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TEXT, REPRESENTATION AND TECHNIQUE IN EARLY MODERN CHINA

ABSTRACT

This paper examines 'number' and numerology as a discursive object among the elite of China in the Ming period (1368–1644). Starting from an anecdote concerning the poet, calligrapher and painter Wen Zhengming (1470–1559), whose refusal to learn these skills from his father led the latter to burn his books, it examines how technical knowledge of this sort was conceived in relation to the humanistic priorities of the Ming elite. It raises the question of how much and what kind of 'numerology', or *shu xue*, (also the modern Chinese word for 'mathematics) learned men of the Ming knew, and in what contexts it was appropriate to admit to knowing it. The ownership and dissemination of the relevant texts is examined, along with the cultural implications of the numerical skills involved in administration and commerce. 'Number' is ultimately seen as problematic for an elite distrustful of 'technique' as a socially compromised form of knowledge.

The term *shu xue* is used in modern Chinese to designate the scientific discourse of mathematics, but to translate it that way in a pre-nineteenth century text is both misleading and anachronistic. As Ho Peng Yoke among others has pointed out, a more satisfactory though still limited translation would be "numerology", incorporating "the art of predicting the future, both in the natural and human world."[1] There is considerable difficulty in gauging the extent to which the specialised knowledge implied by the term was disseminated among the Chinese elite in the Ming period (1368–1644), the era which forms the object of investigation in the present study. However it certainly had one distinguished fifteenth-century practitioner in one elite family of the great Yangtze valley city of Suzhou. This was a man named Wen Lin (1445–1499), father of the famous calligrapher, painter and poet Wen Zhengming (1470–1559).[2] This paper takes as its point of departure an incident in the recorded biography of the latter, as a way of entering into the realm of "number" as a discursive object in at least one social stratum of sixteenth-century Chinese culture. It is an incident which must raise questions concerning the relationship between constructions of knowledge and constructions of the self (often only definable in relation to some Other), and the role of tangible textual artefacts in the creation and sustenance of these constructions. In the context of Ming dynasty China, what one refused to know, what texts one refused to engage with, was to come to be just as important as what one did know, and which books stood on one's shelves.

Wen Lin, according to the official family necrology of his ultimately more famous son, "was expert in numerology" (*shu xue*), and wished to pass the skills and knowledge on to that same favoured second son, Wen Zhengming. Zhengming refused to learn them,

K. Chemla (ed.), History of Science, History of Text, 107–121.

whereupon Wen Lin ordered all his books on the subject to be burned, a command which was immediately executed.[3] Sadly, we have no details of the titles involved, nor of the number of volumes consigned to the flames. The anecdote is recounted immediately after the statement that, though Wen Zhengming was broadly learned and had an extensive library, he refused to read books on the subject of yin-yang cosmology and "magic" (*fang ji*). Clearly the intention of the biographer (Wen Lin's grandson) is to associate *shu xue* with dangerously heterodox areas in which a model Confucian should not dabble. Like many unexamined details in Wen Zhengming's biography, the anecdote when scrutinised closely is more complex than it first appears. Two taboos are violated here, the first being against the wanton destruction of any texts, indeed of any bit of paper with writing on it. There were many powerful social prohibitions on the physical destruction of books, and of the written word in general, in Ming China. The physical destruction of texts, which were not necessarily printed (the wide prevalence of the nearly thousand-year old technology of printing at the time is not equivalent to the extinction of a tradition of transmission of knowledge, especially somewhat arcane knowledge, in manuscript) is the most powerful symbolic act of epistemological rupture possible. It could not fail for an educated person in the Ming to arouse associations of the great "burning of the books" instigated by the tyrant emperor Qin Shihuangdi (r.221-210 BCE), an act which had since antiquity symbolically stood for the potentially fragile nature of culture itself. Loss of the texts (more than loss of people, for example) was the loss of knowledge. Here I wish to argue that the refusal, even the destruction, of texts is also part of the history of those discourses which we now find it convenient to call "science", and that we should not see such acts as purely negative, but as themselves acts which constitute knowledge.

More puzzling still in this tale of texts in flames is the implied lack of filial piety in Wen Zhengming's actions, a challenge to one of the most hallowed norms of the Confucian social order. It is not simply the case that the son represented elite values to which the father did not aspire. Wen Lin was a holder of the highest-level bureaucratic degree, the *jinshi* (achieved in 1472), and he rose successfully to the rank of prefect of Wenzhou, thus doing much better out of the system than did his son, Wen Zhengming, who for all his fame as a writer and artist failed the examination hurdle repeatedly. There is no evidence of imputations of heterodoxy or lack of culture in any contemporary material concerning him, and indeed he was renowned for his active destruction, during his tenure as magistrate of Yongjia in Fujian province, of a range of "lascivious" (*yin*) shrines.[4]

The biographical text in question, "An Account of the Conduct of my Late Father", is by Wen Zhengming's own son (and thus Wen Lin's grandson) Wen Jia (1499–1582), and is intended to show the deceased in a good, not to say a laudatory, light. All biographers go to great lengths to establish Wen's becoming deference, as a model son, to his father's wishes in all other matters, so a point-blank refusal to study a subject of such cherished importance to that father, such that he destroys a library of books on the subject, looks like an act of eccentric unfiliality. To seek to explain it will involve an excursion into the field of the problematic status of geomancy, its texts, and the larger terrain of number in Ming culture.

"Geomancy" is the modern name given to what was in the Ming termed *di li* (literally "the principles of the earth") or *kan yu* ("cover and support" i.e. "heaven and earth").

The modern term *feng shui*, or "wind and water", was at this period something of a colloquialism, rarely used in the written language by the elite. It can even mean "vulgar geomancy", as opposed to "educated cosmology."[5] However the bulk of the evidence suggests that as a practice geomancy was eminently respectable, not a folk superstition but a discourse underpinned for the elite by the most prestigious text in the classical canon, the ancient and arcane "Book of Changes", or *Yi jing*.[6] Why then did Wen Zhengming so vehemently oppose learning the numerology which underlay it? Was it in fact prognosticatory numerology he opposed at all? Perhaps significantly, the explanation given in the biographical literature about him for the repeated failure of this paragon of scholarship to pass the examinations, is that he was too high minded to improve the geomantic prospects of his own dwelling at his neighbours' expense. A patron, Yu Jian is supposed to have built Wen Zhengming a "cottage", and on noticing that the river in front of the house was blocked and dry remarked; "'According to the theories of the geomancers, if this river flows through you will certainly pass the examinations. I will make it flow for you.' Wen refused the offer, saying, 'Opening the river channel will harm the people's cottages and dwellings. I would prefer it if it were not opened.' Yu subsequently regretted this, adding, 'That river ought to have flowed, and if I had not mentioned it to Mr Wen then he would have succeeded long ago.'"[7]

Wen is thus supposed altruistically, and with ultimately unfavourable consequences for himself, to have opposed the re-routing of a watercourse which damaged the geomantic aspect of his own house. There is no sense that he rejected the efficacy of the moves proposed by his patron. Indeed the anecdote (and the excuse) becomes meaningless if Wen was in fact a total sceptic about the subject. The question becomes more complicated when we look at the involvement of the Wen family in geomancy, and at hints of familiarity with the topic in his own writing. That at least one member of the family was prepared in the later sixteenth century to ascribe the family's rise from decent obscurity to geomantic success is suggested by a passage in the "Gazetteer of Tiger Hill" edited by Wen Zhengming's grandson, Wen Zhaozhi. This concerns the family patriarch Wen Hong (1426–1479), whose gaining of the *juren* degree in 1465 set the family on the ladder of bureaucratic success for the first time[8]; "He died and was buried at Huajing in Wuqiu district. He had previously sought for a burial place on Tiger Hill, but a geomancer (*shu zhe*) pointed out an old grave and said, 'If you obtain this you will be noble for generations'. His family thereupon wished to move him, and bought the site. Many people complained that this was pointless."[9]

The potentially transgressive act of moving an ancestor's corpse is presumably justified here by the success which ensued from it, since the Wen family had by the time of writing indeed been "noble for generations". Similarly the account of Wen Zhengming's own burial makes it explicit that divination was used in the choice of a spot and an auspicious day for the interment; "On the 15th day of the 10th month of the year after he died his coffin was placed on the plain of Huajingquao, and after divination of an auspicious time he was interred".[10]

Divination above all implied number. It could be argued that such a phrase, like the use of "he divined and dwelled" (*bu ju*) in the descriptions of the residences of other members of the Wen family contained in the family genealogy, was purely formalistic, but it does at least suggest that in the context of burial some application of the divinatory techniques

derived from numerology was relatively non-controversial, or else the behaviour of Wen Zhengming's family would have looked like a point-blank flouting of his wishes. There is a disjunction here between practice and textual knowledge, which can perhaps be approached through the key Ming discourse of "appropriateness". Just as certain types of picture were indispensable to an elegant interior at certain times of the year, and a vulgar solecism at others, so the seasonal, social, and life-cyclical appropriateness of actions has to be taken into account.[11] To impute inconsistency to Wen Zhengming for refusing *himself* to master numerological techniques, and then acquiescing in their deployment at family funerals or in the purchase of real estate, is to force an inappropriate epistemological category onto the material. Any truly global history of the relationship between texts and knowledge will have to be sensitive to such dimensions, and will have to account for difference at this level, if it is to avoid a naive Euro-centrism.

If geomancy was so respectable, could it therefore in fact be a distaste for what we now classify as "mathematics" which led to the transgressive incident of the book burning? This raises the question of how much mathematics, and what sort of mathematics, did the educated elite of Ming China know? One potential limitation on such study in the Ming lay in the relative rarity of extant editions of the early treatises on number, now accepted as part of the "history of mathematics". These are the books described in some contemporary bibliographies as dealing with *suan shu*, "procedures of calculation", to distinguish them from *shu xue*, or "numerology" (although the extent to which such a distinction is really meaningful in the Ming context seems debatable). This rarity of texts like the *Jiu zhang suan shu* "Nine Chapters on Mathematical Procedures" is asserted by the fifteenth century scholar Wu Jing, who adapted and republished the contents in 1450, and who has been quoted by modern Chinese writers wishing to explain what they see as the lamentable decline of mathematical knowledge in the Ming.[12] This seems an unduly mechanistic explanation, which only produces the further question of *why* were such texts rarely reprinted, at a time when publishing of texts of all sorts expanded dramatically. And Wu Jing's assertion may perhaps be better read as a common strategy of the Ming preface, a claim of rarity being itself part of the marketing of books. A text entitled *Jiu zhang suan fa*, "Nine Chapters on the Methods of Calculation", which may or may not be the same work, does in fact appear in one of the few catalogues we have of a private library of the period, in a section on "miscellaneous arts", which otherwise deals with texts on painting, the playing of chess, and the connoisseurship of embroidery.[13] The owner of this library was no very great scholar himself, but rather someone who aimed at a comprehensive coverage of the knowledge of the day. The existence of the "Nine Chapters" and its contents were certainly familiar to at least one very minor writer of a sixteenth-century *biji*, or "note-form" text, a man named Chen Quanzhi, who displays a passing knowledge of the techniques contained in the "Nine Chapters" in his collection of anecdotes written some time after 1547.[14] And at least one prominent literary figure born in the sixteenth-century did have in his library copies of almost all the early mathematical treatises, including *Jiu zhang suan shu*. This was Qian Qianyi (1582–1664), whose catalogue records at least fourteen titles (significantly some of them Jesuit texts) of this type under the larger category, *Li suan lei*, "Calendars and Calculation."[15] Perhaps mathematical books were not so rare after all (although a wider distribution of texts should not be taken necessarily to imply the presence of lots

of competent readers). The fact is that we are too little-informed about the distribution of books in the Ming to make categorical statements about the rarity or otherwise of a given body of knowledge, whether mathematical or of any other kind.

We are referring here in the main to what were ancient texts, books written many centuries before the Ming, and as such potentially collectable as part of antiquarian studies. Perhaps significantly, Qian Qianyi did not have a copy of what is now considered the major sixteenth-century mathematical treatise, the *Suan fa tong zong*, or "Comprehensive Compendium of Calculative Methods", discussed more fully below. Teleologically oriented accounts of the development of Chinese mathematics view the sixteenth century as pretty much a dark age, devoid of important advances in technique, a stagnant period between the achievements of the Yuan dynasty (1279–1368) and the introduction by Jesuit missionaries of Euclidean geometry and other European mathematical practices at the very beginning of the seventeenth century. It can certainly be shown that techniques laid out in an ancient text like the "Nine Chapters" were either no longer employed, or if transmitted in later texts, no longer fully understood.[16] Positivist writers, particularly those Chinese scholars writing within a Marxist framework, are distressed too by the continued admixture of what they see as "superstitious" elements in those Ming works on number as do exist, such as the *Suan fa tong zong*, of 1592, by Cheng Dawei (1533–1606).[17] Cheng's work opens with illustrations of the most ancient of numerological diagrams, namely the ancient and mysterious *He tu*, "River Chart" and the *Luo shu*, "Luo River Writing", and with a picture of the mythical culture-hero Fuxi inventing the eight trigrams of the *Book of Changes*.[18] The chapters of the main text are, according to modern Chinese scholars, ordered after the cosmological principles of the "Five Elements" (Metal, Wood, Water, Fire, Earth), and the introduction contains the uncompromising assertion that, "Nothing of number is not rooted in the pattern of the Changes".[19] This is material generally dismissed until recently as extraneous to the "real", mathematical content of the book. However such an attitude, and the view of sixteenth-century China in general as a mathematical "dark age", perhaps fails to take account of changes in the social role of the "study of number" (a somewhat literal working translation of *shu xue*), and of important changes too in the application of already existing techniques, particularly in the field of geometry and surveying. These were the cornerstones of Ming mathematics, the areas to which manuals and textbooks devote the greatest amount of space. This had always been the case. The first century AD text, *Jiu zhang suan shu*, "Nine Chapters on Mathematical Procedures", the most influential of all the early mathematical texts, has as its first chapter *Fang tian*, "rectangular fields", and gives the rules for calculating the areas of rectangles, trapezoids, triangles, circles, arcs and annuli. The third century "Sea Island Mathematical Manual" pitches its problems in more practical terms, and perhaps significantly proposes more sophisticated methods of calculating area which are based on a high vantage point, where "looking down on" and "taking control of" are of implicitly military significance (although the extreme rarity of this latter text in Ming times makes it unwise to argue that it was being actively deployed).[20] However these textbook formulae for the measurement of an area of land, which remained in use down to the Ming dynasty (and which were perhaps familiar to the numerologically literate father of Wen Zhengming, whether he learned them from books or not) contain no example of the measurement of an irregular quadrilateral, in actual practice one of the most common forms in which a field could

be found, particularly in south China. According to the modern scholar Kang Chao, the method empirically used between the Han and the Ming for determining the surface area of this shape involved a crude multiplication of half of the products of the addition of opposite pairs of sides. This method of treating a quadrilateral as if it were a rectangle, one "adopted by all ensuing mathematical works and land area conversion tables in China up to the 1578 land survey", always resulted in an overestimate.[21] However in 1578, under the direction of Grand Secretary Zhang Juzheng (1525–1582), orders were given to every magistrate to survey the land in his jurisdiction using a new method, called the *kai fang fa*, "creating a square method". In this method, any quadrilateral to be measured is first surrounded notionally by a rectangle, which can easily be measured accurately. From this total are then subtracted the areas of the right-angled triangles bounded by the notional exterior and the actual field boundary. These are also relatively easy to get right, and so an accurate area for the field can be arrived at. This relatively simple method, which needed no more tools than the chain or the surveyor's measuring rod, was still to prove too cumbersome in practice, and it was never used again after this survey, which lasted from 1578 to 1582.[22]

This has implications for the culture of the elite in general, or at least for that section of it which held or aspired to hold bureaucratic office. It is reasonable to assume that the magistrates who were ordered to undertake the land survey using this new technique had some understanding (to put it no more strongly than that) of what they were being ordered to do. As we have seen, no very high level of numeracy was involved. And there *is* evidence of mathematical interests on the part of individual members of the Ming elite, though it must be remembered that historians of science may be accepting as "mathematics" interests which may well have included the broader cosmological interests better discussed under the heading of "numerology". Tang Shunzhi (1507–1560)[23] and Gu Yingxiang (1483–1565)[24] are two well-connected members of the elite cited by Joseph Needham for their interests in this field.[25] However there was clearly a lot more activity in the period, even if it was not formally innovatory, than has hitherto been acknowledged, and the subject needs further research. For example, although he is hardly of significance to the history of mathematics, the amount of attention given to questions of land surveying by the famous official Hai Rui (1513–1587), especially during his tenures of office as magistrate of Chun'an and as prefect of Suzhou, speaks eloquently of the importance he attached to it, including to the technical aspects which are often deemed to be of little importance by humanistically trained modern sinologists.[26] His essay, "On the principles of the measurement of fields" (*Liang tian ze li*), takes the putative reader, presumably local officials like himself, step by step through all the procedures involved in practical cadastral surveying, beginning with the marking of a blank sheet of paper with the points of the compass, then continuing through the taking of measurements on the ground, their transference to graphic form, and the calculation of the area involved (hence the tax liability). There are also contained in this easy technical diagrams of the types of document which should result from the exercise.[27] Hai Rui's relative success in re-surveying Suzhou, achieved in the teeth of considerable opposition from landholding families, both with and without official status, was instrumental in convincing his superiors that a new cadastral survey of the entire empire would be feasible. Another pioneer of practical survey work was Luo Hongxian (1504–1564), a prominent thinker in the Wang Yangming tradition, as

well as a political associate of Tang Shunzhi, mentioned above.[28] Accounts of his survey of his native area of Jishui, Jiangxi province, undertaken for philanthropic reasons, make it clear that he was prepared to venture out into the fields himself to oversee the practical side of the operation.

A conscientious official was however far more likely to encounter opposition than support from the locally powerful, given that the main aim of the survey was less to increase state revenues from the land tax than it was to curb simple tax evasion and equalise the tax burden. The point was to ensure social harmony by preventing the rich from offloading the entire tax burden for a district onto the poor. But when Tu Long (1542–1605)[29] attempted to carry out the survey as magistrate of Qingbu, east of Suzhou, between 1578 and 1582, he was thwarted by the influence of the retired grand secretary Xu Jie (1503–1583),[30] whose family had huge quantities of land in the area, which they were unwilling to have recorded. Several members of Wen Zhengming's family occupied the kind of posts in which issues of land and the measurement of land were prime concerns; his father Wen Lin was successively both a magistrate and a prefect, his son Wen Peng (1497–1593) was magistrate of Pujiang in Zhejiang province, and his grandson Wen Yuanfa (1529–1602) was (most unusually) magistrate of the same county, during the very decades when the great cadastral survey was carried out. Wen Zhengming himself was associated with the tax-resister Xu Jie as part of his network of clients, providing a laudatory preface for his 50th birthday, and dedicating a picture to him in 1557.[31] Wen Yuanfa alludes in broad terms in his autobiography to the difficulties of collecting taxes in Pujiang, where "the land is barren and the people are devious and addicted to trickery". The local powerful families attempted to bribe him, then to threaten him, finally to impeach him, if he did not relax his rigour. However he survived the ordeal.[32]

For a man like Wen Yuanfa, and equally for his opponents among the wealthy of Pujiang, knowing how to calculate the area of a piece of land was, if not an everyday skill, then at least something not totally alien to their mental universe. It was necessary to the magistrate, for purposes of registration and taxation, but it was necessary too for the private landholder (often one and the same person at a different stage in his career), since land had to be bought and sold and divided equally among a number of heirs. There are some intriguing implications of this for an understanding of the visual culture of the Ming period. The art historian Michael Baxandall has argued that volume and the representation of volume was an issue among the producers and consumers of painting in fourteenth century Italy, men whose education was dominated by mathematical exercises in which gauging, the accurate measurement of volume, played a central role.[33] While it can in no sense be argued that any mathematical skill played an equally prominent part in a Ming landowner's education, the fact remains that if a Ming gentleman knew any mathematics at all it was likely to be a simple planar geometry. How such a way of looking at area, and in particular at a number of interlocking irregular planar fields, might play out in a manner of regarding space and pictorial space is a tantalising subject for further research.[34]

The wide dissemination of geometrical consciousness, to put it no more strongly than that, in the sixteenth century, does not seem to have been matched by any very great measure of prestige. Quite the reverse. Ming calculations were by and large put to practical ends, chiefly land measurement as we have seen but including other types of

sum necessary to a commercial society. This seems likely to have lead to the growth of a cadre of technical specialists, of whom we have but tantalising glimpses in the written record. One Ming land contract dated 1555 is signed by the "surveyor and cartographer" (*zhang liang hua tu ren*) responsible for the map attached to it.[35] Commercial growth and more importantly monetisation of the economy meant that more calculations were now being done more often by more people, and were often now beginning to involve the relatively newly diffused device of the abacus (the date if its invention remains unknown). The abacus is attested by pictorial evidence from 1436, and is mentioned in writings by a member of the elite for the first time in an essay of 1513.[36] It was becoming widespread at the point when Wen Zhengming's refusal to engage with the subject caused his father to burn his books on *shu xue*. The associations of the subject with mercantile operations made it all the more imperative for those who wished to be "pure and lofty" to distance themselves from the very concept of number, as "practical studies" came to be seen as irremediably tainted. There is certainly some sixteenth-century evidence for the patronage of mathematical knowledge within the distinctive merchant culture of Anhui province, and Cheng Dawei was certainly a merchant (which may explain the omission of his work from the library of a scholar like Qian Qianyi).[37] It was to his descendants a matter of pride that Wen Zhengming knew absolutely nothing about the practical details of land management, or of running a household. As his biography records:

> His nature was to detest mundane matters, and all family affairs were entrusted to Mme Wu [his wife], who managed everything to do with funerals and mournings, the marriages of sons and daughters, the building of houses and the purchase of real estate, all without bothering my father one jot. Thus the fact that my father was able to devote himself entirely to literature, and to follow his lofty and sublime resolution, was in truth due to the aid of my mother".[38]

Wen Zhengming's refusal to accept transmission of his father's numerological skills may reflect a change in the perception of what numbers could do, which was all the more vehement in that they were in fact absolutely central to the maintenance of the elite mode of life based on landholding.[39] Numbers now meant economics, and that was what a man like Wen Zhengming could not be seen to dabble in, hence his rejection of both the cosmological and practical implications of the subject.

This rejection of mathematical knowledge, and of the texts which embodied it, thus becomes a historically specific and quite recent event, to do with the maintenance of elite status at a time of growing social mobility and fluidity due to commercial expansion, rather than a timeless characteristic of "the Chinese scholar". This has a bearing on the reception of western pictorial conventions in China in the late Ming, as initially noted by Benjamin March, although he sees the antipathy to geometry as being a constant in Chinese culture. The point may rather be that western conventions were introduced to China precisely at a point when, for other reasons, calculation had uncomfortable resonances.[40] Even in the mid-Ming the wider elite may not have been so absolute. The skilled Ming eye, looking down on the landscape perhaps from an eminence, may well have been able to add an appraisal of area, of the differing proportions of irregularly shaped water and disparate parcels of land to other types of appreciation.

The disdaining of mere technical competence by an elite growing in size, and keen to distance itself from the broader mass of the prosperous, had a possible source in that elite's

constricted access to political power. The number of bureaucratic offices, and the number of examination places which gave access to them, was not expanded during the Ming in line with the growing population, or with the growing segment of the population which was able to turn economic capital into cultural capital through the mechanisms of private tutors and academies. There were more educated men in the Ming than the system allowed jobs for.[41] Arguably, to maintain status this educated elite sought a number of strategies to assert its distinctiveness, one of which might well have been the exaggeratedly fastidious disavowal of subjects (like the study of number) seen as having "practical" connotations, links to trade and commerce especially.

This fastidiousness then had other ramifications. One of these bore upon the whole question or role of pictures in the transmission of technical knowledge. This is a large subject on which work is continuing at present, and conclusions of too firm a nature would be premature. However, some of the broad outlines of the question may be discerned by a brief examination of two texts of the late Ming, one of which is illustrated and one of which is not.

To begin with the unillustrated text first. This is the *Xiu shi lu* ("Records of Lacquering", preface dated 1625) a book entirely without pictures which deals with the manufacture of luxury objects of material culture decorated in various techniques, all of which share a common dependence on the use of the sap of the lacquer tree, *Rhus verniciflua*.[42] This text is obviously of great value to art historians for the unparalleled richness of its material on the techniques and categories of this important Ming craft. However, as well as enlightening us about lacquering *per se*, it can be used to shed some light on how "knowledge" and "technique" were understood in late Ming China, and in particular on the status of the textual transmission of technical knowledge at that time. It is worth remarking here that it shares the characteristic of being unillustrated with the majority of the "handbooks to elegant living", which burgeoned in numbers at the end of the sixteenth-beginning of the seventeenth centuries.

As with the works on *shu xue*, "the study of number", the cosmological schemata of the *Book of Changes* provide the ordering principle for "Records of Lacquering", as well as much of its technical terminology. There should be no need by now to "apologise" for these "non-rational" elements as if they were merely superfluous accretions on what is essentially a work of technical knowledge within a positivist epistemological discourse. Rather it would be widely accepted that it is these very roots in the *Book of Changes* which form a testimony to the work's positioning within norms which were constitutive of the possibility of all sorts of knowledge in the late Ming. The five elements, four phases of time, and the notion of "principle" (*li*), are all parts of the correlative cosmology which underpinned various areas of knowledge at the time. They were as widely accepted, and as necessary to the act of thinking, by the Ming elite, as were macrocosmic ideas, or the Platonic conception of ideal form, to their contemporaries at the other end of Eurasia.[43] Nor are they dismissable as part of "folk belief". We cannot strip them out of the text to reach some notional "real" meaning. Terms which appear everywhere in the text of "Records of Lacquering", like *xiang*, "figure", *fa*, "model" or "pattern", and even *wen*, often translated as "decoration" but which means at the same time "marking" and which has a semantic range right out into concepts like "culture" itself, are essential to educated understanding of the *Book of Changes*, and in particular its claims to provide

an interpretative framework through which all knowledge can be ordered.[44] Any Ming reader with the literacy skills to comprehend *Xiu shi lu* would also have possessed the cultural competencies to read its relationship to a text which possessed unequalled prestige as a foundation for knowledge. These are mainstream ideas, expressed in well-known terminology. They are also ideas which galvanised early western scholars on China, and it is no coincidence that it was the *Book of Changes* which drove Leibniz' fascination with the new accounts of his Jesuit contemporaries, and which he consciously appropriated in his work on the binary system.[45] Only recently, however, has this interest been reaffirmed, and scholarship on the topic of the *Changes* taken to a new level of sophistication.

This text of the "Records of Lacquering" is not an instructional manual. Towards the end of the Ming period, what can be called a "commoditization of culture" coupled with an expansion of printing activity meant it was now possible to buy books purporting to offer accounts of many types of knowledge previously only transmitted orally between actual practitioners.[46] The circulation of texts separated knowledge from practitioners, and inserted that knowledge into a field of market relationships. This phenomenon, tied to the explosion in the quantity of printing in the later sixteenth century, was to become at least as widespread in China as it was in contemporary Europe. The *Xiu shi lu* inhabits a new and still tentative epistemological space, where a gap has opened up between knowing how something is done and actually knowing how to do something. These are two very different kinds of "knowing". It creates knowing subjects who cannot themselves make a lacquer box, subjects who are like those created by the new genre of published merchant route books, which enable you to know the road from A to B without travelling it, or how an elegant garden should be judged, without knowing how to build or irrigate.

Many of these texts have been "rediscovered" in this century, the *Xiu shi lu* itself surviving only in Japan, and have been enthusiastically embraced in twentieth century China as providing material for an alternative and comforting reading of the past in which science and civilisation in China are much more intimately linked than was hitherto realised. It is traditional to ascribe the neglect of these texts, whether about lacquer making or about mathematics, to the humanist culture's disdain for the technical and the practical, the classical pedant's contempt for the artisan. Yet if as I have argued these books in the late Ming embody knowledge itself as a commodity, and are at least as much about consumers as they are about makers (and no-one would suggest that you could use these books unaided to make or do *anything*), then the problem of their existence and flourishing at this precise period assumes a slightly different form. It becomes rather a question of why they exist at all, why humanist disdain at least temporarily allowed a space for them to be brought into being. And why at that moment? Orientalist habits still incline us towards seeing "Chinese thought" as an essentially invariant episteme, when perhaps more attention to cleavages and sites of dissonance over definitions of knowledge would direct attention fruitfully towards historical shifts, moments of contest and appropriation, which we have tended too often to view as mere ripples on an ocean of deep and habitual currents.

To take now an example from among the riches of Ming illustrated books, it is at this same period that we get the first *hua pu*, "pictorial albums", of which the most widely circulated was probably *Gu shi hua pu*, "Master Gu's Pictorial Album" of 1603.[47] This contains reproductive illustrations of one hundred and six paintings by famous artists of

the past and present, with a text commenting on each. The avowed aim of the work is to help the collector avoid forgeries, and to acquaint him with the style of artists whose genuine works are so rare that only the very wealthiest might ever see them. The pictures are referenced back only to other pictures, with the question of content laid to one side. These are not pictures in the sense that the illustrations to a drama or a mathematical manual are pictures, and we can sense here a cleavage opening up, one which was to be fully enforced, at least at the level of aesthetic theory, by the later seventeenth century.

This cleavage between illustrations and pictures was, I would argue, less visible in the fifteenth century, when an elite artist might without discomfort occasionally produce a pictorial scroll depicting coastal defences.[48] Even in the sixteenth century, the evidence of the collected writings of a scholar like Gui Youguang (1507–1571)[49] is that an interest in maps, in visible representations of the perceived world, remained active. The difference between a "map" and a "landscape painting" was at this point a rather fluid and unregulated one. From around 1600 this boundary began to be more forcefully interpreted. It perhaps became visible first in practices like those of book production, where the *absence* of pictures from a text the *Xiu shi lu*, or from one like Wen Zhenheng's, "Treatise on Superfluous Things", with its precise attention to the details of objects in a way which seems to cry out for illustration, is very striking. It was eventually made manifest at the level of explicit aesthetic theory, in the much quoted distinction made by the painter Gong Xian (1599–1689) between *tu*, "pictures/illustrations" and *hua*, "painting". In James Cahill's translation, the relevant passage reads:

> In ancient times there were *pictures (t'u)* but no *paintings (hua)*. Pictures depict objects, portray people, or transcribe events. As for paintings, the same isn't necessarily true of them. [To do a painting], one uses a good brush and antique ink, and executes it on a piece of old paper. As for the things [in a painting], they are cloudy hills and misty groves, precipitous boulders and cold waterfalls, plank bridges and rustic houses. There may be figures [in the painting] or no figures. To insist on a specific subject or the representation of some event is very low class.[50]

Mere "pictures" included maps and diagrams of all sorts, including arrangements of what we would now call "text".[51] They carried meaning and were about something; they were of lower status. Paintings existed in a realm of self-referentiality, within a self-consciously historical tradition, where subject matter takes second place to style as the object of aesthetic contemplation. A distrust of mimesis, of mere transcription of reality, had long existed in Chinese aesthetic theory on visual art, but in the early seventeenth-century it become normative to an even greater degree than hitherto.[52] "Art" in the late Ming sense was far from being an "art" in the sense of a set of transmissible and repeatable techniques (its etymological roots in the European languages, as in e.g. the pseudo-Ciceronian *ars memoriae*). The key word at issue here was *fa*, "method" or "technique", as in *Suan fa tong zong* "Comprehensive Compendium of Calculative Methods", a work written by a man, Cheng Dawei, who came from the merchant background which the landowning elite affected to distance itself from. Techniques were not for gentlemen. Class factors, always encoded in a language of moral worth, now defined in relation to the art of painting who was an artist and who was not, rather than style or subject matter alone. As "pictures" and "painting" came to be two separate things, and as the great apparatus of Ming land registration for taxation purposes, based on a huge collection of pictorial

representations, fell into decline in the later sixteenth century, we can see what is almost an epistemological shift in the way knowledge can be conveyed. This shift is noticeable in the writings, as well as in some of the practices, of the Ming educated elite, and the extent of its hold beyond that narrow group must remain debatable. But broadly speaking, the link between "textuality" and "power", which the critic Margaret Iversen sees as a major theme of Norman Bryson's *Word and Image* would therefore take a substantially different form in Chinese practice from that seen in early modern Europe. In Ming China, "power" adheres more to the "autonomous painterly signifier", the marks of the brush, rather than the thing figured by them.[53]

Wen Zhengming's refusal, in the late 15th century, to accept the transmission of his father's numerological techniques, and the burning of the books to which this refusal gave rise, can thus be read on one level as a straw in the wind, a very early indicator of an early modern Chinese "crisis of representation", which became acute only a hundred years later. To certain Ming thinkers, "number" was diminished by its constant propensity to act as a stable referent, guaranteeing fixed meanings for visible phenomena. It thus claimed to figure the world at a level unworthy of serious philosophical or aesthetic attention. It could not be accepted as "real", any more than the mountain seen out of the window was able to guarantee the value of "realism" in the mountain inscribed by the artist's hand on a surface of paper or silk.

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NOTES

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1 Ho 1991, 506–519; 1985, 6–7.

2 Goodrich and Fang 1976, 2:1471–1474; Clunas 2004.

3 Wen Jia 1987, 1622. A modern collection of biographies of great prognosticators through Chinese history includes Wen Lin, with the statement that, "although he was broadly learned in geomancy and prognostication he was a particular specialist in the *Book of Changes* and in numerology". Yuan Shushan 1948, 24–5. The only source cited is Wen Zhengming's early 18th century *Ming shi* biography.

4 Carlitz, 1997, 631.

5 It is used this way in one mid-sixteenth century text, Chen Quanzhi 1985, *juan* 3:15b. For a fuller account, plus bibliographical references, see Clunas 1996, 177–193.

6 A convenient introduction is Smith 1991, 131–172.

7 Wang Shizhen 1987, 1626.

8 This is the date given for Wen Hong's passing of the examination in both Wen Han, 17th c, *Li shi ke mu zhi*, 19b, and in Zhang Jianhua 1986, 90. However Wen Zhaozhi 1578 gives the date not as Chenghua *yi you* (= 1465), but as Chenghua *yi wei* (= 1475).

9 Wen Zhaozhi 1578, *juan* 1:21a.

10 Wen Jia 1987, 1624.

11 Clunas 1997b, 25–76. An important step in getting beyond a western episteme in the study of a range of Chinese practices linked by the discourse of "propensity" is Jullien 1995.

12 Du Shiran 1989, 10.

13 Gao Ru 1957, 167–168. The edition is said to have been published in Nanjing, with commentary by Yang Rong and Meng Ren, the latter of whom is unrecorded, and the former of whom may be the minor official recorded in Taiwan zhongyang tushuguan 1987, 469 as active in the mid-fifteenth century. The section on 'Calendars and Number' (Gao Ru 1957, 155–156) contains only three entries, all almanac-related. Nor are there any books of number in the 'Minor Studies' (*Xiao xue*) section of the 'Classics' Division.

[14] Chen Quanzhi, *juan* 5:10b–11a.
[15] Qian Qianyi 1935, *juan* 2:57–58.
[16] Chemla 1996, 97–120, also personal communication from Dr Chemla.
[17] E.g. Yan Dunjie and Mei Rongzhao 1990, 26–52. I am very grateful to Dr Karine Chemla for supplying a copy of this article.
[18] Saso 1977, 399–416 discusses the multiple meanings of this magical diagram, a circular pattern of dots, believed to have been voided out of the Yellow River on the back of a magical beast in remote antiquity. See also Clunas 1997b, 105–108.
[19] Yan Dunjie and Mei Rongzhao 1990, 46. Interestingly, Cheng's sequence of the Five Elements accords with neither of the two standard sequences, that of 'mutual production' and 'mutual conquest'. Smith 1991, 371.
[20] Needham 1959, 25; Swetz, 1992, 9.
[21] Chao 1986, 70–71, cites a land-deed of 81 CE, which shows that peasants already at that time measured a quadrilateral by adding together the lengths of opposite sides, and then multiplying those together.
[22] Chao 1986, 71–3. More detail is given by the same author in Zhao 1980, 46–51. Karine Chemla informs me that the term *kai fang fa* is more generally understood within the history of Chinese mathematics to refer to a method for the extraction of roots.
[23] Goodrich and Fang, 2:1252–6.
[24] Taiwan zhongyang tushuguan 1987, 958.
[25] Needham 1959, 51–2.
[26] On Hai Rui see Goodrich and Fang 1976, 1:474–9. But see also Huang 1981, 138–141, where a significantly different point is argued.
[27] Hai Rui 1962, 1:190–201.
[28] Goodrich and Fang 1976 1:980–984. For an inscription by Luo Hongxian on a painting by Wen Zhengming see Wen Zhengming 1987, 1666, but this does not prove they were acquainted.
[29] Goodrich and Fang 1976, 2:1324–1327.
[30] Goodrich and Fang 1976, 1:570–5766.
[31] For the former see Jiang Zhaoshen 1977, 244; for the picture see Liu Jiuan 1997, 219.
[32] Du Lianzhe 1977, 7.
[33] Baxandall 1988.
[34] Some of these issues are tentatively addressed at greater length in Clunas 1996.
[35] Zhang Chuanxi 1995, 2:1108.
[36] Needham 1959, 75–76.
[37] Yan Dunjie and Mei Rongzhao 1990, 28.
[38] Wen Jia 1987, 1623.
[39] This argument depends on Du Shiran 1989, who also associates the trend with the philosophical ascendancy of Wang Yangming, although there are weaknesses in this, given that Luo Hongxian (mentioned above) was a prominent Wang Yangming disciple.
[40] March 1931, 137. For a fuller discussion see Cahill 1982, 70–105.
[41] Wakeman 1985, 1:92–94.
[42] Wang Shixiang1983 is the first modern edition of this rare text. A fuller analysis than that given here is contained in Clunas 1997a.
[43] On the discursive reach of cosmological ideas of this type in the late Ming, see for example Henderson 1984, 132–136. For just one example of recent work tending to undermine older teleological accounts of the "rise of science" in the West, see Grafton 1991.
[44] Peterson 1982, 110–111.
[45] Kuhn 1973.
[46] This forms one of the themes of Clunas 1991.
[47] There is a facsimile edition, Gu Bing 1983. For a more extensive discussion, see Clunas 1997b, 138–146.
[48] Zhang Jianhua 1986, 265.
[49] Goodrich and Fang 1976, 1:759–761.
[50] Cahill 1989, 8.
[51] Lackner 1992.
[52] Ho 1976.
[53] Iversen 1990, 213. Bryson 1981.

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