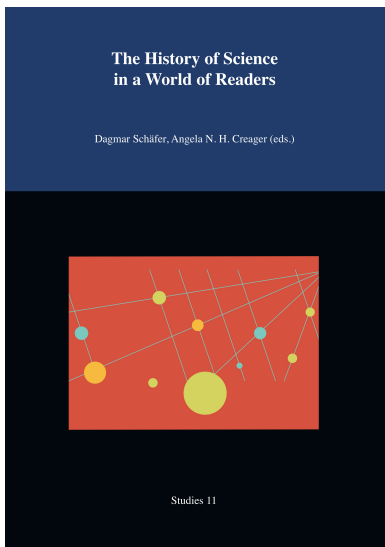


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## Studies 11

*Francesca Bray:*

Technics and Civilization in Late Imperial China: An Essay in the Cultural  
History of Technology



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## Chapter 3

# Technics and Civilization in Late Imperial China: An Essay in the Cultural History of Technology

*Francesca Bray*

In about 1169 the philosopher Zhu Xi set down a series of recommendations on the construction of an ancestral shrine in what was to become his best-known work, *Family Rituals*. The first chapter began as follows: “When a man of virtue builds a house his first task is always to set up an offering hall [ancestral shrine] to the east of the main room of his house.”<sup>1</sup> This passage has not usually been thought of as a key document for the history of Chinese technology. I should like to propose it as such, arguing that in the context of Chinese society of the late imperial period (between about A.D. 1000 and 1800) domestic architecture was a technology of significance comparable to that of machine tool design in the nineteenth-century United States: the shrine was a core element in the formation of a pervasive, flexible, and enduring sociotechnical system, a material artifact around which crystallized a characteristic ideology and social order.<sup>2</sup> By taking the construction of ancestral shrines rather than the production of steel as my subject, I hope to suggest how history of technology can be enriched and connected to other fields of history from which it is at present all too frequently estranged.

### 3.1 Opening up the History of Technology

In his critique of the disjuncture between technology studies and anthropology, Bryan Pfaffenberger uses the phrase “Standard View of technology” to describe a widely accepted overview of what technology is, the work it performs, and how it evolves—an account that, as he says, is routinely purveyed to the public, for example, in high school and undergraduate courses. It goes roughly as follows. The essence of technology is that it extends our physical capacities to alter the natural world: a stone ax allows us to grub the soil deeper than we can manage with our bare hands; the ox plow and then the tractor plow are still more efficient grubbers of soil, substituting alternative sources of energy for human labor. Technological knowledge is cumulative, based on an increasingly accurate understanding of the processes of the natural world that permits the development of increasingly effective solutions to our needs: as human societies advance they invent more complex and more efficient tools for controlling the environment. If a given society does not follow this path

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<sup>1</sup>For quotations from the *Zhuzi jiali* I have followed Hsi (1991); this quotation is from p. 5. In fact, this sentence was itself quoted from a handbook on etiquette published a century earlier by the statesman Sima Guang. Zhu was most famous for his numerous scholarly works on moral philosophy and cosmology, but none reached as wide an audience as the *Family Rituals*.

<sup>2</sup>Bryan Pfaffenberger defines “sociotechnical system” as “the distinctive technological activity that stems from the linkage of techniques and material culture to the social coordination of labor”: Pfaffenberger (1992, 497).

of historical progress or fails to adopt more advanced technology when it is made available, this is probably due to indigenous cultural factors that hamper development – thus “culture” is set up as the antithesis of the material rationality that technology embodies.<sup>3</sup>

The common understanding is that technology (like science) is “culture free,” yet for decades critics have protested that this view naturalizes and justifies the culture of capitalism. Among others, Jacques Ellul stressed the moral risk of evaluating technical artifacts purely according to their functional efficiency as part of a system of material production, thus treating them as independent of the human relations surrounding their use. Lewis Mumford complained that the “tendency to identify tools and machines with technology” was “merely to substitute a part for the whole,” going so far as to claim that the material effects of technology were merely secondary: man engages in technical activities “less for the purpose of increasing food supply or controlling nature than for utilizing his own immense organic resources to fulfil more adequately his superorganic demands and aspirations.”<sup>4</sup>

In 1959, in naming their journal *Technology and Culture*, the founding members of the Society for the History of Technology seemed to be taking up Ellul’s and Mumford’s challenge of rethinking what technology is and does. But in fact their goal was more limited: namely, to foster a new contextual approach in the discipline based on the premise that “technical designs cannot be meaningfully interpreted in abstraction from their human context.” The industrial world continues to provide the definitions of what constitutes a technical design; nor are the boundaries between the technical and the “human context” really in question. A survey of the contents of the journal shows how little interest there has been in nonindustrial societies or technologies. Four decades after *Technology and Culture* was launched, its current editor, John M. Staudenmaier, was obliged to conclude that mainstream history of technology had still failed to come to satisfactory grips with the concept of “culture” in the sense of technology *as* culture, rather than the “standard view” of technology as noncultural in itself but affected by the affordances of culture.<sup>5</sup>

As Pfaffenberger says, the standard view is “a commonsense view of technology ... that accords perfectly with our everyday understanding.” It slips easily into a theory of need-driven technological evolution that continues to direct most archaeology, remains an influential paradigm in the comparative history of technology, and underpins worldwide public understanding of technology and its historical role. Staudenmaier notes that the teleology of this model makes it essentially ahistorical and, therefore, of little interest to other historians—except as a historical phenomenon in itself. The metanarrative is an impediment to a genuine engagement of history of technology with the broader field of history; furthermore, it is unlikely to be productive as applied to non-Western societies, since it is “based on the forcible exclusion of others’ stories.”<sup>6</sup>

<sup>3</sup>Pfaffenberger (1992, 493–495). John S. Staudenmaier (1985) calls this the “myth of progress” or “Whig view” and analyzes its implications for the history of technology; see pp. 134–148.

<sup>4</sup>Ellul (1962); Mumford (1966, 306). Mumford had already explored this theme in his periodized study of technology in human history, Mumford (1934).

<sup>5</sup>Staudenmaier (1985, 165 and 1990). Staudenmaier distinguishes nine key subject areas in *Technology and Culture*. Four “have dominated the field for many years: technological creativity; the science-technology relationship; the American system of manufacturing; and electricity. Two are attracting renewed interest: the military history of technology and technology from a capitalist perspective” (p. 717). He also notes a recent interest in issues of work and gender, and even of the symbolic construction of technology.

<sup>6</sup>Pfaffenberger (1992, 495); Staudenmaier (1985, 164–174). See also Staudenmaier (1990, 725). The standard view also, of course, determines development policies around the world. See Basalla (1988).

Among the “questions seldom asked” in *Technology and Culture*—questions that he believes would help banish tendencies toward whiggishness and develop a richer understanding of technology as culture—Staudenmaier includes analyses of technologies that did not catch on, analyses of technology from the worker perspective, critiques of capitalism—and studies of non-Western technologies. We might indeed imagine that since non-Western societies notably failed to generate either the technology or the value systems<sup>7</sup> that generated Western industrial capitalism, they would provide excellent opportunities to question accepted models of historical change,<sup>8</sup> to explore alternative ideologies of materialism, and to elaborate our understanding of the kinds of work technology performs.

An added incentive is that, at least as applied to non-Western societies such as China, the standard view is approaching its useful limits. For two hundred years Western nations have used technological difference to determine human hierarchies, over time and across space.<sup>9</sup> The mechanical-economic reductionism of the standard view presumes that technologies perform the same work, more or less efficiently, in every society; broadly speaking, the same technologies are *significant* in every society; and continuity is to be explained as *stasis* rather than as *stability*. Transformation is normal: unhampered, technology progresses constantly, generating changes that eventually disrupt modes of production and propel societies into new eras. Most studies of premodern technologies, whether in East or West, trace the lineages of the modern world; they focus on engineering, timekeeping, the conversion of energy, and the production of commodities like metal, food, and textiles—in other words, on the domains that from our perspective seem most significant because they came to shape the world of industrial capitalism.

Though some historians have recently preferred to view Europe’s experience in the light not of inevitability but of a miracle, the path taken by the West still emerges as the best because the most “natural” one, permitting the most rational and efficient use of resources. By contrast, in all non-Western societies, however technically accomplished (the medieval Islamic world, the Inka empire, or imperial China up till about A.D. 1400), the natural energies of technological progress were somehow prevented from taking this natural course: the metaphors used are those of blockages, brakes, or traps.<sup>10</sup> The non-Western experience is then presented as a failure to build on achievements, and it is this failure that requires explanation; usually culture (in the form of epistemologies or institutions) is to blame.<sup>11</sup>

Joseph Needham’s lyrical accounts of Chinese achievements in science and technology transformed the public image of China and its place in history around the world. Needham criticized using science to bolster Western supremacism, but like the other scientists of his generation he fully shared the teleology of the “whig position.” However, by demonstrating

<sup>7</sup>Note, however, current arguments that Confucian values are responsible for the Asian Tiger phenomenon. This directly contradicts the long tradition of historical interpretation that saw Confucian values as antithetical to the development of capitalism. See Brook (1995).

<sup>8</sup>For instance, recent scholarship suggests that, contrary to conventional wisdom, in the early Chinese steel industry large-scale production preceded small-scale operations. See Wagner (1993, 1997).

<sup>9</sup>Adas (1989).

<sup>10</sup>Jones (1981). Bertrand Gille lists China, the Muslim world, and the pre-Columbian empires as *blocked systems*: Gille (1978). Fernand Braudel uses the metaphor of *brakes*: Braudel (1992, 430–435). Mark Elvin uses the metaphor of a *trap*, i.e., the “high-level equilibrium trap”: Elvin (1973).

<sup>11</sup>Joseph Needham was inclined to blame this perceived failure on external social and intellectual factors like the “bureaucratic feudalism” of the Confucian state; see Needham et al. (1954–). Elvin’s terms “high-level equilibrium trap” and “involution” sought explanation in terms of what one might call the dynamics of the Chinese sociotechnical system.

that China had contributed to the world many important elements of modern science and technology—including Francis Bacon’s famous modern trio of printing, gunpowder, and the compass—Needham contrived to turn the Western triumphalism of the standard view into a liberatory platform for other traditions. He proposed the concept of “ecumenical” (universal modern) science and technology, to which various local traditions (not just those of Europe) had contributed, just as rivers flow into the sea.<sup>12</sup> The path of technological progress is still plotted according to the criteria of the standard view, however, and so inevitably we end up having to account for failure to progress—or, rather, failure to become like the West—a problem that continues to enthrall comparative historians of science and technology and to preoccupy economic historians of China, whose discipline leads them to treat technology essentially as a factor of production.<sup>13</sup>

James Clifford has noted how ethnographic museums put together exhibits by selecting artifacts according to categories that fulfill Western expectations of a “primitive” or “traditional” society, thus creating what he calls the illusion of adequate representation.<sup>14</sup> In history of technology, the standard view imposes the categories of industrial capitalism on non-Western societies; it then appears to have represented them inadequately by identifying the causes of their failure to follow the Western path. Once that has been accounted for, what more is there to be said about native technologies?

Yet precisely what is most interesting about non-Western societies is that the material worlds they produced did *not* embody the same values as our own. “We must remind ourselves time and time again that the European experience since the Middle Ages in technology, in the economy, and in the value systems that accompanied them, was unique in human history until the recent export trend began. Technical progress, economic growth, productivity, even efficiency have not been significant goals since the beginning of time ... other values held the stage.” As Mumford argued with regard to the superorganic functions of technology, the work performed by a sociotechnical system may have little or nothing to do with the energy-efficient solving of material problems or the profitable production of commodities. How did other societies see their world and the human place in it, what were their needs and desires, and how did the technologies they developed help fulfill those needs and desires?<sup>15</sup> Such anthropological (or cultural) questions dispel the illusion of adequate representation and provide a creative framework for exploring the complex roles of technology in non-Western or nonindustrial societies and for integrating technology into broader historical studies.

This approach requires a new materialism that takes into account social and symbolic as well as—or, where appropriate, instead of—economic and mechanical efficiency. Technolo-

<sup>12</sup>Greatly influenced by Needham, Arnold Pacey suggests an ecumenical model in which different civilizations continually succeed each other as world leaders; see Pacey (1990). The structure of *Science and Civilisation* classified technologies as applied sciences (my own contribution to the series was Vol. 6, Pt. 2, *Agriculture* [1984], a field of expertise that Needham slotted into his framework as “applied botany”). Lynn White, Jr. took Needham to task for presuming too readily that technical skills represented scientific understanding; see White (1984).

<sup>13</sup>“No category of scholars has given more attention to the history of technology than the economic historian. Technology (or technological knowledge) is clearly a factor of production, and can no more be ignored in a comprehensive study than can capital, labor, or raw materials”: Pursell (1984, 71). On the economic history of China and the metaphors of failure that guide it see Wong (2002). For comparative work see, e.g., Huff (1993); Mokyr (1990).

<sup>14</sup>Clifford (1988, 220).

<sup>15</sup>Finley (1985, 147). According to Basalla, a human technology is a “material manifestation of the various ways men and women throughout time have chosen to define and pursue existence”: Basalla (1988, 14).

gies in this definition are specific to a society, embodiments of its visions of the world and of its struggles over social order; they produce ideas about being human and about relations between people.<sup>16</sup> The world of food, shelter, clothing, and other goods that each society constructs for itself is a domain of material experience that shapes and transmits ideological traditions in unique fashion. Technical activities and artifacts can be understood as a form of communication or as symbols; and technologies that seem to us of minor importance may hold great symbolic significance, as in the case of butter making and fire lighting in India or the construction of the Chinese ancestral shrine that I will discuss here.<sup>17</sup> Like all symbols, technologies are polysemic: their meaning depends on how they are read in relation to other elements in the symbolic system; they mean different things to different people; and sometimes the ambiguities they embody serve to defuse conflict, while at other times they provoke it.<sup>18</sup>

If technology performs symbolic and ideological work, we need to examine how it might construct and stabilize as well as undermine or transform a social order. A successful technology is not necessarily one that destroys the society that produced it. I was offered an interesting variant on the standard view by an environmental scientist who characterized technology not as a more powerful extension of the human arm but as a “damper” or shock absorber, a means of blunting the extreme effects of our environment. The examples he chose as illustrations were agriculture and food storage, which smooth over surplus and dearth; and the house, which stabilizes temperatures. Extending the metaphor from the physical to the social, sociotechnical systems have the capacity to absorb as well as to generate disruptive social energy. Like ecologists, we should look closely at the processes by which a sociotechnical system forms, consolidates, and resists dissociation.<sup>19</sup> The utility of this approach for studying modern technology has been demonstrated;<sup>20</sup> it clearly has great potential applied to a case like late imperial China.

Insofar as political, social, cultural, and intellectual historians of China are engaged with *longue durée*, they are fascinated not by the absence of change but by the astonishing resilience of a political and social system in constant evolution, repeatedly subjected to dramatic shocks and pressures. Between 1000 and 1800 China was three times conquered by foreign invaders and experienced numerous internal rebellions and civil wars. The geopolitical center of China shifted from the northern plains to the cities of the south. Population fluctuated but in the long term grew from roughly 100 million to 400 million. The economy became increasingly commercialized, cities expanded, and more and more of rural China was tied into a web of inter-regional commerce that replaced subsistence farming with local specialization and household commodity production. Printing and publishing industries

<sup>16</sup>See, e.g., my own study of how a set of three different material technologies contributed to the historical structuring of gender identities in China: Bray (1997).

<sup>17</sup>Technological activities and artifacts are treated in this way in the French tradition; see e.g., the journal *Techniques et Culture* or the interdisciplinary collection of papers in Lemonnier (1993). For an example see Mahias (1989). My own work has been strongly influenced by my connections with the French group.

<sup>18</sup>C.A. Bayly gives a marvelous illustration of such ambiguities in his discussion of the conflicting symbolisms, liberatory and oppressive, of cloth production in preindependence India; see Bayly (1986).

<sup>19</sup>“A successful sociotechnical system achieves a stable integration of social and nonsocial actors, but it is no static thing”: Pfaffenberger (1992, 502). The variant on the standard view was offered by Ramon Guardans in a personal communication, 1990.

<sup>20</sup>Following Thomas P. Hughes’s foundational work on electrification, Staudenmaier discusses the potential of the related concepts of “momentum” and “inertia” for exploring the enduring nature of sociotechnical systems; see Staudenmaier (1985, 148–161).

emerged, expanded, and flourished; ever-greater numbers of candidates attempted the imperial examinations that offered access to the governing elite; social boundaries between the old categories of scholar and merchant, peasant and craftsman, became increasingly blurred and permeable. For most historians of late imperial China, the puzzle is what held China together over this period.

Currently the history of technology is isolated from the broader field of Chinese history, despite a growing interest among social, cultural, and intellectual historians in themes that would benefit from a linking of the cultural and the material, such as the body or consumption.<sup>21</sup> Many historians of late imperial China associate the enterprise of history of technology with an inherent Western supremacism that they find distasteful, and the questions it asks appear largely irrelevant or alien to their own concerns.<sup>22</sup> While the “blocked system” model focuses on the failure to transform, the majority of historians of late imperial China face the challenge of accounting for continuity. The history of Chinese technology might engage very fruitfully with the broader field if it turned its primary question on its head to look at continuities not as stasis or as absence of change but, rather, as systemic stability or resistance to dissociation. Among the factors that contributed to the consolidation and reproduction of the sociopolitical order and to the diffusion of orthodoxy in late imperial China, scholars have pointed to elite control over the written word, to death rituals (ceremonies of paramount importance in Chinese society, since they converted dead relatives into ancestors), marriage practices, and family rules.<sup>23</sup> I propose to add technology to this list, and here I shall discuss the development of one key feature of the domestic dwelling that came to tie families of all classes into history and the broader polity: the domestic shrine.

### 3.2 Machines for Living

The American system of manufacture shaped the modern world. It had its roots in “armory practice,” a system of standardization of machine tools specially designed to produce large numbers of interchangeable parts that started in the U.S. small-arms industry in the early nineteenth century and spread rapidly into other areas of manufacture. In Europe skilled craftsmen adjusted their machines to produce components of the required design and dimensions; to profit from an influx of unskilled immigrant labor, U.S. manufacturers designed machines where the craftsman’s skills and tolerances were inbuilt. These machines propelled the development of a new manufacturing system that engendered the labor relations, consumption patterns, and vision of technology typical of Fordist industrial capitalism. The normalization of industry crystallized around “the U.S. Ordnance Department’s 1816 commitment to the philosophical ideal of standardization and interchangeability” and gradually

<sup>21</sup>For cultural historians who have difficulties coming to grips with the material, du Gay, Hall, Janes, et al. (1997) offers a superb model for linking production, consumption, regulation, representation, and identity around a material object and its design.

<sup>22</sup>It is to be hoped that cultural historians of China, who characteristically pay very little attention to the material conditions of life, will soon become aware of the relevance of work by scholars like Dieter Kuhn (1987), who considers Song material culture as an expression of political relations and social identities; Klaas Ruitenbeek (1993) whom I will discuss below; Françoise Sabban (1994) who—à la Sidney Mintz—incorporates tastes and cuisine into her analysis of the Chinese sugar industry; and Lothar von Falkenhausen (1994) who discusses music and pitch as forms of political expression and control.

<sup>23</sup>See, e.g., Johnson, Nathan, and Rawski (1994); Woodside and Elman (1994); Watson and Rawski (1988); Watson and Ebrey (1991).

came to encompass not only the structure of manufacture but also “the growth of standardized and centrally controlled rail systems, the centralization and standardization of corporate research and development, the use of consumer advertising to program individual buying habits, [and] the increasing centralization and complexity of electricity and communication networks.”<sup>24</sup> In other words, the machine tool came to underpin a whole system of goals and values; it was not just a machine for producing, but a machine for living.

When identifying significant technologies, those that have contributed most to shaping the nature of society, historians of Chinese technology have usually followed the example of Western historians and focused on technologies that produced the key commodities of the industrial world—metallurgy, agriculture, and the textile industry. However, late imperial Chinese society was not capitalist, and its characteristic social order was organized around other than modernist goals and values.<sup>25</sup> The institution that most fundamentally shaped late imperial society and culture was the patriarchal lineage, constructed around an architectural feature: the domestic altar. In China, domestic architecture was a significant technology that normalized late imperial society just as the machine tool shaped and cemented the values of the Fordist world.

In speaking of his architectural designs as “machines for living,” Le Corbusier expressed the modernist ideal that domestic space should be designed to meet scientifically defined needs as efficiently as possible: a modern dwelling should be hygienic, thermally stable, efficient in its use of energy, and ergonomically designed. The phrase also expressed the converse modernist principle, that living spaces produce lifestyles. Bauhaus workers’ flats reduced drudgery and increased comfort—and they were also designed as environments that would help the occupants live as responsible modern worker-citizens. In contemporary Western society new housing is professionally designed, incorporating the skills of architects and engineers; the building materials are industrially produced; the house itself and its standard equipment tie the occupants into a complex technological network of utilities suppliers, consumer durables industries, roads and automobile manufacturers, supermarkets, TV cable companies, and so on. The house is a machine for living the particular lifestyle of late capitalism, with its characteristic systems of consumerism, property rights, privacy, and gendered or generational identities. Excellent studies by Dolores Hayden and Mike Davis illuminate the moral, cultural, and political messages embodied in such dwelling forms as the “executive housing” now spreading from the United States to middle classes around the world and invite us to ponder the deeper meanings of gated estates, house frontages that give pride of place to two- or even three-car garages, the absence of shared facilities with neighbors, a separate bedroom, however tiny, for each child, and, of course, multiple bathrooms.<sup>26</sup>

We have naturalized the moral and cultural messages of this architecture. We think of a separate bedroom for each child and a closed-off space for private, solitary defecation and ablutions as needs all societies would meet if they had the means—the standard view looms again. However, as anthropologists and cultural critics have shown, architecture is not neu-

<sup>24</sup>Staudenmaier (1985, 200). On the growth of the American system of manufacture see, e.g., Pursell (1994).

<sup>25</sup>This is not to say that seeking for profit was unknown—far from it—but it was a “muted” discourse in late imperial society. See Brook (1995, 84–90); Bray (1997, Ch–6).

<sup>26</sup>Dolores Hayden discusses the ideology of American middle-class housing design from a feminist perspective in *Redesigning the American Dream: The Future of Housing, Work, and Family Life* (1986). Mike Davis focuses on how contemporary architectural design and its emphasis on security reinforce class differences in *City of Quartz* (1992).



tral. A house is a cultural template; living in it inculcates fundamental knowledge, skills, and values specific to that society. It is a learning device, a mechanism that converts ritual, political, and cosmological relationships into daily experiences of space.<sup>27</sup> The encoded messages of the house teach some lessons that are the same for all and some that are different. As a child grows up and learns the practices of living in a house she learns her proper place within society; she internalizes the hierarchies of gender, generation, and rank that are marked by walls and stairs and practiced in the rules and etiquette of receiving guests, performing rites of passage, and going about daily tasks. She learns about respectability and how the differences between high and low, rich and poor, are concretely expressed.

Much of this cultural expertise forms around material objects, skills, and habits. Within the framework of our own cultural expectations, the technical hardware of modern domestic architecture “dedicates” certain spaces, restricting their use. When we move into a new house we do not contemplate setting up a dining table in the bathroom, nor would we consider relieving ourselves in the bedroom now that the flush toilet has replaced the chamber pot in our lives. But these uses of space and of equipment are neither self-evident nor “natural”—they have to be learned. It is in the nature of capitalist society that new features (the fitted kitchen, the “study”) are constantly being developed and presented to consumers as needs; in such cases we find ourselves instructed and enticed by a range of users’ guides that may include floor plans in the realtor’s window, magazines on furnishing and design, and TV advertisements. Occupants draw upon these as well as their own experience and expectations in order to turn four walls into a home.

### 3.3 Engineering a New Social Order in Late Imperial China

In what follows I describe the interplay between *hardware* (that is to say, the characteristic architectural features that framed spatial practices) and *users’ guides* (texts and shared practices that taught or reminded people what the spaces they occupied signified) in the construction and diffusion of a “standard” Chinese house. The normalization of domestic space, I argue, was a key element in the standardization of social practices and values.

In his superb study of the Chinese carpenter and his technical skills, Klaas Ruitenbeek makes an arresting observation: “One gets the impression that in China *an imaginary architecture existed which was superimposed on ordinary architecture, and which was the primary concern of the owner, geomancer and carpenter alike.*” Ruitenbeek is referring to the superimposition on the physical building of an energetic (geomantic) structure. In my own study of domestic architecture and the construction of gender I eventually came to see three “imaginary architectures” superimposed upon the material shell of the house, each conveying a different set of messages about the relations between its inhabitants, the cosmos, and society at large. First, the Chinese house was a space of decorum, an embodiment of orthodox neo-Confucian values; second, as Ruitenbeek and many anthropologists

<sup>27</sup>In *Mechanization Takes Command: A Contribution to Anonymous History* (1948), Siegfried Giedion provides wonderful insights into the machine-age ideology inherent in such apparently culture-free concepts as “hygiene” and “comfort.” The classic text on house and habitus is Bourdieu (1973). Comparing sedentary and hunter-gatherer cultures, Peter J. Wilson argues that the material experiences of inhabiting dwellings have profoundly reshaped our cognitive patterns and social values, indeed that we owe such institutions as “the family” to the spatial experiences of the house; see Wilson (1988). For an exploration of the connections between house and family structure see Carsten and Hugh-Jones (1995).

have demonstrated, the house was a cosmic, energetic space; and third, it was a space of culture, representing a Chinese view of what home and shelter should be.<sup>28</sup> In the following analysis of the diffusion and reception of the shrine, I concentrate on the interplay between the material structures of the house and the two “imaginary architectures” that produced the space of decorum and the energetic space.

While details of the structure and use of domestic dwellings in China obviously varied according to period, region, class, wealth, and taste, what I call the “standard” house, a concrete material embodiment of neo-Confucian social values, was first defined in texts written in the early Song (from about A.D. 1100). At that time only a few gentry families were claiming for themselves the aristocratic privilege of an ancestral shrine in their homes, but in order to consolidate their own status as social leaders the neo-Confucian elite encouraged ever-larger segments of society to adopt the same configurations of spatial layout and practice in their own homes, along with the social ties and values that they symbolized.

Until about A.D. 1000 the ruling elite of China had consisted principally of aristocratic families who preserved their own culture and privileges by excluding other social groups; in particular, they reserved for themselves the right to domestic rituals of ancestral worship. By A.D. 1000 a new elite, formed of public servants qualified by education rather than by blood, was predominant. Rather than drawing impermeable boundaries around themselves, this new elite saw themselves as members of a meritocracy open to talent. They developed and propagated a social philosophy and accompanying social practices usually referred to in English as neo-Confucianism. The roots of neo-Confucianism go back to the late Tang dynasty, to the eighth and ninth centuries, when the formalization of an examination system for the civil service allowed non-noble scholar-bureaucrats to undermine the political and cultural supremacy of the aristocratic elite. Classic Confucian philosophy had emphasized the organic nature of the state, the continuities between the regulation of the family and that of the polity, and the key importance of ritual in ordering society. Debates on these themes resurfaced in the Tang, sharpened by the threat to orthodoxy represented at that time by the “alien” doctrines and practices of Buddhism. By the early Song commoner scholar-bureaucrats had definitively displaced the aristocracy in government, and the new forms of Confucian orthodoxy they developed justified and extended their own claims to social and cultural leadership, placing great stress on ritual.

The neo-Confucian social order rested on principles of ranking and complementarity. A subject owed respect and obedience to his ruler, who should respond with consideration and compassion. Within the patriline the lineage head occupied an analogous position with respect to junior lineage members, and the relations between father and sons, husband and wife, were similarly conceived as complementary but not equal. The performance of joint rituals served to unite people of different status in a common goal or set of beliefs while reaffirming the proper social hierarchies.

It has frequently been observed that the late imperial ruling class relied on instruction rather than force as a method of social control. Chinese thought emphasized the connection between body and morality; the physical performance of daily rituals inculcated the proper

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<sup>28</sup>Ruitenbeek (1993, 62) (emphasis added). Again, while not wishing to essentialize “Chineseness,” and despite the range of variation across China, we can legitimately point to obvious shared aesthetics, preferences for particular construction materials, the absence of open hearths, the understanding that the house should be constructed and decorated in such a way as to bring good fortune to the family. See, e.g., Lu Yuanting (1991–1996); Knapp (1998); Bray (1997, Chs–3).

feelings and appreciation of relationships that the rituals celebrated. Instructing the common people in ritual, wrote the statesman Ouyang Xiu (1001–1072), “not only would prevent disorder but also would teach them to distinguish superior and inferior, old and young, and the ethics of social relations.” Note that in this formulation ritual has an active rather than simply a symbolic role: it secures political order by reinforcing social relations. It has been said that Chinese authorities were more concerned with orthopraxy (correct practice) than with orthodoxy (correct belief), since where practice led, belief must follow.<sup>29</sup> Hence the moral significance of bodily practices, including work, and of material artifacts: everyone knew, for example, that the philosopher Mencius (fourth century B.C.) had announced his brilliant moral career as a mere infant by playing with sacrificial vessels long before he could lisp their names.

As Michel Foucault has reminded us, everyday artifacts and practices are the more powerful as disciplinary devices because their messages are silent. Domestic architecture was a particularly powerful instrument of moral inculcation in China because of the integration of private and public ethics characteristic of late imperial society. In the West we have experienced a series of separations between spheres of activity that has progressively reduced the dominance of the house in shaping people’s lives.

The Greek and Roman worlds already marked a clear separation between the domestic and the public, political domain; in Christian Europe most important acts of worship and rites of passage came to be performed in the church; and with industrialization came a separation of workplace from dwelling for large numbers of the population. The house became a private domain, a refuge from the pressures of work and of political or religious orthodoxy. In China a contrary historical process occurred, whereby an increasing proportion of the population came to be tied into a polity that did not recognize our distinctions between public and private: rituals of birth, maturation, marriage, and death were performed in the house; the liturgical rituals of the domestic ancestral cult paralleled the ceremonies of state orthodoxy; and the family was the ethical and behavioral training ground for political life.<sup>30</sup>

Nineteenth- and twentieth-century Western observers remarked that every Chinese house, whether of peasant or gentleman, was first and foremost an ancestral temple: the entire structure was centered on the shrine, and when a household divided each brother set up an altar of his own in his new dwelling.<sup>31</sup> Though it seemed that such customs were immemorial, in fact peasants—and even scholars—had not always been entitled to their own ancestral shrines.

Before the Song, the domestic altar with its ancestral tablets was an exclusive emblem of aristocratic status. Commoners were not allowed to worship their ancestors in their own homes. However, in the early Song dynasty neo-Confucian gentry families began constructing patrilineal descent groups and setting up shrines for themselves as marks of their elite status.<sup>32</sup> Domestic shrines (the architectural hardware) and the practices associated with them (described in various users’ guides) served this new elite as an effective tool in their construction of a stable and integrated social order with themselves at the top.

<sup>29</sup>de Bary (1960, 443) (quotation); Watson (1991).

<sup>30</sup>The continuity was reflected in architectural design: in late imperial China ancestral temples, magistrate’s courts, and imperial palaces all shared the basic layout of the farmhouse, if on a larger scale. See Boyd (1962, 48); see also the papers in the colloquium on “*Kongjian, jiating yu shehui*” (Space, house, and society) (1994).

<sup>31</sup>“See, e.g., Myron Cohen’s classic, *House United, House Divided: The Chinese Family in Taiwan* (1976) and Clément, Clément, and Shin Yong-hak (1987).

<sup>32</sup>Ebrey (1991).

In 1169 Zhu Xi, one of the most eminent and influential founders of neo Confucian thought, published a compendium of domestic rituals for use among gentry families, the *Family Rituals*, which—as I have already noted—incorporated the *Miscellaneous Etiquette for Family Life* composed a century earlier by Sima Guang (1019–1086). The combined text constitutes the foundational formulation of the “standard” spatial configuration of domestic space and practices.<sup>33</sup>

Zhu Xi represented the house as a ritual space with the ancestral shrine at its heart: “When a man of virtue builds a house his first task is always to set up an offering hall to the east of the main room of his house.” *Zhu* stated that this section on setting up the shrine came first in his book because it was fundamental to all that followed, not only in moral and metaphysical terms but also for the inculcation of proper deportment: the first chapter, in his words, “provides the basis for understanding the fine points in the later chapters concerning movements and postures, for walking here and there, getting up and down, going in and out, and facing various directions.”<sup>34</sup>

Zhu specified the general principles of construction of the shrine but made allowances for disparities of wealth. Ideally it should be three bays wide, with chests to hold family genealogies and ritual utensils, but poor families could make a shrine a single bay wide or even just use the east end of the main building. Zhu also made allowances for other material inadequacies, such as the lack of a south-facing main building: “Here and throughout this book, in organizing the room, *no matter which direction it actually faces*, treat the front as south, the rear as north, the left as east, and the right as west.” The absolute requirements of orientation were thus reformulated as a set of transformations such that anyone could conform to them. The center of the room was the altar table and the niche containing the ancestral tablets. Again, considerable variation was possible in the number of tablets and the order in which they were arranged; the main thing was that there should be an order.<sup>35</sup>

The daily offerings made to the ancestral tablets and the choreography of the liturgy—“walking here and there, getting up and down”—embodied the principles of filiality, ranking, and harmonious and fecund complementarity that underpinned the neo-Confucian patrilineal and patriarchal order: the respect and obedience due from descendants to ancestors was the pattern of filiality, *xiao*, and was thus the model for relations between children and parents, wife and husband, subject and ruler. One very important feature of shrine construction was the east and west steps of the room, illustrated clearly in Figure 1. Family members ascended and descended the steps in ranked order, according to generation, birth order within the generation, and sex, passing from the daily world up to the holy level of the ancestors and back; men and women were distinguished by using the eastern and the western steps. Here let us note that the basic unit in the liturgy (essentially a reproductive activity) was

<sup>33</sup>“One fundamental element of Chinese domestic spatial norms was the segregation of the sexes. Sima Guang’s *Miscellaneous Etiquette for Family Life* laid down very clear rules for this, and his were the words quoted ever after on the subject. The famous passage begins: “In housing there should be a strict demarcation between the inner and outer parts, with a door separating them. The two parts should share neither a well, a wash room, nor a privy. The men are in charge of all affairs on the outside, the women manage the inside affairs”: Hsi (1991, 29). The two domains were thus presented as complementary. The complementarity of male and female participants in domestic ritual is described below.

<sup>34</sup>Hsi (1991, 8).

<sup>35</sup>Hsi (1991, 8) (emphasis added). A bay is the space between two pillars supporting a roof beam, about ten or twelve feet across. On the preeminence of order over particulars see Watson and Rawski (1988). The illustration from *Shinzoku kibun* (Records of Qing customs) shown in Figure 2, for instance, depicts a merchant family shrine containing five, not four, sets of tablets.

the married couple: every act a man performed (such as offering wine) must be matched by a complementary act by his wife (offering tea). Family ceremonies reinforced patrilineal descent principles both by their choreography and by their inclusions and exclusions (see Figure 2): married sons (who lived in their parents' house) participated with their wives and children; married daughters (who joined their husband's lineage on marriage) were absent; servants were not involved, nor were concubines—who, unlike legal wives, were not presented to the ancestors when they come into the family.<sup>36</sup>

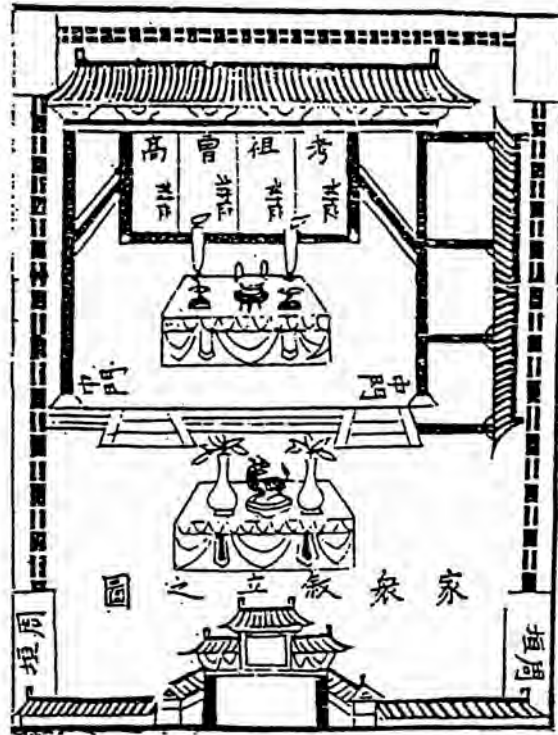


Fig. 1: Family offering hall, from the 1602 edition of Zhu Xi's manual on ritual; see Hsi (1991, 7). The characters on the screen at the back of the chamber indicate the genealogical order in which the tablets should be arranged. Note the two sets of three steps leading up to the chamber from the courtyard.

According to neo-Confucian precepts, all family life and events should be organized around the altar: the ancestors must be informed of comings and goings and of success and failure; new brides were presented to them; dying family members were set down beside the shrine to breathe their last. The senior couple in the family occupied the room closest to the shrine,

<sup>36</sup>On gender complementarity, patriarchal control, and the different meanings that seclusion of women could assume once productive work like weaving or reproductive work like the raising of children was taken into account see Bray (1997, esp. ch. 2 and 3). Concubines never became part of their husband's lineage, since the children to whom they gave birth were considered the offspring of the legal wife, and they were never allowed to conduct ancestral rites even if the wife died; in that case, the husband's duty was to remarry (Bray 1997 ch. 8 and 9).

as befitted both their rank within the family and their closeness to death and ancestral status. If robbers broke in or there was a fire, the first things you should save, said Zhu, were the ancestral tablets and family documents, leaving jewels and money till later (one suspects that this injunction was often ignored in real life).<sup>37</sup>

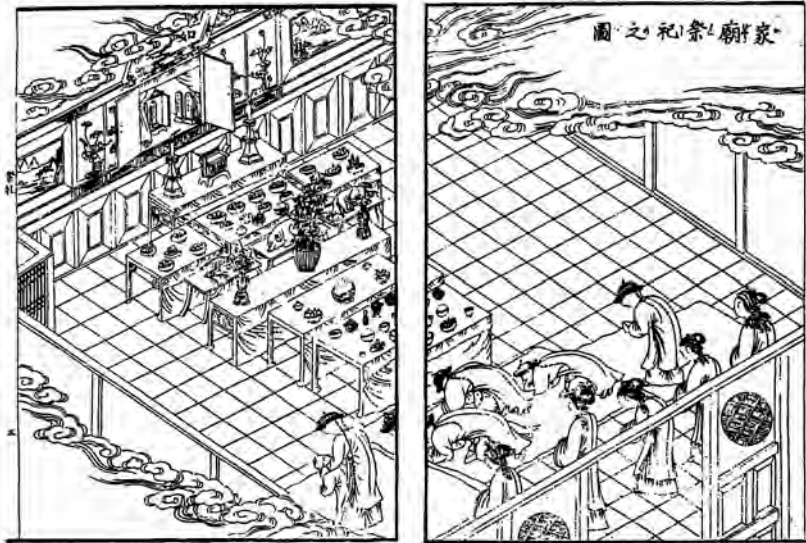


Fig. 2: Celebration of an ancestral sacrifice, from an illustrated work based on the accounts of Chinese merchants and published in Nagasaki, Japan, in 1800; see Nakagawa (1983, 496–7). The sacrifice is performed by all the couples in the family, each wife standing behind her husband, and also by the boys.

Sima Guang, writing in the eleventh century, appears to have been the first person to suggest that the practice of constructing one's house around the family shrine should become general among the literati elite. A century later Zhu Xi took a much more radical step: his goal was to extend the privileges of lineage rituals to whole agnatic groups. He wrote his *Family Rituals*, intended as a manual to help local magistrates educate the people in their charge, in a conscious effort to popularize, to provide a clear and practicable set of liturgical practices for general use—though it is probable that his goal was to educate families of standing rather than the masses.

In placing such emphasis on the shrine, Zhu Xi was not innovating (after all, he begins by quoting from a text a century old) but trying to systematize a practice that had been spreading among the nonaristocratic gentry in the eleventh and twelfth centuries. The established elite disseminated the shrine and its associated neo-Confucian practices as they extended their control over local society, tying their poorer kin into the formal institutions of patrilineal descent groups; meanwhile, other families eager for elite status laid claim to

<sup>37</sup>Hsi (1991, 5).

lineages and kinship networks of their own.<sup>38</sup> Joint ceremonies honoring the founding ancestor took place at special lineage temples that were shrines writ large; they confirmed the landowning and educated elite as lineage heads and as ritual experts and advisors. Though ranked, the system was inclusive: if rich and poor were to be tied together in loyalty as descendants of a common ancestor, then poor families had to have genealogies (and ancestors, and daily rituals at family shrines) too.

Since Zhu's liturgy allowed ceremonies to be carried out with propriety with the most basic of material hardware, poor families could achieve this significant form of respectability at low cost. Thanks to the transformations suggested by Zhu, a simple niche in the wall sufficed as the organizing device for the liturgy.

The influence of Zhu's formulation of the "standard house" and its spatial practices and meanings spread like ripples in a pool. One source of ritual and spatial instruction for ordinary families was the joint lineage ceremonies: for important domestic rituals like weddings, junior families would often invite a related gentry member to participate as sponsor. Another was the actual construction of houses: the carpenters who were principally responsible for building learned from the *Carpenter's Canon* the orientation, proportions, and dimensions of the hall or room housing the shrine and of the shrine itself. In the process of building a new house or adding to an old one, a family went through a period of conscious concern with such issues.<sup>39</sup>

Zhu's book itself became very popular and was produced in various editions. The first illustrated versions appeared at the end of the Song (Figure 1 is from a Ming edition). The original text was popularized and excerpted in household encyclopedias—for example, in the *Householder's Vademecum*, first published in 1301 and widely circulated in the revised Ming edition of 1560. Although only well-to-do families could afford printed books until about 1500, thereafter the reading public grew rapidly, especially in the cities. The middle class, which developed between 1500 and 1800, liked to buy books, both to learn from them and as a sign of status, and books on ritual were very popular.<sup>40</sup>

As concern with proper domestic ritual spread both socially and geographically, along with the spread of lineages, neo-Confucian thinkers became increasingly preoccupied with the problems posed by "vulgar practices" and "local customs"; they wrote commentaries on Zhu Xi's work, or general reconsiderations of ritual, that tried to negotiate these problems so as to include even greater numbers within the circle of orthodoxy. State techniques for extending orthodoxy frequently overlapped or coincided with gentry initiatives. They included legislation on ritual conformity (for instance, the Yuan dynasty [1279–1368] code stipulated that only marriages conducted according to the *Family Rituals* would be considered legal), the setting up of schools, the organization of lectures (especially popular in the early Qing dynasty, during the eighteenth century), and the granting of honors to subjects of outstanding virtue and merit.<sup>41</sup>

It would be wrong to construe this relationship between state or elite and ordinary people as straightforward domination. Ritual and spatial conformity constituted a desirable and

<sup>38</sup>Lineage building was common right through the late imperial period: upwardly mobile local families would identify or invent a famous ancestor and compose advantageous genealogies for themselves. See the classic study by Rubie S. Watson (1985).

<sup>39</sup>Ruitenbeek (1993); Bray (1997, 159–166).

<sup>40</sup>The 1560 (Ming) edition of the *Jujia biyong shilei quanji* was edited by Tian Rucheng. See, e.g., Ko (1994, 34–7) on the "publishing revolution" in the reign of Jiajing (1522–1566).

<sup>41</sup>On the Yuan code pertaining to marriage see Ebrey (1991, 151). On lectures in the Qing, see Mair (1994).

attainable sign of respectability. Norbert Elias decoded the spatial structures of the Parisian *hôtel* as a carefully designed stage on which the French aristocracy under Louis XIV gave uninhibited performances of what they saw as the role of their class; its finely tuned aesthetics, relationships, and forms of rationality were thrown into relief by contrast with the emergent bourgeoisie. Only fellow aristocrats could judge or join in these performances; others were either too vulgar (the bourgeois, confined to the role of envious onlookers) or not really human (the servants—thus a French noblewoman could undress without embarrassment in the presence of a male servant).<sup>42</sup> The lineage temple was likewise a stage designed by the neo-Confucian elite to display their own moral values and social preeminence. But this particular form of social preeminence required the participation of lower-ranked groups who shared and enacted the same values. The neo-Confucian elite invited their social inferiors not only to join them as actors on the stage of the temple but to reproduce the performance in their own homes.

The Chinese elite saw their task as drawing the lower orders firmly into the domain of civility while maintaining the distinctions of rank and learning that justified their own authority. In setting up their own domestic shrines, ordinary families recognized this social order but stood to gain respectability, ancestors, membership in the lineage, control over women (an attraction for men) and over juniors (also an attraction for senior women), and a sense of political incorporation by participating in it. In neo-Confucian doctrine the house was a microcosm of the state, and relations between husband and wife paralleled those between emperor and minister. As the spatial norms of the house diffused through Chinese society in the course of the late imperial period, the daily rituals around the altar came to tie increasing numbers of ordinary and even illiterate families into an ordered social space stretching geographically to the bounds of the Chinese polity and historically to the great scholar and moralist Zhu Xi, and so back to Confucius himself.

All I have said so far suggests that the family altar was instrumental in propagating hegemonic, orthodox values. There is another side to the coin, however. One important factor in the popularization of the altar was a typically Chinese process of accommodation between “orthodoxy” and “popular custom”—the geomancy of the house, which modulated the decorous symbolism of neo-Confucian liturgy, superimposing its own rather different morality upon the family shrine.

Geomancy was applied cosmology; its skills consisted of reading a local landscape in terms of flows of cosmic energy (*qi*) through time and space and then manipulating the landscape so as to direct energy in the desired direction. It was an ancient science that entered a new phase of elaboration with the surge of cosmological studies in the Song dynasty; only scholars and specialists had expert knowledge of the cosmological principles involved, but almost everyone had a smattering of geomantic lore and was familiar at some level with the general precepts concerning the siting of graves and the layout of dwellings. Carpenters, who were the craftsmen responsible for building the wooden houses typical of China, were practically speaking geomantic experts: the carpenter’s rule was marked with lucky and unlucky inches, and when he calculated the width of a lintel or the length of a beam, he was carrying out a series of cosmological computations. Anyone building or altering a house,

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<sup>42</sup>Elias (1985).



however poor, first consulted a geomancer—and if the family couldn't afford a specialist, the carpenter who did the building work was sufficiently expert with a compass to stand in.<sup>43</sup>

As in neo-Confucian liturgy, the altar was the heart of the geomantic house.<sup>44</sup> After the most auspicious site for the altar had been located, the rest of house was designed around it, in a configuration intended to channel *qi* into the main hall where the altar stood (see Figure 3). In the siting and design of a house, geomancy worked to direct *qi* to the advantage of its occupants. A well-sited and well-laid-out house brought health, wealth, happiness, and numerous male heirs; a badly sited dwelling brought strife between father and son, shameless daughters, loss of wealth, and illness (see Figure 4).



Fig. 3: The An Tai Lin residence in eastern Taipei; see Li (1980). The geomantic and social status of the buildings and the rooms within them is differentiated by the height and style of the roof; the apex of the building is the roof of the main hall (at the back of the central courtyard) that houses the ancestral shrine.

Neo-Confucian philosophy said that virtue brings happiness and order brings success; everyday rituals around the shrine were a training in morality and an affirmation of social structure. Differences in roof height, for instance, reflected difference in rank between occupants but did not produce it. Geomancy, however, said that the manipulation of *qi* through architecture *produced* virtue and proper relationships. “A family temple is not like an ordinary house: whether or not sons or brothers will attain wisdom depends wholly on this place. Moreover the rear hall, main hall, corridors and triple gate may increase only gradually in height, since only then do sons and grandsons know their rank; and does not the younger aspire to the older's place. The builder must take careful notice of this.”<sup>45</sup>

Geomancy was not necessarily incompatible with Confucian values, yet, as Stephan Feuchtwang emphasizes, its underlying principles were asocial or even amoral. Geomantic

<sup>43</sup>Bennett (1978). There is a huge Chinese-language literature on housing geomancy; Knapp (1998) cites the most important works in the bibliography. On carpenters as geomantic stand-ins, see Ruitenbeek (1993, 6).

<sup>44</sup>The siting of the kitchen stove was also extremely important, and there are good grounds for thinking of the Chinese house as a bipolar construction in which the stove was as important as the altar in constituting group identity and reproduction. See Bray (1997, 106–14).

<sup>45</sup>A Yuan (1279–1368) passage from the *Carpenter's Canon* (the guild handbook known by heart to every carpenter); translation in Ruitenbeek (1993, 197).

techniques were competitive: they did not increase the cosmic energy within a local landscape; they simply channeled it in new directions. Siting a house or a grave, building a wall, or even planting a tree disrupted existing flows of *qi*; such acts were regarded by the community as a means of attracting fortune for one's own house at the expense of others. "Let one man in a village build a fraction too high; let him build a window or a door which can be interpreted as a threat; and he has a struggle on his hands."<sup>46</sup>

In the cultivated neo-Confucian reading, the ancestral cult was the paramount symbol and instrument of social harmony and political order; the shrine was an object of respect, the focal point around which the performance of family virtues was organized; the ancestral tablets were the symbols of patrilineal descent. However, most people considered that their ancestors' spirits actually inhabited the tablets and intervened actively in their lives. The ancestors' power to help their descendants was affected by the supply of *qi* channeled onto the altar by geomantic means—the shrine was in that sense a machine for converting cosmic energy into human benefits. As with the knowledge of Zhu Xi's formulation of "standard" domestic spatial practice, popular understanding of how the efficiency of this machine could be enhanced was disseminated in the late imperial period by consultations with technical experts (geomancers and carpenters) and by access to users' guides. These included illustrated excerpts from the *Carpenter's Canon* included in the same household encyclopedias and almanacs in which excerpts of Zhu's work were prominently displayed. As print culture evolved, the market grew for specialist monographs on geomancy and for the services of geomantic experts.<sup>47</sup>

The material artifact of the altar thus incorporated two ideologies simultaneously. In the invisible architecture of decorum it embodied the hegemonic neo-Confucian ideal of social harmony and stability founded on filiality, virtue, and collaboration. The altar was also the focal point of an energetic architecture of the house that tied families not into the ordered and socially harmonious space of the polity, but into an anarchic local landscape of competition between households; here it embodied an ideology of uncertainty and competition in which each family must ruthlessly manipulate the local environment to its own advantage if it was to survive.

The shrine, then, was a key device in the normalization of the late imperial world order. The sociotechnical system of neo-Confucian values underpinned by domestic architecture was not static: it gradually expanded from a small new elite to incorporate almost the entire population of China, and it resisted dissociation for centuries despite the considerable social tensions generated by population growth, urbanization, commercialization, and other factors enumerated earlier. The altar celebrated the respectability of families who knew their place in society and strove for higher blessings than material success. At the same time, people did want to succeed and opportunities were limited; they feared failure, and competition and uncertainties grew. The energetic functions of the domestic altar allowed families to take their fate into their own hands—and the blame was then theirs if things went wrong, for their technical skills had been insufficient. So the altar also acted as a safety valve, channeling potentially disruptive social energy in safe directions.

<sup>46</sup>Feuchtwang (1974); Freedman (1979, 330).

<sup>47</sup>Feuchtwang (1974); Smith and Kwok (1993); He Xiaoxin (1990).

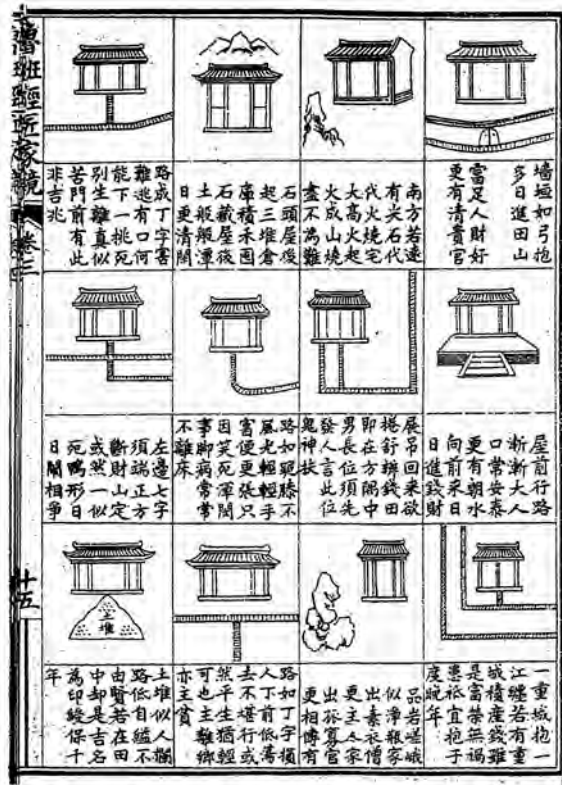


Fig. 4: Page of diagrams from an 1808 edition of the *Lu ban jing* (Carpenter's canon) (1808) depicting lucky and unlucky building forms.

### 3.4 Concluding Remarks

I have focused in this essay on the transformative effects of a technology that is conventionally considered “nonproductive” in order to suggest the benefits of a more organic, anthropological approach to technologies and the work they perform. For the history of technology in non-Western societies this revisionism has clear attractions: it extracts the society in question from a system of negative comparisons with Europe to concentrate instead on material domains perceived as significant within that society. Moreover, by treating technologies as culture it constitutes an intellectual basis for the integration of history of technology into the broader historical discipline. The meritocratic elite of the Song justified their status through the social philosophy of neo-Confucianism and extended their influence and control through the elaboration of extended patrilineal descent groups. The domestic shrine was a material symbol of lineage ties and values. I have analyzed here how, starting in the Song dynasty, the Chinese intellectual and political elites used the rituals and etiquette centered on the shrine to incorporate ever-widening circles of the population into the orthodox fold. I have also suggested that as a material artifact the shrine embodied ambiguities of meaning, and a

corresponding moral flexibility, that aided its successful dissemination and made it a powerful instrument for the reproduction of the social order in the face of potentially disruptive forces.

“Technology” is a modern term for which there is no equivalent in most premodern languages. Certainly there is none in premodern Chinese. Yet I do not think we should therefore reject the uses of technology as a heuristic category. In my own search for what I have labeled “significant technologies” in late imperial China I have looked for categories of material production and practice that were prominent in the debates of the time. (This of course biases me toward the concerns of the literate male elite—but it gives me somewhere to start.) By this reckoning several of the technical domains that we now consider fundamental (like metallurgy and engineering) were at best marginal. Others, like agriculture and textile production, were central concerns, yet their local meaning and value cannot be adequately understood in the terms of modern engineering and economics. Agriculture, the “fundamental occupation,” of course produced food commodities and could be organized more or less productively in economic and environmental terms; but at a higher level the proper organization of farming was viewed as the basis of the ideal relationship between ruler and subject, the root of the state’s strength, and the confirmation of a moral order in which selfish striving after profit was rejected in favor of modest and stable prosperity. Some late imperial authors of treatises on farming wrote in their capacity as landowners intent on running a viable and, if possible, profitable enterprise; others wrote as servants of the state whose goal was the maintenance or restoration of proper relations between the emperor and the male members of the “common people,” who canonically worked as peasant farmers (while their wives and daughters worked as weavers). The two genres commonly quoted the same sources and discussed the same problems, but with different goals. Agriculture was a highly significant technology in late imperial China, but it is not possible to make sense of the distribution, dissemination, and evolution of farming skills and knowledge or their representation in our historical sources unless we take into account the meanings attributed to the occupation of farming and to its political role by different members of late imperial society in a period marked by increasing commercialization and occupational diversification—and by intermittent crises that threatened the collapse of the state.<sup>48</sup>

So some technologies we think of as significant today may be absent from the discourse of other societies; others may figure prominently, but with important differences in their social and material signification from those we now attribute to them. Some that we may not now consider significant (or even technological) may have been central in other societies’ calculations and strategies for producing desired material worlds—as I have argued here in the case of the domestic shrine in late imperial China. Or again, we might look for significant technical systems that linked what to us seem unlikely combinations of technical domains. For instance—again in the case of late imperial China—I have argued that one approach to understanding how gender difference was construed over time, and its place in the evolving social order, is to look at gender relations and other social systems of inequality and power through the lens of what I call a “gynotechnics;” a set of technologies that was fundamental in construing female identities within the prevailing social order and in constructing the corresponding material worlds.<sup>49</sup> For this I brought together three technical domains that our

<sup>48</sup> Will (1994); Bray, “Who Was the Author of the Nongzheng quanshu?” a paper presented at the conference on “Xu Guangqi, Seventeenth-Century Scholar, Statesman, and Scientist” (1995).

<sup>49</sup> Bray (1997).

modern experience does not necessarily see as connected: the production of differentiated domestic space; the making of textiles (denominated “woman’s work” even at a time when men were rapidly taking over from women at the loom); and “reproductive technologies;” that is, the complex of social and physiological techniques used to attain desirable families. Much conventional history of technology has treated women as marginal players, at best consumers rather than creators both of material worlds and of ideology. In my study of Chinese gynotechnics I rooted social ideas in material experience and connected the production of culture to the production of objects to demonstrate that the female dimensions of material existence were neither marginal nor passive, but fundamental in creating what Norbert Elias would have called the Chinese “civilizing process.” Since history of gender and women’s history are currently among the liveliest and most productive arenas in Chinese history, my hope is that the approach embodied in my study of technology and gender will contribute to the reintegration of history of technology into the broader cultural history of China, from which it is currently estranged.

It is easy to see what the history of technology in non-Western societies might have to gain from rethinking its objects and methods, and I think the attractions for historians of Western technology should be no less evident. While clearly the discipline of history of technology will continue to draw strength and analytical power from its associations with economics, engineering, and science, if we allow ourselves also to think more imaginatively about what a technology might be and the social work it performs, if we can conceive of technologies as forms of cultural expression and, thus, key instruments in the creation and transmission of ideology, we open up a whole range of new possibilities for understanding the past, as well as new possibilities of dialogue with other branches of history and cultural studies. This essay, then, is a plea for a new and more imaginative materialism.

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