1 The Power of Standards

[A]t least indirectly a vast amount of "private" activity affects the choices available to the people at large just as effectively as a governmental rule.

—Robert G. Dixon Jr. (1978, 10)

Any study of standards is complicated by the existence of numerous meanings of the term, which are often used virtually interchangeably. A few of these uses are most relevant to this book.

It appears that the term first came into general use in English at the Battle of the Standard in 1138. According to a contemporary observer, Richard of Hexham ([1138] 1988, 67), in this battle between the English and the Scots, the English

soon erected, in the centre of a frame which they brought, the mast of a ship, to which they gave the name of the Standard; whence those lines of Hugh Sotevagina, archdeacon of York:

Our gallant stand by all confest,
Be this the Standard's fight;
Where death or victory the test,
That proved the warriors' might.

On the top of this pole they hung a silver pix [i.e., box or vessel] containing the Host, and the banner of St. Peter the Apostle, and John of Beverley and Wilfrid of Ripon, confessors and bishops. . . . By this means . . . they might observe some certain and conspicuous rallying-point, by which they might rejoin their comrades, and where they would receive succour.[1]

In these few lines we can discern the outlines of some future uses of the term. Prominently, it is related to the notion of taking a stand, that is, of having a position, having standing, as well as being the best. It also

establishes the link between a standard and a test—in this case, the "death or victory" that would prove or disprove "the warriors' might." Moreover, Richard of Hexham noted the legitimacy the standard had by linking it to the highest authorities of the day. It is the "king's standard," as well as a symbol of the Church. Likely this helped bolster the morale of the English soldiers, much as seeing it collapse would have been a blow to morale. Companies such as Standard Oil, American Standard, Standard Textile, The Evening Standard, the Standard Bank of South Africa, and thousands of others continue to use the term in this manner.

A second meaning brings us closer to its more common use today, as an exemplary measure or weight. In this sense it is similar to the object on a pole in that it refers to a physical object—for example, a standard weight such as a kilogram or a standard length such as a meter stick or standard time such as that measured by the atomic clock—and is in some sense the best, the most accurate and precise, for the purpose at hand. However, unlike the standard carried by a soldier or sailor, such standards are usually kept under lock and key in special facilities to guarantee their integrity. Indeed, many standards for kilograms are still kept in special environments to preserve their stability. Were they not kept in such a manner, they would likely change over time. At the same time, if they are to serve effectively as standards, they have to be occasionally removed from their protected environments so that they can be compared with copies, which can then be distributed across space and compared in turn with the weights or measures used in the profane world. Thus, as Joseph O'Connell (1993) has suggested, standards of this sort create universality by the circulation of particulars.

Furthermore, this type of standard is not confined to inert physical objects. Animals of all sorts are revered in this way. One of Napoleon's horses, Marengo, which carried its rider through the battle of the same name, has been immortalized in a painting, and its skeleton is on display at the National Army Museum in London. Similarly, prize bulls, pedigree dogs, and botanical and zoological specimens are kept in protected environments and occasionally compared with those in circulation.

In the same way, people who embody particular virtues or vices are frequently held out as exemplars, somewhat similar to the use of physical standards. In general, such persons are those who are long dead. While Shakespeare may have been correct in having Antony say that "The evil that men do lives after them; The good is oft interred with their bones," the reverse is true as well. In the American national pantheon, former

presidents such as Abraham Lincoln are revered as courageous patriots. Douglas MacArthur is revered as a great general, Elizabeth Cady Stanton as a champion of women's rights, Martin Luther King Jr. as a champion of civil rights, and Babe Ruth as a great baseball player. Others are exemplars only insofar as they are reviled: hence, Benedict Arnold is seen (in the United States, but not in Britain!) as an exemplary traitor. Other nations have similar standards of greatness and revulsion.

In a few instances living persons are raised to this status; however, since living persons are fallible human beings—the bad has not yet been interred with *their* bones—their status as exemplars is far more tenuous. Indeed, in some societies, massive efforts must be made by the state apparatus to maintain such claims. And more often than not, that very effort undermines the claims; one need only look to Kim Jong-il, of North Korea and his designated successor, Kim Jong-un, to see the problems inherent in living exemplars.

In each of these instances, however, real living persons are compared with exemplars, in much the same way that weights used in ordinary everyday commerce are compared with those kept as standards. Of course, unlike weights, which can be compared with great precision, no similar balance exists to compare real persons with exemplars. Hence, reasonable people may disagree over what constitutes exemplary behavior.

A third meaning is more abstract and less precise. One may talk, for example, of someone who insists on a high standard of decorum, or who has a low standard of living. Unlike the highly precise physical standards, always embodied in *particular* objects (including human bodies), standards of this sort are necessarily far more ambiguous. They often involve both actions and an array of physical objects, themselves perhaps subject to a particular ordering. For example, a high standard of decorum would require both a set of actions by the person for whom the high standard is claimed and that person's employing an array of objects in a particular way. Furthermore, when the term is used in this manner, the moral character of all standards is far more evident.

A now dated but quite amusing standard of this type is the *Warrant of Precedence* used in India under the British Raj (see box 1.1). It provided a formalized standard for ranking every British subject in India. It was commonly used to specify the rights and duties associated with a particular rank. Not surprisingly, the queen was at the top of the list. Civilians with "less than four years' standing" were at the bottom. At formal gatherings such as banquets and state functions, it served as a standard of decorum.

To seat the governor-general next to a third-grade officer of the financial department was to commit a terrible faux pas, to show that one did not maintain the proper standards.

Box 1.1
The *Warrant of Precedence* (excerpt)

Precedence in India is regulated by a Royal Warrant dated the 6th of May 1871, a copy of which is subjoined.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith.

To all to whom these presents shall come, greeting.

Whereas it hath been represented unto Us that it is advisable to regulate the Rank and Precedence of persons holding appointments in the East Indies. In order to fix the same, and prevent all disputes, We do hereby declare that it is Our will and pleasure that the following Table be observed with respect to the Rank and Precedence of the persons hereinafter named, viz.:—

Governor-General and Viceroy of India. Governor of Madras. Governor of Bombay. President of the Council of the Governor-General. Lieutenant-Governor of Bengal. Lieutenant-Governor of North-West Provinces. Lieutenant-Governor of the Punjaub. Commander-in-Chief in India, when a Member of Council. Chief Justice of Bengal. Bishop of Calcutta, Metropolitan of India. . . .

FIRST CLASS

Civilians of 28 years' standing to rank with Major-Generals.

Advocate General, Calcutta. Residents at Foreign Courts and Residents at Aden, the Persian Gulf and Bagdad. Recorders of Moulmein and Rangoon. Advocates-General, Madras and Bombay. . . .

SECOND CLASS

Civilians of 20 years' standing ranking with Colonels.

Commissioners of Divisions. Directors of Public Instruction under Governments. Private Secretary to Viceroy. Military Secretary to Viceroy. Archdeacons of Madras and Bombay. Surveyor-General of India. . . . .

THIRD CLASS

Civilians of 12 years' standing ranking with Lieutenant-Colonels.

Political Agents. Under-Secretaries to Government of India. Inspector-General of Education, Central Provinces, and Directors- General of Education, Oude, British Burmah, Berer and Mysore. Officers, 1st Grade. . . .

Box 1.1
(continued)

FOURTH CLASS

Civilians of 8 years' standing ranking with Majors.

Assistant Political Agents. Officers, 2nd Grade, Geological Survey. Officers, 3rd Grade, Education Department. Officers, 3rd Grade, Financial Department. Superintendents, 2nd Grade, Telegraph Department. Government Solicitors.

FIFTH CLASS

Civilians of 4 years' standing ranking with Captains.

Junior Chaplains. Officers, 4th Grade, Education Department.

SIXTH CLASS

Civilians of less than 4 years' standing to rank with Subalterns. . . .

Nothing in the foregoing rules to disturb the existing practice relating to precedence at Native Courts, or on occasions of intercourse with Natives, and the Governor-General in Council to be empowered to make rules for such occasions in case any dispute shall arise.

All ladies to take place according to the rank herein assigned to their respective husbands, with the exception of wives of Peers, and of ladies having precedence independently of their husbands, and who are not in rank below the daughters of Barons; such ladies to take place according to their several ranks, with reference to such precedence in England, immediately after the wives of Members of Council at the Presidencies in India.

Given at Our Court at Windsor, this sixth day of May, in the year of our Lord one thousand eight hundred and seventy-one, and in the thirty-fourth year of our Reign.

By Her Majesty's Command.

(Signed) ARGYLL.

(F. Dr.; W. A. L.)

Source: Encyclopaedia Britannica, 11th ed., 273–274 (Cambridge: Cambridge University Press, 1911).

A more specialized usage of the term is found in the notion of a gold or silver standard. Here the focus is on the guarantee of value associated with a particular coin or banknote. It is worth noting that this terminology has also crept into common usage as a synonym for "the best." Thus, some will claim that the Mayo Clinic is the gold standard for health care delivery, that Harvard University is the gold standard in education, and so on.

Another common use of the term standard is as a rule or norm (reflected in the term *norme* in French and similar terms in other Romance languages). This usage falls somewhere between the precision of the use of standard to indicate a physical object and the notion of high standards. But here too there is a certain ambiguity. Any rule or norm may reflect either an ideal to which one should strive or an average. For example, the ancient Greek poet Hesiod ([ca. 700 BC] 2007, II: 727–732) provided—with apparent solemnity, but rather amusingly to modern eyes—standards for urinating: "Do not stand upright facing the sun when you make water, but remember to do this when he has set towards his rising. And do not make water as you go, whether on the road or off the road, and do not uncover yourself: the nights belong to the blessed gods. A scrupulous man who has a wise heart sits down or goes to the wall of an enclosed court."

These ethical standards for male Greek citizens were more than likely honored in the breach, though clearly they were ideals to which it was claimed a self-respecting Greek male should strive. In contrast, since Karl Pearson initially described the bell-shaped distribution, statisticians have referred to plots of scores on tests as normal distributions. Therefore, on the one hand we may have a code of ethics, while on the other hand we might talk of the courses required for high school graduation. The former standard is a goal toward which one should strive, while the latter describes a typical or average high school graduate.

Furthermore, the use of the standard as a norm or average may be understood in a morally neutral or morally charged matter. Ever since Aristotle coined the notion of the golden mean, and likely before that, the average has sometimes been seen (quite paradoxically) as superior in some sense. Medical standards in particular are frequently subject to this type of interpretation. Being of normal height and weight and having a normal cholesterol level are often looked at in such a way as to identify the average as superior. Hence, being fat or thin may be seen neither as the result of natural variation nor as the result of a medical condition but as the result of a moral failing. Indeed, standards are still frequently used in this way in the social sciences and journalism to identify social conditions deemed deviant or pathological. As such, perhaps Garrison Keillor is right when he

assures us that in the village of Lake Wobegon, all the children are above average.

Émile Durkheim on Norms

The term "norm" has been commonplace in the social sciences at least since the time of sociologist Émile Durkheim (1858–1917). Hence the question inevitably arises as to whether, and how, the notion of a norm differs from or is the same as that of a standard. While a definitive answer to this question is beyond the scope of this book, perhaps an initial attempt can be made to respond to it.

First, the notion of a norm as used by Durkheim is in some ways more limited than that of a standard. Norms apply to people and not to things. Standards apply to both, as well as to the interaction between people and things. They do not posit a world that is somehow purely social (or purely human) but rather a world in which both humans and nonhuman objects exist. A standard is also a more general term in that it may apply to many phenomena, ranging from that which is strongly prescribed to that which is neutrally perceived to that which is strongly proscribed. The term "norm" is usually used to refer to the two poles of this continuum but not to the middle.

Second, Durkheim's norms are somewhat mysterious. They seem to appear out of nowhere as part of the "collective conscience." In contrast, standards are always created by someone or some group. Hence, both Hesiod's standards for urination and those for a high school diploma are traceable to their originators. Standards may become anonymous, but they are always, at least in principle, traceable to their originators.

Third, unlike norms, which are assumed by virtually all those who study them to be all of the same "kind," standards are clearly of several kinds. Perhaps more important, those differences in kind matter. Different kinds of standards lead to different kinds of individual and social behavior, as well as to different kinds of organizational structures and systems of sanctions.

Fourth, Durkheim approaches the question, "How is society possible?," by positing a superorganic answer: norms are not the result of human interaction but rather are fetishized. By contrast, in the phenomenological or interpretive traditions, norms are emergent properties. There is little doubt that norms can and do sometimes take on a life of their own, becoming unquestioned. But Durkheim fetishizes norms by using them as explanations for human behavior. This is fallacious reasoning. It takes the form of using the explanandum as the explanans. That is to say, that which is

in need of explaining, the norm, is used instead to explain certain forms of consistent behavior. This reasoning is essentially circular. Put differently, it posits that norm *N* is a thing that explains behavior *A*, while leaving norm *N* unexplained. It simply exists: as Durkheim suggests, sui generis. Of course, there may be norms that exist sui generis, but if this is the case, it needs to be shown rather than merely assumed.

Fifth, the notion of norm, as used from Durkheim to Parsons to contemporary sociology, unnecessarily assumes some high level of consensus. For example, Victor Nee and Paul Ingram (1998, 19) define norms as " standards of expected behavior that enjoy a high degree of consensus within a group or community." In contrast, I argue here that conformity to standards is far more the result of their taken-for-granted character than of any explicit or implied consent or consensus. In any case, consensus can hardly be taken for granted but must be demonstrated based on empirical research.

Finally, the notion of a standard is (or can be) more precise than that of a norm. Standards can be and usually are measured, tested, examined, revised. Norms, in contrast, are usually amorphous; they are rarely easily definable since they remain, as Durkheim claims, in the realm of the collective conscience. That is to say, for Durkheim norms are ideational phenomena that have material consequences. Standards are at once ideational and material. They span the ideal–material divide, or perhaps obliterate it.

Standards are the rules by which we are told we should live, and the range of possibilities presented to us when we make choices. Thus, standards are more than norms. Standards allow us to break away from the concept of norm, which has the unfortunate tendency to mean the average as well as to imply that breaking away from a given standard is necessarily deviant or pathological. At the same time, the precise character of standards can do violence to persons, a point I return to in chapter 4.

Yet another meaning of standards, and one closely related to the notion of average or normal, can be found in the notion of tolerance. In some sense one might think of this as a more precise casting of the standard as a norm or average. Particularly in engineering, it is common to define tolerances. A sheet of 1-cm-thick steel produced to a tolerance of ±5 mm is quite different from one produced to a tolerance of ±0.0001 mm. The sheet with a smaller tolerance (i.e., produced to a higher standard) will be more costly to produce than the one with a greater tolerance. Both, however, are produced to a standard, and whereas the latter can substitute for the former, the reverse is not usually true.

Moral and religious behaviors are subject to standards of tolerance as well. They are literally the limits of what behavior shall be tolerated. Thus, religious tolerance may be broadly conceived in many nations, but usually not broadly enough to include human sacrifice. U.S. religious tolerance excludes plural marriages; French religious tolerance does not include women or girls wearing head coverings or veils in public schoolrooms. Similarly, the range of behavior tolerated in an American college classroom is fairly broad but would not include coming to class nude. In the case of both people and things, tolerances are the maximum acceptable degree to which a thing or object may differ from some specified behavior without incurring some sort of negative sanction.

In sum, standards may imply that something is the best, or that it may be used as an exemplary measure or weight; or they may emphasize the moral character of someone or the superb qualities of something. Standards may also refer to rules or norms that embody the ideal or merely the average. Finally, standards may refer to tolerances permitted for both people and things. These various meanings are inextricably linked together. All say something about moral, political, economic, and technical authority.

Furthermore, all illustrate a point noted some years ago by Susan Leigh Star and James Griesemer (1989, 412): standards are often (perhaps always) boundary objects. Although they discuss scientific practices, their conceptual innovation applies to other situations as well. As they explain, "In conducting collective work, people coming together from different social worlds frequently have the experience of addressing an object that has a different meaning for each of them. Each social world has partial jurisdiction over the resources represented by that object, and mismatches caused by the overlap become problems for negotiation."

The soldiers who rallied round the king's standard, the moral character of a member of Parliament, the superb qualities of a diamond, the average cholesterol level in the blood, the tolerance for others with different religious beliefs—each of these things called a standard is a boundary object. They are places where persons with different histories, values, and desires are able to stabilize a set of practices that may well have different meanings to them. Hence, soldiers who believed that the king was God's representative on earth, as well as those who merely fought as they were told to do, could all identify that object on a pole as the king's standard. The diamond expert who knows that the specimen in front of her is nearly flawless and the groom who is about to buy it for his bride need not agree on the meanings attached to the standards for flawlessness. The scientist doing research

on cholesterol, the medical technician who administers the blood test, and the person whose blood is drawn need not agree on the meaning of the cholesterol standard; they need only agree on the practices that bring it into use.

But wait! When I talk about standards am I merely engaging in a logical or linguistic fallacy caused by the various ways in which a single word is used? One might argue, for example, that standards for things such as automobile parts are largely unrelated to standards for health care or education. One might also distinguish voluntary standards produced by the private or nonprofit sector from mandatory regulations produced by government agencies, arguing that these are two very different things. But is this the case? I think not.

Two distinctions are generally offered as reasoning. First, some would distinguish standards for things from standards for people. Standards organizations currently make this distinction; in general, the myriad standards organizations are split between those organized around people (e.g., educational standards) and those organized around things (e.g., standards for bridges). But this distinction is a rather superficial one. We do not live in a world devoid of things but rather in one in which things must be taken seriously. Therefore, to the extent that we create standards for things, we implicitly create standards for humans.[2] Similarly, we cannot create standards for humans without creating standards for things.

In recent years some standards development organizations have begun to realize the difficulty of keeping standards for things and those for people apart. Hence, the International Organization for Standardization (ISO) has issued general management standards (ISO 9000) and environmental management standards (ISO 14000). These standards bridge the gap between people and things (see Brunsson and Jacobsson 2000; Loya and Boli 1999).

The second distinction often made is between private standards and public regulations. The former is said to give rise to voluntary rules and choices, the latter to mandatory rules and choices. But is this actually always the case? I think not, for several reasons.

First, private standards are often de facto mandatory (Olshan 1993). In some instances they must be followed in order to participate in a given market. In other cases deviation from the standards puts one at considerable risk for civil penalties in court.

Second, not all public regulations are mandatory. Many public regulations do not prohibit things outright, but encourage or discourage certain behaviors by positive (subsidies) or negative (taxes, fines) sanctions. In some instances, as Richard H. Thaler and Cass R. Sunstein (2008) argue,

they provide a nudge in a given direction. In short, both private standards and public regulations make use of the entire range of positive and negative sanctions (although in general, public regulations tend to have stronger negative sanctions).

Third, it is argued that public regulation occurs through legislative voting mechanisms, while private standards are produced through consensus building. Here too the distinction appears overwrought. There are numerous examples of government regulations that have been developed through the use of legislative hearings, public and industry advisory committees, and the like. As well, many private standards are developed based on a consensus that exists largely among those who attend a given meeting. Both processes involve managed conflict, compromises, and iterative processes.

Fourth, it is sometimes argued that government regulation deals with a different set of issues than do private standards. But on closer examination, this distinction proves weak as well. When one compares standards and regulations across nations, one finds considerable variability in their scope. Moreover, it is not at all uncommon for privately produced standards to become the basis for both positive law (e.g., building codes) and case law (e.g., good medical practice). Lawyers tend to dismiss standards as outside the scope of law, but even they implicitly admit the blurred boundaries when they speak of standards as "soft law."[3]

Finally, it hardly needs noting that standards are nearly always designed to be within the scope permitted by law. In sum, private standards and public regulations are two similar and sometimes overlapping forms of governance, or of what Foucault (2007, 2008) called governmentality. They are two means of governing relations among us.

All this is not to say that public regulations and private standards are identical. Clearly, they are not. Redress of grievances varies considerably between the two. In general, one cannot be jailed for violating private standards. But we should not assume that public regulation and private standards are different; rather, we should demonstrate their differences (and similarities) through careful empirical examination.

Studying Standards

There are at least three ways in which standards might be studied. First, the very multiplicity of meanings of standards suggests that a phenomenological approach to their analysis might be useful. By this I mean an approach that carefully examines the multiple ways that standards are

used, spoken of, employed, designed, put into common practice, and so forth. Such an approach will allow us to appreciate the enormous range of things to which standards are applied. It is the dominant approach used in this book.

A second approach is historical. I could attempt to uncover the historical development of multiple standards from antiquity to the present. Clearly, a comprehensive historical analysis would require multiple volumes. For example, merely describing the history of the standardization of coins and coinage over the last several thousand years would be a multivolume effort in itself. While such an effort would doubtless be of considerable historical value, it is largely beyond the scope of this work. That said, various historical references are incorporated into this work as needed.

Finally, one might focus on the fine technical details of some particular set of standards, noting the ever-advancing attempts to produce yet a better definition, greater precision, or more and better parameters for comparison. Some works of this type have been written, in particular for specialists in particular fields. While I will have occasion to draw on this type of analysis to illustrate certain points, in general, I avoid this degree of technical detail.

What is central to the analysis in this book is the intimate connection between standards and power. However much standards appear to be neutral, benign, merely technical, obscure, and removed from daily life, they are, I argue, largely an unrecognized but extremely important and growing source of social, political, and economic relations of power. Indeed, in our modern world standards are arguably the most important manifestation of power relations. Moreover, as Bruno Latour (2005, 64) notes, "power, like society, is the final result of a process and not a reservoir, a stock, or a capital that will automatically provide an explanation. Power and domination have to be produced, made-up, composed." In short, power is present only when it is performed or enacted.

However, this is not to suggest that standards have the kind of power we associate with a tyrant, lording it over his or her subjects with an iron fist. To the contrary, the power of standards lies in their very subtlety. It is because they are barely noticed, perhaps noticed only when their presuppositions are violated, that standards are powerful.

Let us briefly consider the ways in which standards are powerful. First, I offer a suggested definition of the kind of power of concern here: *the ability to set the rules that others must follow, or to set the range of categories from which they may choose*. When Caesar or a Ming Dynasty emperor or,

more recently, Stalin or Mao was said to be powerful, it was precisely for this reason. While they might well have had the power to put a particular individual to death, or to take away that individual's property and offices and confine him or her to prison, or conversely, to reward a given (perhaps otherwise undeserving) person with honors or expensive gifts, that paled in comparison to their ability to set rules that others had to follow, to provide the categories among which other people might choose.

The public display of power takes place only on special occasions and in certain places. An army can march through the main square on holidays, but to do so every day would take away the awe the spectacle inspires. A public hanging might warn one's enemies of the consequences of certain behavior, but too many people dying or imprisoned might and often has sparked revolts and the overthrow of that powerful person or persons. In contrast, the setting of rules for others to follow is more subtle, often deflecting attention to the rule and away from the ruler. Nearly all of these rules involve the establishment of standards—standards for things as well as for people. Indeed, our very use of the term "ruler" both for someone who rules and for a measuring device reflects this dual character of power. And the use of the ruler as an object for disciplining students in the classrooms of yesterday strengthens that linkage.

Second, unlike the direct power often exercised by a ruler, standards display *anonymous* power. Even if we know who established them, standards take on a life of their own that extends beyond the authorities in both time and space. The premodern Chinese bureaucracy offers another relevant example here. For the highest-level positions, every several years an examination of some three days' duration was given in Nanjing in a special examination hall constructed for that purpose. Students spent years studying in the hopes of passing the examination and entering the civil service. Elaborate measures were taken to ensure that students were unable to cheat and that grading was truly anonymous. Success meant a career as a highly paid and privileged civil servant, perhaps even as a servant to the emperor himself. But only a small number of candidates actually passed the exams.

To our modern eyes the exams seem puzzling, as they often had little or nothing to do with the actual matters of administration but queried examinees on Confucian philosophy, Chinese literature, calligraphy, and history. When looked at from the point of view of standards, however, their purposes become obvious: the exams were designed to provide a means of upward mobility and to shift the center of authority from local landlords and merchants to fiercely loyal agents of the state.

Responsibility for passing or failing the exams was placed squarely on the shoulders of those who took them. As sociologist C. Wright Mills ([1976] 1956) suggested fifty years ago in a different context, those who failed the exams saw public issues (the small chance of passing and even the legitimacy of the examination system itself) as personal troubles (the failure to study sufficiently hard, to memorize the necessary texts, etc.). Put differently, the highly standardized exams were "naturalized." They were not subject to challenge but were seen as challenging those who took them. Moreover, they legitimated the centralized state precisely because of their apparent objectivity.

The history of the watt provides another instructive example. We know in considerable detail how the watt came to be measured as it is now. We know a great deal about the debates over how to standardize it, when it was first standardized—at the 1889 convention of the International Electrical Congress—and that it is now part of the international system of measures. We also know for whom it is named, James Watt. Of course, one is "free" to use some other measure to describe the electrical work produced by a 60-watt bulb—36.7 buschs, for example—but one does so at one's own risk! Since other measures are not the subject of international agreements, or widespread use and at least tacit agreement on their importance, they are not likely to be accepted.[4]

Moreover, once established, existing standards become "natural," and their very naturalness makes other potentially competing standards suspect. While occasionally one standard does replace another—hundreds of local measures were replaced by metric measures in France during the nineteenth century—making such a change is exceedingly difficult. Even in France, where metric measure was invented, it took nearly half a century for it to fully replace older measures (Adler 1995). And despite this, old ways persist even now. One need only consider the common use of the pound (*livre*) in France today to mean 500 grams, or the description and sale of nails in the United States not by their length or shank thickness but by their pennyweight!

Third, standards make things ready-to-hand or handy (*zuhanden*). The philosopher Martin Heidegger (1977) once suggested that a central characteristic of human–tool relations was their handiness. For Heidegger, things that were handy allowed us to perceive those aspects of the world that are revealed to us only through our transformation of it. For example, those characteristics of wood revealed to us by a hammer are quite different from those revealed by looking at a tree. Those revealed by a saw or by sandpaper are different as well.

In pre-industrial societies, handiness was produced only by direct experience. A carpenter knew precisely how to handle *his* hammer, how much force to apply at the tip, how to raise it and bring it down on the nail, by virtue of years of practice. This kind of handiness extended to the wood itself: a carpenter would know precisely how much force to apply to a given type of wood, how to shave off precisely the right amount so as to produce a smooth surface, and so on. Conversely, the hammer had to "respond" consistently to the carpenter. These aspects of the world could only be known by virtue of using a hammer, and only one that was handy. A hammer whose head fell off with each use could hardly be called handy. The same would have been true of all tools, and is still true today.

But the advent of standardized tools and especially machinery markedly changed the character of handiness. An example will help clarify what I mean. Some forty years ago I was working in Guinea and had a Chevrolet pickup truck at my disposal. In order to move a rather large object, I borrowed a Russian-made GAZ-51 truck. The young Guinean colleague with whom I was working was astonished to discover I was able to drive the Russian truck even though I had never been inside one in my life. What he did not understand was the handiness of the truck, or, to be more precise, the handiness of human–truck relations. By virtue of the standardized character of the interface between driver and vehicle (but not of the various parts of the vehicles), I was able to instantly understand what was necessary. Without thinking, I could depress the clutch, turn the key in the ignition, shift into first gear, depress the gas pedal while releasing the clutch, and drive off. The internal workings of the engine became a black box I had no need to inquire into unless the truck broke down.

The same would be true for a contemporary carpenter. Whereas in times past, carpenters made their own tools or had them custom-made for them, today they are likely to buy tools at a hardware store. If a carpenter's 16-oz. hammer breaks or is lost, he or she can purchase another one and immediately establish a relation of handiness with it. One consequence of the embedding of standards in everyday objects is that the objects acquire a kind of taken-for-grantedness that is not the case for nonstandardized objects. The hammer that was once handy for a particular carpenter is now handy for any carpenter. There might be dozens of hammers of the same brand and type in a shop, each seemingly identical to the others. From the vantage point of a carpenter, the hammer's origin is unknown and likely of no interest. Similarly, from the perspective of the producer of the hammer, the carpenter is anonymous and unknown. Moreover, the carpenter seeking to buy a 16.65-oz. hammer would look in vain, with no

more chance of finding one than of finding a five-legged cow or an oak tree with three trunks.

As Heidegger noted, this handiness of everything marks a qualitative change in the relations humans have with the natural world. In our contemporary world everything is turned into "standing reserve." That is, everything becomes malleable, transformable, storable in different states. Hence, we can dam up great rivers and turn their force into electricity. Engineers can turn petroleum into gasoline to power our cars and into plastics to mold into a nearly infinite number of shapes. Managers, engineers, and scientists can turn everything—human beings included—into "resources," things to be drawn on when necessary to replenish declining stocks.[5]

The handiness of objects is matched by the handiness of organizations. The historian Lewis Mumford (1967) once described organizations as megamachines. He even went so far as to speculate that the machines we now employ were modeled on the human machines used to build monuments by ancient civilizations. Regardless of the validity of that claim, there is little doubt that Mumford was right in arguing for the machinelike character of organizations. Because the behavior of persons in organizations is standardized, organizations, like tools and machines, may become handy. I can put a stamp on a letter and drop it in the mailbox in East Lansing, Michigan, confident that in a week or so it will arrive in Germany. I can fill out a (standardized) form and be confident that a standardized driver's license will arrive in the mail several days later. I can even participate in an organization of which I am not a member by engaging in standardized behavior. For example, I can walk into the supermarket, put the items I wish to buy into a grocery cart, take them to the cashier, put them on the conveyor belt, slide my credit card through a reader, sign on the dotted line, take my bagged groceries, and leave the store. In short, I can participate in the store's handiness. I can consider it and all the people and things in it as if they were natural objects, as ordinary as a tree or a rock.

This very naturalness imbues standardized things and behavior with power. Here is what I mean by the power of standards: If someone tries to prevent me from entering a building by standing outside blocking the door, I am likely to be angry at that person. But if I find the door unopenable because of a snowdrift, I will only be frustrated and grumble about it. I will do the same if I find it to be locked and do not have a key. In short, the power of established standards is that they structure our expectations, because standards, like the world of nature, are seemingly "supposed" to

be the way they are. What could be more powerful than something that is revealed as no less than a part of the natural world itself?[6]

Handiness can also be understood as predictability—predictability that allows us to get on with other projects. This aspect of handiness is empowering, in that the very taken-for-grantedness allows us to pursue other activities. Hence, the rules of the road allow me to feel in control, empowered when driving, since the behavior of other drivers is (usually) as expected. And conversely, when that handiness fails to materialize, when other persons or things do not perform as expected, then we are disempowered, as was Santa Anna in vignette 1 of the prologue.

Finally, the importance of power with respect to standards is reflected in the fact that the emergence of standards is almost invariably the result of conflict or disagreement. That conflict may occur (1) in the development of the standards, for example, within the confines of a technical committee designing a particular standard, where participants may disagree over the nature of the standard to be developed or where one or more participants may take part in order to block the creation of a new standard, or (2) by virtue of competition among supporters of several incompatible extant standards.

In general, it is fair to say that people do not normally have conflicts over things that do not matter to them. Conversely, when people engage in conflict, they care deeply about something. Although standards are often set by consensus, that consensus emerges only after considerable conflict and disagreement. This is the case because standards create winners and losers. The more that is at stake in these debates, the more rancorous people are likely to become. Recent debates over Blu-ray standards for digital video disks (DVDs) versus high-definition DVDs are a case in point. The companies involved invested vast sums of money in designs that were fundamentally incompatible. Widespread acceptance of one standard, Blue Ray, has led to the virtual abandonment of the other. Moreover, it is quite possible that, in part as a result of the protracted uncertainty posed by two competing and incompatible standards, both will lose, and a third standard, one for downloaded films, will capture the lion's share of the market (Gardiner 2008). Another example is when many actors stand to lose if a single standard is adopted and respond by deliberately creating conflicting standards. Cargill and Bolin (2007) argue that this is what has happened in parts of the IT industry.

Conflict is also related to precision, both in the case of standards for people and in the case of standards for things. A vague standard can be easily circumvented or even ignored when convenient, without fear of sanction. Thus, a standard of literacy is likely to be of little consequence

when it consists of merely asking people if they can write, but it will be far more consequential if it requires taking a test demanding detailed knowledge of each paragraph of the U.S. Constitution. Indeed, tests of precisely that nature were used in the U.S. South in the last century to keep African Americans from voting. Similarly, the standard height of ceilings could vary considerably in a world in which walls were constructed of plaster and individually cut laths. But once standard building materials, such as (in the United States) 2 × 4s, and 4 foot × 8 foot sheets of plasterboard were made available, the variation in the height of ceilings was sharply reduced even as the speed at which wooden homes could be built increased. Furthermore, the need for skilled labor declined, waste was minimized, and costs were reduced, such that the use of nonstandard heights would result in considerable extra costs. This did not make construction of nonstandard buildings impossible, but it meant that they became considerably more difficult to build and costlier than standard buildings; indeed, as a result, having a new home with 9-foot ceilings has now become a point of prestige and status.

Furthermore, the *combination* of standardized building materials—that is, 2 × 4 studs each 8 feet in length, 4 foot × 8 foot sheets of plasterboard, and insulation designed to fit in the spaces between the studs—created a "system" of commensurable materials that could be coupled together. This in turn gave further impetus to a particular path of standardization.

Commensurability and Coupling

Standard home construction materials are an example of commensurable standards.[7] Like all standards, home construction standards may be either commensurable or incommensurable.[8] Hence, the 4 foot × 8 foot panel commonly used in the United States is easily translated into balloon frame construction on 16-inch centers. So is the fiberglass insulation typically manufactured to fit precisely in the space between the studs.

Consider the case of temperature. Degrees Celsius translates to degrees Fahrenheit using the well-known formula F = 9/5 C + 32. Hence, 32° F is exactly equal to 0° C. However, at many other temperatures, there is a very small margin of error. For example, 39° F is equal to 3.8888888 . . . 8° C. For most purposes, the difference produced by an infinitely repeating decimal is inconsequential, but in certain scientific experiments small errors might make a significant difference. Hence, it is fair to say that these two scales are nearly fully commensurable. Moreover, someone has to do the measuring; as such, achieving commensurability (or not) is an achievement and not a given.

In contrast, cuts of meat are only partially commensurable. Meat butchered according to British standards includes only some cuts that are similar to those produced by an American butcher; many cuts commonly available in the United States are simply unavailable in Britain, and vice versa (figure 1.1).

Certain standards are fully incommensurable. They cannot be translated unless an intermediary is available. American television uses National Television Standards Council (NTSC) standards, while French television uses Phase Alternating Line (PAL); hence, one needs two television sets (or a television with dual circuitry and a special switch) to pick up both signals unless a converter is available. Furthermore, in some cases commensurability is deliberately blocked. Coca-Cola keeps its recipe (the standard for

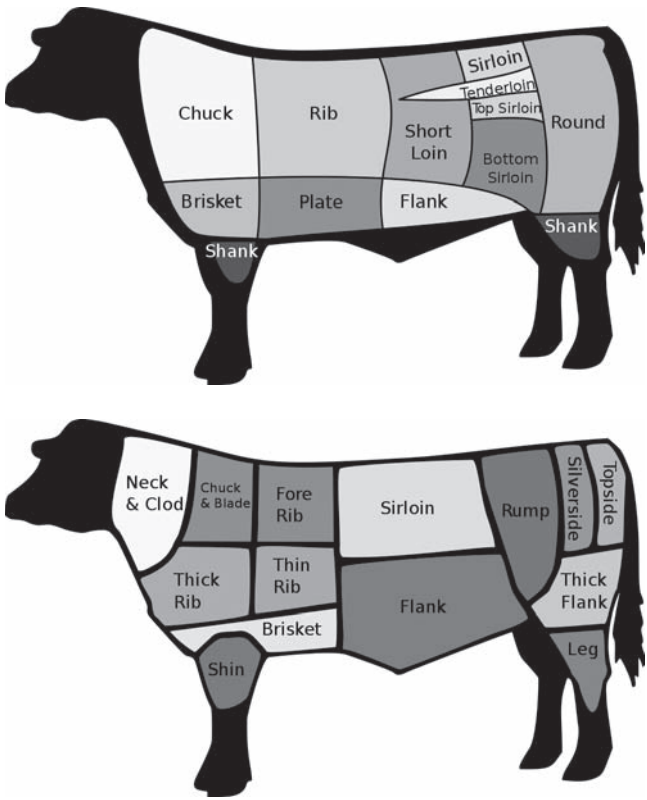

Figure 1.1
Standard cuts of beef in the United States and the United Kingdom.
Source: Wikipedia commons.