Introduction

The Book of Nature and the Nature of the Book

Pick up a modern book. This one will do: the one you are looking at right now. What sort of object is this? There are certain features about it of which you can be reasonably confident. Its professed author does indeed exist and did indeed write it. It contains information believed to be accurate, and it professes to impart knowledge to readers like you. It is produced with its author’s consent, and it is indeed the edition it claims to be. If the dust jacket announces that it is the product of a given organization—in this case the University of Chicago Press—then this too may be believed. Perhaps you may even say to yourself that that fact vouches for the quality of its content. You may safely assume that the book you now hold will have been printed in many copies, and a copy of the same book bought in Australia, say, will be identical in all relevant respects to one bought in the United States or in Great Britain.

Begin to use this object. It should immediately become clear that there are things about its proper utilization of which a reader like you can be equally confident. This book has not been produced with a specific, individual reader in mind. To some extent, at least, it is a commercial product, designed to appeal to purchasers. Its cost may have limited its readership somewhat, but its distribution will still have been fairly widespread, and it may be available for consultation in a number of libraries. Readers will not have to endure any formal vetting or approval process before being permitted to read this book. You yourself are free to carry it around and to lend it to others. You are not free, however—beyond certain legal limits—to reproduce its contents in your own right for commercial gain. Nor may you now proceed to issue translations, epitomes, or abridgments of those contents. It is improbable (but not impossible) that you will choose to declaim the text of this book aloud in a public place, and it is even more unlikely that you will make it the focus of a collective act of commemoration, worship, or similar ritual. Some books are indeed used in these ways, incidentally, but this is probably not going to be one of them. In short, while in
some respects this book’s usage is up to you, in others it appears to be quite closely constrained.

That we can assume all these things of such an object—that such an object actually exists—derives from our living in what many people call “print culture.” Such phenomena, we say, are due to printing. Or rather, we would say this, but so infallibly reliable are they that we rarely even have to articulate the relation. It is obvious, self-evident, even necessary. The practical consequence is that we do not have to agonize over the reliability of a published book before we can put it to use. We do not need to undertake investigatory work to confirm that its author does exist and that its text is authorized. No literary spy need be hired to ascertain that it was indeed made by its stated publisher and that its contents will be the same as those of another copy of the same book found in any other place. In our world, all these characteristics are inherent in virtually any published book (and the duties of a “literary agent” are comparatively mundane). We take them for granted, every day of our lives. We depend on them, and our reliance is, by and large, justified.

It is this very self-evidence that encourages us to ascribe all these characteristics to a technological order of reality. If called upon, we may assert that printed texts are identical and reliable because that is simply what printing is. The identification is as momentous as it is straightforward. It has become the point of departure for all current interpretations of print and its cultural consequences, and is the root from which the very concept of “print culture” has grown.¹ It is thereby also the foundation of a conviction that that culture has rendered possible the establishment of veracious knowledge in modern society. Yet this book argues that it is substantially false. Not only that: The Nature of the Book maintains that it is probably the most powerful force resisting the acceptance of a truly historical understanding of print and any cultural consequences it may foster.

This book contends that what we often regard as essential elements and necessary concomitants of print are in fact rather more contingent than generally acknowledged. Veracity in particular is, it argues, extrinsic to the press itself, and has had to be grafted onto it. The same may be said of other cognate attributes associated with printing. In short, The Nature of the Book claims that the very identity of print itself has had to be made. It came to be as we now experience it only by virtue of hard work, exercised over generations and across nations. That labor has long been overlooked, and is not now evident. But its very obscurity is revealing. It was dedicated to effacing its own traces, and necessarily so: only if such efforts disappeared could

¹. For this term, see below, pp. 10–11, and Eisenstein, Printing Press, I, 43–159. I am not sure of its genesis: Eisenstein, its prime recent exponent, seems to take it from McLuhan (e.g., Gutenberg Galaxy, 146–9).
printing gain the air of intrinsic reliability on which its cultural and commercial success could be built. Recovering it is therefore a difficult task, but one well worth attempting. This book tries accordingly to excavate the complex issues involved in the historical shaping of print—issues that our conventional notion of print culture obscures with all the authority of a categorical definition. The Nature of the Book is the first real attempt to portray print culture in the making.

Yet how could print conceivably be anything else? If it were really the result of a significant process of historical construction, then surely we could not now find it so obvious, universal, and undeniable. If it could have developed differently, then surely it would now differ noticeably from place to place, and in any one place it would still bear the traces of its development. We would see the wreckage of failed alternatives all about us. In practical terms, we would indeed have to worry about the specific status of a given printed book in order to use it. Questions of where it had come from, who had made it, and whether or not its putative author acknowledged its content would all need to be posed and answered before we could safely trust any printed book. That they do not constitutes a powerful reason to accept the obvious.

Even a little reflection suggests that there is greater complexity to the subject than this. Any printed book is, as a matter of fact, both the product of one complex set of social and technological processes and also the starting point for another. In the first place, a large number of people, machines, and materials must converge and act together for it to come into existence at all. How exactly they do so will inevitably affect its finished character in a number of ways. In that sense a book is the material embodiment of, if not a consensus, then at least a collective consent. Its identity can be understood accordingly, in terms of these intricate processes. But the story of a book evidently does not end with its creation. How it is then put to use, by whom, in what circumstances, and to what effect are all equally complex issues. Each is worthy of attention in its own right. So a printed book can be seen as a nexus conjoining a wide range of worlds of work. Look closely and you are likely to find simplicity and inevitability in neither the manufacture of an object like this nor its subsequent construal. The processes leading to the deployment of a book and those consequent upon its use both depend on too many contingencies. That in turn means that print cannot be as straightforward as it seems.

One way to appreciate the implications is to examine more closely places where printing exists, but where its cultural consequences seem very different from those familiar to us. There are two such places, separated from us by space and by time. The first may be found in certain regions of the world where, to international publishers’ disgust, so-called “piracy” has become a
prevalent commercial practice. You could not be so sure of all those “self-evident” facts about this book if you had bought your copy in such a place. It might indeed prove reliable. But it might also have been produced by an anonymous manufacturer, and have different contents. Its purported author might have no idea of the claims it contained. Some such companies produce not just unauthorized reprints of existing books, but wholly new texts claiming to be written by best-selling authors. Their products threaten to compromise both the economic production of authorized works and, by generating correspondingly divergent readings, their reception. The potential effects are suggested by the most notorious of all recent controversies to arise from publishing. The author Salman Rushdie was complaining of piracy of his works in Pakistan and India long before the appearance of *Satanic Verses*. When it did appear, the book was properly published in another country; the protests that occurred in Lahore and elsewhere, and that first set in train the events leading eventually to Khomeini’s fatwa, centered on the public reading of unauthorized copies and photocopied extracts. A Penguin representative even noted that piracy would permit readers to circumvent the Indian government’s subsequent ban on the book.\(^2\)

Rushdie’s is admittedly an extreme case. But for good or ill, countless authors and publishers have encountered to some degree the loss of control induced by piracy. It means that the experiences associated with print are indeed different from those familiar to most Western readers. And any suggestion that the intrinsic cultural consequences of technology have simply been inadequately realized in such settings would be difficult to endorse. The evidence of recent international trade disputes indicates that modern technology, far from eliminating such practices, may even be facilitating them. The arguments currently raging over such matters are intense and important. Few claim to know how they will end.\(^3\)

The alternative is to look not to other places in our own time, but to other times in our own place. It is possible to argue not only that print may differ from place to place, but also that its nature has changed over time even in our own society. If this is so, the implications are again substantial, but in rather different ways. Such an argument compels us to reappraise where our own concept of print culture comes from, how it developed, when it took hold, and why its sway continues to seem secure. These are


3. These disputes extend far beyond “copyright” as conventionally understood, and include conventions now being forged to cover the “inventions” and “texts” produced in areas such as biotechnology and genome research. The economic, cultural, and moral implications at stake in these, as in the battles raging over computer and music software, are truly massive. For confrontations between the USA and China over the latter, see Faison, “Copyright Pirates.”
some of the questions addressed in the following chapters. Tactically forget-
ting that we ourselves "know" what printing is, The Nature of the Book be-
gins by asking the question of what printing was. It addresses how the people of
the sixteenth, seventeenth, and eighteenth centuries constructed and con-
structed the craft, in their own setting and for their own ends. This entails
comprehending the complex social processes by which books came to be
made and used in their society—the society in which printing first really
thrive, and in which any consequences it might have were first fully mani-
fested. The result is that what began as a tactical decision to forget our own
knowledge is soon vindicated as rather more. As chapter 2 will show in de-
tail, early modern printing was not joined by any obvious or necessary bond
to enhanced fidelity, reliability, and truth. That bond had to be forged.

If an early modern reader picked up a printed book—De Natura Libri,
perhaps—then he or she could not be immediately certain that it was what
it claimed to be, and its proper use might not be so self-evident. Piracy was
again one reason: illicit uses of the press threatened the credibility of all
printed products. More broadly, ideas about the correct ways to make and
use books varied markedly from place to place and time to time. But what-
ever the cause, it is not easy for us to imagine such a realm, in which printed
records were not necessarily authorized or faithful. What could one know
in such a realm, and how could one know it? We ourselves routinely rely
on stable communications in our making and maintenance of knowledge,
whether of the people around us or of the world in which we live. That
stability helps to underpin the confidence we feel in our impressions and
beliefs. Even the brisk skepticism we may express about certain printed ma-
terials—tabloid newspapers, say—rests on it, inasmuch as we feel confident
that we can readily and consistently identify what it is that we are scorn-
ing. Instability in records would equally rapidly translate into uncertainty of
judgment. The most immediate implication, then, would be epistemic.

In a sense, the point is a well-entrenched one. It has been made at least
since the sixteenth century, when printers and others took to lauding their
craft for its power to preserve. The contrast they drew was with previous
scribal forms of reproduction, which they delineated as intrinsically corrup-
tive. It now seems almost indisputable. We should recognize, however, that
the first identification of that contrast was partly a product of interest. Print-
ers stood to gain from what was originally a contentious argument, not a
straightforward observation. If, on the other hand, it is not printing per se
that possesses preservative power, but printing put to use in particular ways,
then we ourselves may usefully draw some rather different distinctions. We
may look not just for differences between print and manuscript reproduc-
tion, but for different ways in which the press itself and its products have
been (and continue to be) employed. The roots of textual stability may be
sought as much in these practices as in the press itself. And knowledge, such as it is, has come to depend on that stability. Here, then, is one way in which a social history of print can prove not just interesting, but consequential. A reappraisal of print in the making can contribute to our historical understanding of the conditions of knowledge itself.

TYCHO BRAHE, GALILEO GALILEI, AND THE PROBLEMS OF "PRINT CULTURE"

The central concern of this book is the relation between print and knowledge. As its title suggests, to pursue this theme it focuses in particular on natural knowledge—knowledge of Creation and of humanity's place within it. To that extent, The Nature of the Book may be regarded as contributing to the discipline known, rather anachronistically, as the history of science. It proposes a new account of how early modern Europeans put printing to use to create and maintain knowledge about the natural world.

The focus on the history of science is not, however, an exclusive one. The ambit of The Nature of the Book is not exhausted by scientific knowledge, and none of its conclusions should be regarded as restricted to science alone. Science is treated here as just one among a range of activities characterized by the creation and use of knowledge. The historical problems identified in the course of this book were so general that they applied to all of them, from scriptural exegesis, through astronomy, experiment, and alchemy, to the formation of political ideologies and representations of gender. All make their appearances in the following chapters. Nonetheless, the widely accepted status of modern science as the most objective, valuable, and robust kind of knowledge currently available makes it a peculiarly appealing subject for the historian of printing. This high status means that any conclusions demonstrable for science stand a chance of being accredited a fortiori for other activities now held in lower repute. Furthermore, the history of science offers an unusually clear opportunity to discuss the assumptions and implications of the historiography of print. For it is in the history of science that one finds the figure who, more than any other, personifies print culture as conventionally understood. That figure is the Danish nobleman and astronomer Tycho Brahe (fig. 6.1).

4. As explained further below, I share other historians' doubts about using the terms "science" and "scientist" in reference to periods before they became recognized by contemporaries, and will therefore employ them sparingly in this book. For the issues involved, see Jardine, "Writing Off the Scientific Revolution"; Copenhaver, "Did Science Have a Renaissance?"; Pickstone, "Past and Present Knowledges"; and the polemical argument in Cunningham and Williams, "De-centring the 'Big Picture'."

5. I should stress the attributive and pragmatic character of such a representation; claims that scientific knowledge actually is objective are, of course, extremely controversial, and the image of science as such has been questioned many times.
FIG. 1.1. Tycho Brahe: different representations for different readers. (top left) Hand-copied portrait. Reproduced from Tycho Brahe, Opera Omnia, I. (By permission of the Syndics of Cambridge University Library.) (top right) Printed portrait from the work in which Tycho attacked Ursus. Tycho Brahe, Epistolatarum Astronomiarum Libri. (By permission of the Syndics of Cambridge University Library.) (above left) Tycho with his mural quadrant, as portrayed in a presentation impression of the Astronomiae Instauratae Mechanica (1598). (By permission of the British Library, C45.h.3.) (above right) Michael Sparke's English version of Tycho's mural quadrant portrait, published with his astrological prophecy in 1632 as Learned Tico Brahe his Astronomical Conjectur. (By permission of the Syndics of Cambridge University Library.)
In 1576 the king of Denmark granted Tycho feudal powers over a small island named Hven, lying in the sound just north of Copenhagen. Here Tycho erected a remarkable castle-observatory, in which he lived and worked for the next two decades. His work at this palatial observatory, which he called Uraniborg (fig. 1.2), resulted in an unequaled series of observations and interpretations of the heavens. They secured for him a reputation as the greatest of all astronomers. Almost immediately, Tycho himself became an icon of the very enterprise of astronomy. Mathematical practitioners in succeeding generations came to see in him an unimpugnable model of the harmony of nobility and "mechanic" skill. In the hands of modern historians, moreover, Tycho has again proved a powerful emblem, in two important and revealingly paradoxical respects. First, Uraniborg has become the outstanding Renaissance exemplar of the importance of locale in the making of knowledge. This is an important issue, to be addressed

6. Hannaway, "Laboratory Design." Shackelford has responded to Hannaway, with more heat than really necessary, in "Tycho Brahe."
later in this chapter. At the same time, however, Tycho has come to personify the role of print in transcending place and rendering natural knowledge universal. He has thus become emblematic of the transformation of local craft into global science. This latter apotheosis has been due above all to Elizabeth Eisenstein’s *The Printing Press as an Agent of Change*. Published in 1979, this is still probably the most influential anglophonic interpretation of the cultural effects of printing. Yet *The Nature of the Book* pursues for the most part a quite different approach from hers. A consideration of Tycho Brahe provides the ideal opportunity to specify how and why it does so.

The unifying concept of Eisenstein’s argument is that of “print culture.” This “culture” is characterized primarily in terms of certain traits that print is taken to endow on texts. Specifically, those produced in such an environment are subject to conditions of *standardization*, *dissemination*, and *fixity*. The last of these is perhaps the most important. According to Eisenstein, printing meant the mass reproduction of precisely the same text, repeatable on subsequent occasions and in different locations. No longer need any work suffer the increasing corruption that Eisenstein assumes to be endemic to any “script culture.” She focuses on this attribute of fixity as the most important corollary of the press, seeing it as central to most of the effects of print culture. For example, in conditions of fixity the simple practice of juxtaposing texts became immensely significant. Newly available printed representations of opposing astronomical, anatomical, or other knowledge could be placed side by side, and their viewer could now be confident that conclusions drawn from comparing such reliable texts would be worthwhile. Correspondents on the other side of Europe could do the same, with representations that could be supposed identical. Such scholars no longer needed to concern themselves primarily with the fidelity of their representations, and were freed from spending their lives eradicating scribal mistakes. It was fixity that liberated them from such labor and thus made possible the progressive improvement of knowledge. This is the basis on which


Eisenstein can claim that the Renaissance and Reformation were rendered permanent by the very permanence of their canonical texts, that nationalism developed thanks to the stabilization of laws and languages, and that science itself became possible on the basis of phenomena and theories reliably recorded. With this new foundation of certainty at their disposal, "scientists" (as Eisenstein insists on calling them) could begin to develop new doubts about their previous authority, namely antiquity. The "Scientific Revolution" was thus inconceivable without a preceding printing revolution. And for Eisenstein Tycho Brahe personifies both.

Eisenstein's Tycho was an autodidact. This in itself was remarkable: before the printing revolution, not enough faithful editions could have been amassed in one place to enable him to teach himself. But while he was doing this, Tycho was able to place authoritative printed representations of the Copernican and Ptolemaic systems of the heavens side by side before his eyes. By this simple process of juxtaposition, he could immediately see that there were serious discrepancies. Later, working on Hven, he instigated a program to rectify the data and theories on which astronomy was based. He and his assistants labored for years to produce a systematic corpus of recorded observations of the heavenly bodies, using not only Tycho's own careful observations but those sent to him by astronomers across central Europe. When ready, Tycho could then supervise the correct printing of this vital material in his own printing house, using paper made in his own paper mill (figs. 1.3 and 1.4). As a result, one nova—"Tycho's star," as it came to be called—became "fixed" to the extent that it continued to be shown on celestial globes long after it had disappeared from the sky.

In this guise has Eisenstein's Tycho entered a current debate over science itself. Bruno Latour has built an account of the making and power of science on her representation of a print culture, first in his concept of "immutable mobiles" and more recently in that of "mediators." Latour identifies the collection and deployment of durable paper entities as the foundation of...
FIG. 1.3. Uraniborg. Ground plan, showing Tycho Brahe's printing house (at B). Tycho Brahe, Astronomiae Instauratae Mechanica (1598). (By permission of the Syndics of Cambridge University Library.)

FIG. 1.4. The island of Hven. (above) Map from Tycho Brahe's manuscripts, showing the paper mill in relation to Uraniborg. Tycho Brahe, Opera Omnia. IV. (By permission of the Syndics of Cambridge University Library.) (opposite) The printed map issued by Tycho in his Astronomiae Instauratae Mechanica (1598). (By permission of the Syndics of Cambridge University Library.)
of science's success. The creation and circulation of such objects, Latour maintains, enabled Tycho to master natural and social entities that were otherwise beyond reach. He could use print both to capture heavenly bodies, as Eisenstein claimed, and, furthermore, effectively to turn every observatory in Europe into an extension of Uraniborg. This he achieved by distributing printed forms on which astronomers could enter their observations before returning them to the central site of Hven. In doing so, he pioneered a practice central to the development of modern science. For this, Latour thinks, is essentially how the modern laboratory sustains its authority too. The Latourian laboratory is an inscription engine, dedicated to the construction, collation, dispersal, and accommodation of such materials. It is a compelling and enormously influential argument. And it is consonant not only with Eisenstein herself, but more extensively still with her inspiration and bête noire, Marshall McLuhan. Latour's vision of science in


16. A plausible summary of McLuhan's views in relation to Latour's might run as follows. Like Latour, McLuhan urged the importance of what he called the "network" as a category of analysis, important in deciding ways of perceiving the world. He too identified a railway system as the representative network par excellence (compare Latour, We Have Never Been Modern, 117; and Latour, Aramis). What McLuhan's networks achieve—what lends them their power—is their ability to produce changes in scale. They permit individuals and organizations to localize and universalize by allowing them to magnify and reduce traces of the
action depends on Eisenstein’s “print culture”—and thereby implicitly on McLuhan’s “Gutenberg Galaxy”—to underwrite the stability of both knowledge and society.17

The Tycho of Eisenstein and Latour has become the incarnation of textual, social, and epistemic order. But just how credible is this Tycho? There is something altogether too neat, too immaculate, about the figure and his achievements. As Philip Marlowe put it in The Big Sleep, such testimony displays “the austere simplicity of fiction rather than the tangled woof of fact.”18 Maybe the Tycho so far portrayed will change somewhat if we investigate more closely how his “mediators” actually came into being and were put to use. For Tycho does indeed represent perhaps the purest example of a particular kind of printing, and a particular way of using the products of the press. Like Regiomontanus before him, and Hevelius after, he controlled his own printing operation. His was a singular printing house, however. It was as geographically isolated on the island of Hven as it was socially isolated from the companies of the European book trade. It was even physically embedded in the five-meter high, five-meter thick wall that enclosed his entire estate. Such isolation meant, at least in principle, that Tycho could produce books when, for whom, and in whatever form he liked.19 Works like his Astronomiae Instauratae Mechanica, which described Uraniborg in all its glory, were scarcely intended to be published at all, but were to be distributed as gifts to patrons at courts and universities (fig. 1.5). The more prestigious were not just printed books, but hybrids—hand-colored, individualized tributes, presented to their intended recipients on specific dates.20 Tycho meant to bypass the structures of the international book trade altogether.

things on which they wish to operate to roughly the same size without destroying them. The “message” of his networks is that they permit such control; and what is perceived as reality is in fact the current state of competing networks in dynamic interaction. The boundary between natural and social must therefore be forgotten when considering them. In such a world of natural/social hybrids, power comes from “translation.” This is the agency by which we “enlarge the scope of [our] action” and affect sites distant from ourselves. See McLuhan, Understanding Media, 3–21, 56–61, 89–105, 338–45, 346–59; compare Latour, Science in Action, 188–21, 223–32, 247–57, and We Have Never Been Modern, 10–12, 49–142. A reassessment of McLuhan is, I think, overdue, though attention to his work is currently reviving. Eisenstein herself roundly denied following him, but with an insistence and a perseverance that almost amounted to protesting too much: e.g., Printing Press, ix–xi, xvii, 40–1, 88, 129, 171.

19. Thoren, Lord of Uraniborg, 144.
The recipient of a book like Tycho’s *Astronomiae Instauratae Mechanica* was thus likely to be found in a distinctive place: a royal court or a university. Here a book took its place and gained its meaning only amid a vast arsenal of other objects directed to similar ends. It would be encountered alongside natural curiosities, thaumaturgical wonders, mathematical devices, paintings, musical compositions, alchemical medallions, magical machines, and other books (fig. 1.6). In such surroundings, every aspect of appearance and handling mattered for creating an impact. The reader of such a work, in such a place, would be consciously engaging in a distinctive system of practices and ideas—in Tycho’s case, feudal ones. The giving and receiving of such gifts was an important part of court culture, enmeshed in conventions of status recognition, reciprocation, and reward. This could not fail to affect the way in which that reader regarded the book. It was invested with enhanced credit, being untainted by “mechanick” influence, and it was accorded the privileged reception due to such a noble gesture. The veracity of its contents warranted respect. They could not be dismissed without cost. Yet at the same time such a gesture all but commanded creative responses—including challenges—from suitably prestigious interlocutors. Tycho’s book would now fall subject to the conventions surrounding philosophical and mathematical disputes in these settings. The variables that determined both whether a “scientific” debate would even take place, and, once battle had been joined, how it would proceed, were local ones: to whom one pre-

The place of books in the cabinet of curiosities. In places like this—a museum of curiosities in Naples—books, along with crocodiles, fossils, and a panoply of natural and artificial marvels, served to facilitate conversation (see Findlen, “Courting Nature,” 68-9). Imperato, Historia Naturae. (By permission of the Syndics of Cambridge University Library).

sented the book, through which channels it was distributed, with which patron it was identified. Disputes like this were affairs of honor, conducted through appropriate intermediaries and champions. Printed books were their vehicles. That was what they were for.  

When, therefore, Tycho found himself attacked by Nicolai Reymers Baer (or Ursus), a recognized mathematician but a man of low birth whom he himself had accused of plagiarism, a scientific debate was not the principal outcome. Rather unusually, Tycho did in fact deign to reply himself. But

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22. In addition to the works of Biagioli and Hannaway cited here, see Findlen, “Economy of Exchange”; Findlen, “Courting Nature,” esp. 61; Moran, Alchemical World, esp. 9, 93–4, 97, 110–2; Smith, Business of Alchemy, 49–50; Daston, “Factual Sensibility”; and Davis, “Beyond the Market.” Compare also the difficulties experienced by Becher in translating commercial documents for courtly readers: Smith, Business of Alchemy, 139.
he did so with a series of elaborately indignant letters to his fellows across Europe, which he had printed on his press at Uraniborg and circulated in 1596. In this correspondence he recited the tale of Ursus's alleged theft and argued that, whatever the date of Ursus's publication, Tycho had printed the cosmology first. Ever willing to recall his opponent's low birth, he even seems to have suggested that Ursus be executed for his presumption. But the more philosophical side of the dispute he delegated to a second, the relatively humble Kepler. The result was Kepler's "Defense of Tycho against Ursus," a remarkably sophisticated historical argument for the status of astronomical hypotheses and their creators. It was never printed. 23

Much even of this story could be taken as reinforcing Eisenstein's image. However, two elements make it less confirmatory. The first is that Tycho was extremely atypical in his successful use of print. Other writers regarded him not as representative of their own situation, but as a model that they sought, with widely varying degrees of success, to emulate. Like most icons, he stood for an ideal that was unrealizable. The second is that, as his argument against Ursus implies, even Tycho himself found the ideal impossible to achieve. That was why he built his own printing house and paper mill; he discovered that he could not otherwise obtain acceptable materials and workmanship. 24 Even with these in place, moreover, most of his work remained unprinted until after his death. 25 Latour's preprinted forms, for example, seem to be mythical; Tycho did correspond extensively, but left no trace of having used such objects. 26 And while he began producing the images and descriptions for the Astronomiae Instauratae Mechanica as early as

23. Brahe, Epistolae Astronomicarum Libri, 33–4, 148–51; Brahe, Opera Omnia, VI, 61-2. Jardine, Birth of History and Philopros of Science, 9–28 and passim (for Ursus's peasant background); Dreyer, Tycho Brahe, 183; Rosen, Three Imperial Mathematicians. Tycho's decision to strike at Ursus personally (which Kepler, for one, found surprising) may well be related to the fact that, as Hannaway points out, his status was feudal in origin; Tycho was not a courtier. See Hannaway, "Laboratory Design," 589 n. 11. For Tycho's conflicts see also Gingerich and Westman, Wittich Connection (which contrasts Tycho's treatment of Ursus to his response to the relatively well-born Wittich), and Thoren, Lord of Uraniborg. I am grateful to Robert Westman for conversations about this affair, which remains one of the more controversial among scholars of early modern astronomy.

24. Brahe, Opera, VI, 224, 365 n; VII, 214, 274; IX, 175; X, 302. Even with the mill in working order, he remained reliant on the cooperation of nearby parishioners to provide raw materials, as they were exhorted to do in regular "rag sermons."

25. In particular, the star catalogue (circulated only in manuscript until years after Tycho's death, and then inaccurately printed) and the Astronomiae Instauratae Progymnasmata (begun at Uraniborg, but completed only under the aegis of his heirs in 1602).

26. I have found no trace of these preprinted forms in Tycho's Opera Omnia, nor in any relevant secondary authority. I am also unable to find Latour's source for this central claim; it may well derive from an imaginative reading of certain passages in Eisenstein's Printing Press, c.g., 626–7.
1585, soon after building his printing house, the volume was not completed until thirteen years later. By that time he was in exile in Hamburg—the only place he could find with printers capable of finishing the book, even though he had brought his own press with him from Hven. Taken by his son to the Holy Roman Emperor, the book now became an instrument in Tycho’s attempt to secure imperial patronage. This proved successful, and he removed to Prague. But he soon discovered that even here, in the center of the empire, no printer able to undertake his prized star catalogue could be found. He was reduced to circulating hand-copied versions, and the catalogue remained unprinted on his death (fig. 1.7).

At that point his works began to fall out of court circles altogether. They descended into the hands of the book trade. Even the *Astronomiae Instauratae Mechanica* was reprinted commercially. Such books were likely to be produced to different standards. They stood at risk of piracy and imitation, despite Rudolf II’s stern commands forbidding such “printers’ frauds.” They were also likely to be read in different ways, by different people, in different places and for different reasons. Their accreditation became far more insecure. So, for example, the English astronomer royal, John Flamsteed—who, as we shall see, identified himself profoundly with Tycho—dismissed the posthumous printing of his star tables as, quite simply, a “fraud.” Tycho’s inscriptions appear to have become distinctly mutable once they fell out of his control and left the courtly matrix (fig. 1.8).

If even Tycho Brahe found it so difficult to maintain his printed materials as mobile and immutable, what hope is there of explaining the achievements of less powerful figures in Eisenstein’s terms? Attempting to do so would mean attributing to printed books themselves attributes of credibility and persuasion that actually took much work to maintain. It would thereby draw our attention away from important problems that any individual, even Tycho, had to overcome. Talk of “print culture” is strangely ethereal when compared to Tycho’s struggles. It stands oddly disconnected from the professed experiences of real historical figures. For example, who actually

28. Thoren, *Lord of Uraniborg*, 150, 185–7, 367, 381–97, 414–5, 421, 478. Tycho had planned to present the catalogue to Rudolf II on New Year’s Day, apparently a customary occasion for gift-giving: Kaufmann, *Mastery of Nature*, 106. For Rudolf II’s undertaking to provide a “new Uraniborg,” see *Brahe, Opera*, VIII, 178, 188. It is also likely, of course, that Tycho’s circulation of the catalogue in manuscript was intended to enhance its status as a collectible object.
printed (and reprinted) Tycho’s pages? It is a question worth asking, since Tycho himself spent many frustrating years seeking suitable printers—and the astronomer Christoph Rothmann, at least, believed that Ursus had been able to plagiarize his world system because he had been employed in Tycho’s printing house.31 And how were those pages employed by their recipients? Of what use were they to them? How did Tycho ensure that such distant readers took them as authoritative, especially when, as was often the case in early modern testimony about celestial observations, they conflicted with figures produced locally? Eisenstein and Latour begin by decreeing such issues peripheral. The Nature of the Book does the opposite. If we are to understand how and why printed texts became trustworthy, it argues, we need to appreciate all of them, in something approaching their full ‘woof.’

The disconnected air exhibited by Eisenstein’s account is not accidental. In her work, printing itself stands outside history. The press is something “sui generis,” we are told, lying beyond the reach of conventional historical analysis. Its “culture” is correspondingly placeless and timeless. It is deemed to exist inasmuch as printed texts possess some key characteristic, fixity being the best candidate, and carry it with them as they are transported from place to place. The origins of this property are not analyzed. In fact, the accusations of technological determinism sometimes leveled against Eisenstein may even be wide of the mark, since she consistently declines to specify any position on the question of how print culture might emerge from print.32 But the example of Tycho does suggest that the focus of her approach is in practice highly selective. The portrait it generates identifies as significant only the clearest instances of fixity. It regards instances when fixity was not manifested as exceptional failures, and even in the successful cases it neglects the labors through which success was achieved. It identifies the results of those labors instead as powers intrinsic to texts. Readers consequently suffer the fate of obliteration: their intelligence and skill is reattributed to the printed page. Tycho’s labors deserve better. To put it brutally, what those labors really tell us is that Eisenstein’s print culture does not exist.

There is an alternative. We may consider fixity not as an inherent quality, but as a transitive one. That is, it may be more useful to reverse our commonsense assumption. We may adopt the principle that fixity exists only inasmuch as it is recognized and acted upon by people—and not otherwise. The consequence of this change in perspective is that print culture itself is

31. Dreyer, Tycho Brahe, 184 n. 1.
32. Eisenstein, Printing Press, e.g., 159, 166–8, 609 n, 89–90, 702–3. See also Grafton, “Importance of Being Printed.” The fact that Eisenstein is simultaneously too provincial (thus missing the contingent elements of print culture by her lack of a comparative perspective) and not local enough (thus missing the work needed to make print culture at all) may be inferred from Cohen’s discussion in Scientific Revolution, 357–67.
FIG. 1.7. Tycho Brahe’s star catalogue, distributed in manuscript to princes and patrons. Note the careful imitation of a printed page. Reproduced from Norlind, *Tycho Brahe*, 297. (By permission of the Syndics of Cambridge University Library.)

immediately laid open to analysis. It becomes a *result* of manifold representations, practices and conflicts, rather than just the monolithic *cause* with which we are often presented. In contrast to talk of a “print logic” imposed on humanity, this approach allows us to recover the construction of different print cultures in particular historical circumstances. It recognizes that texts, printed or not, cannot compel readers to react in specific ways, but that they must be interpreted in cultural spaces the character of which helps to decide what counts as a proper reading. In short, this recasting has the advantage of positioning the cultural and the social where they should be: at the center of our attention.

If Tycho Brahe has hitherto been made the personification of print culture, then the experiences of his near-contemporary, Galileo Galilei, may in turn stand for this new approach. In 1610, Galileo produced the first of a series of dramatically successful books, called the *Sidereus Nuncius*. In vivid illustrations, he showed mountains and valleys on the surface of the Moon,

33. Compare the discussions of power in Latour, “On the Powers of Association,” and Latour, “Technology Is Society Made Durable.” This suggestion has obvious resonances with certain works in critical theory, such as Fish, *Is There a Text in This Class?* Since my aim is primarily historical I shall not be making many explicit links with such material, though the parallel deserves to be noted. Compare also McKenzie, *Bibliography and the Sociology of Texts*.

and the discovery of new stars in Orion and the Pleiades (fig. 1.9). These and other "nebulous" regions—the Milky Way in particular—could now be resolved into stars. Above all, however, Galileo revealed four previously unknown satellites revolving about Jupiter, providing a vivid model of Copernican cosmology. This discovery, embodied in a small book, would soon establish him as the foremost philosopher on the Italian peninsula. Yet it
fig. 1.9. Illustrations of the lunar surface, from the first and three subsequent editions of Galileo Galilei's Siderius Nuncius.

These are perhaps the most famous of all early modern scientific illustrations. They were the first images to show the lunar surface, revealing it to be rough and cratered, and constituted an important element in the campaign to establish the imperfection of this heavenly body. It is especially striking, then, to note the transformations wrought on Galileo's images through their reproduction. Here, the first row across pictures is Galileo's own, printed in his Venice edition of the Siderius Nuncius (1610). The second comes from an unauthorized impression issued almost immediately in Frankfurt. Note that the sequence of the first two pictures has been reversed. Moreover, the imperfections of such unauthorized printing defected speed and economy, and as a result changed the images themselves. As well as showing degradation in each picture, the first and fourth images of the impression were in fact printed from the same woodcut, rotated through 180°. The third
version reproduced here was issued in London in 1653. It reused the same blocks as the Frankfurt edition, again duplicating the first and fourth images. It also reiterated the sequence of the unauthorized version. So did the fourth version, printed in 1683. By this time the painstakingly crafted verisimilitude of Galileo's original drawings had been significantly eroded—a degradation in which the practices of piratical reproduction had played a large part.

(top row) Galileo Galilei, Sidereus Nuncius (Venice, 1610).
(second row) Galileo Galilei, Sidereus Nuncius [sic]
(Frankfurt, 1610). (third row) Galileo Galilei, Sidereus Nuncius
was not just for the intrinsic value of these observations that the *Siderius Nuncius* had such an impact. In fact, Galileo and his allies deployed the book brilliantly to make its success.\(^{35}\) He was angling to enter the court of an absolute prince, Cosimo II de’ Medici, whose family had long been linked iconographically to Jupiter. Paying for the printing himself, Galileo named his new Jovian satellites accordingly. As the “Medicean stars” they formed the centerpiece of the book he now presented to the grand duke. It was not easy. Galileo actually had to change the name in mid-printing, after Medici officials told him that his original choice of “Cosmian” would not meet with approval; the new name was glued over the old on the pages already printed. He then went in person to make the presentation, ensuring that Cosimo would successfully see the new phenomena through his telescope. When Galileo distributed additional copies to princes and cardinals across Europe, along with spyglasses to support his claims, he did so under the carapace of Cosimo himself via the Medici diplomatic service. In promulgating the announcement, Galileo had presented Cosimo with heroic and noble homage, for which the conventions of patronage suggested an appropriate response. When that response came, Galileo declared that his whole “being” had been transformed. Perhaps for the first time, a mathematical practitioner underwent the transfiguration into court philosopher.\(^{36}\)

Galileo was trying to create a new kind of authority on, and for, natural knowledge. The construction of this persona and the elaboration of his work in cosmology and mechanics thus took place together, and both rested on the skillful exploitation of patronage dynamics at an absolutist court. The point is a rather subtle one. Patronage was not simply something that could be used as a tool to achieve aims defined by other, perhaps scientific, criteria. It helped constitute at once what were reasonable aims to adopt, what were good claims to make in pursuit of those aims, how they could best be made, and to which audiences. Evidence came into being and was accredited by means of the civil culture of the court. There was no “Galileo, scientist” standing outside this cultural realm and manipulating its mechanisms in order to achieve objective ends. It is important to appreciate this, since at each crucial moment of transition—from Venetian patronage to Florentine, and thence to papal—books were central to Galileo’s advance. From the *Siderius Nuncius*, so effective in raising him to Cosimo’s court, to the


Dialogo, which triggered his downfall at the hands of Pope Urban VIII's Inquisition, books were key elements in any strategy to take advantage of patronage opportunities.37

At court, what appear to modern eyes to be scientific disputes were seen by participant and spectator alike in these different terms. They would be triggered and structured by Galileo's patron for purposes of diversion and the expression of status. He was expected to produce entertaining and involving debates, and to challenge other court philosophers of sufficient rank.38 While it was important not to lose such a dispute, it was also important to conduct it properly; and, as Tycho Brahe had known, regular challenges by qualified individuals were imperative to show that one's status was being recognized. So, for example, when the Medici ambassador presented a copy of the Sidereus Nuncius to imperial mathematician Johannes Kepler, he responded correctly with a printed reply dedicated not to Galileo, but to the ambassador. In a sense, Galileo was engaging with Kepler; but Cosimo was also communicating with the Holy Roman Emperor.39 Unlike Tycho, however, Galileo had no private press. His book fell immediately into the hands of commercial printers. By late 1610 an unauthorized impression had appeared in Frankfurt, his fine illustrations marred by hasty reproduction. For the rest of the century these adulterated images would be reproduced repeatedly. Countless readers saw them—far more, in all likelihood, than ever came upon the authorized originals of what are probably the most momentous astronomical images of their era.40

Even exempting such piratical enterprises, the social dynamics of challenges were modified by the unavoidable involvement of new personnel and places. The case of Galileo's 1623 work, Il Saggiatore, is instructive in this respect. It was printed in April and May in a few hundred copies. In October the work was ritually presented to the pope and important cardinals. This was the courtly aspect of its production. But Galileo's allies also used the

37. For this portrayal I am indebted to Biagioli, Galileo, Courtier, esp. chaps. 1, 2, 6. See also Eamon, "Court, Academy and Printing House"; Biagioli, "Galileo's System of Patronage." Some aspects of Biagioli's work—particularly his claim regarding the association between Cosimo and Jupiter—have been strenuously challenged by Shank, with results that remain inconclusive at the time of writing. The particular thrust of Shank's attack means that it does not directly impinge on my own argument. See especially Biagioli, "Playing with the Evidence," and Shank, "How Shall We Practice History?" 38. Biagioli, Galileo, Courtier, 163; Biagioli, "Galileo's System of Patronage," 30; Castiglione, Book of the Courtier, esp. 68 ff. 39. Drake, Galileo Studies, 131–4. 40. Galilei, Sidereus Nuncius (Venice, 1610); Galilei, Sidereus, Nuncius [sic] (Frankfurt, 1610). It is perhaps worth adding the rider that the latter edition was unauthorized as far as anyone then or now has known; Galileo (like Isaac Newton later in the century) was quite capable of perpetrating his own "unauthorized" publications. The point remains that he was unable to oversee the production of the work, and in particular that of its illustrations.
book in what looks much more like a process of publication. They did so in
order to expose the tactics of a Jesuit antagonist lurking behind the pseudo-
nym of “Lotario Sarsi.” They ensured that one of the licensor’s copies was
delivered early to the Sun bookshop. This was a well-known center for lib-
ertine literature, which the Jesuit would surely be monitoring for such
works. Its proprietor had agreed to cooperate in the plan. Sure enough,
“Sarsi” arrived and seized upon that very copy. He “changed color” on the
spot, attacked the bookseller himself as personally responsible for the text,
and left declaring loudly that he would take up the challenge and produce
a rebuttal within three months. In so doing, he revealed himself as Orazio
Grassi, lecturer in mathematics at the Collegio Romano and the Jesuits’
most prestigious architect. The bookseller immediately told Galileo’s allies
of his outburst. Two of them wrote excitedly to their friend to tell him the
news, whereupon Galileo came to Rome and successfully preempted Grassi’s
rebuttal.41 Access to the bookshop, and the character of both the premises
and its proprietor, had transformed the dispute.

Here was something quite alien to Tycho’s Uraniborg. For Galileo too,
however, despite this success it was ultimately to prove an inauspicious de-
velopment. In the events of his notorious fall not only the printers and
booksellers, but the entire licensing and publication mechanism, would be
implicated. The Saggiatore incident led directly to this far more significant
affair. It began in 1623 with the election of Galileo’s ally, Maffeo Barberini,
as Pope Urban VIII. This was the spur for Galileo, becalmed in Florence, to
seek a position of favor in Rome itself. He did so by using two tools: Il
Saggiatore itself, which he redirected at the last moment and presented to
Urban, and his long-projected Copernican work on the tides. The first of
these was a great success. After the incident at the Sun bookshop, Urban
had it read to him at table, and seems to have relished its wit and rhetorical
dexterity. He began to accord Galileo audiences, in which his favor seemed
clear. So clear, in fact, that Galileo probably understood himself released
from a private instruction issued some years earlier not to engage in public
support for Copernicanism. He returned to Florence and began writing his
greater work, which became the momentous Dialogo... sopra i due Massimi
Sistemi del Mondo.

The Dialogo was not immediately or obviously scandalous. In fact, it
successfully underwent an extensive licensing procedure, such that the

41. Galilei, Opere, XIII, 145–8; Galilei, Sidereus Nuncius, 94, 102; Redondi, Galileo: Heretic,
28–67, 179–83; Drake, Galileo at Work, 268–77, 279, 284–5, 287–8. It is perhaps worth
noting that those involved in this plan probably knew “Sarsi’s” actual identity throughout;
the objective was to get an open declaration from Grassi of the fact, and of his future
intentions.
printed edition could boast as many as five imprimatur

42 Initially planned to appear in Rome in 1630, it was finally published only in 1632 in Florence. The book was in the event duly licensed in both cities, but nonetheless it caused a stir. Another of Galileo’s Jesuit opponents, Christoph Scheiner, immediately repeated Grassi’s error by revealing his outrage in front of the bookseller, who dutifully reported it back to his friends.43 Murmurs soon spread that Galileo had violated Bellarmine’s confidential instruction, which was rumored to ban him from even discussing the issue of Copernicanism, let alone supporting it. Events then moved very quickly. In April, Galileo’s ally and patronage broker in Rome, Ciampoli, fell from grace, just as Urban came under stringent attack from Spanish interests for insufficient zeal in pursuing the Thirty Years’ War and the struggle against heresy. This was a crucial development. Ciampoli was just the kind of intermediary needed by such a book to smooth its progress in courtly circles; he it was who had read Il Saggiatore to Urban at table. Without such mediation the Dialogo would soon prove vulnerable, especially as the pope now associated its publication with Ciampoli’s newly established impropriety. In these circumstances, what might otherwise have been appreciated as witty dialogic sallies came to be read very differently. Papal sensibilities took its barbs as personal affronts. That summer Urban called in the book, appointing a commission to investigate the circumstances of its appearance. In the autumn he transferred the case to the Inquisition. In February Galileo was summoned to Rome. From April until June negotiations continued in secret. The pope urged the Inquisition on, however, and Galileo was finally resolved to be “vehemently suspected of heresy” — one of the most serious offenses in the Inquisition’s ambit. He was forced to abjure, and sentenced to permanent house arrest.44 Sudden and irrevocable, Galileo’s fall has remained one of the most resonant incidents in history, let alone in the history of science. Here, as throughout Galileo’s life, the uses of a book had proved crucial to the transformation. This was no Tychoic success story. It would be difficult to identify fixity or immutability as important to the role of the Dialogo at any stage of its story. Galileo’s fate was decided by different criteria. His fortunes, and in Mario Biagioli’s terms perhaps even his identity, rested on the way in which his book would be read. As scholars working in the last two decades

42. Its five licenses are reproduced in Galilei, Dialogue, [2]. For problems over printing and licensing, see Drake, Galileo at Work, 311–14, 319–20, 332–44, and Westfall, “Patronage and the Publication of Galileo’s Dialogue,” esp. 386–7, 393.
44. Finocchiaro, Galileo Affair, 32–9; Drake, Galileo at Work, 344–52. After this chapter was written, Paula Findlen and Tara Nummedal kindly showed me their “Scientific Books in the Seventeenth Century,” which includes an excellent discussion of Tycho, Galileo, and Kepler.
have revealed, Galileo was a fine mathematician, a profound philosopher, a superb rhetorician, a devious antagonist, and an agile courtier; but even he could not control such readers.\textsuperscript{45}

\section*{From Fixity to Credit}

A new historical understanding of print is needed. What will it look like? One immediately evident feature will be its regard for the labors of those actually involved in printing, publishing, and reading. Another will be its respect for their own representations of printing, embracing both its prospects and its dangers. The dangers in particular will loom larger and more substantial than they have hitherto. Historians tend to disregard such perils as accidental; early modern readers and writers knew otherwise. They had good cause to fear that in the realm of print seemingly in prospect, authorial control over such efforts as Galileo’s would be undermined. More than that, some of them thought that it was \textit{already} undermined. Increasingly they articulated responses by which the culture of the learned gentleman could be saved from this “mechanick art.” Perhaps we should remind ourselves of the extent to which those responses appeared to fail—of the extent to which the print culture of the eighteenth century could be perceived by contemporaries, not as a realization of the rationalizing effects now so often ascribed to the press, but as destabilizing and threatening to civility. Such a stance, artificial though it would be, might help us to distance ourselves from the apparent stability of our own print culture, with its uniform editions, mass reproduction, and typographical fixity. Early modern fears would then begin to appear not as incidental lapses, defined a priori as marginal, but as credible statements of experience. They would finally be recognized as no less substantial than the phenomenon of fixity itself.

\textit{The Nature of the Book} tries to treat all sides of the world of print with equal historiographical respect. In so doing, it inherits and attempts to develop initiatives central to the current state of cultural history. In particular, it reflects the important French field of \textit{histoire du livre}. This field, at first associated with the \textit{Annales} movement, has since the 1950s developed into an academic industry in its own right.\textsuperscript{46} At the same time, its approaches


\textsuperscript{46} Its origin is conventionally dated to the appearance in 1958 of Febvre and Martin’s \textit{L’Apparition du Livre} (which has appeared in English translation as \textit{The Coming of the Book}). Perhaps its most ambitious recent product has been Martin, \textit{History and Power of Writing}. I have surveyed the field and its implications at greater length in Johns, “Science and the Book.”
have changed substantially. Its original practitioners dedicated themselves to accounting for the effects of printing in terms of quantitative measures of manufacture and distribution. They divided up the realm of print by subject matter and by the social character of purchasers, hoping to arrive at objective indices of cultural change. In fact, fewer useful figures emerged than had been hoped for. But the approach, so representative of Annales historiography, nonetheless had—and still has—substantial advantages. Above all, it suited commonsense perceptions of what it is that most properly characterizes print: the large-scale reproduction and distribution of precisely the same objects. Eisenstein's representation of print culture effectively embodies those same perceptions, albeit without the quantification. However, as illustrated by the examples of Galileo and Tycho, there were also costs to such a strategy. One was that it was effectively "indifferent to the objects themselves." It assumed that successive editions of a work were essentially the same, whatever their variations in text, format, or appearance. It would have accounted the Venice edition of Galileo's Sidereus Nuncius the same as the unauthorized Frankfurt impression. Another, equally serious, disadvantage was that it remained silent about how the objects being counted were employed by readers such that they could have divergent cultural consequences. It could not have explained the different receptions accorded Galileo's Dialogo, because it ignored what Roger Chartier calls the "intellectual labor" required to put a book or paper to use.47

Chartier himself has been central to efforts to address these costs. He has worked to recover the different modes of labor surrounding printed materials, revealing how readers in local settings could "appropriate" in different ways the books they read. From this perspective, ways of reading are recognized as "social and cultural practices." Like other such practices, they have a history, and one that can be reconstructed. The practical implications prove substantial. Sensitivity to the historical character of these practices often shows that an apparently authoritative text, however "fixed," could not compel uniformity in the cultures of its reception. In practice, rather the reverse seems to have happened. Local cultures created their own meanings with and for such objects. For example, during the Counter-Reformation, printed images issued in large numbers in an attempt to standardize religious practice instead frequently served as vehicles for continued differentiation. The elements of a printed book—its format, layout, and typography—acted as no more than elements in an instrument, the book itself, that was useful for constructing knowledge. They were the tools, among others, with

which users forged readings. In general, we may conclude that print entailed not one but many cultures, and that these cultures of the book were themselves local in character. 49

As the opening pages of this chapter implied, there was one concern in particular that possessed early modern readers, and that may be used as a key to the rest. Could a printed book be trusted to be what it claimed? Perhaps a reader would be prudent to reserve judgment. On the most obvious level, whether a Sidereus Nuncius printed in Frankfurt was really Galileo’s text, or an Astronomiae Instauratae Mechanica produced in Nuremberg was really Tycho’s, could justifiably be doubted. More broadly, the very apprehension that printed books might not be self-evidently creditable was enough to rule out any possibility of their bearing the power attributed to them by most modern historians. And that apprehension was widespread. Piracy and plagiarism occupied readers’ minds just as prominently as fixity and enlightenment. Unauthorized translations, epitomes, imitations, and other varieties of “impropriety” were, they believed, routine hazards. Very few noteworthy publications seemed to escape altogether from such practices, and none at all could safely be regarded as immune a priori. It was regarded as extremely unusual for a book professing knowledge—from lowly almanacs to costly folios—to be published in the relatively unproblematic manner we now assume. Contemporaries had good reason to be wary. Their editions of Shakespeare, Donne, and Sir Thomas Browne were liable to be dubious. So were those of Robert Boyle, not to mention the first “scientific” journal, the Philosophical Transactions. Even Isaac Newton’s Principia suffered from unauthorized reprinting. From Galileo and Tycho to Newton and John Flamsteed, no significant learned author seemed to escape the kinds of practices soon colloquially subsumed under the label of piracy. This meant that even when a book was not so treated, the possibility that it might be still permeated the negotiations, practices, and conventions by which it was made, distributed, exchanged, and used. If piracy was as widespread as commonly feared, then trusting any printed report without knoll-

edge of those processes could be rash. Profound problems of credit thus attended printed materials of all kinds. Without solutions there could be few meaningful uses for books—and perhaps no durable reasoning from them.

It should not be surprising, then, that contemporaries did not always identify fixity as a central characteristic of print. Surveying the books available to aid ocean navigators, Edmond Halley, for one, noted that “the first Editions have generally been the best; frequent Copying most commonly vitiating the Originals.”50 Even when people did refer to enhanced reliability, it was often in the face of direct evidence to the contrary. Textual corruption of even such closely monitored texts as the Bible actually increased with the advent of print, due to various combinations of piracy and careless printing.51 The first book reputed to have been printed without any errors appeared only in 1760. Before then, variety was the rule, even within single editions. Martin Luther’s German translation of Scripture was actually beaten into print by its first piracy, and in succeeding years the proportion of unauthorized to authorized texts was roughly ninety to one; these included Luther’s own translation, newly ascribed to others (including Catholics), and others’ work reattributed to him. A century later, the first folio of Shakespeare boasted some six hundred different typefaces, along with nonuniform spelling and punctuation, erratic divisions and arrangement, mis paging, and irregular proofing. No two copies were identical. It is impossible to decide even that any one is “typical.”52 In such a world, questions of credit took the place of assumptions of fixity.

In attending to this issue, The Nature of the Book builds on Steven Shapin’s identification of trust as a key element in the making of knowledge.53 Where Shapin concentrates particularly on intersubjective trust, asking fundamental questions about whom one should believe, why, and in what circumstances, The Nature of the Book identifies a similar issue in the trust accorded to printed materials. It asks how readers decided what to believe. A central element in the reading of a printed work was likely to be a critical appraisal of its identity and its credit. Readers were not without resources for such an assessment. When they approached a given book, with them came knowledge about the purposes, status, and reliability of printed materials in general—knowledge they used to determine the appropriate kind and degree of faith to vest in this unfamiliar object. Yet here too they also brought to bear knowledge about kinds of people. Their worries about

literary credit were often resolved, as a matter of everyday practice, into assessments of the people involved in the making, distribution, and reception of books. Readers worried about who decided what got into print, and about who controlled it once it was there. The twin problems of whom and what to credit were in practice often combined into one.

When early modern readers determined a book not to be worthy of credit, they could do so on a number of grounds. It was in the attribution of “piracy,” however, that the issues of credibility and print particularly converged. The term seems to have been coined by John Fell, bishop of Oxford, to describe the rapacious practices of London printers and booksellers. It had a technical meaning: a pirate was someone who indulged in the unauthorized reprinting of a title recognized to belong to someone else by the formal conventions of the printing and bookselling community. But it soon came to stand for a wide range of perceived transgressions of civility emanating from print’s practitioners. As such, almost any book could, in principle, find itself accounted a piracy, whatever its actual circumstances of production and distribution. Historians of printing have therefore misconstrued instances of alleged piracy in at least two senses. First, they have seen piracy, like fixity, as inherent in the object, and not as a contestable attribution. Second, furthermore, they have assumed cases of piracy to be exceptions, accidental (in the philosophical sense of the word) to the essentially stabilizing character of print. Contemporaries were not so sure of this. Incidents that have been retrospectively dismissed as isolated and exceptional often seemed to them commonplace and representative. They might even be seen as attempts to undermine, and thereby to reform, the whole structure of the book trade. Even when conducted in more humdrum circumstances, moreover, and with less ambitious ends in sight, piracy still had powerful implications. Its apparent prevalence affected the economic and cultural conditions of all printed and written communication. It conditioned the accreditation of printed materials of all sorts, from the humblest ABC to the most elaborate encyclopedia.  

54. An inspiration for this treatment, as for other aspects of this book, has come from medieval history. Medievalists have devoted much attention to activities of “forgery” and “plagiarism.” They have constructed a sophisticated historiography addressing the diversity of acts since subsumed under such labels, immersing the subject in a detailed and authoritative treatment of the cultural uses of writing and reading in general. Medieval “forgery” is appropriately seen as a form of truth-creation, justified (and perhaps even determined) by contemporary ideas about the nature and purposes of writing. It was also extraordinarily common. Perhaps half the documents known from Merovingian times are by our lights fake, and two-thirds of the documents known to have been issued to ecclesiastics before 1100 would now be reckoned forgeries. See Grafton, Forgers and Critics, 24–5, 30–32; Clanchy, From Memory to Written Record, 118–20, 231–57; Stock, Implications of Literacy, 59–87; Constable, “Forgery and Plagiarism.” For a robust contrasting view, see Brown, “Falsitas piae Repe-
For the learned, and for natural philosophers in particular, this had peculiarly important consequences. In the agonistic field of early modern natural knowledge, allegations of piracy readily shaded into charges of plagiarism. Such allegations therefore extended to the reputation of authors. That is, unauthorized printing threatened to “unauthorize” authors themselves. Even more important, it threatened the credibility to be attributed to their ideas. Like print itself, piracy therefore had epistemic as well as economic implications: it affected the structure and content of knowledge. For an enterprise like experimental philosophy, in particular, which depended implicitly on the trust accorded to the printed reports issued by its protagonists, the consequences threatened to be nothing short of devastating.

The Nature of the Book provides the first extensive taxonomy of practices labeled piratical—from piracy itself, through abridgment, epitomizing, and translation, to plagiarism and libel. It not only traces the people, places, and practices through which books came into existence and were circulated. It also shows how allegations of impropriety in general, and of piracy in particular, emerged from the practices of the printing house and bookshop. It thus explains how and why such allegations gained their apparent ubiquity. Moreover, it then proceeds to ask how these changes could possibly be comprehended in terms of the polite civility supposed to guide intellectual conduct, and how claims that such practices had been pursued affected the reception of the works concerned. In short, it addresses precisely the epistemic significance of piracy.

Printers and booksellers were manufacturers of credit. They had to be. The skills of those producing and trading in books, and the perceptions of those using them in learned work, might not intersect harmoniously. Whether or not they did at the moment of publication, moreover, accounts of printers’ and booksellers’ actions might still be drawn upon later by critics and rivals to challenge the value of any particular book, for example by alleging piracy. When they did succeed in remaining in the background—a rarer achievement than we might suppose—it was likely to be the result of hard and continuing work carried out “behind the scenes.” A principal aim of The Nature of the Book is to recover this work and display its importance. While it mentions many instances in which publishing enterprises failed to proceed smoothly, then, its intent is not just to attest to the frequency of such failure. It instead substantiates Marc Bloch’s dictum that “a good calamity suits our business.” The historian, Bloch pointed out, often depends on “calamities” for the preservation and revelation of information, and this

*hensibiltis.* For these medievalists’ perspectives on print—which deserve more attention than they have received—see Clancy, “Looking Back,” and Rouse and Rouse, Authentic Witnesses, 449–66.
is no exception. Problems and disputes were often the occasion for the creation of records documenting practices that remained unrecorded in cases of more successful publication. This volume is accordingly concerned to use such testimony to display the commonplace and unremarkable quite as much as the disastrous and spectacular, and especially to use the latter to reveal the former. The indispensable agency of printers and booksellers might remain unnoticed, for example, since the credit of their products depended on its being so. They themselves developed sophisticated ways of ensuring that they stayed just sufficiently in the background to avoid suspicion of either subterfuge or authorship. But in disputes the character of a bookseller or printer mattered. For readers attuned to its significance, anonymity itself might then become a source of suspicion.6 Historians can put the resulting allegations to use as evidence. They need no longer be explicit in the cabal by their own silence.

The ways in which such agents thought of and represented themselves were therefore of central importance to the received credit of printed knowledge. The point is not a simple one. What it was for a printer or bookseller to act "properly" could be determined in any number of ways. The principles of such propriety were consequently liable to vary. Yet it is impossible to understand impropriety without at the same time comprehending these, the conventions of propriety that were allegedly being violated. The two came into being in tandem. Chapter 3 thus addresses the ways in which printers and booksellers themselves fought to create a trustworthy realm of printed knowledge by articulating such conventions. The civility they adopted was complex, but it was also highly consequential. On its central concept of "propriety" rested the authorship of every writer who aspired to profess knowledge in print. Its maxims, reconstructed below, were important not just because of their use in resolving individual cases of piracy or unlicensed printing, but because they became central to the trade's representation of itself as a respectable craft. How printing should properly be practiced, in what ways it should properly be regulated—in effect, what printing itself was—would all be defined by reference to them. The epistemic significance of piracy therefore extended, reflexively, to printing itself: the very nature of print remained unresolved throughout the early modern period, and piracy was central to its resolution. From the practical régime described in chapter 3 emerged print culture itself.

 Chapters 4 and 5 trace how this happened. Chapter 4 tells the story of John Streater, a printer with a remarkably sophisticated republican philoso-

56. For example, in his attacks on Ursus, Tycho Brahe was given to remarking upon his antagonist's book's having been published without a printer's name, as was customary for "notorious libels"; Jardine, Birth of History and Philosophy of Science, 16.
phy. Streeter’s actions threatened to transform the nature of print and society simultaneously. His activities and interests ranged widely, from soldiering and arms dealing to natural magic and law reform. In particular, though, Streeter tried to redefine the grounds of proper action for printers and booksellers by doing historical work of an extraordinarily ambitious sort. He rewrote the history of printing in an attempt to reconfigure its governing political culture and thereby redefine its current and future identity. The initiative was then inherited from Streeter himself by others who pursued cognate goals through the eighteenth century. Chapter 5 examines their rivalries. It explains the new historical identities they forged for both print and its propriety.

In fact, the use of historiographical work to create new identities and proprieties is an idée fixe of this book. It has become well known that scholarly figures attempted this kind of enterprise fairly frequently. So, however, did craftsmen and hacks. Joseph Moxon placed the press and the printer in a tradition of the mathematical sciences going back, through Tycho Brahe, to Vitruvius; chapter 2 describes his work. Streeter and his ally, the embittered ex-Cavalier Richard Atkyns, told the history of printing as one of proto—industrial espionage. Sir Thomas Browne constructed a history of plagiarism, and Joseph Glanvill articulated a double-usurpation theory of ancient philosophy in order to criticize Aristotle and make room for the experimentalists of the Royal Society. These characters appear in chapter 7. Astronomer Royal John Flamsteed, the subject of chapter 8, went further still, and constructed three parallel histories: that of his own feud with Newton; that of Tycho’s with Ursus (of which he thought the former was a recapitulation); and a full history of astronomy from biblical times to the present, designed to culminate in its own appearance at the head of Flamsteed’s great Historia Coelestis Britannica. Through these he tried to guide posterity to an understanding of his own proper identity. Each of these historiographical projects plays its part in the narrative that follows. I take such historical self-representation to be of central importance in constituting the identities agents felt themselves to possess, and hence in influencing their notions of proper action for their contemporaries too. The historiographical efforts recounted in chapter 5, in particular, led directly to the assumptions of reliability and credibility from which the print culture of the modern age arose. And the present work is of course no exception to this rule. The transformed history presented in The Nature of the Book is intended to encourage new thinking about the character of print in our own age.

The sources of print culture are therefore to be sought in civility as much as in technology, and in historical labors as much as in immediate cause and effect. The “printing revolution,” if there was one, consisted of changes in the conventions of handling and investing credit in textual materials, as
much as in transformations in their manufacture. The point deserves to be stressed explicitly. I do not question that print enabled the stabilization of texts, to some extent; although fixity was far rarer and harder to discern in early modern Europe than most modern historians assume. I do, however, question the character of the link between the two. Printed texts were not intrinsically trustworthy. When they were in fact trusted, it was only as a result of hard work. Fixity was in the eye of the beholder, and its recognition could not be maintained without continuing effort. At no point could it be counted on to reside irremissibly in the object itself, and it was always liable to contradiction. Those faced with using the press to create and sustain knowledge thus found themselves confronting a culture characterized by nothing so much as indeterminacy. If printing held no necessary bond to truth, neither did it show a necessary bond to falsity or corruption. Each link remained vulnerable to dispute. It is this epistemic indeterminacy that lends the history of the book its powerful impact on cultural history. Understanding how it could be overcome to make knowledge and hence cultural change is what the history of the book is for.

There did exist strategies that could be adopted in order to secure as much credibility for printed objects as readers needed. Chapters 6 and 7 describe such strategies, as pursued by gentlemen and philosophers in a number of different settings. They argue that their pursuit was vital for the establishment of both new philosophies of nature and new practices of knowledge-making. A central tactic in most cases was that of attributing trust to a book on the basis of an evaluation of a person. Look closely at attributions of credit to printed materials, and, as already noted, there will generally be an attribution of credit to an individual involved. “It must be only by the Marks and Properties of an Imposture, that we can know an Imposture from that which is a Real Truth, when attested unto us,” counseled Humphrey Prideaux in a much-read analysis of the credibility of alleged scriptural writings. But in identifying such “marks” of imposture, attention should center on consideration of its maker and his conduct. If the producer seemed a wicked man, using “craft” and “fraud” to propagate a claim for his own interest, then that claim could justifiably be accounted a falsehood.” Prideaux’s recommendation was conventional enough. Similar exhortations appeared in many works of his era. In action, these skills were therefore intriguingly recursive. Readers assigned credit to printed materials

on the grounds of knowledge about their makers, which was in turn assessed partly in terms of printed sources already accredited. In such ways might knowledge become more secure.

But this was only one of many possible strategies. From the printing house and bookshop, through the craft center of Stationers' Hall, to the learned sites of the Royal Society of London and the Royal Observatory at Greenwich, *The Nature of the Book* identifies the techniques developed in each location by which books could be appraised and accredited. The use of print for making knowledge depended on these local practices of printing, exchange, and reading. The bookshop and printing house were regularly identified as places of promise and achievement. But they were also centers of conflict, plotting, and betrayal, where the proprietor could exhibit a notable fluidity of social identity. In anachronistic terms, he or she—the book trades were remarkable for the participation of both men and women—merged the roles of socialist, friend, ally, entrepreneur, and even spy. His or her responsibility for the contents of a book seemed almost infinitely negotiable; however tactically unwise, outbursts such as those by Grassi and Scheiner against the bookseller were not intrinsically unreasonable. Hence the merging of trust in people with trust in things. Concerns over the effect of printing were readily expressed in terms of such practitioners. Bookshops represented points of attraction for potential Brunos and Patrizis, it was said, in part because those who ran them were so inclined. They were also frighteningly good at their work. To flirt with anachronism once more, besides being manufacturers of credit, seventeenth-century booksellers were the best sociologists of literature of their day.

The autonomy and creativity of Continental scholar-printers in these respects are well known. Eisenstein conjured an image of what she called "print-shops" as "polyglot households"—nodal points for the transfer of people, writings, and knowledge. The European "print-shop," she suggested, was where the "scholar" and the "craftsman" really met.58 In some respects, and under certain circumstances, the smaller printing house or bookshop of London, Paris, or Rome could become a similar social site. Indeed, the household unit typically found here was perhaps rather more appropriate for such sociability than the relatively large operation of an Elzevir or a Plantin. But it also had to operate under more evident regulatory constraints. Eisenstein's view was that printers and booksellers were "natural" enemies to outside regulation of any kind. In fact, this was far from the case. In cities like London and Paris, the vast majority supported licensing

and similar régimes. They had good reason to do so. Those systems were
deemed necessary to guarantee trust, order, and propriety in their craft.99
Livelihoods therefore depended on them. A new understanding of these
measures is needed. It must acknowledge their use to suppress texts of which
the state disapproved—a use that was certainly real, but that included pub-
lications discreditable for reasons of piracy as well as of sedition or obscenity.
But it must also appreciate the obverse of this function: the central role
contemporaries ascribed to such systems in the maintenance of any trust at
all in the realm of print. Printers were “mechanicks,” as much in need of
“licensing” as preachers (especially “mechanick” preachers) and medical
practitioners (the analogue here being “empiricks”). For similar reasons, the
book trades themselves participated in their own regulation.

Some went further still. They proposed ways to change the very nature
of the printing enterprise and to transform the character of its practitioners.

59. Eisenstein, Printing Press, 442. It is also significant that early modern images of the
press showed a greater diversity than recognized by Eisenstein. Eisenstein shows only the
complimentary iconography of Prosper Marchand (“The press descending from the heav-
en”); we need also to remember the devils chasing each other through the printing house
portrayed in Huss’s La Grande Dance Macabre, and broadsheets mocking those who believed
anything produced by the press. Something of this iconographic range is reproduced in chap-
ter 5 below. For an example of the importance of Catholic censorship in astronomy, see
Gingerich, “Censorship of Copernicus.”
There were ambitious attempts to establish a non-“mechanical” printing house for learned work, for example. In England the most notable such effort was Archbishop William Laud’s at Oxford. Inherited by John Fell at the Restoration, Laud’s initiative was eventually secured as Oxford University Press. The appointment of quasi-genteel “patentees” was, as chapters 3 and 4 show, an even more ambitious strategy to change the very nature of printing so as to eliminate problems of discredit. Patentees were wealthy printers or booksellers—or even gentlemen from outside the trade altogether—to whom the crown granted exclusive rights to key titles, or indeed to whole classes of publication. One patentee held the right to all law books, for example; another held that to all bibles. It was reckoned that they and their books would be securely trustworthy by virtue of their gentility and their dependence on royal favor. In the eyes of some, they could become a model for a future realm of print guaranteed by a decreed civility. Perhaps an urban equivalent to Tycho’s civil press—or at least, to Hevelius’s at Stellaeburg—could be constructed (fig. 1.10).

60. Ward, Oxford University Statutes, I, 205–6, declaring that an archi typographus must be appointed so that “sordid and vulgar artizans may not pervert the indulgence of that most clement prince [Charles I] to their own private lucre ... experience has shown [that] these mechanical artizans ... pay the least possible attention to calligraphy, or the beauty or elegance of the work, but thrust into publication any works, however rude and incorrect.”
To the early modern world, then, the character of the printing house and the civil order in which printed books could be accorded trust were interdependent. Booksshops too were places encouraging novel interactions, as indeed were institutions such as the Royal Society. Throughout this book close attention is therefore accorded to the details of such locations. Readers will be led down the darkest alleys of London, and guided through homes and workplaces to reveal their characters with an intimacy few early modern gentlemen can have shared. But here, it may be thought, crouches a paradox. Does the importance of print not lie precisely in its ability to transcend such local contexts and enable communication across wide distances? Surely such a close focus on individual locations risks obscuring this, the most consequential issue of all. It is a real question, with implications beyond the understanding of print alone. The next section addresses this apparent paradox, and from a correspondingly broad perspective. For a central theme of The Nature of the Book is to see this power to transcend place as something itself in need of explanation.

PLACE, PRACTICE, AND KNOWLEDGE

Books are a load of crap.

PHILIP LARKIN, “A Study of Reading Habits,” Collected Poems, 131

The Nature of the Book concentrates for the most part on one country, England, and in particular on its capital city, London.61 The focus is by no means exclusive, and in fact discussion does extend across Europe as appropriate. Nevertheless, the question must arise: why? The choice may appear arbitrary. More to the point, it may seem perverse to address questions of the identity and consequences of print by examining any one location, when the very essence of print, supposedly, is that it enables human beings to transcend their immediate circumstances and communicate reliably with others in different times and places. These are important questions. One plausible answer to the first derives from the extensive attention that historians have directed at the emergence of polite commerce in Augustan England.62 As part of this, England became one of the earliest nations to de-