

1 The Making of an Imprint in China, 1000–1800

Throughout the past century, the invention of printing has ranked, in the eyes of Chinese scholars, as one of their country's greatest contributions to the history of humankind. The view of the present doyen of Chinese book history, Zhang Xiumin, could have been expressed by any scholar and bibliophile in China over the past four generations: "As everyone knows, our country not only invented the art of paper making but also invented the art of printing, woodblock as well as moveable-type, and thereby has made a very important contribution to the development of world culture."¹

Minus its remarkable assertion that a country can invent something, this piece of cultural self-congratulation does contain a fair amount of truth on the centrality of China in the discovery of paper and printing and in the development of book culture. And yet, as one reviews the Chinese writing on woodblock printing, the oldest and most common type of traditional Chinese printing, an odd fact slowly emerges. The Chinese historical record contains strikingly little direct commentary about this invention, especially in its first few centuries. It fails to identify the date of the invention of this type of printing and the name of the putative Chinese man or woman who invented it.² It reveals very little concrete information about the early spread of this invention throughout the empire during its first 250 years; it is likewise surprisingly quiet about its use during the next six centuries, from being adopted to print the Confucian classics between 932 and 953 in the southwestern region of Sichuan, to the sudden appearance of some very detailed accounts of the late sixteenth-century book world. And, it tells us precious little about the organization of book production operations and the relation among the different parties involved in such work. In fact, we have strikingly few accounts of how Chinese woodblock books were made, even though printing, along with the two other inventions of gunpowder

and the compass, would become, in Francis Bacon's famous words, one of the three inventions (all Chinese) that "have changed the whole face and condition of things throughout the world in literature, in warfare, and in navigation."³

The difficulty of studying this invention, then, begins with the obscurity of its own beginning. Ever since the Song dynasty, the origin of printing has been traced by commentators to the Tang dynasty (618–907) or to the mid-tenth-century printing of the Confucian canon in Sichuan.⁴ These views, seldom based on extensive research, have, over the last hundred years, given way to fresh interpretations. Drawing on more concrete evidence, these modern discoveries have turned simple questions about the early history of printing into a hornets' nest of complexity about books, charms, and non-Chinese printed items.

Consider, for instance, the issue of the first printed book. Tang records indicate the printing and availability of imprints and other printed materials in the major urban centers of northern and central China during the ninth century. They refer to almanacs privately printed in 835 in Sichuan and the Huainan area in the lower Yangzi valley, to an imprint on the medical techniques of moxibustion by no later than 861 in the capital of Chang'an (present Xi'an), and to the printing of writing on monastic rules by 873–79 in probably the other capital of Luoyang. They also tell of a poetry collection printed in 847–49 in Jiangxi Province and of printed reading-primers, character lists, and dream interpretation and divination books for sale in Sichuan in 883.⁵ But, about fifteen years ago, Zhang Xiumin, drawing on the reading notes of a nineteenth-century scholar, announced that a sixteenth-century source related how the Tang court had carved and printed (*zixing*) a book in 636 or slightly later. A collection of essays about model Chinese women compiled by a deceased empress, this book was judged by Zhang to be the earliest known imperial imprint and possibly the oldest printed book in world history.⁶ Yet, as Zhang himself admitted, no Tang source, including those that mentioned this essay collection, confirmed his claim of its being printed. Furthermore, although these Ming and Qing sources take us closer to the supposed event, they remain no closer than nine centuries away from it⁷ (as if the only English reference to the Norman invasion of England had been written in the twentieth century). Support for Zhang's claim of the discovery of the practice

of printing by the early seventh century comes instead from another Tang report, stating that the Buddhist Monk Xuanzong (d. 664) had a Buddhist image printed up for distribution in large numbers after his return to China from India in 645.⁸ Interestingly, none of these sources claims that this empress's compilation is China's oldest printed book, a silence that perhaps makes the information more credible. Even more recent research by Timothy Barrett has traced the first practical and public use of woodblock printing to a slightly later date, to an early eighth-century effort by the Tang dynasty Empress Wu (r. 670–710) to print Buddhist prayers and images. Barrett even raises the possibility that printing may have been in use in China at least a century earlier, but his scholarly restraint keeps him from stretching the evidence.⁹

Thus, while it is clear that activities at least similar to printing were occurring in Tang China, not least at its court, this evidence still leaves us in the fuzzy world of speculative scholarship.¹⁰ In search, then, of something more concrete, we fortunately can turn to an actual surviving Tang imprint, a copy of the *Jingang jing* (Diamond Sutra; Vajracchedikā), published with a date of 868, that seems to merit the accolade of being the world's oldest extant printed book. Discovered about a century ago among 40,000-odd documents in a cave at the Dunhuang Buddhist monastic complex in far northwest China, this sixteen-feet long scroll has a quality of carving that bespeaks at least a few generations of experience and tradition. Not surprisingly, it turns out to be not the oldest extant example of Chinese printing. That honor — since early printing was not used solely, and not necessarily primarily, for books — arguably goes to a Buddhist charm discovered in 1944 in a tomb in Sichuan's provincial capital of Chengdu and dated by modern scholarship to sometime after 757. But even this Chinese charm is not for sure the world's oldest extant example of printing, since ancient charms discovered in Japan and Korea may well deserve that title. Certain Buddhist charms printed in about 770 in Japan survive today, and a Korean Buddhist one dates from between 704 and 751. Unearthed in 1966 in a temple stupa in Kyongju in southeast Korea, this Korean Buddhist scroll of about fourteen feet (originally, it stretched probably to more than twenty feet) may actually be the world's oldest surviving example of printing.¹¹ Its retention of this title for the past four decades has prompted some Koreans to claim that printing itself was an original

Korean invention, but few researchers outside of Korea have taken this suggestion seriously. Some Chinese and Western scholars even claim, without any convincing evidence, that this scroll was of Chinese origin. In sum, evidence of printing in China and in Chinese dates from no later than the mid-eighth century and possibly from half a century earlier.

If dates and names in printing history are problematic, so then is information on how a woodblock book was actually made. In the words of the well-known Chicago historian of the Chinese book, Professor Tsien Tsuen-hsuei, “unlike papermaking, the technical procedures of printing have scarcely been documented in Chinese literature. No information on how printing blocks were made ... is available, except for occasional remarks made by a few foreign observers and writers.” The first reasonably detailed Chinese description of the work involved in any of the four stages of woodblock printing of books — transcribing the text to be printed, carving it into prepared woodblocks, printing sheets off the carved blocks, and binding the printed sheets into a book — was recorded from an oral interview held in China only in 1947, at least some 1,200 years after the discovery of printing.¹² Even as recently as 1987, Tsien felt this lacuna in the Chinese documentary record so sharply that he visited woodblock printing shops in Beijing and Shanghai in order to write a firsthand account of this production work that he had spent a half century studying from afar.¹³

Reasons for this gap can be readily imagined. Chinese artisans, it may be thought, kept their artisan skills to themselves and their offspring. Yet, they were not the only persons involved in book production, as many scholars from the eleventh century onwards privately sponsored book publication and distribution but never described such work in their writings.¹⁴

Such an omission may then be attributed to these scholars' reputed aversion to recording technical information on manual labor and manufactures. Even the eleventh-century polymath, Shen Kuo, was faulted with his arithmetic by a mid-thirteenth-century author, who concluded, “Few are the scholar-officials who know the art of calculating.”¹⁵ Yet, on four closely related techniques, that antipathy is hard to discern. For instance, the earliest surviving complete description of how a Chinese artisan mounted a scroll of calligraphy and painting was written in 847 by a scholar-artist from a collecting

family; this comparison is not arbitrary, since the spatial arrangement of the different parts of a hanging scroll served as a model for the distribution and location of blank space and characters on a printed sheet (hence the frequent use of the same terms for sections of a scroll and a printed sheet).¹⁶ Furthermore, detailed manuals for first builders and then other types of carpenters were written and distributed as early as the tenth and thirteenth centuries,¹⁷ and the techniques of papermaking were described generally in the late tenth century and then in great detail in the 1637 work, *Tiangong kaiwu* (*The Creations of Nature and Man*).¹⁸ Although this late Ming book on technology in general paid no attention to printing of any sort, the Chinese invention of moveable-type printing was described by Chinese scholar-officials, first in the mid-eleventh century by Shen Kuo and then, in far greater detail, in the early fourteenth and mid-eighteenth centuries by highly informed scholar-officials.¹⁹

In all likelihood, then, the most persuasive explanations for the prolonged absence of such a record in Chinese about the production of woodblock printing are the most obvious. Initially, some detailed descriptions of printing may have appeared in writing and perhaps print, but they do not survive. Meanwhile, workers with special skills for producing good quality imprints had little reason or interest in sharing such valuable knowledge with non-family members. The general skills and technology, however, were so simple and, by the Song, so widespread that literate people regarded them as too commonplace to write about. In the words of one mid-nineteenth-century Chinese scholar, “It is far from certain that the invention of woodblock printing was hard. Since antiquity there have been charms and seals that could have taught this idea. Really, for this invention there was no waiting for a strange and clever idea.”²⁰ In other words, the vast majority of Chinese readers would have agreed with Francis Bacon that the craft of printing is mainly obvious and straightforward but would have, at least up until the early twentieth century, regarded his assessment of their vital significance in human history as uninformed and eccentric.²¹

When, then, was such a detailed description of woodblock printing first recorded? The answers to this question are perhaps the oddest, and least expected, of all in this extraordinary tale. Firstly, the earliest extant record, in detail, of how a Chinese woodblock book was made appeared in print in 1820. Secondly, this account of

printing technology and work was written and published outside of China, in Malacca. And, thirdly, it was authored by a Scottish Protestant missionary, William Milne (1785–1822), then based in Malacca, in his English language book, *A Retrospect of the First Ten Years of the Protestant Mission to China*.²²

All these landmark events in the historiography of Chinese printing result from early nineteenth-century missionary activities supported in East and Southeast Asia by the London Missionary Society. In the first half of this chapter, I wish to introduce and discuss Milne's exceptionally informative early nineteenth-century account of woodblock book production. In making use of a book that has so far escaped the attention of virtually all earlier studies of the Chinese book (the main exception is the noted French expert on the Chinese book, Jean-Pierre Drège),²³ my aim is more than bibliographical. My interest in Milne's work is not due to its rarity and originality but to the quality of its analysis of issues that have long bedeviled the study of Chinese book history. Thus, I first present Milne's account of the different stages in the production of woodblock imprints and explain their implications for workers' wages and book prices. The next section then seeks to explain the relative cheapness of woodblock imprints, by examining certain late fifteenth- and sixteenth-century technical changes in Chinese imprint production that simplified and hastened the production process. Then, in the final section, the focus falls on the life of the workers themselves, especially the carvers, and how they responded to the changing technical and economic circumstances of their craft in the sixteenth century.

Milne's Account

In 1812 the London Missionary Society, a voluntary association established in London in 1795 to promote the spread of evangelical Protestantism to all corners of the globe, sent William Milne as its second missionary to China. Even before he arrived in East Asia, Milne was acutely aware of the challenge he and other missionaries faced in trying to convert people to the word of God, without the aid of a fully translated Bible. The London Missionary Society's first China missionary, Robert Morrison, had succeeded in translating the New Testament into Chinese by 1807, but Milne, even after translating

into Chinese many books in the Old Testament, recognized the inadequacy of his and Morrison's accomplishment. A student of the Chinese language needed to have "bones of brass, lungs of steel, heads of oak, hands of spring-steel, eyes of eagles, hearts of apostles, memories of angels, and lives of Methusaleh!"²⁴ Even then, a good Chinese translation of the Bible was not enough. It still needed to be printed and widely distributed to a people who preferred the use of the mission's printing budget for their more practical needs and in a country that closed its doors to Protestant missionaries and forced them to rely on Chinese servants to distribute their books at night and in secrecy.²⁵

What, then, was the best — the most efficient, effective, and inexpensive — way to print this translation? To help its governing committee to make this decision, the London Missionary Society asked its representatives in the field to report on the relative feasibility and costs of the alternative technologies of woodblock printing and moveable type. Milne, conscious that the committee of his financial supporters back in London was largely ignorant of Chinese woodblock printing practices, took upon himself the task of explaining and assessing for them the workings of this craft. Fortunately, he had been apprenticed, and successful, as a house carpenter for several years back in Scotland,²⁶ and had, in 1817, brought from Canton to Malacca Chinese men, including printers.²⁷ He then became closely acquainted with Chinese printing practices, by either running or supervising the Mission's publishing operation there until his death in 1822.²⁸ Moreover, he did so usually along Chinese lines, relying on Chinese woodblock printing methods to publish anything written in Chinese, and, in the eyes of one disgruntled British junior, managing the workforce of eighteen men (including one Chinese for Chinese publications) as if they were all Chinese: "As to the principles on which the mission was conducted, I believe it to be purely Chinese gathered from the rules and maxims of the Four Books of Confucius, which is the principle of a father and his family, where the father alone has power to act and direct. And the seniority and juniority which has created so much bitter dissention [among some missionaries] has been the strict adherence to the Chinese doctrine of elder and younger brothers."²⁹

In drafting his report, Milne was aided by all his experience in the carpenters' and printers' shops as well as by consultations with

Chinese and non-Chinese experienced with woodblock printing.³⁰ Consequently, his extended account of Chinese printing practices in *A Retrospect of the First Ten Years of the Protestant Mission to China* provides the first detailed account in any language of Chinese printing methods (the first detailed East Asian discussion of woodblock printing technology would appear in the 1929 Japanese publication, *Nishikie no hori to suri* (*The Carving and Printing of Colored Woodblock Prints*)).³¹ What follows, then, is a review of Milne's 1820 text, interwoven with passages from an 1838 account of Chinese printing by a missionary-printer successor to Milne, Walter Henry Medhurst.

The simplest, and rarest, kind of woodblock printing practiced by Chinese in Malacca (and presumably in parts of southeast China) required the very quick preparation and carving of assorted wooden strips: "... when an urgent affair occurs, a number of workmen are called in, and a small slip of wood, with space for one, two, or more lines, is given to each, which they cut with great expedition, and when all is finished, join together by small wooden pins." Used to print recent news and other ephemera for handbills, court gazettes, and local announcements, this form of printing clearly did not require the participation of highly skilled carvers.³² Another kind of quick carving-to-order relied on softer surfaces such as beeswax and resin, or clay, or pulverized gypsum; the first of these entailed "spreading a coat of wax on a wooden frame, after which, with a graving tool, they cut the characters thereon ..." Though seldom practiced in Malacca (Milne and his Chinese workers there claimed never to have observed it), this method was used to issue gazettes and other ephemera in Canton, Ningbo, and Beijing.³³

The kind of woodblock printing, which in Milne's view "almost universally prevails,"³⁴ was far more complex, at least in its initial stages. It made use of wooden blocks that were far sturdier and longer lasting than the wooden slips. It also demanded considerable care from the artisans using these thin rectangular slabs of wood:

The process of preparing for and printing with the blocks, or in the stereotype way, is as follows. The block, or wooden plate, ought to be of the Lee 梨 [i.e., the Chinese character meaning pear] or Tsaou 枣 [i.e., the Chinese character meaning jujube] tree which they describe thus:—"The Lee and the Tsaou are of a fine grain, hard, oily, and shining; of a sourish taste; and what vermin do not soon touch, hence used in printing." The plate is first squared to the size of pages, with

the margin at top and bottom; and is in thickness generally about half an inch. They then smooth it on both sides with a joiner's plane; each side contains two pages, or rather indeed but one page according to the Chinese method of reckoning; for they number the *leaves*, not the pages of a book. The surface is then rubbed over with rice, boiled to a paste, or some glutinous substance, which fills up any little indentments [*sic*], not taken out by the plane; and softens and moistens the face of the board, so that it more easily receives the impression of the character.³⁵

Some knowledge of the different types of wood and their particular features was clearly required, if only to facilitate their preservation and the work of the artisans involved in making imprints from them:

The transcriber's work is, first to ascertain the exact size of the page, the number of lines, and of characters in each line; and then to make what they call a 格 *K'ih*, or form of lines, horizontal and perpendicular, crossing each other at right angles, and thus leaving a small square for each character — the squares for the same sort of character, are all of equal size, whether the letter be complicated as to strokes, or simple: a letter or character with fifty strokes of the pencil, has no larger space assigned to it than one with barely a single stroke. This makes the page regular and uniform in its appearance, though rather crowded, where many complicated characters follow each other in the same part of the line. The margin is commonly at the top of the page, though not always so. Marginal notes are written, as with us, in a smaller letter. This form of lines, being regularly drawn out, is sent to the printer, who cuts all the squares leaving the lines prominent; and then prints off as many sheets, commonly in *red ink*, as are wanted. The transcriber then with black ink, writes in the squares from his copy; fills up the sheet; points it; and sends it to the block-cutter, who, before the glutinous matter is dried up from the board, puts the sheet on *inverted*, rubs it with a brush and with his hand, till it sticks very close to the board. He next sets the board in the sun, or before the fire, for a little, after which he rubs off the sheet entirely with his fingers; but not before a clear impression of each character has been communicated. The graving tools are then employed, and all the white part of the board is cut out, while the black, which shews the character, is carefully left. The block being cut, with edged tools of various kinds, the process of printing follows.³⁶

The modern reader, aware of the multitude of beautiful East Asian books made in this manner, can only marvel at the simplicity of this

process of preparing and carving woodblocks. For this work, the carver employed only a handful of simple tools that, as Milne aptly observed, “may be carried in the workman’s hand, in a tolerably large pocket handkerchief ...”³⁷ Among these “graving tools” Milne includes “a joiner’s plane” and “edged tools” which he does not identify,³⁸ probably because they were the ordinary iron knives, chisels, groovers, sharpening stones, scrapers, and planes commonly found in the traditional carpenter’s kit.³⁹ Since the materials likewise were chosen not for expense but for durability and practical utility, the quality of woodblock carving essentially depended on the manual dexterity of the practitioners — in other words, their artisanal training, experience, and interest in the job.

Milne, unfortunately, provides no detail on the methods of these carvers. For such instruction, we must turn to Medhurst’s 1838 book on the contemporary situation in China and its reception of Christian books. Originally trained as a moveable-type printer in England, Medhurst keenly favored the adoption of this kind of print for the mission’s Chinese printing. Nonetheless, he paid close attention to the actual work practices of Chinese woodblock carvers and came away impressed:

The block, after having been smoothly planed, is spread over with a glutinous paste; when the paper is applied and frequently rubbed, till it becomes dry. The paper is then removed, as much of it as can be got away, and the writing is found adhering to the board, in an inverted form. The whole is now covered with oil, to make the letters appear more vivid and striking; and the engraver proceeds to his business. The first operation is, to cut straight down by the sides of the letters, from top to bottom, removing the vacant spaces between the lines, with the exception of the stops. The workman then engraves all the strokes which run horizontally; then, the oblique; and, afterwards, the perpendicular ones, throughout the whole line; which saves the trouble of turning the block round, for every letter [i.e., character]. Having cut round the letters, he proceeds to the central parts; and, after a while, the page is completed.⁴⁰

The skill of Medhurst’s carver would seem to lie in his ability to cut into the woodblock rapidly and cheaply. His goal was not to reproduce the expressive shape of the character or the flow of ink presumably evident in the original brushstrokes; it was simply to carve a recognizably similar form of the character as quickly as possible.

The two remaining stages in book production, printing and binding, appear, if anything, simpler in Milne's account:

The block is laid on a table; and a brush made of hair, being dipped in ink, is lightly drawn over the face.⁴¹ The sheets being already prepared, each one is laid on the block and gently pressed down by the rubbing of a kind of brush, made of the hair of the Tsung [i.e., 棕 palm] tree. The sheet is then thrown off; one man will throw off 2,000 copies in a day. Chinese paper is very thin, and not generally printed on both sides, though in some particular cases that is also done. In binding, the Chinese fold up the sheet, turning inward that side on which there is no impression. On the middle of the sheet, just where it is folded, the title of the book, the number of the leaves, and of the sections and also sometimes the subject treated of, are printed, the same as in European books, except that in the latter, they are at the top of the page, whereas here, they are on the front-edge of the leaf; and generally cut so exactly on the place where it is folded that one in turning the leaves, sees one half of each character, on one side, and the other half, on the other. The number of sheets destined to constitute the volume, being laid down and pressed between two boards, on the upper one of which a heavy stone is laid, they are then covered with a sort of coarse paper — not with boards as in Europe; the back is then cut, after which the volume is stitched, not in our way, but through the whole volume at once, from side to side, a hole having been previously made through it with a small pointed iron instrument. The top and bottom are then cut, and thus the whole process of Chinese type-cutting, printing, and binding is finished.⁴²

All this work was sometimes executed by just one person⁴³ but far more commonly by separate specialists in each of the four stages.⁴⁴ Although by probably the mid-thirteenth century and no later than the early fourteenth century, some workers, including carvers, were women or children, they usually were adult males.⁴⁵

The overall cost of this work has long confounded Western commentators (traditional Chinese records very rarely mention the issue), and on this matter Milne expressed to London his own perplexity. Firstly, “there are always a great many incidental expenses, which cannot at first be brought into any calculation.”⁴⁶ More troublesome was the great number of variables for every aspect of the printing stages, creating a confusing tangle of figures and prices that undermine the validity of any clear-cut conclusion on prices and thus on the key issue of the relative costs of printing with woodblocks or with moveable type:

Not having a sufficient series of facts on both sides of the subject, to form proper data, I choose rather to propose this in the form of question, than to affirm any thing relative to it. Without seeing both methods fairly developing their advantages, no man can be a proper judge of their merits; and without a full, clear, explicit, and merchant-like statement of all and every item of expense attending both methods, for *a given quantity of work*, (say an edition of thirty thousand copies of some standard book,) there is no means of coming to a correct decision.⁴⁷

A major complication to any calculation of production costs was the lifespan of woodblocks. Over time, their surface wore out, thereby limiting the number of clear copies they could make.⁴⁸ To postpone that inevitability, the printers would, “after making 2000 to 3000 copies, ... gently wash the plate, repeatedly dry the blocks and not allow their face to soften by being kept wet with ink for a long time, then let the blocks dry, so as to re-harden their surface and thereby extend their printing life.”⁴⁹ Yet, the point at which blocks started to print blurred, unsellable copies was hard to determine in general, and Milne’s conclusions are characteristically cautious and precise:

The permanent clearness of a Chinese impression depends greatly on the quality of the wood of which the plate is made; on the goodness of the type cutter’s work; on the proper tempering of the ink, and on the care of the printer. If, for example, the printer be a clumsy or careless workman, the very first thousand copies will appear blotted, and the blocks will not last any length of time — perhaps they will not bear casting off 6 or 7,000 copies without being renewed, or at least repaired. I am not able to say with certainty, *what number* of copies, good blocks will bear to be cast off: our printers there affirm, that *thirty thousand* can be printed from the same plate, if it possess the quality and advantages above mentioned. From some that we have used, in the service of the Mission, upwards of *ten thousand* copies have been printed, and they seem perfectly able to bear another edition of the same number, if carefully treated.⁵⁰

Two decades later, another missionary raised Milne’s top figure of 30,000 by roughly a third: “It used to be supposed by foreigners that not more than 15000 or 20000 copies could be taken from a set of [wood]blocks. But from recent experiments it appears that more than 40000 copies may be struck, giving very fair impressions.”⁵¹

In the end, this basic issue of the maximum size of a print run

remains for both Milne and us too complex to permit just one figure. The variables of quality he indicated for wood, ink, and print work are too great to allow any single conclusion, but rather a set of maximum estimates of, say, 6,000 for poorly carved and tended blocks, a maximum of roughly 40,000 copies of well-cut blocks of very hard wood, and, far more commonly, runs of 15,000 to 30,000. And, to muddy the water even more, these woodblocks, even while still capable of printing readable copies, could themselves be sold off to be replaned for the carving of another book.⁵²

After presenting his readers with all these complexities, Milne is aware of woodblock printing's disadvantages. He mentions the length of its production time, its seeming inappropriateness for miscellaneous ephemera, the storage problem created by the accumulation of woodblocks, the declining clarity of a used woodblock's impressions, the expense from the repetitive labor required to carve the same character many times, the uselessness of worn-out wooden blocks, and the difficulty of including other languages' writing in columns of Chinese characters. Yet, in the end Milne does not disguise his conviction that woodblock printing in some if not many instances is both cheaper and more suitable than moveable type for printing in Chinese. Admittedly, he is largely ignorant of the variety of earlier Chinese successes in using moveable type (he seems unaware that moveable type was invented four centuries earlier than Gutenberg by Bi Sheng [c. 990–1051] in the 1040s)⁵³ and of the considerable drop in book prices from the mid-eighteenth century to the early nineteenth.⁵⁴ Moreover, wooden moveable type, according to a sophisticated analysis recently presented by Martin J. Heijdra, was arguably the cheapest means of printing books with very small runs, of roughly a hundred or fewer. Milne, most likely due to his interest in achieving large runs for the Bible and his religious tracts, ignores this possibility and so focuses, like virtually all the missionaries, on metal moveable-type versus woodblock printing, to reach a conclusion he considers valid for all runs regardless of their size.⁵⁵ And, he completely neglects the advances of stereotyping⁵⁶ and especially the attractions of lithography, a very late eighteenth-century invention that represented the first major innovation in Western printing technology since Gutenberg's time.⁵⁷

Despite these weaknesses in his analysis, Milne distinguishes

himself from most of his British contemporaries by calling attention to the important cost advantages of woodblock printing for Chinese-language texts. Firstly, Chinese woodblock publishers, unlike their Western counterparts, had no need of a foundry for casting type, or expensive and complex machines for printing and binding, or premises (with costly rent) for housing equipment and products (they had only to house the woodblocks).⁵⁸ In addition to a handful of simple carving tools, carvers merely required a small table and odd stool. Moreover, this pair of wooden furniture pieces could be located virtually anywhere, be it temporarily designated space in a domestic or temple courtyard, the corner of a cellar or attic, alongside the bed in a small room, publicly accessible land alongside a field or road, or even the deck of a traveling ship.⁵⁹ Consequently, a publisher's overhead and rent were minimal, as would also be the initial layout of capital and interest payments.⁶⁰

Secondly, the casting and cutting of Chinese characters into metallic type was, at least initially, more expensive than the purchase and carving of woodblocks, not least because the Chinese language consisted of tens of thousands of distinct characters, some of which would have to be made in many copies for moveable-type printing. Long-term use of these fonts would cut their cost, but many beginning enterprises could not bear the heavy initial outlays or interest rates on loans to meet the starting costs of a printing press and type font. At this time, Milne was seeking funds to print in Chinese his *On the Exposition of the Epistle of Paul to the Ephesians*, and in a separate composition explains why printing this book with woodblocks would be far cheaper than with Western-style moveable type:

The expense of preparing a set of good blocks for it will amount, I suppose, to £50 sterling at least. It contains about 86,000 characters. If to these the points and head-lines be added, they will amount to 90,000. The expense of printing it with the defective font of moveable characters which we possess, would amount, I think, to much more than four times that sum; for there are, as you will see, three different sizes of letter, which could require as many different sizes of character. This would necessarily be very expensive. On the Chinese mode, the different sizes of character are all cut on the same block, by the same hand, with the same ease, and at nearly the same price. But indeed, in our circumstances, and with our views of the subject, we are fully satisfied that the Chinese method of printing is the most suitable to their language, and best adapted to our purposes.⁶¹

And, thirdly, labor costs for woodblock production were noticeably cheaper than for moveable-type printing. The block cutters' "only business is to follow their copy. Of this latter sort, there are many in China, females particularly (for they also cut as well as men), who cannot read a single word; and yet they earn their daily bread at this work. But such could not be employed as [moveable-type] compositors," since a compositor needs to have some knowledge of reading: "A tolerably educated Chinese cannot be employed for much less than double the wages of a mere mechanic; and I am persuaded that men of tolerable education are necessary to carry on this work with expedition."⁶²

The low wages of these woodblock workers, as well as their efficiency, astonished Milne, as they had all Western commentators on Chinese printing ever since the Jesuit missionary Matteo Ricci noted "the ridiculously low" price of Chinese books in the late sixteenth century.⁶³ Milne estimated that, over the course of a year, a good carver could cut on average 150 characters a day, and two Chinese workers, each printing from a separate block, will between them run off 2,000 paper copies a day. This Chinese pair, if compared with the production level of an English press using a form of only four pages for each impression, could produce "about as many sheets in a day as the two men at the English press can, supposing both parties equally qualified in regard to skill and strength."⁶⁴ Medhurst, in coming to the conclusion that "the rapidity with which [the Chinese] carve their intricate and complicated characters is really surprising, and not to be imitated by European artists, in the same style of execution," lowered the first of these figures to 100 characters a day for the carver but raised the second to 3,000 copies a day for one printer.⁶⁵ Equally striking to Medhurst was the cheap cost of Chinese labor: "A London engraver was surprised when he learned, that what could cost sixty or eighty shillings in England might be accomplished by a Chinese workman for half-a-crown [i.e., 2.5 shillings, or less than 5 per cent of the London cost]."⁶⁶

Yet, once again Milne shows a sharp awareness of the complexity of labor costs by noting the great range in Chinese carvers' pay. Whereas the famous Haechang Temple in Canton hired carvers by the day for one cash per carved character for its handbills, public notices of festivals, and religious tracts,⁶⁷ he notes that his colleague Morrison at the start of the nineteenth century had received from several workers in Canton greatly varying estimates for the price ("in

Spanish [i.e., Mexican] dollars”) of three grades of work involved in carving 10,000 woodblock characters: top-best quality: 30, 21, and 11; second-best quality: 20 and 15; and, third-best quality: 12 and 7.5. Westerners often had to pay more than Chinese, not least because the Chinese government banned the printing of their religious tracts in China and thus obliged Milne to set up his press in Malacca rather than Canton. Nonetheless, the second of Morrison’s estimates approximates the carving expenses Milne paid in Malacca in c.1820.⁶⁸ When compared with the cost of printing by moveable type, it does seem to have been cheaper, particularly when the publisher was not willing to make a long-term investment in his printing enterprise.

After his death in 1822, Milne’s recommendation would eventually lose out to arguments in favor of using moveable type for printing Chinese texts. The advocates of this technology held that moveable type was actually cheaper once its machinery was in place and once an adequate type font had been made for Chinese characters. Furthermore, they believed that the operation of this Western technology, since it needed little if any aid from Chinese workers, would free the mission from Qing dynasty controls over Chinese carvers and thus enable it to schedule more regular publication of its books.⁶⁹ But, I suspect that what won the London committee over to this “Westernization” printing plan was the committee’s evangelical drive to save the souls of 450,000,000 Chinese with its translated version of the Bible. Type fonts had their inadequacies,⁷⁰ but their runs far outstripped those of any Chinese woodblocks with maximum runs of, say, 40,000 cheap impressions. Salvation, then, lay with the technology of the printing press, and, by the mid-nineteenth century, its font was ready and its machinery had been moved to Hong Kong and then Shanghai. Virtually, without notice, the woodblocks made for the missionaries’ translation of the Bible fell into disuse, and two Western methods of printing, first lithography and then moveable type, came to replace woodblock printing for the great majority of urban publications by the second and third decades of the twentieth century.

If Milne’s recommendation of woodblock printing won few Western supporters during the nineteenth century, his analysis nonetheless remains highly valuable for its account of the process and economics of woodblock production on the eve of the introduction into China of modern Western printing methods, lithography as well

as moveable type. It enables us to understand why knowledgeable Chinese, aware of the potential of moveable type, still preferred woodblock printing and why its advocates in China were often hardheaded men of business as well as literati and scholars.

Changes in the Production of Woodblock Imprints

Milne's claims of low production costs for woodblock printing are, it must be said, supported by a variety of Chinese descriptive accounts and some price data from the mid-Ming onwards. These sources indicate the introduction of significant drops in production costs for each of the four stages of production during the sixteenth century. Consider first the matter of binding. The stitched binding of books mentioned in Milne's description was a method that originated between the late ninth and late tenth centuries but was widely adopted only from the sixteenth century, in part, to make books more durable.⁷¹ In contrast to the two kinds of book binding more commonly used from the tenth to the sixteenth centuries — that is, wrapped-back binding and butterfly binding with a stiff cover and pasted spine — stitched binding avoided the troublesome pastes that all too often in these other binding methods failed to hold the folded paper sheets together. Instead, it relied on puncturing the folded sheets with a sharp awl and threading them, with the aid of a press, into an evenly tied collection of pages. The production of such flexible but tightly bound volumes, moreover, required fewer workers and permitted a lower level of skill than did other binding methods. These books also proved more convenient for shipping and storing, with or without the protection of a clothboard box cover.⁷² Consequently, the widespread adoption of this kind of stitched binding, even for Buddhist texts, can only have cut book production expenses.⁷³

Printing costs, as far as I can discern, fell not due to any simplification of the printing process itself but due to a significant reduction in the price of printers' paper.⁷⁴ In the Song dynasty, paper had been expensive enough to warrant its regular recycling, as the late Ming scholar Zhang Xuan confirmed when, to his surprise, he discovered writing on the backside of pages in Song imprints stored in the Ming imperial library.⁷⁵ Song court offices even relied on the sale of used paper to finance a banquet or increase their revenue.⁷⁶ Then, in the fifteenth and sixteenth centuries, the greater production of cheap

(and sometimes improved) bamboo paper from Fujian and Zhejiang Provinces and the exploitation of once distant forests in Jiangxi Province greatly increased the supply of cheap paper in south China.⁷⁷ So inexpensive did paper become that the walls of villages in the southeast were soon festooned with government paper posters and shrines and temples lit up by the constant burning of paper money.⁷⁸

But, the major factor in reduced book production costs during the middle and late Ming came from falling labor costs in reproducing the script carved into woodblocks. As such, these savings were most evident in the transcription and carving stages of the production process, two stages that, together, account for most production costs in the known woodblock printing budget estimates from the late Ming and the nineteenth century.⁷⁹ Whereas up to the early Ming the transcriber of a literati text onto the paper sheets destined for a woodblock might be the author of the text, his disciples, his friend, his son, or even a respected calligrapher,⁸⁰ from the latter half of the Ming the transcriber even for literati works was normally a “mere transcriber.” He was, as Milne noted, not a scholar or literatus but a lowly scribe with a few circumscribed skills: “To write this form of the character, is of itself an employment in China. There are men who learn it of purpose, and devote themselves entirely to the labor of transcribing for the press. Few of the learned can write it: indeed they rather think it below them to do the work of a mere transcriber.”⁸¹ The transcribers were expected to write characters in a calligraphic style that blended and simplified the brushstroke styles of Tang dynasty calligraphers famous in the Song dynasty, such as Ouyang Xun (557–641), Yan Zhenqing (709–85), and Liu Gongchuan (778–865). Commonly known, therefore, as “Song dynasty characters” (*Songti zì*) — this is the very term Milne uses to name the kind of characters written by transcribers in his analysis⁸² — this homogenized style is more accurately described by its alternative name of “artisanal characters” (*jiangti zì*). Nondescript and impersonal, it relied on the manipulation of a brush to form square-like characters out of five kinds of straight, flat, and upright strokes (一, |,), \, and ㄟ). The resulting box-like uniformity of characters facilitated carving and legibility as well as imparted a balance to the look of the page.⁸³ But, it paid little attention to the dynamic interplay in the original brushstroke order and style of the calligraphy, and the imprint looked significantly less like a manuscript (see Figures 2, 3 and 4).⁸⁴ Predictably, the eyes of literati readers were not pleased.

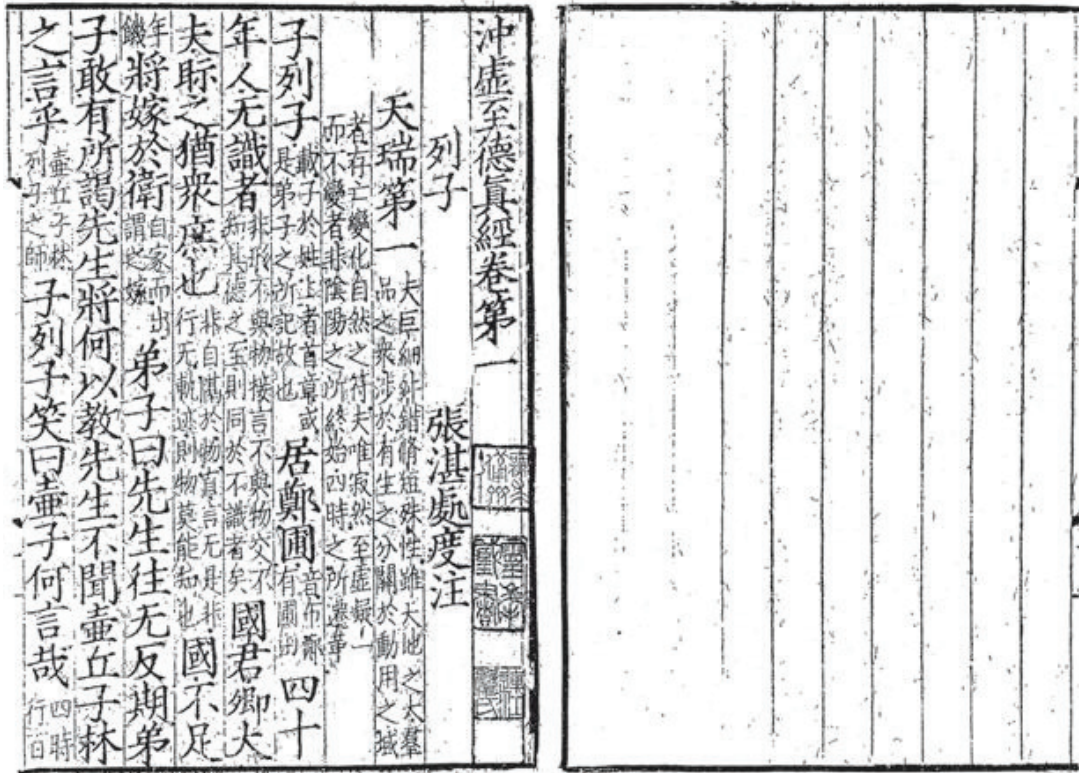


Figure 2 Zhang Zhan, annot., *Chongxu zhide zhenjing zhu* (Northern Song imprint), in Yan Lingfeng, comp. *Wuqiu bei zhai Liezi jicheng* (Taipei: Yiwen yinshua shuguan, 1971), v. 2

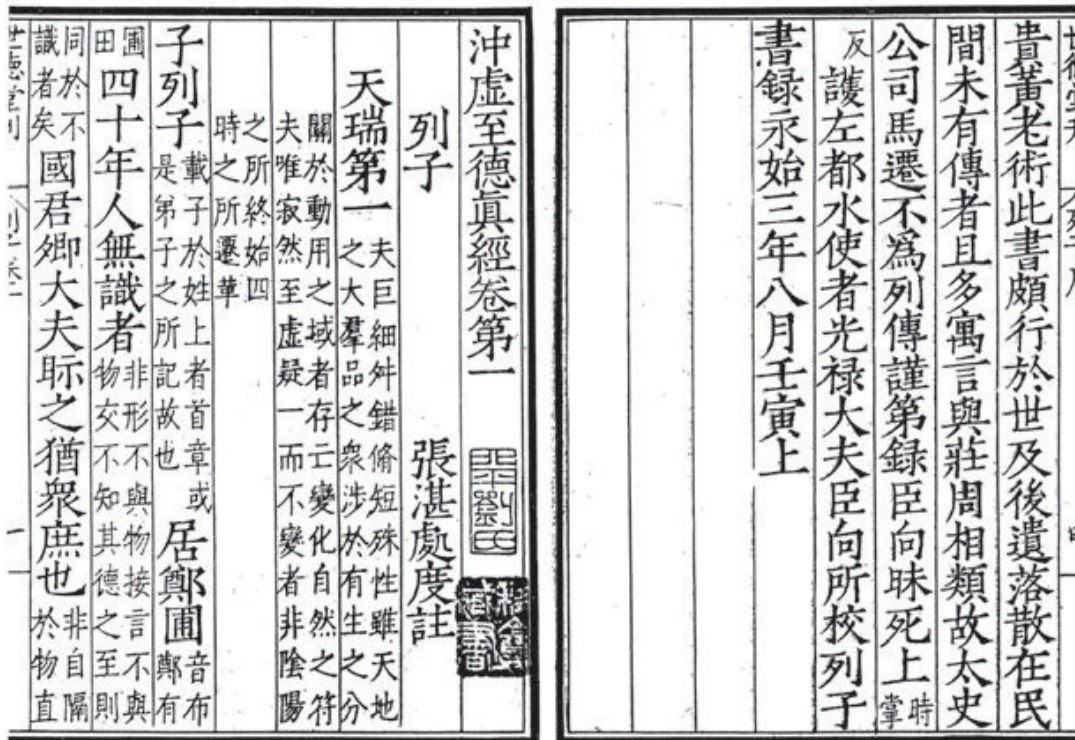


Figure 3 Zhang Zhan, annot., *Liezi zhu* (1530 imprint), in Yan Lingfeng, comp. *Wuqiu bei zhai Liezi jicheng* (Taipei: Yiwen yinshua shuguan, 1971), v. 2

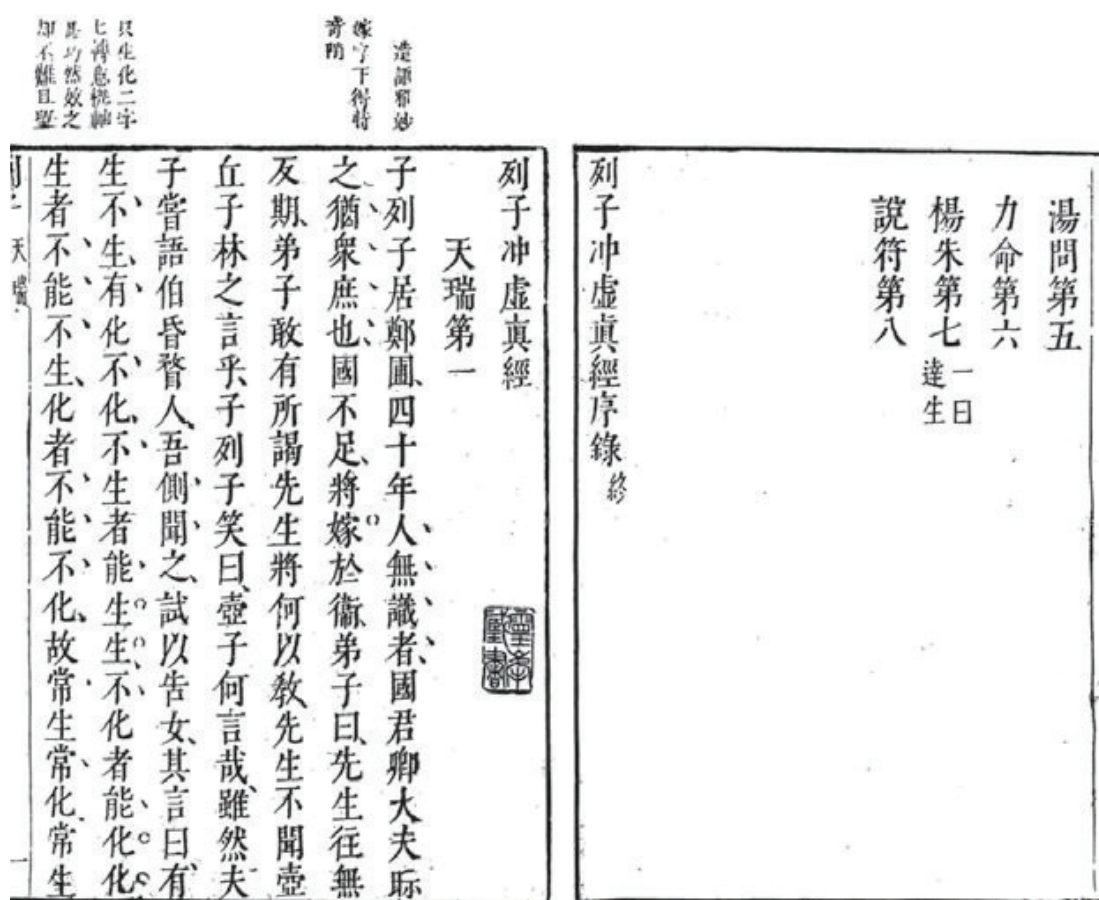


Figure 4 Sun Kuang, annot., *Liezi chongxu zhide zhenjing ping* (1621–27 imprint), in Yan Lingfeng, comp. *Wuqiu bei zhai Liezi jicheng* (Taipei: Yiwen yinshua shuguan, 1971), v. 8.

This change of calligraphy style had clear implications for woodblock scribal and carving work beyond the concerns of aesthetics.⁸⁵ In Lucille Chia's view, it cut costs, since it allowed the publisher to squeeze more characters onto the surface of a woodblock.⁸⁶ The severe restriction it placed on the range of a scribe's strokes and carver's cuts further lowered costs, since it reduced the range of calligraphic and carving skill demanded of their work. Able thereby to farm out some of this work to family members less gifted with cutting tools, the carvers seem to have gone about their work more quickly and cheaply but also in a strikingly different way. The clearest guide to the scale of savings is found in the wages prescribed for the scribes and carvers engaged to write or carve three different calligraphy styles for the Imperial Household Department (*neifu*) in the eighteenth century:

Calligraphy Style	Scribe, per 1000 Characters	Carver, per 100 Characters
Song [or, Artisanal]	2 <i>qian</i> of silver	8 <i>fen</i>
Ou[yang Xun]	4 <i>qian</i> of silver	1 <i>qian</i> 6 <i>fen</i>
Standard (<i>kaishu</i>)	3 <i>qian</i> of silver	1 <i>qian</i> 3 <i>fen</i> ⁸⁷

The drop in the labor costs of these two relatively expensive stages of book production of 50 percent (shifting from the standard to artisanal style) and 100 percent (shifting from the Ouyang Xun to artisanal style) points to significant savings that, in a competitive market, must have eventually led to considerable cuts in the cost of books for customers.

This change in the calligraphy style of an imprint also led, it seems, to a different method of carving, if not in this project then in other carving assignments. Just as a scribe reproduced a limited array of brushstrokes easy to carve, so did a carver cut on a single woodblock all examples of one type of brushstroke before cutting the rest. Each stroke in a character functioned as a reproducible part within what Lothar Ledderose has aptly termed “the module system” of Chinese script and art.⁸⁸ Once carved and printed, this script invariably resembled metal or wooden type more than the calligraphy of the famous masters it was said to imitate. In hindsight, then, the widespread adoption of these artisanal characters for literati imprints from the mid-Ming onwards represents a significant step in the long-term evolution of Chinese printing styles from manuscript-style to type-style script.⁸⁹ This shift would culminate in China with the widespread switch to lithography in the late nineteenth century and then to moveable-type printing in the twentieth century. Eventually, it would lead to the virtual demise of woodblock printing by the middle of the twentieth century.⁹⁰

While we have no Ming description of the carvers’ actual division of their labor (and Milne’s own Chinese printer did all four stages of the work in Malacca), Medhurst’s 1838 account presented above clearly has a carver cut a woodblock’s characters in a stroke order — first the horizontal strokes, then the oblique, and finally the perpendicular (i.e., the vertical) — very different from the order in which they would have been transcribed. Three twentieth-century accounts generally confirm and clarify the workings of this carving process. A field survey report on traditional practices observed in

Yangzhou in 1999 indicates that each of the five artisanal strokes used for writing characters would be completely carved in turn for an entire sheet and woodblock, not for just each character in turn.⁹¹ Such a reconstitution of the work process had potential implications for the carvers themselves; that is, once this work was divided in this way, more than one carver could in theory share in the work of carving the text of a single woodblock. In fact, this type of division of labor into distinct work modules was observed by Tanaka Shishō on a visit to China before World War II. The hard work (e.g., the horizontal strokes) was done by accomplished carvers and the relatively easy work (e.g., the vertical strokes) by their apprentices and other less experienced carvers, thereby relying on as many as four workers to carve the text of a single woodblock.⁹² A recent report from Huizhou prefecture in southern Anhui confirms the general point of Tanaka's account, as woodblock carvers there are said to have divided up the carving work for a single woodblock among themselves according to the five separate strokes of the artisanal characters (no mention was made of a reliance on apprentices, but their use cannot be automatically ruled out).⁹³

Since the first detailed Chinese account of the process of book production dates from 1947, the lack of any Ming or Qing source confirming such a division of carving labor need not rule out its practice then. Indeed, late Ming China boasted of far more detailed divisions of labor (up to 400 workers were used in as many as twenty-three stages in the production of porcelain at the Ming imperial kiln in Jingdezhen),⁹⁴ as well as of a trend for the adoption of simplified carving techniques for the related art of lacquerware (this change has been attributed to a shift of the work to large studios where carving assignments were parceled out to different carvers).⁹⁵ In sum, we should allow for a variety of carving practices associated with the increasing use of the artisanal characters from the mid-Ming, as determined by availability of carvers, their varying levels of expertise, their work schedules, the production budget, and other local factors. While the more advanced practices of labor division may have originated after the Ming, even the use of a single carver for artisanal characters in the latter half of the Ming would have generally simplified the previous work process, making it quicker and cheaper. Thus, the late fifteenth and early sixteenth century changes in book publishing skill, especially carving, confirm the first half, though not

the second half, of Francesca Bray's general assessment of Ming technology: "the overall technological trend was towards smaller, not larger, scale, and toward more skilled methods."⁹⁶ Even though the writing and carving of artisanal characters required their own special skills, the latter claim of Bray's statement held only for up-market editions of literati imprints and their prefaces, a share of the total imprint market that declined greatly over the course of the Ming.

The claim of lower production costs and cheaper books is confirmed by the very limited price data we have on carvers' wages and book prices from the Song through the Yuan and Ming dynasties. These figures are notoriously hard to interpret accurately, since prices for the same title and amount of work could vary greatly according to the quality and availability of labor and materials, the place of production, and the infernally complex irregularities of metallic currency changes and depreciations over the seven centuries of these three distinct dynasties. Nonetheless, the price data for carving 100 characters in the Yangzi delta show a remarkable drop from, on average, about 35 *wen* in ca.1250 to 3.5 *wen* in ca.1600.⁹⁷ This fall in so crucial a component in book production costs, when combined with the other production savings we have considered, can only have meant a considerable drop in the overall cost of producing and buying books. High-cost versions of new and old titles continued to be published, but far cheaper versions of these were now available and in far greater numbers. These production and price changes would have, as we shall see, a considerable impact on the great expansion of commercial publication that took place in the last century and a half of the Ming.

The Worlds of Woodblock Carvers

What, then, was the impact of this fall in the cost of carving and other imprint production factors on the condition and organization of labor during the sixteenth century? By itself, perhaps little. But, thanks to some official records, to information in the imprints themselves, and to apparent changes in the way work was recorded on the woodblocks and their printed sheets, we can attempt an answer to this difficult question for the carvers. Unfortunately, our sources are seldom informative about the other kinds of artisans involved in imprint production.

Tucked away in printed books on the fold of sheets, at the end of prefaces, chapters, and introductory remarks or in the corners of illustrated prints, are the names of some 3,000 woodblock carvers from the Song and Yuan and another 6,000-odd from the Ming.⁹⁸ Their names appear in only a small portion of the surviving imprints of these dynasties — for example, less than four per cent in the Ming.⁹⁹ They also tended to appear more in some areas' imprints than in others'; for example, far more often in publications of Hangzhou and Hubei in the Song and Suzhou in the Ming than in those of Nanjing, Guangdong, Fujian, and the regional princely establishments in the Ming.¹⁰⁰ They are far more numerous than the names found so far for individuals involved in the production of other types of Song, Yuan, and Ming dynasty handicraft goods, such as porcelain, jade, ivory, and lacquerware. Also, they far outnumber the names of other book workers. For instance, for the Song we know the names of no more than twenty-two printer artisans and fewer binders, and just five printer artisans and seven binders in the Ming.¹⁰¹

This information, when used to reconstruct the working career of these carvers from their listed involvement in various book publications, shows that a carver's life in certain dimensions did not change significantly from the Song through the Ming. Carvers tended to congregate in centers of book production. By the mid-thirteenth century, thus, they worked in at least ninety-one prefectures in south China, but mainly in Hangzhou, Jianyang in northern Fujian, and Chengdu in Sichuan.¹⁰² In the Jin and Yuan dynasties, the centers of production were Pingyang prefecture in southern Shanxi Province and, once again for southeast China, Hangzhou and Jianyang.¹⁰³ By the late Ming, the lower Yangzi delta, mainly Suzhou and Nanjing, would dominate along with Jianyang. By the early seventeenth century, carvers would also have found their way to provinces that, in the Song and Yuan, had produced only a few books (e.g., Hunan, Shaanxi, and Guangdong) but had recently started to print a fair number of imprints for the book market.

Conversely, many woodblock carvers from Song times onward were journeymen.¹⁰⁴ Their tools, as already seen, were few and portable. The demand for their labor in a single location or establishment could be unreliable and intermittent,¹⁰⁵ lasting perhaps a few days but also stretching out at intervals for as long as a

century.¹⁰⁶ And, many prefectures had a shortage of artisans with the necessary skills for quality work,¹⁰⁷ so that much low-grade carving was done as secondary work by locals normally engaged in agriculture and other occupations. In the Song and Yuan dynasties, many traveling carvers appear to have been born in Hangzhou and Fujian.¹⁰⁸ In the Ming, many still came from Fujian but also from Zhejiang and, perhaps primarily, Jiangxi¹⁰⁹ (the Ming transcribers often came from Suzhou, or at least claimed to).¹¹⁰ The range of their movements was extensive, a single Ming carver working in places as distant and varied as a Suzhou commercial printing house and a Mt. Wutai monastery off in northern Shanxi Province¹¹¹ (one suspects the involvement of labor or monastic brokers). The labor market for woodblock carvers in southeast China by the late twelfth century had started to become integrated, with, for instance, Hangzhou-based carvers finding work in 1177 alongside local carvers in Fuzhou, Jiangxi Province.¹¹² By the early fourteenth century, and even more during the sixteenth and seventeenth centuries,¹¹³ that process had further developed, so that by the late sixteenth century as many as 387 carvers (as well as 84 scribes and 3 illustration carvers) from over 50 counties in 5 southeastern provinces might work in Hangzhou prefecture for the publication of an extensive collection of Buddhist texts.¹¹⁴

We can also note three changes that mark off the organization, division of labor, and social status of carvers in the sixteenth century from what they had been in the early Ming. Firstly, Ming artisan households acquired, by the late fifteenth century, greater independence from state control than they had known up to the late fifteenth century. As one type of artisan household, carvers' households, particularly those resident in or near large cities with publishing houses, like Nanjing, Beijing, and Hangzhou, would have been obliged to carve woodblocks for state printing publications for as much as two months every two years. For instance, 150 carvers were assigned to the Directorate of Ceremonial in the initial Ming capital of Nanjing on regular two-year assignments, as were 312 binders and 58 printers on regular one-year assignments.¹¹⁵ By the end of the first century of Ming rule, such government work duties had begun to be replaced by cash payments, and by 1531, the number of artisans in this Directorate who were listed as engaged solely in publishing had more than doubled, to almost 1,300. Of these, 48 were brush-

makers, 62 papermakers, 77 illustrators (or painters), 77 ink-makers, 80 cutters, 134 printers, 189 paper-sheet folders, 293 binders, and, as the largest group, 315 carvers. Quite likely, many of these workers did not work full-time and paid someone else to do this work for them. Nonetheless, it is clear that, by 1582, the woodblock carvers in Beijing had their own guild, as the emperor then granted a tax exemption to a woodblock carvers guild (*kanzi hang*) and thirty-one other guilds, including those for book workers (*tushu*), gazette copiers, intermediaries, and brush sellers, in the two metropolitan counties of Beijing.¹¹⁶ For south China, a woodblock carvers guild is first recorded in 1739 in Suzhou.¹¹⁷ The precise governance of these guilds, organized at least in part to ease the payment of taxes levied collectively on members, remains unclear. Yet, the state's role would certainly have receded, to allow for the increasing demands of the commercial publishing houses from the sixteenth century.

Secondly, as government controls weakened, the carvers seem to have formed more of their own work groups. Carvers had routinely worked in groups as just one of the various types of artisans engaged in imprint production, and each had regularly done just a small number of the pages in an imprint since at least the Song. As many as 134 carvers were hired for a Southern Song (1127–79) printing of the 102-chapter (*juan*) collected writings of the neo-Confucian master Zhu Xi, and, arguably, 80 carvers worked regularly in the relatively large publishing establishment of Mao Jin, *The Hall of Drinking from the Well of Antiquity* (*Jigu ge*), in the mid-seventeenth century.¹¹⁸ Yet, beginning in the Yuan dynasty and increasingly evident from the late fifteenth century was, in the view of Nagasawa Kikuya and Tanaka Shishō, another form of carvers' work group: the carver whose name was cut into the woodblock had actually become the head of a group of carvers. As head, he arranged not just his own employment but also that of the other carvers in his group, both the experienced and the apprentices. The evidence for this claim about changes in work arrangements is largely circumstantial; that is, the declining frequency of the inclusion of a single carver's name on woodblocks and the sheets from the Song, when it was often on every printed sheet, to the Ming, when it was on but a few printed sheets and sometimes just on the final printed sheet of a chapter.¹¹⁹ Since many artisans working for commercial publishers in the Song would also have had their own young apprentices, it is hard to think of such a group

arrangement as new. But, it may be that the increased use of commercial printing in the Ming made it more common and allowed the head to arrange work for other experienced carvers as well as his apprentices, including younger family members and relations.¹²⁰

Far less speculative is the evidence of greater stratification within the ranks of woodblock carvers by skills, location, and connections. Within the overall process of imprint production from Song times onward, the carvers as a group accounted for most of the wages paid to the four types of artisans involved in imprint production. Yet, even if their share might total nine or ten times more than, say, the payment for scribes, the average scribe nonetheless could do the work far more quickly than a carver (transcribing, by one estimate, 2,500 characters a day)¹²¹ and on an annual basis would probably have earned considerably more than the ordinary carver. Furthermore, the scribe was literate and the carver often was not, thereby letting the scribe, even when younger, receive more face than the carver.¹²² During the Ming, such distinctions among these different kinds of book production artisans persisted. Significantly, however, they were supplemented by increased distinctions in pay and status among the carvers themselves. While such economic and social differences had undoubtedly existed earlier in the Song (when these workers might have held the same tools and jobs and came from the same native place), in the late Ming we see a far wider social span, some carvers at the top, and less typical, end of the social hierarchy of their craft, distinguishing themselves as literati artisans.

The clearest examples of literati carvers were the Huangs of She county, Huizhou prefecture, in southern Anhui Province. Between the mid-sixteenth and the mid-seventeenth centuries, hundreds of them gained fame and fortune for themselves and their lineage by means of their delicate thin carving.¹²³ First recognized as the regional Huizhou style, their skilled use of the carving tools eventually influenced carving styles elsewhere in the empire. This popularity not only enabled the Huangs to replace a rival lineage as the dominant group in their native village and in the Qing dynasty to secure a special niche in the printing of lineage genealogies.¹²⁴ But also, it won much demand for their work as woodblock carvers and even small publishers in Nanjing, Hangzhou, and other cities of the Yangzi delta.¹²⁵

These Huangs generally made no effort to disguise their lowly origins as farmers, carvers, or even book merchants.¹²⁶ Yet, many of

these males preferred, like some highly respected late-Ming potters, gardeners, and bamboo-carvers, to present themselves as literati rather than as artisans¹²⁷ (at least in the nineteenth century, ordinary woodblock carvers in north and south China worshipped the god Wenchang, better known as the god for literati and civil service examination candidates).¹²⁸ Admittedly, no Huang seems to have imitated the artisan Zhu Gui by carving a book he had written.¹²⁹ Yet, their work, often included as illustrations in the flourishing literati genres of drama, fiction, drama, and print albums, won favor in literati circles. Understandably, then, many Huangs adopted a literati persona, taking on at least one style name (*zi*) and one soubriquet (*hao*) in the manner of any aspiring literatus. Some achieved local fame for their calligraphy and transcribed the texts they proceeded to carve.¹³⁰ Others became known for their compositions, their prose style, and their medical knowledge.¹³¹ Others were skilled in the literati arts of painting, portraiture, calligraphy, and music.¹³² And yet others became heads of small publishing concerns.¹³³ Many regularly traveled back and forth between their Huizhou village and the cities of the Yangzi delta, taking up work assignments and long-term residence in urban literati centers like Suzhou, Nanjing, and, especially, Hangzhou.¹³⁴ If no Huang carver actually passed the civil service examinations beyond the local student school level, some of their kin did gain official appointments, a certain Huang Quan even becoming a painting aide in the Ministry of War and a scholar in the Ministry of Rites.¹³⁵ To cite just one example, Huang Yingcheng (1565–1640) revised the family genealogy, wrote fine prose, composed a preface to a lineage genealogy, and carved illustrations for at least one known imprint.¹³⁶

How different was the compensation for the successful literati carvers like the Huangs from that for the ordinary carver? At present, it is impossible to say. But, clearly their reputation and higher salary derived from the eminence that more than thirty of them achieved as carvers of illustrations (*huike*).¹³⁷ Despite the excellence of some Song illustrated prints (often to accompany Buddhist texts), this specialized term and category was first applied to carvers of woodblock illustrations, I believe, in the late Ming, as recognition of their distinctive craft.¹³⁸

At the bottom, more typical, end of the scale, one finds artisans with poor working conditions and low pay. Working on short-term

jobs, perhaps as brief as a day, they would be hired to carve between 100 and 150 characters a day. They were paid per diem or for each 100 characters they carved; calculated either way, their wages were low, varying in several sixteenth-century cases from 2.5 to 3.5 *fen* of copper cash per 100 characters.¹³⁹ A full day's work of, say, 150 characters, would earn a carver between 3.8 and 5.2 *fen*, along with a hard bed and a meager board of two meals. If his work was judged insufficiently skilled or not in line with the requested specifications, then, according to two late Ming contract forms for hired labor (both of which were published in the lower Yangzi delta), he was to lose a portion of his already paltry pay.¹⁴⁰ Although the wages for carvers, according to early nineteenth-century reports, accounted for between a third to a quarter of all the production costs for buying, cutting, and printing books off woodblocks,¹⁴¹ the carvers then and earlier could barely scrape together a living for themselves (in the late Ming, 1 *fen* was needed to pay for one day's humble fare for a Buddhist monk).¹⁴² Consequently, these itinerant workers rarely had any savings and at least a sizeable minority had no family of their own (a single imprint title often has carvers of the same surname, and it is likely that they were kin, but few of the 6,000 Ming woodcarvers we know of are identified as father and son). When marrying, many carvers, particularly the journeymen, may well have been unable to pay for the service of that respect-conferring busybody so well known to readers of Chinese fiction as the go-between.

The most insightful guide we have to the life and circumstances of such carvers is a short, but remarkably personal, biography written by the Suzhou literatus, Tang Shunzhi (1507–60), about a hired book worker (*shuyong*) named Hu Mao.¹⁴³ Fortunately, his name is not a literary dead-end, as Tang's appreciation of Hu's work opens a window onto the otherwise unrecorded experience of workers involved in the production of books, in this case principally the stage of binding, probably in Suzhou, the city reputed to do the best binding work.¹⁴⁴ Born in the southern Zhejiang county of Longyou, Hu Mao lacked the funds required to continue in the occupation of his father and elder brother(s), of trading in used books. But his skill at collating and binding books, particularly at ordering the mass of texts for printing sheets and piercing the sheets with a sharp awl, astonished many contemporaries in the book trade, not least because the pace and quality of his work were not deterred by his inability to

fathom the meaning of the text. Initially, his talent won him much work in bookstores and in scholars' homes, both of which often printed books. Otherwise, his sole interest throughout his life was liquor: "The cash pay acquired by hired book workers is not much, and he used it all up in liquor. Hired book workers do not ask about being paid in cash; they invariably ask about whether the liquor can be enough or not. Mao had no wife and son. He was a hired book worker for several decades, and he had no pile of tiles where he might perch his body. Other than being permanently drunk, he was aware of nothing."¹⁴⁵ Later on, he made a living in the homes of various scholars, but his skill with books went unused. Fearing, then, that Hu had made no preparations for his burial, Tang ended up buying him a coffin made of fine cypress (*shan*) wood and composing a brief memorial to honor his skilled work. The response of Hu Mao and other Ming workers with woodblocks to these working conditions, when they were sober, can easily be imagined. Yet, no Ming account records any collective activity by them other than for, perhaps, religious worship and mutual support. They certainly did not engage in collective efforts to raise their salary, such as were attempted, in vain, by Suzhou's papermakers in 1755 and printing employees in 1845.¹⁴⁶

This vignette of "a proto-industrial proletariat" suggests a sharp social divide between woodblock carvers and the literati authors of the texts they cut. Often that must have been the case, Tang Shunzhi's sympathy being more the exception than the rule. But, in the late Ming also the boundaries between artisan and literatus were blurred not only by artisans like the Huangs but also by Yangzi delta literati like Wen Peng (1498–1573). This painter, the son of sixteenth-century Suzhou's most famous literatus, Wen Zhengming (1470–1559), took up a chisel and knife to carve seal stones and secured a very successful career as a seal carver, with no loss to his reputation as a literatus.¹⁴⁷ Even with woodblock carving, one can note a few signs of this trespassing, as when some students at the National University in Nanjing during the last half of the sixteenth century carved woodblocks that were eventually used to print the university's edition of three dynastic histories (neither their Song nor Qing counterparts appear to have engaged in such labor).¹⁴⁸ In the commercial printing world of Mao Jin's publishing establishment, Jigu ge, the 200 men who were hired to produce books printed in the "artisanal character" style worked alongside literati who also became friends of their employer.¹⁴⁹

Yet, such crossovers into artisanship, even for literati painters who carved seal stones and sold them to others, were relatively few.¹⁵⁰ We know of a certain Mu Jinwen, a Nanjing man registered in Suzhou, who, upon giving up his *shengyuan*, or district, degree and his hopes for an official career, set up his own shop to support himself in the latter half of the eighteenth century. His business work had him personally carving woodblocks, at least sometimes for books dealing with ancient calligraphy and inscriptions, that his shop would then print from and sell. Similar cases of literati turning to the work of artisan are seldom recorded (his son, for example, succeeded to his job, but no claim is made for him of any examination success)¹⁵¹ and probably occurred more often than our sources suggest. Yet, carving the woodblocks of ordinary imprints was, unlike the carving of seals on order from individuals, impersonal work and of no status. Also, the work was quite often collective, obliging literati to associate with artisans engaged in the other stages of print and imprint production. By its nature, it would have been particularly otiose to many status-conscious literati, including those without the lowly district degree.

The future of woodblock production, however, lay with the artisans. In the eighteenth century, the simplicity, portability, low production costs, and low demand on skills enabled many poorer families to enjoy the benefits of its technical promise and its potential social reach. For the first time, many parts of China printed cheap individual illustrated sheets that met the demand of a far larger market for a more plebian treatment of popular subjects.¹⁵² The world of literati-ish carvers like the Huangs lost out to the world of Hu Mao and ordinary carvers.¹⁵³ Not only would there emerge in the large cities of the lower Yangzi delta a greater divide between some readers of literati books and their artisan producers, a gap that an artisan like Qian Jinren would try to bridge. But this world of cheap and numerous imprints would also impress Qian's near contemporary, William Milne, and prompt him to write his graphic account of how these books were made.

Appendix 1.1

A late sixteenth-century imprint of the Buddhist canon in the lower Yangtze delta details the budget for different stages of publication. Note that the cost of paper, printing, and binding is not included,

presumably because anyone receiving an offprint from these woodblocks was expected to pay these charges and services by himself or herself. Nonetheless, the prominence of carvers' wages in this budget (about three-quarters), combined with what we know of lower costs at this time for paper and binding, suggests that carvers' wages were the principal cost in this woodblock publishing venture. A photograph and transcription of this text, reproduced in the Japanese reprint of this canon, can be found in Inoue, *Chūgoku*, pp. 223–4:

- For each 100 characters the scribe receives 4 *li* of silver and the carver 3 *fen* and 5 *li* of silver.
- For each single woodblock, the transport from the place of purchase up to the temple is altogether 3 *fen* and 4 *li*, its planing work is 2 *li* of silver, and its margin-making work is 2 *li* of silver.
- For each woodblock, both faces have 20 columns. One column has 20 characters, so that each woodblock, upon the completion of the work on two sheets of the sutra, will altogether have a total of 800 characters [when a block has its full 800 characters, the carver would be paid 2 *qian* and 8 *fen* of silver].
- When both faces of each woodblock are carved and full of columns, the total expense [per woodblock] is 3 *qian* and 4 *li* of silver.

Appendix 1.2

Walter Henry Medhurst, *China: its State and Prospects*, pp. 569–71:

1. By Block Printing, at Malacca:	£	s.	d.
The passage of nine workmen, to and from China	72	0	0
Two thousand blocks, at £1 per hundred	20	0	0
Tools, gravers, &c	10	0	0
Transcribing 2,689 pages, at 9d. per page	100	16	9
Engraving 1,160,548 characters, at 1s. 3d. per hundred	725	6	10
Printing and binding 5,378,000 pages, at 1s. 8d. per thousand	448	3	4
Two hundred and ten peculs of paper, at £2. 10s. per pecul	525	0	0
[Total]	1901	6	11

The foregoing is the charge generally made for work done at Malacca, Batavia, and Singapore; in China the prices to Europeans are about two thirds of the above; but as we cannot now print with safety at Canton, we are obliged to take the estimate of work done in the colonies. The time occupied in the above undertaking, by nine type-cutters, and five printers and binders, would be somewhere about three years.

2. By Lithography, at Batavia:	£	s.	d.
For two lithographic presses, with stones	100		
Materials, repairs, &c.	100		
Transcribing 2,689 pages, twice over, at 9d. per page	201	13	6
Printing 5,378,000 pages, at 1s. per thousand pages	268	18	0
Binding the above, at 3d. per thousand pages	67	4	6
Paper, the same as in the first statement	525	0	0
[Total]	1262	16	0

The above is the charge for printing by lithography at Batavia, where labour is cheap. The folding and collating would cost less for sheets worked off at a press, than for separate pages printed by the hand, according to the Chinese mode. The time occupied in the work, by one transcriber, four pressmen, and one binder, would be two years.

3. By Typography			
Cost of 3000 punches, or matrices, furnished by Mr Dyer	425	0	0
Ditto of one thousand pounds weight of metal, at 2s. per pound	100	0	0
One iron press, cases, furniture, &c	100	0	0
Composition of 2,689 pages, at 2s. per page	268	18	0
Printing 5,378,000 pages, at 6d. per thousand pages	134	9	0
Binding the above at 3d. per thousand pages	67	4	6
For 168 peculs of paper, at £2.10s per pecul	420		
[Total]	1511	11	

My Dyer's types being somewhat smaller than those used in the octavo edition of the Bible, less paper will be required. If, however, the French types be used, not only will the original cost be less, but a saving of one half the price of paper will be effected. The time required for the punch cutting cannot be precisely stated; but supposing the types ready, the printing of two thousand copies of the Chinese Bible would occupy four compositors, two pressmen, and one binder, one year.

Thus the entire cost being reckoned, the balance will appear at first in favour of lithography, but permanently in that of typography; in addition to greater speed and superiority of execution. When the first two thousand copies are struck off, if executed by means of xylography, we possess a set of blocks adapted for printing the scriptures alone, already much worn, and capable of working only five more editions, at one half of the original cost. If the work be performed at a lithographic press, we possess after its completion, only the presses and the stones, very much the worse for wear. But if metal types be employed, we have, when the work is done, a set of punches and matrices, from which millions of types may be cast, sufficient to supply the whole world; besides an iron press, and a complete fount of types, from which fifty more editions can be taken, at a lower rate, than that at which each edition could be printed from the wooden blocks.