for the monarchy. It compromised the most vital and sensitive aspects of state security. Food supply was the Achilles heel of the early modern state; short of religious war, nothing so menaced the state as food shortages and the resulting social upheavals. Without comparable units of measurement, it was difficult if not impossible to monitor markets, to compare regional prices for basic commodities, or to regulate food supplies effectively.[49] Obliged to grope its way on the basis of sketchy information, rumor, and self-interested local reports, the state often responded belatedly and inappropriately. Equity in taxation, another sensitive political issue, was beyond the reach of a state that found it difficult to know the basic comparative facts about harvests and prices. A vigorous effort to collect taxes, to requisition for mil-

itary garrisons, to relieve urban shortages, or any number of other measures might, given the crudeness of state intelligence, actually provoke a political crisis. Even when it did not jeopardize state security, the Babel of measurement produced gross inefficiencies and a pattern of either undershooting or overshooting fiscal targets.[50] No effective central monitoring or controlled comparisons were possible without standard, fixed units of measurement.

Simplification and Standardization of Measurement

> The conquerors of our days, peoples or princes, want their empire to possess a unified surface over which the superb eye of power can wander without encountering any inequality which hurts or limits its view. The same code of law, the same measures, the same rules, and if we could gradually get there, the same language; that is what is proclaimed as the perfection of the social organization. . . . The great slogan of the day is *uniformity*.
> —Benjamin Constant, *De l'esprit de conquête*

If scientific forestry's project of creating a simplified and legible forest encountered opposition from villagers whose usage rights were being challenged, the political opposition to standard and legible units of measurement was even more refractory. The power to establish and impose local measures was an important feudal prerogative with material consequences which the aristocracy and clergy would not willingly surrender. Testimony to their capacity to thwart standardization is evident in the long series of abortive initiatives by absolutist rulers who tried to insist on some degree of uniformity. The very particularity of local feudal practices and their impenetrability to would-be centralizers helped to underwrite the autonomy of local spheres of power.

Three factors, in the end, conspired to make what Kula calls the "metrical revolution" possible. First, the growth of market exchange encouraged uniformity in measures. Second, both popular sentiment and Enlightenment philosophy favored a single standard throughout France. Finally, the Revolution and especially Napoleonic state building actually enforced the metric system in France and the empire.

Large-scale commercial exchange and long-distance trade tend to promote common standards of measurement. For relatively small-scale trade, grain dealers could transact with several suppliers as long as they knew the measure each was using. They might actually profit from their superior grasp of the profusion of units, much as smugglers take advantage of small differences in taxes and tariffs. Beyond a certain point, however, much of commerce is composed of long chains of transactions, often over great distances, between anonymous buyers and sellers. Such trade is greatly simplified and made legible by standard weights and measures. Whereas artisanal products were typically made by a single producer according to the desires of a particular cus-

tomer and carried a price specific to that object, the mass-produced commodity is made by no one in particular and is intended for any purchaser at all. In a sense, the virtue of the mass commodity is its reliable uniformity. In proportion, then, as the volume of commerce grew and the goods exchanged became increasingly standardized (a ton of wheat, a dozen plow tips, twenty cart wheels), there was a growing tendency to accept widely agreed upon units of measurement. Officials and physiocrats alike were convinced that uniform measures were the precondition for creating a national market and promoting rational economic action.[51]

The perennial state project of unifying measures throughout the kingdom received a large degree of popular support in the eighteenth century, thanks to the réaction féodale. Aiming to maximize the return on their estates, owners of feudal domains, many of them arrivistes, achieved their goal in part by manipulating units of measurement. This sense of victimization was evident in the *cahiers* of grievances prepared for the meeting of the Estates General just before the Revolution. The cahiers of the members of the Third Estate consistently called for equal measures (although this was hardly their main grievance), whereas the cahiers of the clergy and nobility were silent, presumably indicating their satisfaction with the status quo on this issue. The following petition from Brittany is typical of the way in which an appeal for unitary measures could be assimilated to devotion to the Crown: "We beg them [the king, his family, and his chief minister] to join with us in checking the abuses being perpetrated by tyrants against that class of citizens which is kind and considerate and which, until this day has been unable to present its very grievances to the very foot of the throne, and now we call on the King to mete out justice, and *we express our most sincere desire for but one king, one law, one weight, and one measure.*"[52]

For centralizing elites, the universal meter was to older, particularistic measurement practices as a national language was to the existing welter of dialects. Such quaint idioms would be replaced by a new universal gold standard, just as the central banking of absolutism had swept away the local currencies of feudalism. The metric system was at once a means of administrative centralization, commercial reform, and cultural progress. The academicians of the revolutionary republic, like the royal academicians before them, saw the meter as one of the intellectual instruments that would make France "revenue-rich, militarily potent, and *easily administered.*"[53] Common measures, it was supposed, would spur the grain trade, make land more productive (by permitting easier comparisons of price and productivity), and, not incidentally, lay the groundwork for a national tax code.[54] But the reformers also had in mind a genuine cultural revolution. "As mathematics was the language of science, so would the metric system be the

language of commerce and industry," serving to unify and transform French society.[55] A rational unit of measurement would promote a rational citizenry.

The simplification of measures, however, depended on that other revolutionary political simplification of the modern era: the concept of a uniform, homogeneous citizenship. As long as each estate operated within a separate legal sphere, as long as different categories of people were unequal in law, it followed that they might also have unequal rights with respect to measures.[56] The idea of equal citizenship, the abstraction of the "unmarked" citizen, can be traced to the Enlightenment and is evident in the writings of the Encyclopedists.[57] For the Encyclopedists, the cacophony among measurements, institutions, inheritance laws, taxation, and market regulations was the great obstacle to the French becoming a single people. They envisioned a series of centralizing and rationalizing reforms that would transform France into a national community where the same codified laws, measures, customs, and beliefs would everywhere prevail. It is worth noting that this project promotes the concept of *national* citizenship—a national French citizen perambulating the kingdom and encountering exactly the same fair, equal conditions as the rest of his compatriots. In place of a welter of incommensurable small communities, familiar to their inhabitants but mystifying to outsiders, there would rise a single national society perfectly legible from the center. The proponents of this vision well understood that what was at stake was not merely administrative convenience but also the transformation of a people: "The uniformity of customs, viewpoints, and principles of action will, inevitably, lead to a greater community of habits and predispositions."[58] The abstract grid of equal citizenship would create a new reality: the French citizen.

The homogenization of measures, then, was part of a larger, emancipatory simplification. At one stroke the equality of all French people before the law was guaranteed by the state; they were no longer mere subjects of their lords and sovereign but bearers of inalienable rights as citizens.[59] All the previous "natural" distinctions were now "denaturalized" and nullified, at least in law.[60] In an unprecedented revolutionary context where an entirely new political system was being created from first principles, it was surely no great matter to legislate uniform weights and measures. As the revolutionary decree read: "The centuries old dream of the masses of only one just measure has come true! The Revolution has given the people the meter."[61]

Proclaiming the universal meter was far simpler than ensuring that it became the daily practice of French citizens. The state could insist on the exclusive use of its units in the courts, in the state school system, and in such documents as property deeds, legal contracts, and tax codes. Outside these official spheres, the metric system made its way only very slowly. In spite of a decree for confiscating *toise* sticks in

shops and replacing them with meter sticks, the populace continued to use the older system, often marking their meter sticks with the old measures. Even as late as 1828 the new measures were more a part of *le pays légal* than of *le pays réel*. As Chateaubriand remarked, "Whenever you meet a fellow who, instead of talking *arpents*, *toises*, and *pieds*, refers to hectares, meters, and centimeters, rest assured, the man is a prefect."[62]

Land Tenure: Local Practice and Fiscal Shorthand

The revenue of the early modern state came mainly from levies on commerce and land, the major sources of wealth. For commerce, this implied an array of excise taxes, tolls and market duties, licensing fees, and tariffs. For landed wealth, this meant somehow attaching every parcel of taxable property to an individual or an institution responsible for paying the tax on it. As straightforward as this procedure seems in the context of the modern state, its achievement was enormously difficult for at least two reasons. First, the actual practices of customary land tenure were frequently so varied and intricate as to defy any one-to-one equation of taxpayer and taxable property. And second, as was the case with standardizing measurement, there were social forces whose interests could only be damaged by the unified and transparent set of property relations desired by the state's fiscal agents. In the end, the centralizing state succeeded in imposing a novel and (from the center) legible property system, which, as had the work of the scientific foresters, not only radically abridged the practices that the system described but at the same time transformed those practices to align more closely with their shorthand, schematic reading.

An Illustration

> *Negara mawi tata, desa mawi cara* (The capital has its order, the village its customs).
> —*Javanese proverb*

A hypothetical case of customary land tenure practices may help demonstrate how difficult it is to assimilate such practices to the bare-bones schema of a modern cadastral map. The patterns I will describe are an amalgam of practices I have encountered in the literature of or in the course of fieldwork in Southeast Asia, and although the case is hypothetical, it is not unrealistic.

Let us imagine a community in which families have usufruct rights to parcels of cropland during the main growing season. Only certain crops, however, may be planted, and every seven years the usufruct

land is redistributed among resident families according to each family's size and its number of able-bodied adults. After the harvest of the main-season crop, all cropland reverts to common land where any family may glean, graze their fowl and livestock, and even plant quickly maturing, dry-season crops. Rights to graze fowl and livestock on pasture-land held in common by the village is extended to all local families, but the number of animals that can be grazed is restricted according to family size, especially in dry years when forage is scarce. Families not using their grazing rights can give them to other villagers but not to outsiders. Everyone has the right to gather firewood for normal family needs, and the village blacksmith and baker are given larger allotments. No commercial sale from village woodlands is permitted.

Trees that have been planted and any fruit they may bear are the property of the family who planted them, no matter where they are now growing. Fruit fallen from such trees, however, is the property of anyone who gathers it. When a family fells one of its trees or a tree is felled by a storm, the trunk belongs to the family, the branches to the immediate neighbors, and the "tops" (leaves and twigs) to any poorer villager who carries them off. Land is set aside for use or leasing out by widows with children and dependents of conscripted males. Usufruct rights to land and trees may be let to anyone in the village; the only time they may be let to someone outside the village is if no one in the community wishes to claim them.

After a crop failure leading to a food shortage, many of these arrangements are readjusted. Better-off villagers are expected to assume some responsibility for poorer relatives—by sharing their land, by hiring them, or by simply feeding them. Should the shortage persist, a council composed of heads of families may inventory food supplies and begin daily rationing. In cases of severe shortages or famine, the women who have married into the village but have not yet borne children will not be fed and are expected to return to their native village. This last practice alerts us to the inequalities that often prevail in local customary tenure; single women, junior males, and anyone defined as falling outside the core of the community are clearly disadvantaged.

This description could be further elaborated. It is itself a simplification, but it does convey some of the actual complexity of property relations in contexts where local customs have tended to prevail. To describe the usual practices in this fashion, as if they were laws, is itself a distortion. Customs are better understood as a living, negotiated tissue of practices which are continually being adapted to new ecological and social circumstances—including, of course, power relations. Customary systems of tenure should not be romanticized; they are usually riven with inequalities based on gender, status, and lineage. But because they are strongly local, particular, and adaptable, their plas-

ticity can be the source of microadjustments that lead to shifts in prevailing practice.

Imagine a lawgiver whose only concern was to respect land practices. Imagine, in other words, a written system of positive law that attempted to represent this complex skein of property relations and land tenure. The mind fairly boggles at the clauses, sub-clauses, and sub-sub-clauses that would be required to reduce these practices to a set of regulations that an administrator might understand, never mind enforce. And even if the practices could be codified, the resulting code would necessarily sacrifice much of their plasticity and subtle adaptability. The circumstances that might provoke a new adaptation are too numerous to foresee, let alone specify, in a regulatory code. That code would in effect freeze a living process. Changes in the positive code designed to reflect evolving practice would represent at best a jerky and mechanical adaptation.

And what of the *next* village, and the village after that? Our hypothetical code-giver, however devilishly clever and conscientious, would find that the code devised to fit one set of local practices would not travel well. Each village, with its own particular history, ecology, cropping patterns, kinship alignments, and economic activity, would require a substantially new set of regulations. At the limit, there would be at least as many legal codes as there were communities.

Administratively, of course, such a cacophony of local property regulations would be a nightmare. The nightmare is experienced not by those whose particular practices are being represented but by those state officials who aspire to a uniform, homogeneous, national administrative code. Like the "exotic" units of weights and measures, local land tenure practice is perfectly legible to all who live within it from day to day. Its details may often be contested and far from satisfactory to all its practitioners, but it is completely familiar; local residents have no difficulty in grasping its subtleties and using its flexible provisions for their own purposes. State officials, on the other hand, cannot be expected to decipher and then apply a new set of property hieroglyphs for each jurisdiction. Indeed, the very concept of the modern state presupposes a vastly simplified and uniform property regime that is legible and hence manipulable from the center.

My use of the term "simple" to describe modern property law, whose intricacies provide employment to armies of legal professionals, will seem grossly misplaced. It is surely the case that property law has in many respects become an impenetrable thicket for ordinary citizens. The use of the term "simple" in this context is thus both relative and perspectival. Modern freehold tenure is tenure that is mediated through the state and therefore readily decipherable only to those who have sufficient training and a grasp of the state statutes.[63] Its relative simplicity is lost on those who cannot break the code, just

as the relative clarity of customary tenure is lost on those who live outside the village.

The fiscal or administrative goal toward which all modern states aspire is to measure, codify, and simplify land tenure in much the same way as scientific forestry reconceived the forest. Accommodating the luxuriant variety of customary land tenure was simply inconceivable. The historical solution, at least for the liberal state, has typically been the heroic simplification of individual freehold tenure. Land is owned by a legal individual who possesses wide powers of use, inheritance, or sale and whose ownership is represented by a uniform deed of title enforced through the judicial and police institutions of the state. Just as the flora of the forest were reduced to Normalbäume, so the complex tenure arrangements of customary practice are reduced to freehold, transferrable title. In an agrarian setting, the administrative landscape is blanketed with a uniform grid of homogeneous land, each parcel of which has a legal person as owner and hence taxpayer. How much easier it then becomes to assess such property and its owner on the basis of its acreage, its soil class, the crops it normally bears, and its assumed yield than to untangle the thicket of common property and mixed forms of tenure.

The crowning artifact of this mighty simplification is the cadastral map. Created by trained surveyors and mapped to a given scale, the cadastral map is a more or less complete and accurate survey of all landholdings. Since the driving logic behind the map is to create a manageable and reliable format for taxation, the map is associated with a property register in which each specified (usually numbered) lot on the map is linked to an owner who is responsible for paying its taxes. The cadastral map and property register are to the taxation of land as the maps and tables of the scientific forester were to the fiscal exploitation of the forest.

The Code Rural *That Almost Was*

The rulers of postrevolutionary France confronted a rural society that was a nearly impenetrable web of feudal *and* revolutionary practices. It was inconceivable that they could catalogue its complexities, let alone effectively eliminate them, in the short run. Ideologically, for example, their commitment to equality and liberty was contradicted by customary rural contracts like those used by craft guilds, which still employed the terms "master" (*maître*) and "servant" (*serviteur*). As rulers of a new nation—not a kingdom—they were likewise offended by the absence of an overall legal framework for social relations. For some, a new civil code covering all Frenchmen seemed as if it would be sufficient.[64] But for bourgeois owners of rural property who, along with their noble neighbors, had been threatened by the local uprisings

of the Revolution and La Grand Peur and, more generally, by the aggressiveness of an emboldened and autonomous peasantry, an explicit *code rural* seemed necessary to underwrite their security.

In the end, no postrevolutionary rural code attracted a winning coalition, even amid a flurry of Napoleonic codes in nearly all other realms. For our purposes, the history of the stalemate is instructive. The first proposal for a code, which was drafted between 1803 and 1807, would have swept away most traditional rights (such as common pasturage and free passage through others' property) and essentially recast rural property relations in the light of bourgeois property rights and freedom of contract.[65] Although the proposed code prefigured certain modern French practices, many revolutionaries blocked it because they feared that its hands-off liberalism would allow large landholders to recreate the subordination of feudalism in a new guise.[66]

A reexamination of the issue was then ordered by Napoleon and presided over by Joseph Verneilh Puyrasseau. Concurrently, Deputé Lalouette proposed to do precisely what I supposed, in the hypothetical example, was impossible. That is, he undertook to systematically gather information about all local practices, to classify and codify them, and then to sanction them by decree. The decree in question would become the code rural. Two problems undid this charming scheme to present the rural populace with a rural code that simply reflected its own practices. The first difficulty was in deciding which aspects of the literally "infinite diversity" of rural production relations were to be represented and codified.[67] Even in a particular locality, practices varied greatly from farm to farm and over time; any codification would be partly arbitrary and artificially static. To codify local practices was thus a profoundly political act. Local notables would be able to sanction their preferences with the mantle of law, whereas others would lose customary rights that they depended on. The second difficulty was that Lalouette's plan was a mortal threat to all the state centralizers and economic modernizers for whom a legible, national property regime was the precondition of progress. As Serge Aberdam notes, "The Lalouette project would have brought about exactly what Merlin de Douai and the bourgeois, revolutionary jurists always sought to avoid."[68] Neither Lalouette's nor Verneilh's proposed code was ever passed, because they, like their predecessor in 1807, seemed to be designed to strengthen the hand of the landowners.

The Illegibility of Communal Tenure

The premodern and early modern state, as we have noted, dealt more with communities than with individuals when it came to taxes. Some apparently individual taxes, such as the notorious Russian "soul tax," which was collected from all subjects, were actually paid directly

by the communities or indirectly through the nobles whose subjects they were. Failure to deliver the required sum usually led to collective punishment.[69] The only agents of taxation who regularly reached to the level of the household and its cultivated fields were the local nobility and clergy in the course of collecting feudal dues and the religious tithe. For its part, the state had neither the administrative tools nor the information to penetrate to this level.

The limitations on state knowledge were partly due to the complexity and variability of local production. This was not the most important reason, however. The collective form of taxation meant that it was generally in the interest of local officials to misrepresent their situation in order to minimize the local tax and conscription burden. To this end, they might minimize the local population, systematically understate the acreage under cultivation, hide new commercial profits, exaggerate crop losses after storms and droughts, and so on.[70] The point of the cadastral map and land register was precisely to eliminate this fiscal feudalism and rationalize the fiscal take of the state. Just as the scientific forester needed an inventory of trees to realize the commercial potential of the forest, so the fiscal reformer needed a detailed inventory of landownership to realize the maximum, sustainable revenue yield.[71]

Assuming that the state had the will to challenge the resistance of the local nobles and elites and the financial resources to undertake a full cadastral survey (which was both time-consuming and expensive), it faced other obstacles as well. In particular, some communal forms of tenure simply could not be adequately represented in cadastral form. Rural living in seventeenth- and early eighteenth-century Denmark, for example, was organized by *ejerlav*, whose members had certain rights for using local arable, waste, and forest land. It would have been impossible in such a community to associate a household or individual with a particular holding on a cadastral map. The Norwegian large farm (*gard*) posed similar problems. Each household held rights to a given proportion of the value (*skyld*) of the farm, not to the plot of land; none of the joint owners could call a specific part of the farm his own.[72] Although it was possible to estimate the arable land of each community and, making some assumptions about crop yields and subsistence needs, arrive at a plausible tax burden, these villagers derived a substantial part of their livelihood from the commons by fishing, forestry, collecting resin, hunting, and making charcoal. Monitoring this kind of income was almost impossible. Nor would crude estimates of the value of the commons solve the problem, for the inhabitants of nearby villages often shared one another's commons (even though the practice was outlawed). The mode of production in such communities was simply incompatible with the assumption of individual freehold tenure implicit in a cadastral map. It was claimed, although the evi-

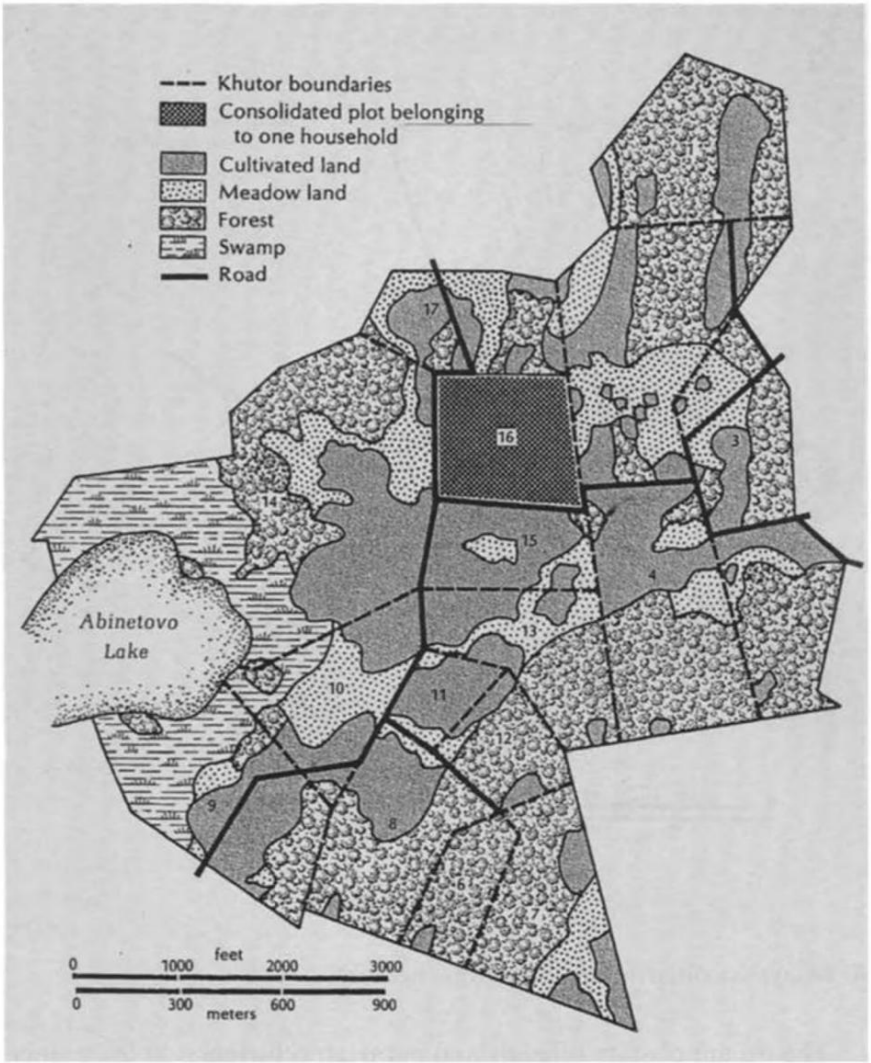
dence is not convincing, that common property was less productive than freehold property.[73] The state's case against communal forms of land tenure, however, was based on the correct observation that it was fiscally illegible and hence fiscally less productive. Rather than trying, like the hapless Lalouette, to bring the map into line with reality, the historical resolution has generally been for the state to impose a property system in line with its fiscal grid.

As long as common property was abundant and had essentially no fiscal value, the illegibility of its tenure was no problem. But the moment it became scarce (when "nature" became "natural resources"), it became the subject of property rights in law, whether of the state or of the citizens. The history of property in this sense has meant the inexorable incorporation of what were once thought of as free gifts of nature: forests, game, wasteland, prairie, subsurface minerals, water and watercourses, air rights (rights to the air above buildings or surface area), breathable air, and even genetic sequences, into a property regime. In the case of common-property farmland, the imposition of freehold property was clarifying not so much for the local inhabitants—the customary structure of rights had always been clear enough to them—as it was for the tax official and the land speculator. The cadastral map added documentary intelligence to state power and thus provided the basis for the synoptic view of the state and a supralocal market in land.[74]

An example may help to clarify the process of installing a new, more legible property regime. The case of two prerevolutionary Russian villages provides a nearly textbook example of state attempts to create individual tenure in keeping with its convictions about agricultural growth and administrative order. Most of rural Russia, even after the emancipation of 1861, was a model of fiscal illegibility. Communal forms of tenure prevailed, and the state had little or no knowledge of who cultivated which strips of land or what their yields and income were.

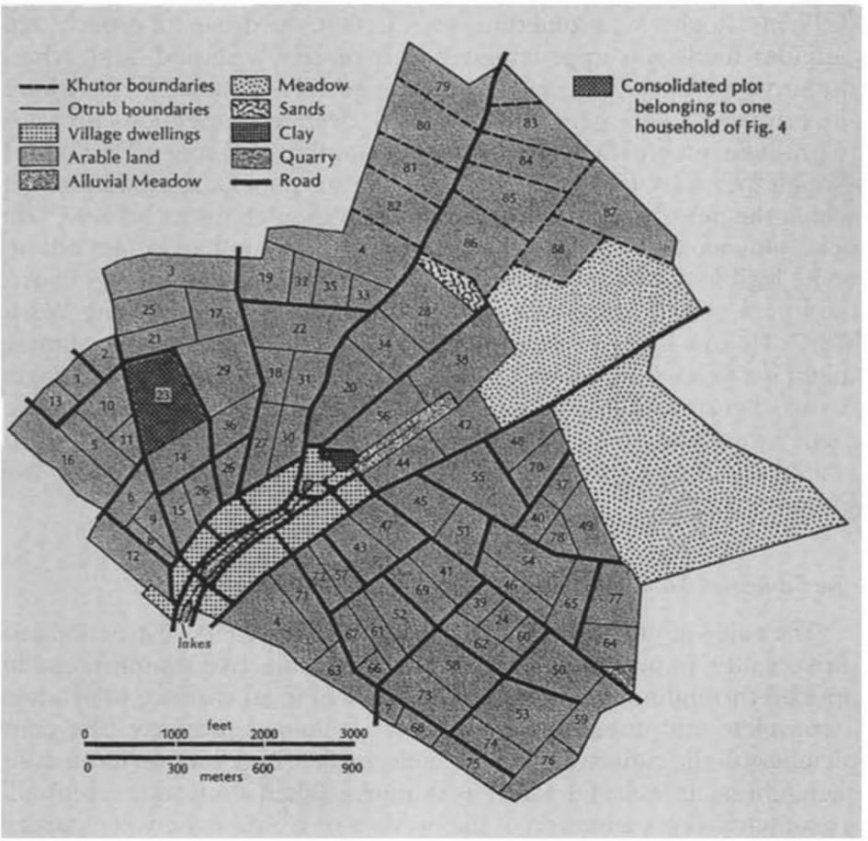
Novoselok village had a varied economy of cultivation, grazing, and forestry, whereas Khotynitsa village was limited to cultivation and some grazing (figures 3 and 4). The complex welter of strips was designed to ensure that each village household received a strip of land in every ecological zone. An individual household might have as many as ten to fifteen different plots constituting something of a representative sample of the village's ecological zones and microclimates. The distribution spread a family's risks prudently, and from time to time the land was reshuffled as families grew or shrunk.[75]

It was enough to make the head of a cadastral surveyor swim. At first glance it seems as if the village itself would need a staff of professional surveyors to get things right. But in practice the system, called interstripping, was quite simple to those who lived it. The strips of land



5. Novoselok village after the Stolypin Reform

peasants off to new lands, leaving those remaining more room. Third tableau: departing peasants, freed from restraints of strips, set up khutor [integral farmsteads with dwellings] on new fields and adapt latest methods. Those who remain, freed of village and family restraints, plunge into a demand economy—all are richer, more productive, the cities get fed, and the peasants are not proletarianized."[76] It was abundantly clear that the prejudicial attitude toward interstripping was based as much on the autonomy of the Russian village, its illegibility to outsiders, and prevailing dogma about scientific agriculture as it was



6. Khotynitsa village after the Stolypin Reform

on hard evidence.[77] The state officials and agrarian reformers reasoned that, once given a consolidated, private plot, the peasant would suddenly want to get rich and would organize his household into an efficient workforce and take up scientific agriculture. The Stolypin Reform therefore went forward, and cadastral order was brought to both villages in the wake of the reform (figures 5 and 6).

In Novoselok village, seventeen independent farmsteads (*khutor*) were created in a way that aimed to give each household a share of meadow, arable, and forest. In Khotynitsa village, ten khutor were created as well as seventy-eight farms (*otrub*), whose owners continued to dwell in the village center. As a cadastral matter, the new farms were mappable, easily legible from above and outside, and, since each was owned by an identifiable person, assessable.

Taken alone, the maps shown in figures 5 and 6 are misleading. Such model villages suggest efficient cadastral teams working their way diligently through the countryside and turning open-field chaos into tidy lit-

tle farms. Reality was something else. In fact, the dream of orderly, rectangular fields was approximated only on newly settled land, where the surveyor faced little geographical or social resistance.[78] Elsewhere, the reformers were generally thwarted, despite tremendous pressure to produce integral farms. There were unauthorized consolidations, although they were forbidden; there were also "paper consolidations," in which the new farmers continued to farm their strips as before.[79] The best evidence that the agricultural property system had in fact not become legible to central tax officials was the immensely damaging procurement policies pursued by the czarist government during World War I. No one knew what a reasonable levy on grain or draft animals might be; as a result, some farmers were ruined, while others managed to hoard grain and livestock.[80] The same experience of forced procurement without adequate knowledge of landholdings and wealth was repeated again after the October Revolution during the period of War Communism.[81]

The Cadastral Map as Objective Information for Outsiders

The value of the cadastral map to the state lies in its abstraction and universality. In principle, at least, the same objective standard can be applied throughout the nation, regardless of local context, to produce a complete and unambiguous map of all landed property. The completeness of the cadastral map depends, in a curious way, on its abstract sketchiness, its lack of detail—its thinness. Taken alone, it is essentially a geometric representation of the borders or frontiers between parcels of land. What lies inside the parcel is left blank—unspecified—since it is not germane to the map plotting itself.

Surely many things about a parcel of land are far more important than its surface area and the location of its boundaries. What kind of soil it has, what crops can be grown on it, how hard it is to work, and how close it is to a market are the first questions a potential buyer might ask. These are questions a tax assessor would also want to ask. From a capitalist perspective, the physical dimensions of land are beside the point. But these other qualities can become relevant (especially to the state) only after the terrain to which they apply has been located and measured. And unlike identifying location and dimension, identifying these qualities involves judgments that are complex, susceptible to fraud, and easily overtaken by events. Crop rotations and yields may change, new tools or machines may transform cultivation, and markets may shift. The cadastral survey, by contrast, is precise, schematic, general, and uniform. Whatever its other defects, it is the precondition of a tax regimen that comprehensively links every patch of land with its owner—the taxpayer.[82] In this spirit, the survey for a 1807 Dutch land tax (inspired by Napoleonic France) stressed that all

surveyors were to use the same measurements, surveyors' instruments were to be periodically inspected to ensure conformity, and all maps were to be drawn up on a uniform scale of 1:2,880.[83]

Land maps in general and cadastral maps in particular are designed to make the local situation legible to an outsider. For purely local purposes, a cadastral map was redundant. Everyone knew who held, say, the meadow by the river, the value of the fodder it yielded, and the feudal dues it carried; there was no need to know its precise dimensions. A substantial domain might have the kind of prose map, or *terrier,* that one finds in old deeds ("from the large oak tree, north 120 feet to the river bank, thence . . ."), with a notation about the holder's obligations to the domain. One imagines such a document proving valuable to a young heir, new to the management of a domain. But a proper map seems to have come into use especially when a brisk market in land developed. The Netherlands was thus a leader in land mapping because of its early commercialization and because each speculator who invested in the draining of land by windmill wanted to know in advance precisely what plot of the newly opened land he would be entitled to. The map was especially crucial to the new bourgeois owners of landed estates, for it allowed them to survey a large territory at a glance. Its miniaturization helped it to serve as an aide-mémoire when the property consisted of many small parcels or the owner was not intimately familiar with the terrain.

As early as 1607, an English surveyor, John Norden, sold his services to the aristocracy on the premise that the map was a substitute for the tour of inspection: "A plot rightly drawne by true information, discribeth so the lively image of a manor, and every branch and member of the same, as the lord sitting in his chayre, may see what he hath, and where and how he lyeth, and in whole use and occupation of every particular is upon suddaine view."[84] A national tax administration requires the same logic: a legible, bureaucratic formula which a new official can quickly grasp and administer from the documents in his office.

What Is Missing in This Picture?

> Administrative man recognizes that the world he perceives is a drastically simplified model of the buzzing, blooming confusion that constitutes the real world. He is content with the gross simplification because he believes that the real world is mostly empty—that most of the facts of the real world have no great relevance to any particular situation he is facing and that most significant chains of causes and consequences are short and simple.
> —Herbert Simon

Isaiah Berlin, in his study of Tolstoy, compared the hedgehog, who knew "one big thing," to the fox, who knew many things. The scientific

forester and the cadastral official are like the hedgehog. The sharply focused interest of the scientific foresters in commercial lumber and that of the cadastral officials in land revenue constrain them to finding clear-cut answers to one question. The naturalist and the farmer, on the other hand, are like the fox. They know a great many things about forests and cultivable land. Although the forester's and cadastral official's range of knowledge is far narrower, we should not forget that their knowledge is systematic and synoptic, allowing them to see and understand things a fox would not grasp.[85] What I want to emphasize here, however, is how this knowledge is gained at the expense of a rather static and myopic view of land tenure.

The cadastral map is very much like a still photograph of the current in a river. It represents the parcels of land as they were arranged and owned at the moment the survey was conducted. But the current is always moving, and in periods of major social upheaval and growth, a cadastral survey may freeze a scene of great turbulence.[86] Changes are taking place on field boundaries; land is being subdivided or consolidated by inheritance or purchase; new canals, roads, and railways are being cut; land use is changing; and so forth. Inasmuch as these particular changes directly affect tax assessments, there are provisions for recording them on the map or in a title register. The accumulation of annotations and marginalia at some point render the map illegible, whereupon a more up-to-date but still static map must be drawn and the process repeated.

No operating land-revenue system can stop at the mere identification of parcel and ownership. Other schematic facts, themselves static, must be created to arrive at some judgment of a sustainable tax burden. Land may be graded by soil class, how well it is watered, what crops are grown on it, and its presumed average yield, which is often checked by sample crop-cuttings. These facts are themselves changing, or they are averages that may mask great variation. Like the still photo of the cadastral map, they grow more unrealistic with time and must be reexamined.

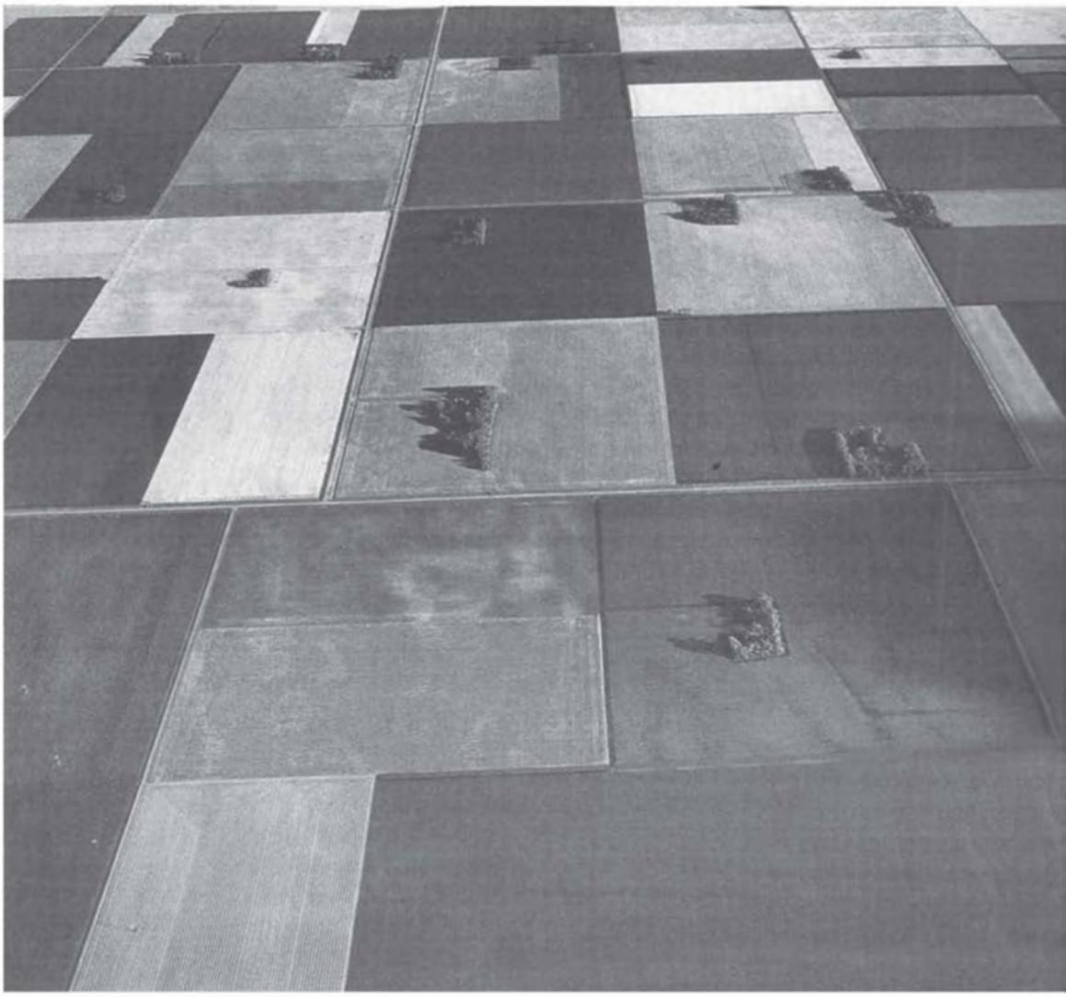
These state simplifications, like all state simplifications, are always far more static and schematic than the actual social phenomena they presume to typify. The farmer rarely experiences an average crop, an average rainfall, or an average price for his crops. Much of the long history of rural tax revolts in early modern Europe and elsewhere can be illuminated by the lack of fit between an unyielding fiscal claim, on one hand, and an often wildly fluctuating capacity of the rural population to meet that claim, on the other.[87] And yet, even the most equitable, well-intentioned cadastral system cannot be uniformly administered except on the basis of stable units of measurement and calculation. It can no more reflect the actual complexity of a farmer's experience than the

thwarted in 1679 by the combined opposition of the aristocracy and clergy. After the Revolution more than a century later, the radical François-Noël Babeuf, in his "Projet de cadastre perpetuel," dreamed of a perfectly egalitarian land reform in which everyone would get an equal parcel.[95] He too was thwarted.

We must keep in mind not only the capacity of state simplifications to transform the world but also the capacity of the society to modify, subvert, block, and even overturn the categories imposed upon it. Here it is useful to distinguish what might be called facts on paper from facts on the ground. As Sally Falk Moore and many others have emphasized, the land-office records may serve as the basis for taxation, but they may have little to do with the actual rights to the land. Paper owners may not be the effective owners.[96] Russian peasants, as we saw, might register a "paper" consolidation while continuing to interstrip. Land invasions, squatting, and poaching, if successful, represent the exercise of de facto property rights which are not represented on paper. Certain land taxes and tithes have been evaded or defied to the point where they have become dead letters.[97] The gulf between land tenure facts on paper and facts on the ground is probably greatest at moments of social turmoil and revolt. But even in more tranquil times, there will always be a shadow land-tenure system lurking beside and beneath the official account in the land-records office. We must never assume that local practice conforms with state theory.

All centralizing states recognized the value of a uniform, comprehensive cadastral map. Carrying out the mapmaking, however, was another matter. As a rule of thumb, cadastral mapping was earlier and more comprehensive where a powerful central state could impose itself on a relatively weak civil society. Where, by contrast, civil society was well organized and the state relatively weak, cadastral mapping was late, often voluntary, and fragmentary. Thus Napoleonic France was mapped much earlier than England, where the legal profession managed for a long time to stymie this threat to its local, income-earning function. It followed from the same logic that conquered colonies ruled by fiat would often be cadastrally mapped before the metropolitan nation that ordered it. Ireland may have been the first. After Cromwell's conquest, as Ian Hacking notes, "Ireland was completely surveyed for land, buildings, people, and cattle under the directorship of William Petty, in order to facilitate the rape of that nation by the English in 1679."[98]

Where the colony was a thinly populated settler-colony, as in North America or Australia, the obstacles to a thorough, uniform cadastral grid were minimal. There it was a question less of mapping preexisting patterns of land use than of surveying parcels of land that would be given or sold to new arrivals from Europe and of ignoring indigenous peoples and their common-property regimes.[99] Thomas Jefferson, with



7. The survey landscape, Castleton, North Dakota

an eye trained by Enlightenment rationalism, imagined dividing the United States west of the Ohio River into "hundreds"—squares measuring ten miles by ten miles—and requiring settlers to take the parcels of land as so designated.

The geometrical clarity of Jefferson's proposal was not merely an aesthetic choice; he claimed that irregular lots facilitated fraud. To reinforce his case, he cited the experience of Massachusetts, where actual landholdings were 10 percent to 100 percent greater than what had

been granted by deed.[100] Not only did the regularity of the grid create legibility for the taxing authority, but it was a convenient and cheap way to package land and market it in homogeneous units. The grid facilitated the commoditization of land as much as the calculation of taxes and boundaries. Administratively, it was also disarmingly simple. Land could be registered and titled from a distance by someone who possessed virtually no local knowledge.[101] Once it was in place, the scheme had some of the impersonal, mechanical logic of the foresters' tables. But in practice, land titling in Jefferson's plan (which was modified by Congress to provide for rectangular lots and townships that were thirty-six square miles) did not always follow the prescribed pattern.

The Torrens system of land titling, developed in Australia and New Zealand in the 1860s, provided a lithographed, presurveyed grid representing allotments that were registered to settlers on a first-come, first-served basis. It was the quickest and most economical means yet devised to sell land, and it was later adopted in many British colonies. The more homogeneous and rigid the geometric grid, however, the more likely it was to run afoul of the natural features of the nonconforming landscape. The possibilities for surprises was nicely captured in this satirical verse from New Zealand.

> Now the road through Michael's section
> though it looked well on the map
> For the use it was intended
> wasn't really worth a rap
> And at night was not unlikely
> to occasion some mishap.
>
> It was nicely planned on paper
> and was ruled without remorse
> Over cliffs, and spurs and gullies
> with a straight and even course
> Which precluded locomotion
> on part of man or horse.[102]

The cadastral survey was but one technique in the growing armory of the utilitarian modern state.[103] Where the premodern state was content with a level of intelligence sufficient to allow it to keep order, extract taxes, and raise armies, the modern state increasingly aspired to "take in charge" the physical and human resources of the nation and make them more productive. These more positive ends of statecraft required a much greater knowledge of the society. And an inventory of land, people, incomes, occupations, resources, and deviance was the logical place to begin. "The need for the increasingly bureaucratic state to organize itself and control its resources gave an impulse to the collection

of vital and other statistics; to forestry and rational agriculture; to surveying and exact cartography; and to public hygiene and climatology."[104]

Although the purposes of the state were broadening, what the state wanted to know was still directly related to those purposes. The nineteenth-century Prussian state, for example, was very much interested in the ages and sexes of immigrants and emigrants but not in their religions or races; what mattered to the state was keeping track of possible draft dodgers and maintaining a supply of men of military age.[105] The state's increasing concern with productivity, health, sanitation, education, transportation, mineral resources, grain production, and investment was less an abandonment of the older objectives of statecraft than a broadening and deepening of what those objectives entailed in the modern world.

2 Cities, People, and Language

> And the Colleges of the Cartographers set up a Map of the Empire which had the size of the Empire itself and coincided with it point by point. . . . Succeeding generations understood that this Widespread Map was Useless, and not without Impiety they abandoned it to the Inclemencies of the Sun and the Winters.
>
> —Suarez Miranda, *Viajes de varones prudentes (1658)*

An aerial view of a town built during the Middle Ages or the oldest quarters (*medina*) of a Middle Eastern city that has not been greatly tampered with has a particular look. It is the look of disorder. Or, to put it more precisely, the town conforms to no overall abstract form. Streets, lanes, and passages intersect at varying angles with a density that resembles the intricate complexity of some organic processes. In the case of a medieval town, where defense needs required walls and perhaps moats, there may be traces of inner walls superseded by outer walls, much like the growth rings of a tree. A representation of Bruges in about 1500 illustrates the pattern (figure 8). What definition there is to the city is provided by the castle green, the marketplace, and the river and canals that were (until they silted up) the lifeblood of this textile-trading city.

The fact that the layout of the city, having developed without any overall design, lacks a consistent geometric logic does not mean that it was at all confusing to its inhabitants. One imagines that many of its cobbled streets were nothing more than surfaced footpaths traced by repeated use. For those who grew up in its various quarters, Bruges would have been perfectly familiar, perfectly legible. Its very alleys and lanes would have closely approximated the most common daily movements. For a stranger or trader arriving for the first time, however, the town was almost certainly confusing, simply because it lacked a repetitive, abstract logic that would allow a newcomer to orient herself. The cityscape of Bruges in 1500 could be said to privilege local knowledge over outside knowledge, including that of external political authori-

city is obvious. Lewis Mumford, the historian of urban form, locates the modern European origin of this symbiosis in the open, legible baroque style of the Italian city-state. He claims, in terms that Descartes would have found congenial, "It was one of the triumphs of the baroque mind to organize space, to make it continuous, reduce it to measure and order."[6] More to the point, the baroque redesigning of medieval cities—with its grand edifices, vistas, squares, and attention to uniformity, proportion, and perspective—was intended to reflect the grandeur and awesome power of the prince. Aesthetic considerations frequently won out over the existing social structure and the mundane functioning of the city. "Long before the invention of bulldozers," Mumford adds, "the Italian military engineer developed, through his professional specialization in destruction, a bulldozing habit of mind: one that sought to clear the ground of encumbrances, so as to make a clear beginning on its own inflexible mathematical lines."[7]

The visual power of the baroque city was underwritten by scrupulous attention to the military security of the prince from internal as well as external enemies. Thus both Alberti and Palladio thought of main thoroughfares as military roads (*viae militaires*). Such roads had to be straight, and, in Palladio's view, "the ways will be more convenient if they are made everywhere equal: that is to say that there will be *no part in them where armies may not easily march*."[8]

There are, of course, many cities approximating Descartes's model. For obvious reasons, most have been planned from the ground up as new, often utopian cities.[9] Where they have not been built by imperial decrees, they have been designed by their founding fathers to accommodate more repetitive and uniform squares for future settlement.[10] A bird's-eye view of central Chicago in the late nineteenth century (William Penn's Philadelphia or New Haven would do equally well) serves as an example of the grid city (figure 9).

From an administrator's vantage point, the ground plan of Chicago is nearly utopian. It offers a quick appreciation of the ensemble, since the entirety is made up of straight lines, right angles, and repetitions.[11] Even the rivers seem scarcely to interrupt the city's relentless symmetry. For an outsider—or a policeman—finding an address is a comparatively simple matter; no local guides are required. The knowledge of local citizens is not especially privileged vis-à-vis that of outsiders. If, as is the case in upper Manhattan, the cross streets are consecutively numbered and are intersected by longer avenues, also consecutively numbered, the plan acquires even greater transparency.[12] The aboveground order of a grid city facilitates its underground order in the layout of water pipes, storm drains, sewers, electric cables, natural

9. Map of downtown Chicago, circa 1893

gas lines, and subways—an order no less important to the administrators of a city. Delivering mail, collecting taxes, conducting a census, moving supplies and people in and out of the city, putting down a riot or insurrection, digging for pipes and sewer lines, finding a felon or conscript (providing he is at the address given), and planning public transportation, water supply, and trash removal are all made vastly simpler by the logic of the grid.

Three aspects of this geometric order in human settlement bear emphasis. The first is that the order in question is most evident, not at street level, but rather from above and from outside. Like a marcher in a parade or like a single riveter in a long assembly line, a pedestrian in the middle of this grid cannot instantly perceive the larger design of the city. The symmetry is either grasped from a representation—it is in fact what one would expect if one gave a schoolchild a ruler and a blank piece of paper—or from the vantage point of a helicopter hovering far above the ground: in short, a God's-eye view, or the view of an absolute ruler. This spatial fact is perhaps inherent in the process of urban or architectural planning itself, a process that involves miniaturization and scale models upon which patron and planner gaze down, exactly as if they were in a helicopter.[13] There is, after all, no other way of visually imagining what a large-scale construction project will look like when it is completed except by a miniaturization of this

kind. It follows, I believe, that such plans, which have the scale of toys, are judged for their sculptural properties and visual order, often from a perspective that no or very few human observers will ever replicate.

The miniaturization imaginatively achieved by scale models of cities or landscapes was practically achieved with the airplane. The mapping tradition of the bird's-eye view, evident in the map of Chicago, was no longer a mere convention. By virtue of its great distance, an aerial view resolved what might have seemed ground-level confusion into an apparently vaster order and symmetry. It would be hard to exaggerate the importance of the airplane for modernist thought and planning. By offering a perspective that flattened the topography as if it were a canvas, flight encouraged new aspirations to "synoptic vision, rational control, planning, and spatial order."[14]

A second point about an urban order easily legible from outside is that the grand plan of the ensemble has no necessary relationship to the order of life as it is experienced by its residents. Although certain state services may be more easily provided and distant addresses more easily located, these apparent advantages may be negated by such perceived disadvantages as the absence of a dense street life, the intrusion of hostile authorities, the loss of the spatial irregularities that foster coziness, gathering places for informal recreation, and neighborhood feeling. The formal order of a geometrically regular urban space is just that: formal order. Its visual regimentation has a ceremonial or ideological quality, much like the order of a parade or a barracks. The fact that such order works for municipal and state authorities in administering the city is no guarantee that it works for citizens. Provisionally, then, we must remain agnostic about the relation between formal spatial order and social experience.

The third notable aspect of homogeneous, geometrical, uniform property is its convenience as a standardized commodity for the market. Like Jefferson's scheme for surveying or the Torrens system for titling open land, the grid creates regular lots and blocks that are ideal for buying and selling. Precisely because they are abstract units detached from any ecological or topographical reality, they resemble a kind of currency which is endlessly amenable to aggregation and fragmentation. This feature of the grid plan suits equally the surveyor, the planner, and the real-estate speculator. Bureaucratic and commercial logic, in this instance, go hand in hand. As Mumford notes, "The beauty of this mechanical pattern, from the commercial standpoint, should be plain. This plan offers the engineer none of those special problems that irregular parcels and curved boundary lines present. An office boy could figure out the number of square feet involved in a street opening or in

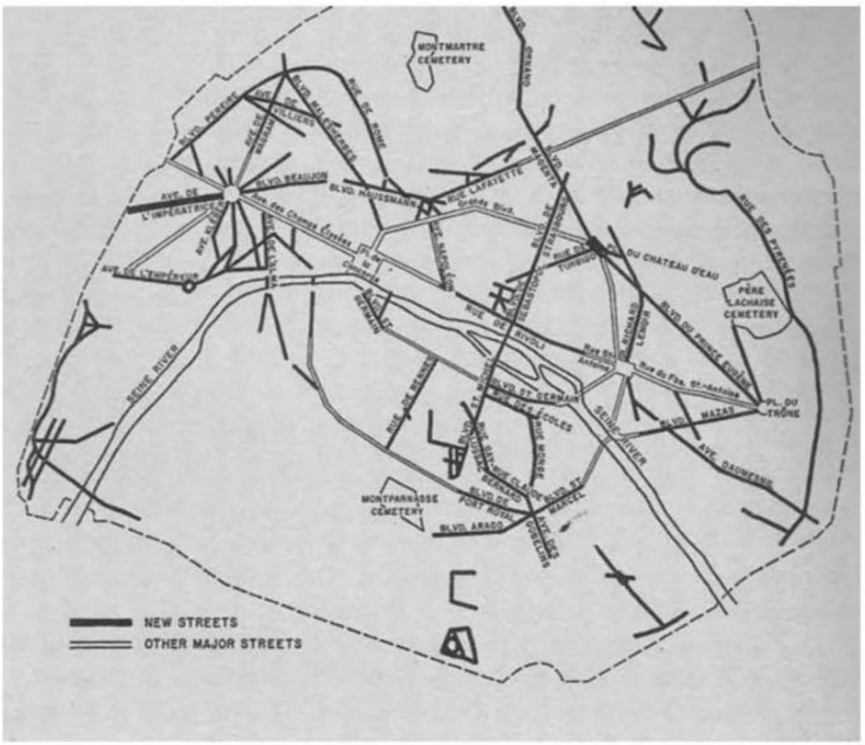
a sale of land: even a lawyer's clerk could write a description of the necessary deed of sale, merely by filling in with the proper dimensions the standard document. With a T-square and a triangle, finally, the municipal engineer could, without the slightest training as either an architect or a sociologist, 'plan' a metropolis, with its standard lots, its standard blocks, its standard width streets. . . . The very absence of more specific adaptation to landscape or to human purpose only increased, by its very indefiniteness, *its general usefulness for exchange*."[15]

The vast majority of Old World cities are, in fact, some historical amalgam of a Bruges and a Chicago. Although more than one politician, dictator, and city planner have devised plans for the total recasting of an existing city, these dreams came at such cost, both financial and political, that they have rarely left the drawing boards. Piecemeal planning, by contrast, is far more common. The central, older core of many cities remains somewhat like Bruges, whereas the newer outskirts are more likely to exhibit the marks of one or more plans. Sometimes, as in the sharp contrast between old Delhi and the imperial capital of New Delhi, the divergence is formalized.

Occasionally, authorities have taken draconian steps to retrofit an existing city. The redevelopment of Paris by the prefect of the Seine, Baron Haussmann, under Louis Napoleon was a grandiose public works program stretching from 1853 to 1869. Haussmann's vast scheme absorbed unprecedented amounts of public debt, uprooted tens of thousands of people, and could have been accomplished only by a single executive authority not directly accountable to the electorate.

The logic behind the reconstruction of Paris bears a resemblance to the logic behind the transformation of old-growth forests into scientific forests designed for unitary fiscal management. There was the same emphasis on simplification, legibility, straight lines, central management, and a synoptic grasp of the ensemble. As in the case of the forest, much of the plan was achieved. One chief difference, however, was that Haussmann's plan was devised less for fiscal reasons than for its impact on the conduct and sensibilities of Parisians. While the plan did create a far more legible fiscal space in the capital, this was a by-product of the desire to make the city more governable, prosperous, healthy, and architecturally imposing.[16] The second difference was, of course, that those uprooted by the urban planning of the Second Empire could, and did, strike back. As we shall see, the retrofitting of Paris foreshadows many of the paradoxes of authoritarian high-modernist planning that we will soon examine in greater detail.

The plan reproduced in figure 10 shows the new boulevards constructed to Haussmann's measure as well as the prerevolutionary inner



10. Map of Paris, 1870, showing the principal new streets built between 1850 and 1870

boulevards, which were widened and straightened.[17] But the retrofit, seen merely as a new street map, greatly underestimates the transformation. For all the demolition and construction required, for all the new legibility added to the street plan, the new pattern bore strong traces of an accommodation with "old-growth" Paris. The outer boulevards, for example, follow the line of the older customs (*octroi*) wall of 1787. But Haussmann's scheme was far more than a traffic reform. The new legibility of the boulevards was accompanied by changes that revolutionized daily life: new aqueducts, a much more effective sewage system, new rail lines and terminals, centralized markets (Les Halles), gas lines and lighting, and new parks and public squares.[18] The new Paris created by Louis Napoleon became, by the turn of the century, a widely admired public works miracle and shrine for would-be planners from abroad.

At the center of Louis Napoleon's and Haussmann's plans for Paris lay the military security of the state. The redesigned city was, above

segregation of the population by class and function. Each fragment of Paris increasingly took on a distinctive character of dress, activity, and wealth—bourgeois shopping district, prosperous residential quarter, industrial suburb, artisan quarter, bohemian quarter. It was a more easily managed and administered city and a more "readable" city because of Haussmann's heroic simplifications.

As in most ambitious schemes of modern order, there was a kind of evil twin to Haussmann's spacious and imposing new capital. The hierarchy of urban space in which the rebuilt center of Paris occupied pride of place presupposed the displacement of the urban poor toward the periphery.[31] Nowhere was this more true than in Belleville, a popular working-class quarter to the northeast which grew into a town of sixty thousand people by 1856. Many of its residents had been disinherited by Haussmann's demolitions; some called it a community of outcasts. By the 1860s, it had become a suburban equivalent of what the Faubourg Saint-Antoine had been earlier—an illegible, insurrectionary *foyer*. "The problem was not that Belleville was not a community, but that it became the sort of community which the bourgeoisie feared, which the police could not penetrate, which the government could not regulate, where the popular classes, with all their unruly passions and political resentments, held the upper hand."[32] If, as many claim, the Commune of Paris in 1871 was partly an attempt to reconquer the city ("la reconquete de la Ville par la Ville")[33] by those exiled to the periphery by Haussmann, then Belleville was the geographical locus of that sentiment. The Communards, militarily on the defensive in late May 1871, retreated toward the northeast and Belleville, where, at the Belleville town hall, they made their last stand. Treated as a den of revolutionaries, Belleville was subjected to a brutal military occupation.

Two diagnostic ironies marked the suppression of the Commune. The first was that the strategic design of Haussmann was triumphant. The boulevards and rail lines that the Second Empire had hoped would foil a popular insurrection had proved their value. "Thanks to Haussmann, the Versailles army could move in one fell swoop from the Place du Chateau d'eau to Belleville."[34] The second irony was that, just as the Faubourg Saint-Antoine had been effaced by Haussmann's demolitions, so too was much of the newly offending quarter obliterated by the building of the Eglise Sacré Coeur, built "in the guilty town . . . as restitution made on the site of the crime."[35]

The Creation of Surnames

Some of the categories that we most take for granted and with which we now routinely apprehend the social world had their origin in state projects of standardization and legibility. Consider, for example, something as fundamental as permanent surnames.

A vignette from the popular film *Witness* illustrates how, when among strangers, we do rely on surnames as key navigational aids.[36] The detective in the film is attempting to locate a young Amish boy who may have witnessed a murder. Although the detective has a surname to go on, he is thwarted by several aspects of Amish traditionalism, including the antique German dialect spoken by the Amish. His first instinct is, of course, to reach for the telephone book—a list of proper names and addresses—but the Amish don't have telephones. Furthermore, he learns, the Amish have a very small number of last names. His quandary reminds us that the great variety of surnames and given names in the United States allows us to identify unambiguously a large number of individuals whom we may never have met. A world without such names is bewildering; indeed, the detective finds Amish society so opaque that he needs a native tracker to find his way.

Customary naming practices throughout much of the world are enormously rich. Among some peoples, it is not uncommon for individuals to have different names during different stages of life (infancy, childhood, adulthood) and in some cases after death; added to these are names used for joking, rituals, and mourning and names used for interactions with same-sex friends or with in-laws. Each name is specific to a certain phase of life, social setting, or interlocutor. A single individual will frequently be called by several different names, depending on the stage of life and the person addressing him or her. To the question "What is your name?" which has a more unambiguous answer in the contemporary West, the only plausible answer is "It depends."[37]

For the insider who grows up using these naming practices, they are both legible and clarifying. Each name and the contexts of its use convey important social knowledge. Like the network of alleys in Bruges, the assortment of local weights and measures, and the intricacies of customary land tenure, the complexity of naming has some direct and often quite practical relations to local purposes. For an outsider, however, this byzantine complexity of names is a formidable obstacle to understanding local society. Finding someone, let alone situating him or her in a kinship network or tracing the inheritance of property, becomes a major undertaking. If, in addition, the population in question has reason to conceal its identity and its activities from ex-

of names that they generated were to the legibility of the population what uniform measurement and the cadastral map were to the legibility of real property. While the subject might normally prefer the safety of anonymity, once he was forced to pay the tax, it was then in his interest to be accurately identified in order to avoid paying the same tax twice. Many of these fourteenth-century surnames were clearly nothing more than administrative fictions designed to make a population fiscally legible. Many of the subjects whose "surnames" appear in the documents were probably unaware of what had been written down, and, for the great majority, the surnames had no social existence whatever outside the document.[49] Only on very rare occasions does one encounter an entry, such as "William Carter, tailor," that implies that we may be dealing with a permanent patronym.

The increasing intensity of interaction with the state and statelike structures (large manors, the church) exactly parallels the development of permanent, heritable patronyms. Thus, when Edward I clarified the system of landholding, establishing primogeniture and hereditary copyhold tenure for manorial land, he provided a powerful incentive for the adoption of permanent patronyms. Taking one's father's surname became, for the eldest son at least, part of a claim to the property on the father's death.[50] Now that property claims were subject to state validation, surnames that had once been mere bureaucratic fantasies took on a social reality of their own. One imagines that for a long time English subjects had in effect two names—their local name and an "official," fixed patronym. As the frequency of interaction with impersonal administrative structures increased, the official name came to prevail in all but a man's intimate circle. Those subjects living at a greater distance, both socially and geographically, from the organs of state power, as did the Tuscans, acquired permanent patronyms much later. The upper classes and those living in the south of England thus acquired permanent surnames before the lower classes and those living in the north did. The Scottish and Welsh acquired them even later.[51]

State naming practices, like state mapping practices, were inevitably associated with taxes (labor, military service, grain, revenue,) and hence aroused popular resistance. The great English peasant rising of 1381 (often called the Wat Tyler Rebellion) is attributed to an unprecedented decade of registrations and assessments of poll taxes.[52] For English as well as for Tuscan peasants, a census of all adult males could not but appear ominous, if not ruinous.

The imposition of permanent surnames on colonial populations offers us a chance to observe a process, telescoped into a decade or less,

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