PART I

Origins and the Linguistic Dimension

CHAPTER 1

Getting "Right" with Heaven and the Origins of Writing in China

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It has long been recognized that the *tiāngān dìzhī* 天干地支, or "heavenly stems" and "earthly branches," may provide a clue to the origins of the Chinese writing system. Indeed, it is probable that the ten stems and twelve branches are the most archaic remnant of a very early stage of written Chinese.[1] Even though some appear originally to have had concrete referents or to bear a resemblance to Shang graphs whose meaning is known, the one and only application of the binary *gānzhī* 干支 combinations is as ordinals and, uniquely in the case of the ten stems, as cultic appellations for the royal ancestors. As Edwin G. Pulleyblank remarked:

> The curious thing about these twenty-two signs is that neither the graphs nor the names attached to them have any separate meaning. Their meaning is simply the order in which they occur in the series to which they belong. It is true that a few of the characters are also used to write other homophonous words, but these are a small minority and such words have no apparent relation to the cyclical signs as such.[2]

1. Recent studies of the origins of writing in East Asia include Robert Bagley, "Anyang Writing and the Origin of the Chinese Writing System," in *The First Writing: Script Invention as History and Process*, ed. Stephen D. Houston (Cambridge: Cambridge University Press, 2008), 190–249; William G. Boltz, *The Origin and Early Development of the Chinese Writing System* (New Haven, Conn.: American Oriental Society, 1994); Victor H. Mair, "Language and Script: Biology, Archaeology, and (Pre)history," *International Review of Chinese Linguistics* 1.1 (1996), 33b of 31a–41b.
2. Edwin G. Pulleyblank, "The *Ganzhi* as Phonograms and Their Application to the Calendar," *Early China* 16 (1991), 39–80. See also Mikhail Kryukov, "K probleme

These unique characteristics suggest that by the Yinxu 殷墟 period in late Shang (late thirteenth–mid-eleventh century B.C.E.), any semantic origins of these cyclical signs were obscure. Indeed, if traditional historiography is any guide, the ten stems were already being used as (posthumous?) royal appellations by the rulers of Xia 夏. This would mean that their invention predates the appearance in the archaeological record of the oracle bone script by several hundred years.

The Cyclical Signs and the Early Calendar

It has been suggested that the origin of the stems and branches may be traced to their use in the late Shang ancestral cult, but this is a minority opinion.[3] The calendrical use of the cyclical signs is considerably more archaic and may have originated in a pre-Shang culture. Moreover, it is difficult to understand why, given an imperative to devise ordinal designations for the deceased ancestors, signs lacking separate meanings like the ten stems would have been adopted *unless* they possessed a special significance by virtue of their very archaism, or because of their supposed numinous origins or connection with temporal power and authority (viz., the calendar).[4] Arbitrariness in the initial choice of signs to represent numbers is well documented (e.g., in cuneiform) and illustrates the

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tsiklicheskikh znakov v Drevnem Kitae," in *Drevnye sistemy pis'ma—etnicheskaja semiotika,* ed. Ju.V. Knorozov (Moscow: Nauka, 1986), 107–113.

3. Cf. Nicholas Postgate, Tao Wang, and Toby Wilkinson, "The Evidence for Early Writing: Utilitarian or Ceremonial?" *Antiquity* 69 (1995): 463. In William G. Boltz's view, "We cannot assume writing to have arisen in an exclusively religious context"; "Language and Writing," in *The Cambridge History of Ancient China: From the Origins of Civilization to 221 b.c.*, ed. Michael Loewe and Edward L. Shaughnessy (Cambridge: Cambridge University Press, 1999), 108. Cf. David N. Keightley, "The Origins of Writing in China: Scripts and Cultural Contexts," in *The Origins of Writing*, ed. W. M. Senner (Lincoln: University of Nebraska Press, 1989), 197. After critical review of such proposals, Robert W. Bagley concludes: "The idea that writing in China was confined to the ritual context in which we first encounter it, though firmly embedded in the literature, has no basis"; Bagley, "Anyang Writing," 226.
4. On this point, David N. Keightley says: "The Shang ritualists were . . . certainly calendar, day, and sun watchers, whose temporal and jurisdictional concerns were sanctified by profound religious assumptions." See David N. Keightley, *The Ancestral Landscape: Time, Space, and Community in Late Shang China (ca. 1200–1045 B.C.)* (Berkeley, Calif.: Institute of East Asian Studies, 2000), 51. The conventional interpretation of the ten stems as denoting the mythical solar progenitors of royal Shang clans elides the question of their origin as written signs.

essential independence of writing in being able to represent ideas directly — ideographic writing was not initially a "graphic echo of speech."[5] There is still no scholarly consensus on how the Shang kings' temple names were chosen or why they were selectively adopted, though perhaps the original ordinal significance of the signs was being invoked in some way, even if the information thus encoded is now obscure.[6] It is also true that some stems were thought more auspicious than others, which was certainly the case later.[7]

Calendrical Notation as a Cultural Imperative

Figure 1.1 shows the layout of the solar observation platform attached to the southeast wall of the middle period city recently excavated at Xiangfen 襄汾, Taosi 陶寺, in Shanxi. This unprecedented discovery dates from around 2100 B.C.E. and is both the earliest and the most elaborate Neolithic or Bronze Age structure ever discovered in China that was unequivocally dedicated to astronomical observation. The structure outlined in the drawing originally consisted of a curved rammed-earth wall, facing east-southeast, perched atop three concentric rammed-earth terraces.

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5. "Writing was, after all, an attempt to represent the message visually, not the sounds associated with a narrative version of the same message." See Merlin Donald, *The Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition* (Cambridge, Mass.: Harvard University Press, 1991), 294. My intentional use of the disputed term "ideograph" is informed by Merlin Donald's discussion of the neuropsychological evidence for the independence of visual and phonological reading; ibid., 300ff.
6. Kwang-chih Chang's analysis ruled out the possibility that the heavenly stems in posthumous royal appellations were assigned on the basis of birth or death dates, because the sequence of posthumous temple names is anything but random. Instead, Chang proposed, "the Shang royal lineages were organized into ten ritual units, named after the ten *gān*-signs (day-signs). Kings were selected from various units and were named posthumously according to their day-sign units, which also regulated the rituals performed to them." See K.C. Chang, *Shang Civilization* (New Haven, Conn.: Yale University Press, 1980), 169, 172. David N. Keightley has offered an alternative conjecture in *The Ancestral Landscape*, 35.
7. Keightley, *The Ancestral Landscape*, 33. K.C. Chang's tabulation of 1,295 bronze inscriptions with ancestral names containing heavenly stems showed that the even-numbered stems (*yǐ* 乙, *dīng* 丁, *jǐ* 己, *xīn* 辛, *guǐ* 癸) were far and away the more preferred, and of these, the first two outstripped the others in frequency by a wide margin; see Chang, *Shang Civilization*, 169–70.

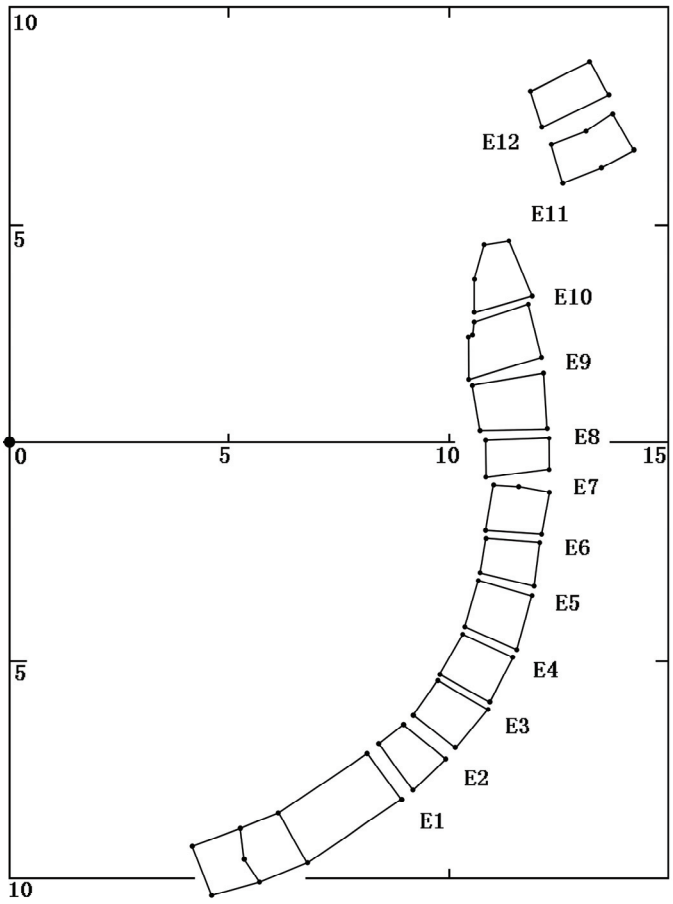

Figure 1.1. Scale drawing of the Taosi solar-observing apertures and observation point "0" (scale is in meters). After Pankenier et al., "The Xiangfen, Taosi Site: A Chinese Neolithic Observatory?" (in press). Drawing courtesy of Liu Ciyuan.

The curved wall was perforated by narrow slits, forming an array of twelve pillars. The spot marked by the dot on the left edge of the drawing is about ten meters from the wall. The spot marks the location of a small, round, rammed-earth pedestal from which observations were intended to be made through slits in the wall opposite as the sun rose above the mountain ridge to the east. Analysis has shown that this structure would have permitted its users to devise a calendar based on the movements of the rising sun along

the horizon as it oscillated between the solstitial extremes (observing slits E2 and E12).[8] Such a horizonal calendar could have yielded an approximation of the length of the solar year, perhaps to within a week or so. This degree of attention paid to the solar year clearly shows that Taosi's designers were interested in correlating the tropical year with the lunar months, an effort that would eventuate in a luni-solar calendar of the type that became conventional by late Shang (at least in the context of the oracle bone divinations), as demonstrated by the Shang use of an intercalary thirteenth month to maintain synchronization between solar and lunar cycles. Some have even suggested, based on the number of viewing apertures at Taosi, that the observing platform represents an early effort to create a fortnightly scheme of twenty-four solar periods (*jiéqì* 節氣) like that familiar to us from much later times, though this suggestion is problematic.[9] It is immediately apparent from the design and layout of the viewing platform that those early calendar priests (and priest-astronomers they most certainly would have been, judging from the elite burials adjacent to the platform) must have possessed a number of crucial concepts and related terminology. Whether in the construction or the use of the facility, those concepts and terms ought to have included sun, moon,

8. David W. Pankenier, Liu Ciyuan, and Salvo de Meis, "The Xiangfen, Taosi Site: A Chinese Neolithic 'Observatory'?" in *Archaeologia Baltica: Astronomy and Cosmology in Folk Traditions and Cultural Heritage* (Klaipeda, Lithuania: University of Klaipeda Press, 2008), 141–48; cf. Liu Ciyuan et al., "A Chinese Observatory Site of 4,000 Year [*sic*] Ago," *Journal of Astronomical History and Heritage* 8.2 (2005): 129–30; Wu Jiabi 武家壁, Chen Meidong 陳美東, and Liu Ciyuan 劉次沅, "Taosi guanxiangtai yizhi de tianwen gongneng yu niandai" 陶寺觀象台遺址的天文功能與年代, *Science in China* (G: Physics and astronomy issue) 38.9 (2008): 1265–72.
9. The twelve observing slits are evenly spaced. However, the sun takes only six months to travel from one extreme to the other, and near the equinoxes the sun moves six times as fast along the horizon as around the solstices, so wall segments of similar size necessarily partition the year into unequal intervals, varying between about eight days or so near the equinoxes and over a month near the solstices. (The location of moonrise on the horizon would have been too irregular and difficult to pin down by means of such viewing apertures.) A similar scheme described in the "Dahuang jing" 大荒經 section of the *Shanhaijing* 山海經 may be a throwback to the archaic Taosi model; see Hwang Ming-chorng 黃明崇, "Ming-tang: Cosmology, Political Order and Monuments in Early China" (PhD diss., Harvard University, 1996), 596. The "Tianwen" 天文 chapter of the *Huainanzi* 淮南子 describes a horizontal solar calendar comprising seven *shè* 舍 'lodgings, habitations' arrayed along the eastern horizon from winter solstice to summer solstice. See John S. Major, *Heaven and Earth in Early Han Thought* (Albany: State University of New York Press, 1993), 87.

stars, horizon, sight line, direction, location, elevation, aperture, diameter, curve, straight line, to measure, unit of measure (Neolithic yard?), and so forth. More apropos in terms of the present discussion, their technical vocabulary must also have included such temporal concepts as day, night, month, sunrise, moonrise, solstice (and possibly achronical and heliacal rising in reference to the stars). The implications of this are momentous. It was Otto Neugebauer who called astronomy the first of the exact sciences, and as Merlin Donald has said:

> The earliest evidence of an elementary form of theory formation is found in ancient astronomy. Astronomical knowledge, like writing, was a powerful device of social control; the measurement of time in terms of astronomical cycles was probably the ultimate controlling activity in early agricultural societies, setting dates for planting, harvesting, storage, and distribution of grain for religious observations, as well as a number of cyclical social functions. . . . Quite early in the history of visuographic symbolism, analog devices were invented that served both a measurement and predictive function in representing time. These devices eventually allowed humans to track celestial events, construct accurate calendars, and keep time on a daily basis.[10]

There is no doubt that, whatever other cultic or ritual purpose Taosi might have served, the observing platform was certainly an analog device for measuring and predicting time in the form of the sun's progress along the horizon. Traditional accounts confirm that other analog methods, presumably inspired by the art of weaving, relied on knotting cords to record information. As the "Appended Commentary" (Xici zhuan 系辭傳) of the *Book of Changes* (Yijing 易經) says: "In high antiquity they knotted strings and brought order; the Sages of later generations switched to writing with inscribed graphs" (上古結繩而治，後世聖人易之以書契). No examples of such "tools of governance" have survived in China — the invention of writing is too ancient for that — but analogous devices have appeared elsewhere, for example, in the form of the Inka *khipu*.[11] Many of these survived the holocaust of the Spanish Conquest, though examples of calendar *khipu* are extremely rare.[12] Maintained by specialists who were

10. Donald, *The Origins of the Modern Mind*, 335.
11. "Inka" and "*khipu*" are the preferred Aymara and Quechua spellings of these words. Other spellings commonly seen include "Inca" and "*Quipu*."
12. For an interpretation of the code employed in the *khipu*, see Gary Urton, *Signs of the Inka Khipu* (Austin: University of Texas Press, 2003); also Charles C. Mann, "Cracking

the schedulers of the religious rites of the Inka and guardians of their cultural astronomy and cosmology, these devices were zealously sought out by the Spanish missionaries as repositories of "pagan devil worship" and consigned to the bonfires of pre-Columbian cultural artifacts.

A remarkable example of such a calendar *khipu* for the year 1532 has survived in the form of a reproduction in a seventeenth-century Spanish text, however (fig. 1.2, a), and it is well worth examining in some detail for what it reveals about this method of recordkeeping in preliterate societies.[13] The thirteen square cartouches arrayed along the top cord are ideograms representing the noteworthy agricultural activities or ceremonials for which each month of the year was named or with which it was identified.[14] Suspended from these are cord pendants on which groups of red and yellow knots mark the days. The knots are separated into continuous ten-day weeks by allowing space between the groups. Tags attached to particular days signify events of note, including astronomical phenomena of importance: full moons, the Pleiades rising, eclipses, and so forth. Seven long months of thirty days and five short months of twenty-nine days occur in irregular sequence, and a thirteenth month is appended that contains ten epagomenal days, bringing the total number of days represented to 365, matching the number of days in the solar year.

Contemporaneous accounts of Inka *khipu* and their use as external recording devices in conjunction with counting pebbles attest to their impressive capacity to preserve complex information, including periodic tribute, barter and exchange agreements, and even narratives, which information was read out as required by elite officials known as "knot-readers" (*khipukamayuq*) (fig. 1.2, b).[15] This is an example of a

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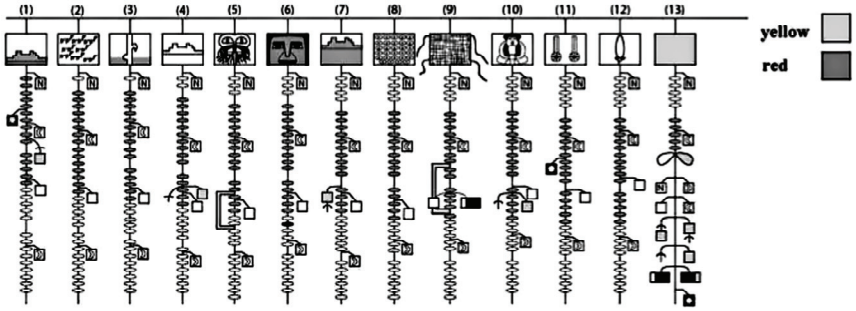
the *Khipu* Code," *Science* 300 (13 June 2003): 1650–51.

13. See Laura Laurencich Minelli and Giulio Magli, "A Calendar *Quipu* of the Early 17th Century and Its Relationship with the Inca Astronomy," *History of Physics* 801 (*ArXiv e-prints*, January 2008; arXiv:0801.1577v1, Web version)
14. The cartouche images resembling Bactrian camel humps are *sucancas*, or the pairs of pillars bracketing crucial astronomical rising or setting points on the high mountain ridges around Cuzco.
15. Gary Urton, "From Knots to Narratives: Reconstructing the Art of Historical Record Keeping in the Andes from Spanish Transcriptions of Inka *Khipus*," *Ethnohistory* 45.3 (1998): 409–38. Accounts of the process indicate that the *khipu* reader "parsed the knots by inspecting them visually, and by running their fingers along them Braille-style, sometimes accompanying this by manipulating stones"; Mann, "Cracking the *Khipu* Code," 1650.



(a)

(b)

Figure 1.2. Inka calendar *khipu* (a) and Inka "knot-reader" (astrologer) (b), carrying in his right hand a forked astronomical sighting rod and in his left a *khipu*. Top: from Laurencich Minelli and Magli, "A Calendar Quipu of the Early 17th Century"; (b): from Felipe Guaman Poma de Ayala, *El primer nueva corónica y buen gobierno* (1615/1616) (Copenhagen: Det Kongelige Bibliotek, GKS 2232 4°). Reproduced with permission.

kind of analog device from another context that would have preceded the invention of writing (in contrast to the mercantile tokens familiar from the Mesopotamian context). It illustrates the kinds of information that ultimately had to be converted into written form — a number set to count the days, the ten-day week, terms for the phases of the moon, various celestial bodies, names of the months, colors, rituals, agricultural products, tribute items, seasons, a variety of action verbs, and so on, analogous in many respects to the technical vocabulary that would have been employed by the designers of the Taosi "observatory."

In other words, once the mental leap was made from the ideographic representation of a *khipu*-like device to zodiographs,[16] a substantial repertoire of contextually related signs would have to have been invented (or appropriated from existing religious symbolism, textile motifs, and other visuographic symbols or "iconic images" [*xiàng* 象] such as those abundantly documented from the Chinese Neolithic) in order to accomplish the transition to a written calendar. The application of writing in this specialized way could have come about in short order. If it were to be functional, such a written calendar, once conceived, would need to embody from the outset the kinds of elements and concepts itemized above. Short of pointing to the corresponding *khipu* cartouche, an ideograph for "corn-planting month," say, would have to be named to be spoken of, and all that is required to produce a zodiograph is for the spoken word to stick to the conventional graphic representation. In the case of the depictions of *sucancas* (pillars on the horizon marking the sun's location on critical dates) in cartouches 1, 4, and 7, for example, because of their similarity, the reading of each would have to have been distinctive and quite specific. The *khipu* cartouches may have already been more than merely incipient zodiographs.

It is not so difficult to imagine how the non-glottographic representation of a concept, for example, the graphic for "corn-planting month," could imperceptibly be transformed in conventional usage into the glottographic denotation of that month. Once the technique of representing words graphically emerged, as it independently did in different contexts and cultures, the conversion of a notational system into writing and the

16. In terms of the developmental stages of writing: "When a graph is primarily a depictive representation of a thing, it is a *pictograph* and is not writing. When the same graph, or a modified version of it, represents primarily the name of the thing, that is, the word for the thing, and stands for the thing itself only as information conveyed by the word, we call it a *zodiograph* and define it as writing"; see Boltz, "Language and Writing," 110.

spread of the process to other contexts *could* occur quite suddenly, yet it *need* not. Whether such a development was imminent in the Inka context is unknown.

Calendrical Use of the Cyclical Signs

> Visual symbols had immediate advantages over speech. Lists of transactions and numbers were much better expressed in writing than in speech. Lists of genealogies, and other historical sequences, were also much clearer in written form, and *devices such as astronomical almanacs . . . simply could not be formulated or expressed in spoken language*.[17]

For the purposes of counting the days between full moons at Taosi, not to mention solstices, harvest festivals, and so on, a primitive number system (e.g., 1, 2, 3, many) and reliance on memory alone would simply not do. At a minimum, one either devised a scheme to represent "1, 2, 3 . . . 10, 20, 30 . . .," or maintaining a horizon calendar over time would have been impossible. A rudimentary number set consisting of "1, 2, 3, many" coupled with an oral narrative listing regularly observed astronomical or meteorological events such as full moons would certainly be inadequate to the task — biological memory is far too limited.[18] Given their conceptual toolkit, the elite users of the Taosi observing platform must have possessed an external recording device like a *khipu*, if not a system of written signs, and this some eight centuries before Shang king Wu Ding 武丁. This chapter puts forward the hypothesis that the set of cyclical signs was a mental tool initially devised in response to the conceptual demands outlined above, that their origin is crucially related to the origin of the

17. Donald, *The Origins of the Modern Mind*, 290 (emphasis mine).
18. On the advantages of writing in particular, Merlin Donald writes: "Part of the gain was in the transportability and permanence of records; but another important part was in the ability to arrange virtually endless lists of items. The *list* is a peculiarly visual institution. The usefulness of oral listing is very limited, owing to memory limitations; orally memorized lists tend to tie up working memory, preventing further processing of the list. In contrast, visual lists can be arranged in various ways, and juxtaposed to simplify the later treatment of the information they contain. List arrangement can facilitate the sorting, summarizing, and classifying of items and can reveal patterns otherwise not discernible. With the invention of visual lists, the newly created state could acquire, analyze, and digest the information it needed to function." See Donald, *The Origins of the Modern Mind*, 288.

calendar, and that it was calendrical astronomy that lent impetus to the invention of writing in China.[19]

Calendar tables from the Shang inscriptional materials provide useful information. They are clearly not divination texts, nor do they all represent calligraphy "practice."[20] The two examples described below were analyzed in 1929 by Guo Moruo 郭沫若 in his pioneering monograph on the origins of the cyclical signs, "Shi zhigan" 釋支干 [*sic*].[21] Guo points out that examples that repeat only the first three ten-day weeks (*xún* 旬) several times in succession are actually about as numerous as those that reproduce the whole series of sixty cyclical signs. He inferred that these thirty-day tables are an indication that the Shang months originally comprised three *xún* of thirty days, which means that every month would have begun with *jiǎzǐ* 甲子 (day 1) and ended with *guǐsì* 癸巳 (day 30). This is an entirely reasonable proposition, since alternation of long and short months must have appeared as a corrective some considerable time after the invention of the twelve-month calendar, when it was realized that

19. Stephen D. Houston makes the point that "writing is a sequence of step-like inventions" and that "most early script did not expand to fulfill every conceivable function — an anachronistic fallacy — but served, at least initially, very limited needs;" Stephen D. Houston, "Overture to the First Writing," in *The First Writing: Script Invention as History and Process* (Cambridge: Cambridge University Press, 2008), 11–12.

20. In contrast, an example of a practice inscription is HJ: 18946, on which essentially the same sequence of fewer than ten characters is repeated in five separate lines. A number of such tables of cyclical signs may be found following HJ: 38044. For practice inscriptions as an index of literacy in late Shang, see Adam Smith, "The Evidence for Scribal Training at Anyang," chapter 5 in this volume. David N. Keightley concluded that many examples such as those identified by Guo are, in fact, written calendars used for reference; Keightley, *The Ancestral Landscape*, 39. In a similar context, Qiu Xigui 裘錫圭 cites the Xiaochen Qiang 小臣牆 bone, one side of which recorded events in what is the longest non-oracular Shang inscription so far discovered, while the reverse displays a table of cyclical signs, suggesting a connection between historical record and reference calendar; Qiu Xigui 裘錫圭, *Wenzixue gaiyao* 文字學概要 (Beijing: Shangwu Yinshuguan, 1996 [1988]), 41, fig. 6 (reprinted in *Chinese Writing*, trans. Gilbert L. Mattos and Jerry Norman [Berkeley, Calif.: Society for the Study of Early China, 2000], 62, fig. 6).

21. See Guo Moruo, "Shi zhigan" 釋支干, in *Guo Moruo quanji* 郭沫若全集 (Beijing: Kexue Chubanshe, 1982), 1:155–340. This is not the place for an analysis of Guo's hypothesis concerning the astral correlates of the stems and branches and their supposed Babylonian origins. Many of his philological analyses have not stood the test of time; for a recent critique, see Wang Ning 王寧, "Shi zhigan bianbu" 釋支干辨補, *Zhongguo xian Qin shi* 中國先秦史 (30 July 2006), http://www.zgxqs.cn/article/2006/0730/article_905.html (accessed 2 April 2009).

twelve months of 30 days are actually some 5 days longer than twelve lunations of 354 days.

The arrangement of some of the tabulations Guo cites proves that they are calendars. In one (HJ 21783), the cyclical signs from *jiǎzǐ* (day 1) through *guǐhài* (day 60) are arranged in four registers, the first two registers together comprising twenty-nine days and the second two comprising thirty-one days. Furthermore, the distribution of the days among the four registers is 14-15-17-14, reproducing a count of days for two successive months, the first short and the second long, divided at the full moon. This arrangement could hardly be accidental, nor could this be intended as a tabulation of cyclical signs designed purely for reference or scribal practice, since the irregular layout and the month of thirty-one days are both highly unusual. Conclusively, however, in figure 1.3 (HJ 24440), transcribed as table 1.1, a scribe has again reproduced the sequences of *gānzhī*, but in this unique inscription, the names of the months are supplied — "Month 1 Regular is called 'Eat Wheat' " 月一正曰食麥 and "Second month Father X" 二月父X. In addition to showing that this table is indisputably a fragment of a calendar, the thirty days of two successive long months are enumerated using the cyclical signs 1 through 60, with one fortnight per column. (Since adequate space was available, it is curious that the scribe felt no compunction in splitting *jǐsì* 己巳 [day 5] at the bottom of column 1 and *gēngxū* 庚戌 [day 47] at the bottom of column 6, for no apparent reason.) Remarkably, the inscription records what must have been the conventional names for the first two months of the year, the first of which, "Eat Wheat" (*Shímài* 食麥), is corroborated by later textual evidence, for example, from the "Monthly Ordinances" (Yueling 月令) chapter of the *Yi Zhou shu* 逸周書.[22] Guo Moruo called this inscription "China's earliest calendar."[23] It certainly is the earliest

22. The activities prescribed in the "Monthly Ordinances" for the first month of spring, "when the sun is in Yingshi," include the admonition to "eat wheat and mutton." Winter wheat is harvested in late spring, so some have argued on this basis that if the Shang month was named for the first fruits of that harvest, the first month should have fallen near the summer solstice. See Yang Shengnan 楊升南, *Shangdai jingji shi* 商代經濟史 (Guiyang: Guizhou Renmin Chunbanshe, 1992), 121. For the same reason, the association of wheat and mutton with the first month of spring in the Monthly Ordinances seems incongruous.

23. The oracle bone inscription (OBI) graph for *shí* 食 is not immediately recognizable on the rubbing, as strokes have been omitted; for analysis, see Guo Moruo, "Shi zhigan," 161. See also Yang Shengnan, *Shangdai jingji shi*, 121.

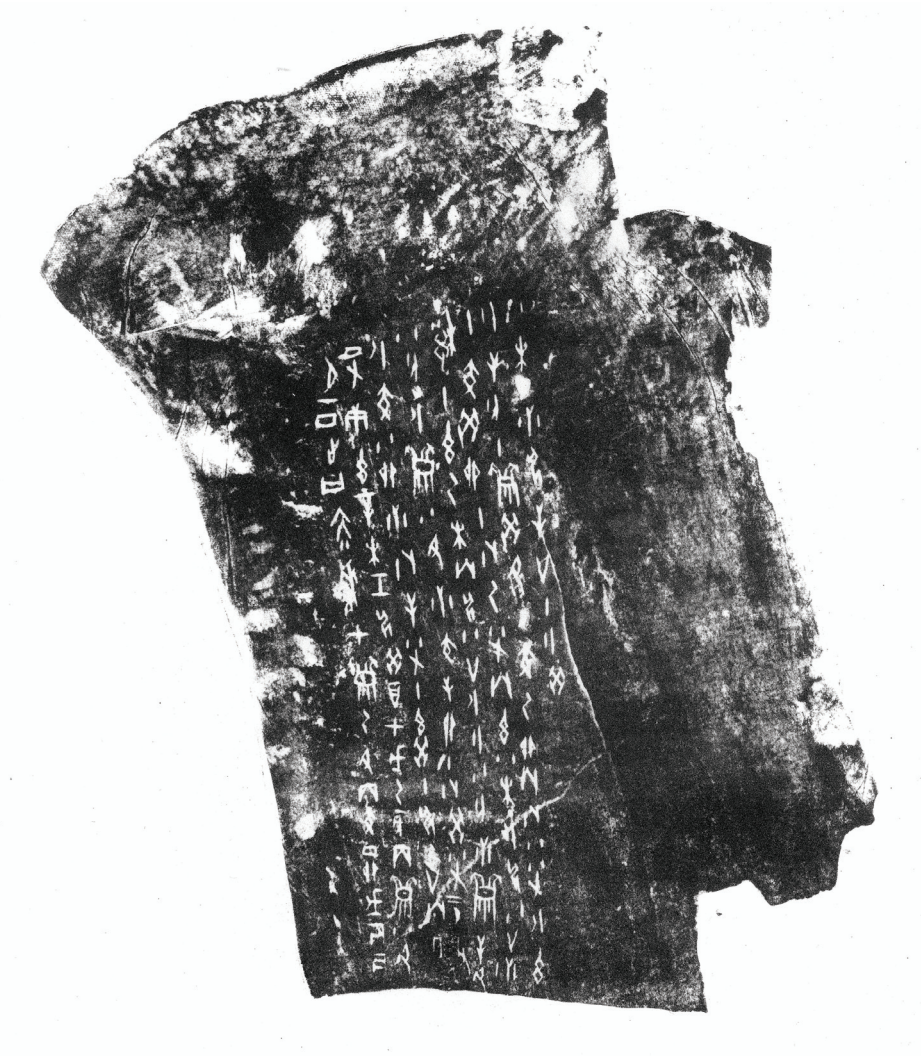


Figure 1.3. Two-month calendar table from HJ: 24440 showing successive thirty-day months beginning the year.

Table 1.1. Transcription of HJ: 24440 rubbing in Figure 1.3.

月	巳	戊	丁	X	壬	戌	己
一	庚	寅	亥	甲	寅	辛	未
正	午	己	戊	午	癸	亥	庚
曰	辛	卯	子	乙	卯	壬	申
食	未	庚	己	未	甲	子	辛
麥	壬	辰	丑	丙	辰	癸	酉
	申	辛	庚	申	乙	丑	壬
	癸	巳	寅	丁	巳	甲	戌
	酉	壬	辛	酉	丙	寅	癸
	甲	午	卯	戊	午	乙	亥
	戌	癸	壬	戌	丁	卯	
	乙	未	辰	己	未	丙	
	亥	甲	癸	亥	戊	辰	
	丙	申	巳	庚	申	丁	
	子	乙	二	子	己	巳	
	丁	酉	月	辛	酉	戊	
	丑	丙	父	丑	庚	午	

discovered to date. It must reflect early calendrical usage, since, with the exception of "Month One Regular" (*yuè yī zhèng* 月一正), none of the noteworthy features of this calendar are used in the dating formulas of the actual Shang divination texts, which typically alternate twenty-nine and thirty-day months and invariably enumerate the months rather than naming them.[24]

24. Cf. David N. Keightley's observation: "I suspect, in fact, that 'the start of the year' could have involved more than one kind of year. The Shang diviners might have pegged the first moon of their luni-solar calendar to the first lunation after the winter solstice, while the peasants might have tied their agricultural calendar to the observation of stars and constellations. It would have been the first, liturgical system,

The reconstructed readings of the twenty-two signs reveal the patterns that might emerge from different arrangements. Table 1.2 reproduces the Old Chinese reconstructions of the cyclical signs. To the right of these reconstructions, the rhymes are labeled D, A, B, C, a, and X (X signifying no obvious rhyme with the other signs in the set or with each other).[25]

Several features are immediately apparent in the earthly branches, the second element in each pair of cyclical signs, which one would expect to have occupied the stressed, rhyming position when the series was recited. First, apart from *wǔ* 午 and *xū* 戌, the other ten signs all share four rhymes, perhaps about 12 percent of those available, one of which, "a," is in assonance with "A." Second, the "A" rhymes divide the twelve signs roughly in two. Third, remarkably, among the codas there are no labials, only a single nasal, and no velars (excluding the seemingly overrepresented **-q*, a glottal stop). Compare these features with those of the ten stems. Rhyme pairs are almost entirely lacking, but the stems display a full range of codas. The contrasting features of the twelve earthly branches are certainly eye-catching and appear prima facie to suggest that, by comparison with the ten stems, some deliberate process of selection must have been operative at the time the twelve branches were created. In other words, the choice of rhymes and perhaps even the sequence of signs may not be random.[26]

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not the second, agricultural system, that gave rise to the numbered moons recorded in the divination inscriptions"; see Keightley, *The Ancestral Landscape,* 44.

25. I am grateful to Paul R. Goldin, Wolfgang Behr, and David Prager Branner for comments and corrections with regard to Old Chinese rhyming and phonetics. The reconstruction given here (the "Baxter-Sagart" system, before its last revision), is that presented in Robert H. Gassmann and Wolfgang Behr, *Antikchinesisch — Ein Lehrbuch in drei Teilen*, Teil 1 (Bern: Peter Lang, 2005): **-q* represents glottal stop in final suffixal position; doubled initials represent "type A" syllables.

26. Having said that, I am not persuaded by Pulleyblank's thesis about the deliberate selection of the twenty-two stems and branches to serve as phonograms as early as the second millennium B.C.E. This strikes me as too self-conscious and sophisticated a linguistic analysis to impute to such an early stage in the development of Chinese writing. See Pulleyblank, "The *Ganzhi* as Phonograms," 39–80.

Table 1.2. Old Chinese phonetic reconstructions of the *gānzhī*

	天干		OC	Rhyme
1.	甲	［八部］	**kkrap*	
2.	乙	［十二部］	**qrik*	
3.	丙	［十部］	**prang*	D
4.	丁	［十一部］	**tteng*	
5.	戊	［三部］	**mu-s*	
6.	己	［一部］	**kə-q*	
7.	庚	［十部］	**kkrang*	D
8.	辛	［十三部］	**sing*	
9.	壬	［七部］	**nəm*	
10.	癸	［十五部］	**k^{W}ij-q*	

	地支		OC	Rhyme
1.	子	［一部］	**tsə-q*	A
2.	丑	［三部］	**hnru-q*	B
3.	寅	［十二部］	**lin*	C
4.	卯	［三部］	**mmru-q*	B
5.	辰	［十三部］	**dər*	a
6.	巳	［一部］	**s-lə-q*	A
7.	午	［五部］	**ngnga-q*	X
8.	未	［十五部］	**mət-s*	a
9.	申	［十二部］	**hlin*	C
10.	酉	［三部］	**lu-q*	B
11.	戌	［十二部］	**s-mit*	X
12.	亥	［一部］	**ggə-q*	A

The implications of this become apparent when we examine a thirty-day tabulation of *gānzhī*, considering only the rhyme of the second element in each binary combination:

First column:	A	B	C,	B	a	A,	x	a	C,	B
Second column:	x	A|	A	B	C,	B	a	A,	x	a
Third column:	C,	B	x	A|	A	B	C,	B	a	A

Vertical slashes show where the sequence begins to repeat, so that there are two and one-half repetitions of a sequence of twelve ordinals, with alternation between two rhymes in third position as in xxC/xxA/xxC/xxA. Even without speculating about sources of uncertainty in the reconstructions, the features of the earthly branches suggest that a pattern such as this, even if based only on vocalic assonance or generic rhyming, may have played a role in the arrangement.

To this, some might object that the recursive pattern is merely an artifact of the pairing of twelve branches with ten stems that produced the cycle of sixty signs, since a pattern must necessarily emerge. This is true, of course, but one cannot ignore the stark contrast between the two sets of terms — the ten stems with their random selection of rhymes and finals and the twelve branches with their prominent rhymes and series of codas that conspicuously avoids labials and velars (except for the special case of coda **-q*). [27] Some will object that extrapolating Old Chinese reconstructions back a thousand years before the *Book of Poetry* (Shijing 詩經) is a risky proposition, but while the criticism may apply to the precise details of the reconstructed Old Chinese pronunciation, phonetic change does follow more or less regular patterns, so that the same rules should apply to all members of a given set of words. Thus, it is probable that, while the phonological complexion of the individual members of the two sets of stems and branches in the early to mid-second millennium B.C.E. may not have been exactly as represented, the fundamental *contrast* between the linguistic features of the two sets is unlikely to have changed that much. A further objection might be that there is no unequivocal evidence of rhyming of any kind earlier than the Western Zhou bronze inscriptions. This is also true, but here, however, the argument is for

27. This latter feature was called to my attention by Paul R. Goldin (personal exchange), who stressed the unlikelihood of this being a random occurrence. By contrast, fully half the ten stems have labial or velar finals, and nasals are well represented, too.

self-conscious use of rhyme not as literary embellishment but merely as a simple device that may have been useful in remembering the repetitive sequence of binary cyclical signs whose recitation would naturally have tended to be rhythmic.

Keeping in mind the likely calendrical origin of the ten stems, perhaps one might infer that the two series were created at different times. Initially, the ten stems were invented to enumerate the days of the ten-day week, and only later were they complemented by the twelve branches that may have once denoted the months.[28] Originally, the days would have been named using just the ten stems, an arbitrary set of signs easily committed to memory, but this meant that each stem had to repeat three times a month, once each week. At some point, possibly to help resolve ambiguity in dating events, the series of twelve branches was paired with the ten stems in sequential fashion by matching successive branches with each of the ten stems. Proceeding in this fashion for six ten-day weeks until the first pair — *jiǎzǐ* — reappeared produced the familiar series of sixty unique signs (in fact, only half the 120 possible combinations). But now each combination of signs would repeat only six times a year, in different months sixty days apart, in contrast to thirty-six appearances spaced ten days apart for the unpaired stems. This meant that the number of unique combinations requiring memorization would have increased by a factor of six, so that at this point, rhythmic repetition and rhyming might conceivably have been called upon as an aid to memory. The sequence of rhymes illustrated above — minimally xxC/xxA/xxC/xxA — would repeat five times within

28. The twelve earthly branches are generally thought to derive from a different source than the ten stems, about which there has been much speculation, including their putative origin, in Guo Moruo's view, as astronyms derived from Babylonian astronomy. Richard S. Cook makes a case for an early representational and etymological connection between *chén* (a conventional designation for lunar lodges 4-6 Fang 房, Xin 心, Wei 尾), and a scorpion, while leaving the identification with the dragon unexplained; see "The Etymology of Chinese 辰 *Chén*," *Linguistics of the Tibeto-Burman Area* 18.2 (1995). Some of Cook's claims about the connections between *Chén* 辰 and a scorpion, as well as other aspects of his astronomical analysis, are based on mistranslation of the "Treatise on the Celestial Offices" (Tianguan shu 天官書) in *Shiji* and oracle bone inscriptions; see David W. Pankenier, *Bringing Heaven down to Earth: Astrological and Cosmological Foundations of Chinese Civilization* (New York: Cambridge University Press) forthcoming. Guo's, Cook's, and others' claims of the likely diffusion of astronomical concepts from Mesopotamia to China do not bear scrutiny from the perspective of the history of Chinese astronomy; see Jiang Xiaoyuan 江晓原, *Tianxue zhenyuan* 天學真原 (Shenyang: Liaoning Jiaoyu Chubanshe, 1991; rev. ed., 2004), 276–94.

the sequence of sixty cyclical signs, perhaps providing basic rhythmic cues.

It may be, therefore, that two sets of cyclical signs, stems and branches, were initially devised to respond to the conceptual and recordkeeping demands of the calendar, and the origins of the two are crucially related. It is likely that calendrical astronomy lent impetus to the development of writing in China and prefigured its application to other forms of recordkeeping that emerged later, including the Shang divinations, in which we see a mature written language fully formed. Rhyme may have provided a crucial connection between orality and functional notation, linking the practical use of the two sets of ideographs and the *idea* of writing words. In other words, rhyming may have served as the notional stimulus prompting the realization that the sounds of individual spoken words could be attached to specific conventional graphic signs and thus serve as analogs of speech, in effect inventing a new medium — true writing. This is conjectural, of course, so it remains for us to establish if possible a *direct* connection between the early calendar, astronomy, and the inspiration leading to the invention of the cyclical signs.

Finding Inspiration in the Sky

Study of the cosmological significance of the North Pole in ancient Chinese thought suggests that ritual specialists in Bronze Age China, like their earlier counterparts in ancient Egypt, used the circumpolar stars to find true north, a task complicated during the last two millennia B.C.E. by the absence of a comparatively bright star near the Pole.[29] Similarly, archaeological discoveries from the Xia, Shang, and Zhou periods show

29. See David W. Pankenier, "A Brief History of *Beiji* 北極 (Northern Culmen), with an Excursus on the Origin of the Character *di* 帝," *Journal of the American Oriental Society* 124.2 (2004), 211–36; and, especially, Ban Dawei (David W. Pankenier), "Zai tan beiji jianshi yu di zi de qiyuan" 再談北極簡史與「帝」字的起源, in *Xi fang Zhongguo shi yanjiu luncong* 西方中國史研究論叢, vol. 1: *Gudai shi yanjiu* 古代史研究, ed. Chen Zhi (Shanghai: Shanghai Guji Chubanshe, in press); Noemi Miranda et al. offer persuasive evidence of the use of a hand-held standard to align with stars in the bowl of the Dipper and the Pole; "Uncovering Seshat: New Insights at the Stretching of the Cord Ceremony," in *Archaeologia Baltica: Astronomy and Cosmology in Folk Traditions and Cultural Heritage* (Klaipeda, Lithuania: University of Klaipeda, 2008), 57–61. Figure 1.2 above shows a more primitive, but conceptually analogous implement.

that it had become crucially important to achieve a cardinal orientation of the built environment — walls, palaces, temples, tombs, common burials, and even storage pits give evidence of a preoccupation with N-S axial alignment.[30] There are nearly ubiquitous methods for achieving cardinality involving observations of the sun's shadow using a gnomon, but what follows is a brief description of a quite original solution to the problem that makes use of the stars. Until now, scholars have overlooked this method, one that underscores the distinctive polar-equatorial focus of Chinese astronomy and also links astronomy with the origin of the ten stems.

Evidence for this indirect technique designed to achieve precise alignment on the north celestial Pole is provided by the ode "Dìng zhi fang zhong" 定之方中 (no. 50) in the "Airs of Yong" (Yong feng 鄘風) section of the *Book of Poetry*:[31]

> 定之方中，作於楚宮；揆之以日，作於楚室。[32]
>
> When [the asterism] Dìng just culminated, he started work on the *Chu* Palace; When he had measured it by the sun, he started work on the *Chu* Hall.

Determining the correct orientation in the landscape of the main ancestral hall takes pride of place among the activities described. Commentators all agree that the time to commence work, "just when Dìng was centered" (Dìng zhi fang zhong 定之方中), refers to the moment when the asterism Dìng transited the local meridian due south in the evening. A previous study demonstrated that the asterism Dìng is none other than the combination of Yingshi 營室, lunar lodge 13, and Dongbi 東壁, lunar lodge 14, immediately to the east.[33] The two bright stars of Yingshi form

30. Keightley, *The Ancestral Landscape*, 82.
31. The ode celebrates the restoration of Duke Wen 文 of Wey 衛 at Chuqiu 楚丘 in 658 B.C.E. (Duke Min 閔 of Lu 魯, second year) after Wey had been destroyed by an invasion of the Di 狄. Resettlement of Duke Wen and the remnant population of Wey was brought about through the intervention of Duke Huan 桓 of Qi 齊, who drove the Di out of the area.
32. Bernhard Karlgren, *The Book of Odes* (Stockholm: Museum of Far Eastern Antiquities, 1950), 33 (modified).
33. Before the fifth century B.C.E., Yingshi and Dongbi formed a single asterism Dìng, which continued to be graphically represented as a square in Han dynasty tomb murals. See Ban Dawei (David W. Pankenier), "Beiji de faxian yu yingyong," 北極的發現與應用, Ziran kexueshi yanjiu 自然科學史研究, 27.3 (2008): 281–300. *Erya* 爾雅

the western side of the prominent asterism known to us as the Great Square of Pegasus, which forms the torso of the celestial winged horse.

The Alignment Function of Asterism Dìng

If one looks at the longitudinal meridian lines on the star chart in figure 1.4, which depicts the situation in 650 B.C.E., one can see that the Eastern and Western Walls of Dìng (i.e., Yingshi and Dongbi) align with the meridians converging on the Pole to the north. Therefore, by early Zhou at the latest, the Chinese possessed a technique capable of precisely locating true north in the absence of a bright star at the Pole. Now, the large distance from Yingshi-Dongbi to the Pole means that it was not possible to observe the circumpolar sky in the north and the Dìng asterism in the south at the same time. In addition, the diurnal and annual revolutions of Pegasus also mean that Yingshi-Dongbi would have been useful only for the purpose of aligning on the pole at a singular time — on transiting the meridian in the evening when the two parallel sides of Dìng would have been perpendicular to the horizon and pointing overhead through the zenith to the Pole. At other times of the year when Dìng was either invisible or oriented at some oblique angle to the horizon, it could not have served the stated purpose. Here, then, is the meaning of Mao Heng's commentary:

> Dìng is Yingshi; *fāng zhōng* [means] at dusk to rectify (*zhèng* 正) the four directions. . . . Watching to the south [he] observes Dìng, and to the north he aligns on the Pole, in order to rectify (正) south and north.[34]

Investigation reveals that the best time for such alignment observations in late Shang and Western Zhou would have been in early evening in late autumn, when Dìng would have been optimally positioned right after sunset. Various sources confirm that it was in late autumn, after the end of the agricultural season, that this "aligning by the stars" would have taken

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("Shitian" 釋天) says, "Yingshi is called Dìng" 營室謂之定. Guo Pu's 郭璞 (276–324) comment reads: "Dìng is zhèng (正). In building temples and halls all take Yingshi's culmination [on the meridian] to be straight and true" (定，正也。作宮室皆以营室中为正). See Shisanjing zhushu 十三經注疏, ed. Ruan Yuan 阮元 (Beijing: Zhonghua Shuju, 1980), 6:2609 (number before colon corresponds to traditional division of chapters in a particular text). My rendering of zhèng as "true" here means "exact, accurate, precise; correct" as in "straight and true."

34. See *Shisanjing zhushu*, 2:2609.

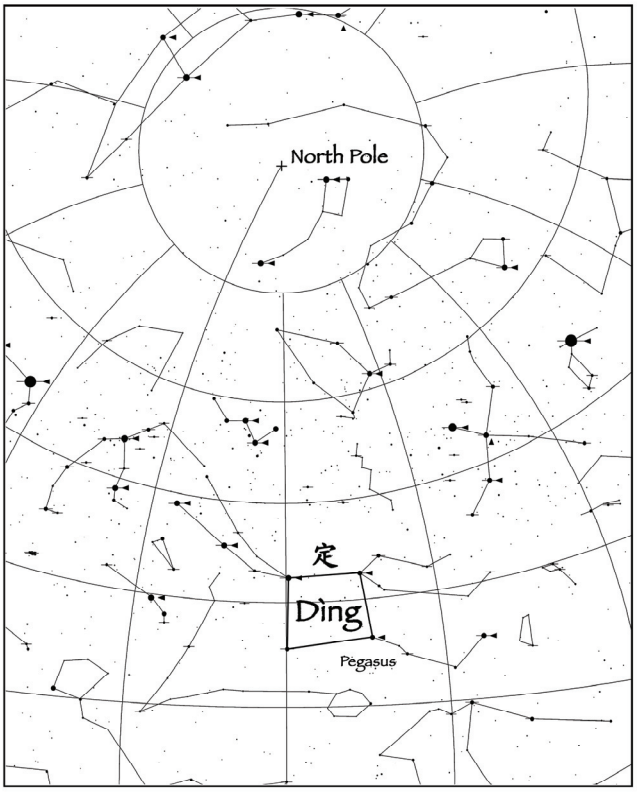

Figure 1.4. Dìng, the Great Square, due south on the local meridian, 10 November 650 B.C.E. Note the exact alignment of the meridian and Dongbi, the Eastern Wall, defined by the two stars at the corners of the left side of the square. Viewing from Luoyang, China. Longitude: 112° 27′ 06″ Latitude: 34° 40′ 11″. 650 BC/11/10 8:16:09 PM (Local). Chart center (J2000): RA: 23h 29.215m Dec: 48° 9.427′. Altitude: 89° 56.562′. Azimuth: 179° 57.558′ (south). FOV: 126°. Limiting magnitude: 5.8. Starry Night Pro 5, Imaginova Canada Ltd.

place. In the "Zhouyu" 周語 section of *Tales of the States* (Guoyu 國語), it says, "When Ying Palace is centered [on the meridian], the work of building begins" (營宮其中，土功其始).[35] *Zuozhuan* 左傳 (Duke Zhuang 莊公, twenty-ninth year) says:

35. See *Guoyu* 國語, *Sibu beiyao* ed. (repr., Taipei: Taiwan Zhonghua Shuju, 1975), 2.9b.

> 凡土功，龍見而畢務，戒事也。火見而致用，水昏正而栽，日至而畢。[36]
>
> As to the work of building, when the Dragon [asterism] appears, [farming] labors end, for [the Dragon] alerts to the undertakings [to come]. When the Fire Star (Antares in Scorpius) appears, [the laborers] are put to work. When "Water" (Yingshi) culminates at dusk, the foundations are built; at winter solstice, [the work is] finished.

Similarly, the "Monthly Ordinances" chapter of the *Lüshi chunqiu* 呂氏春秋, concerning the activities appropriate to mid-autumn, says that this is the time to construct walls and build capitals and cities.[37] Implicit in the reference to the culmination of Dìng ("Ying Palace" in *Tales of the States*) is that asterism's identity as the prototypical Celestial Temple and its specialized function as an accurate guide for aligning symbolic structures on the Pole. Thus, Dìng's evening culmination precisely marks the season reserved for laying out walls and temples whose construction is to follow.

Dìng "Right and True"

The "Inward Training" (Neiye 內業) chapter of *Guanzi* 管子 says:

> 天主正，地主平，人主靜 . . . 能正能靜，然后能定。[38]
>
> For the heavens, the ruling principle is to be *regular* 正. For the earth, the ruling principle is to be level. For human beings, the ruling principle is to be tranquil. . . . If you can be regular and tranquil, only then can you be *stable* 定.

In all references to these alignment procedures above, the word *zhèng* 正 (**tengs*) 'correct~regular' characterizes the observations integral to, as well as the outcome of, the specific alignment procedures. Similarly, *jīng*

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36. See *Shisanjing zhushu*, 2:1782; see especially Kong Yingda's 孔穎達 (574–648) *Zhengyi* 正義 commentary. "Water" here refers to Yingshi.
37. See *Lüshi chunqiu xin jiaozheng* 呂氏春秋新校正, *Xinbian zhuzi jicheng* 新編諸子集成 ed (Taipei: Shijie Shuju, 1974), 7:76.
38. See *Guanzi* 管子, *Ershi'er zi* ed. (Shanghai: Shanghai Guji Chubanshe, 1986) 16, pp. 155; Harold Roth, Original *Tao: Inward training (Nei-yeh) and the Foundations of Taoist Mysticism* (New York: Columbia University Press, 1999), 58–61. For the significance of *zhèng* 正 'to square up ~ center ~ align' in the "Inward Training" chapter, see Roth, *Original Tao*, 109.

經 (**keng*) 'arrange in order' and *yíng* 營 (**weng*) 'delimit ~ delineate ~ lay out', in the "Luogao" 洛誥 and "Shaogao" 召誥 chapters in *Shangshu* refer to the large-scale arrangement of walled settlements or temple compounds and the "four quarters" of the kingdom. All three words share a common rhyme as well as a close semantic relationship, "be or make straight ~ be or make right ~ put in order." More than that, however, they share a rime with the name of the asterism actually used to accomplish the task, "Dìng" 定.[39] It seems clear that *dìng* 定 (**ttengs*) and *zhèng* 正 are essentially the same word in such contexts, so that alignment procedures like those described draw on the root meaning of "right ~ straight ~ correct ~ regular" (*zhèng*).[40] That *dìng* 定 and *zhèng* 正 seem to be interchangeable is borne out by the fact that *zhèng* 正 (**tengs*) is simply the B-syllable version of *dìng* 定 (**ttengs*). What the A/B-syllable distinction represents, both phonologically and semantically, is still a matter of debate; however, it is clear that such words must be cognate. This phonophoric series also includes the cognate *zhēn* 貞 (**treng*) used to introduce the charge to the bone in the Shang divinations.[41]

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39. When, therefore, the "Shaogao" chapter represents King Cheng 成王 as saying, "when the Duke had fixed the site" 公既定宅, *dìng zhái* may mean more than merely to "settle on" a location. It could actually connote making the layout conform to the celestial standard using the Dìng asterism.

40. Yu Xingwu 于省吾, *Jiagu wenzi gulin* 甲骨文詁林 (Beijing: Zhonghua Shuju, 1996), 1:790. See also Sergey Starostin's compilation of cognate words in Sino-Tibetan; Starostin, "The Tower of Babel Project: Evolution of Human Language Project; Sino-Tibetan Etymology" (Internet version http://starling.rinet.ru/babel.php?lan=en, accessed 4 October 2009). In the specialized language of the epigram above taken from the "Inward Training" chapter, the practice of *zhèng* 'aligning' means "adjusting or lining up something with an existing pattern or form," where the focus is the physical alignment of the body. See Roth, *Original Tao*, 109. This also calls to mind that it was said of the Sage in the "Xiang dang" 鄉黨 chapter of the *Analects*: *Xí búzhèng búzuò* 席不正不坐, "if the mat was not straight, he did not sit"; see *Shisanjing zhushu*, 10:2495. Perhaps there was more to Confucius' fastidiousness than previously suspected.

41. *Dǐng* 鼎 (**tteng-q*) 'cauldron' is used interchangeably with *zhēn* in the oracle bone divinations, in some instances even in the same inscription; see Yu Xingwu, *Jiagu wenzi gulin,* 3:2718ff. Cf. William G. Boltz, "Three Footnotes on the *Ting* 鼎 'Tripod'," *Journal of the American Oriental Society* 110.1 (1990): 1–8, and Ken-ichi Takashima, "Settling the Cauldron in the Right Place: A Study of 鼎 in the Bone Inscriptions," in *Wang Li* Memorial *Volumes* (English volume) (Hong Kong: Joint Publishing Company, 1987), 408–9.

A politico-religious imperative lay behind the impulse to correctly align sacred precincts and structures on the Pole using the circumpolar stars or asterisms: "At a time when the Lord-on-High's intentions vis-à-vis the Shang state were very much a national security concern, 'taking direction' *literally* from the ultimate source of supernatural power, may well have called for a more direct 'polar' method."[42] As discussed above, the method attested in the ode "Dìng zhi fang zhong" could have produced accurate alignment on the Pole throughout Shang and Zhou, and possibly earlier. More important, the intentionality this technique discloses is surely revealing. Given the clear connection between the concrete meaning of "fix ~ true up ~ make straight ~ rectify" at the root of the *dìng* 定 – *zhèng* 正 series, to which *zhēn* 貞 – *dǐng* 鼎 'establish ~ fix ~ settle' also belong, then one can discern in the use of *zhēn* 貞 – *dǐng* 鼎 in the oracle bones the analogous noetic impulse to "verify congruence with" the supernatural forces, which lies at the heart of the divination phenomenon.[43] In other words, "making right" (*dìng* 定 – *zhèng* 正) the delimiting of physical space by aligning on the locus of celestial power has its psychological counterpart in the exercise in mental space of establishing the correctness of a proposition through oracular communication *zhēn* 貞 with those supernatural entities.

The Very Image of the Written Word

The imperative to conform precisely to Heaven from the earliest times made it essential to devise practical methods of achieving that objective. The practice of divination is one modality that exemplifies this impulse. Devising a calendar is another. The symbolic design of ritual precincts is another. The accumulation of knowledge about the celestial "landscape" and its application to the orientation of sacred space on the ground is still another. Transcending in importance its figurative role in the eponymous

42. Pankenier, "A Brief History of *Beiji*," 229.

43. Cf. David S. Nivison's gloss of *zhēn* 貞 in the oracle bone inscriptions, "Officially verify the correctness of the results of a divination about"; see Nivison, "The 'Question' Question," *Early China* 14 (1989): 125. This interpretation agrees with the earlier analysis of Paul L.-M. Serruys, for which see the discussion in Ken-ichi Takashima, "Introduction," *English Translation of Fascicle Three of Inscriptions from the Yin Ruins*, vol. 1 (Taipei: Institute of History and Philology, Academia Sinica, forthcoming).

ode, insight into the ancient method of aligning on the Pole using Dìng, together with the nexus of phonetic and semantic linkages within the *dìng* 定 – *zhèng* 正 – *zhēn* 貞 – *dǐng* 鼎 word family, reveals this to have been the "right and true" method, designed, literally, to bring the normative celestial images *xiàng* 象 down to earth.[44] The alignment method described above, making use of the Celestial Temple asterism Dìng's precise alignment on due north, is abundantly well documented beginning in mid-Zhou dynasty, though it could potentially have been exploited centuries earlier. A final question to consider, therefore, is, how early can we trace this focus on asterism Dìng, the Great Square of Pegasus, and its special attributes?

Earlier, reference was made to the passage in *Tales of the States* in which the Yingshi is mentioned. There, the calendrical function of the Farmer's Auspice (Nóngxiáng 農祥; lunar lodge Fang chamber in Scorpius) was described: "When Farmer's Auspice is 'right' on the meridian at dawn, the sun and moon are in the Celestial Temple" (農祥晨正，日月底於天廟). Wei Zhao's commentary explains:

> 農祥，房星也。晨正，謂立春之日，晨中於午也。農時之候，故曰農祥也。底，至也。天廟，營室也。孟春之月，日月皆在營室也。
>
> Farmer's Auspice is asterism Fang. "Right" at dawn means to say, on the day "Spring Begins," at dawn [Fang] is on the meridian. [Fang] is the harbinger of the agricultural season, so it is called "Farmer's Auspice." *Dǐ* is "to reach." "Celestial Temple" is Yingshi (Align the Hall). In the first month of spring, sun and moon are both in Yingshi.[45]

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44. Among the earliest and most striking Neolithic pictographs so far unearthed are those discovered in 1992 at a site near the village of Shuangdun 雙墩 in Bengbu 蚌埠, Anhui 安徽, dating from 7330 to 6900 B.P. Numerous depictions of fish, deer, and pigs as well as stilt-huts, suns, woven patterns, and the like were found inscribed on the bases of clay pots, and this three millennia before Taosi; see Xu Dali 徐大立, "Bangbu, Shuangdun yizhi kehua fuhao jianshu" 蚌埠雙墩遺址刻畫符號簡述, *Zhongyuan kaogu* 中原考古 3 (2008): 75–79. What is particularly interesting is that the same symbols are reported to have been found at another site some sixty kilometers from Shuangdun. It is hardly a stretch to imagine that during the many centuries between Shuangdun and Taosi those early peoples came to identify distinctive stellar patterns with depictions of the domesticated and wild animals on which their lives depended; hence the later designation of such images as *xiàng* 象 — itself originally a pictograph of an elephant.
45. See *Guoyu*, *Sibu beiyao* ed. (Taipei: Taiwan Zhonghua Shuju, 1975), 1.6b–7a.

Not only is the astronomy in *Tales of the States* technically correct; the application of this calendrical maxim in Warring States times is confirmed by the inscription on a lacquer box from the tomb of Marquis Yi of Zeng 曾侯乙 (circa 433 B.C.E.), the same tomb that yielded the famous lacquer hamper with a depiction of the entire scheme of twenty-eight lunar lodges written on its lid. This second box bears the inscription: "It is Fang to which the people sacrifice; when the syzygy (alt. 'sun's chronogram') is at the (intercardinal) node, the 'Heavenly Quadriga' begins the year" (民祀唯房，日辰於維，興歲之駟). "Heavenly Quadriga" is another name for the array of four stars composing lunar lodge Fang.[46] The meridian passage near dawn of Farmer's Auspice or Heavenly Quadriga (and by implication, the new moon marking the Beginning of Spring in the Celestial Temple) would have been serviceable as a harbinger of the arrival of spring throughout the Xia, Shang, and Zhou dynasties. In view of our earlier discussion of calendrical astronomy, this allusion to the location of the sun in Dìng (Yingshi-Dongbi) in the "regulation" (*zhèng* 正) month that begins the year has special significance.

Ancient Chinese calendar priests from Taosi in Shanxi were observing sunrise daily at least as early as 2100 B.C.E.[47] Needless to say, those calendar priests and their successors would also have paid attention to the regular sequence of asterisms rising in succession just before sunrise and after sunset during each month of the year. It is worth noting here that in February 2100 B.C.E., the first month of the year, when the sun was in

46. In an article discussing the imagery on the front of the famous lunar lodge hamper from the tomb, Wu Jiabi 武家壁 identified the asterism depicted as lodge Fang in its guise as Heavenly Quadriga. Wu further conjectured that the hamper and inscribed box were both originally used in the very Farmer's Auspice ritual alluded to in *Tales of the States* and documented in the inscription on the second box; see Wu Jiabi, "Zeng Hou Yi mu qixiang fang xing tukao" 曾侯乙墓漆箱房星圖考," *Ziran kexue shi yanjiu* 20.1 (2001): 90–94. This function of Fang underscores the error of Richard S. Cook's identification of Fang and Tiansi, "Heavenly Quadriga," with the Great Square of Pegasus; see "The Etymology of Chinese *Chén*," 23–29.

47. Cf. Liu Ciyuan et al., "A Chinese Observatory Site of 4,000 Year [*sic*] Ago," 129–30; He Nu 何努, "Taosi zhongqi xiaocheng daxing jianzhu jizhi IIFJT1 shidi moni guanxiang baogao"陶寺中期小城大形建築基址II FJT1實地模擬觀象報告, *Gudai wenming yanjiu tongxun* 古代文明研究通訊 [Ancient Civilizations Review] 29 (2006): 3–14; Wu Jiabi and He Nu, "A Preliminary Study about the Astronomical Date of the Large Building IIFJT1 at Taosi," *Gudai wenming yanjiu tongxun* 古代文明研究通訊 8 (2005): 50–55; Wu Jiabi, Chen Meidong, and Liu Ciyuan, "Taosi guanxiangtai yizhi de tianwen gongneng yu niandai."

Yingshi, the leading or "determinative" star of Yingshi, Markab (Alpha Peg), would have risen on the mountain ridge east of Taosi at azimuth 95.5°, precisely in the aperture marked E7 in figure 1.1. They would have observed the correlation of the Dragon constellation (and lunar lodge Fang near its center) with the arrival of spring and the all-important initiation of farming activity. No doubt this is a principal reason the Dragon came to figure so prominently in myth and iconography and as a seasonal indicator in popular astral lore (including the line texts of hexagram *Qián* 乾 in the *Book of Changes*).[48] Ancient skywatchers awaiting sunrise in the twentieth century B.C.E. also could not have failed to notice still another dawn phenomenon. An impressive massing of all five visible planets occurred in late February 1953 B.C.E. in the longitude of the star Alpha Peg (fig. 1.5), the earliest such phenomenon alluded to in the early texts.[49]

The star Alpha Peg is none other than Markab, the determinative star of lunar lodge Yingshi — the Celestial Temple. Clearly, we have here a persuasive explanation for why the ancients' attention might have been powerfully drawn to asterism Dìng as early as the twentieth century B.C.E. This sanctioning by means of a spectacular celestial phenomenon, together with Dìng's unique polar alignment, could well explain that asterism's later function as the standard in architectural, calendrical, and ritual

48. Léopold de Saussure was the first sinologist to discuss the correlation between the Dragon asterism's appearance as it seasonally rose and traversed the sky with hexagram *Qián*'s 乾 description of the dragon's behavior in the *Book of Changes*; see de Saussure, "Les origines de l'astronomie Chinoise: La règle des cho-ti," in *Les origines de l'astronomie Chinoise* (Paris: Maisonneuve, 1930), 378. See also Feng Shi 馮時, *Zhongguo tianwen kaoguxue* 中國天文考古學 (Beijing: Zhongguo Shehui Kexue Chubanshe, 2007), 416–17. Edward L. Shaughnessy illustrates the correlations between the hexagrams' line statements and the Dragon constellation's appearance; see "The Composition of 'Qian' and 'Kun' Hexagrams," in *Before Confucius: Studies in the Creation of the Chinese Classics* (Albany: State University of New York Press, 1997), 197–219. In fact, the Dragon constellation was an accurate seasonal indicator throughout both summer and winter, and the connection with hexagram *qian* was never very obscure. In glossing "dragon" *lóng* 龍, for example, *Shuowen jiezi* 說文解字 explains: ". . . It climbs into the sky at the vernal equinox and hides in the abyss at autumnal equinox" (春分而登天，秋分而潛淵). See *Shuowen jiezi* (Beijing: Zhonghua Shuju, 1963; repr., 1979), 245. Even today, there is the popular saying, "On the second of the second month, the dragon lifts its head" (*èr yuè èr, lóng tái tóu* 二月二龍抬頭).

49. David W. Pankenier, "The Cosmo-Political Background of Heaven's Mandate," *Early China* 20 (1995): 123.

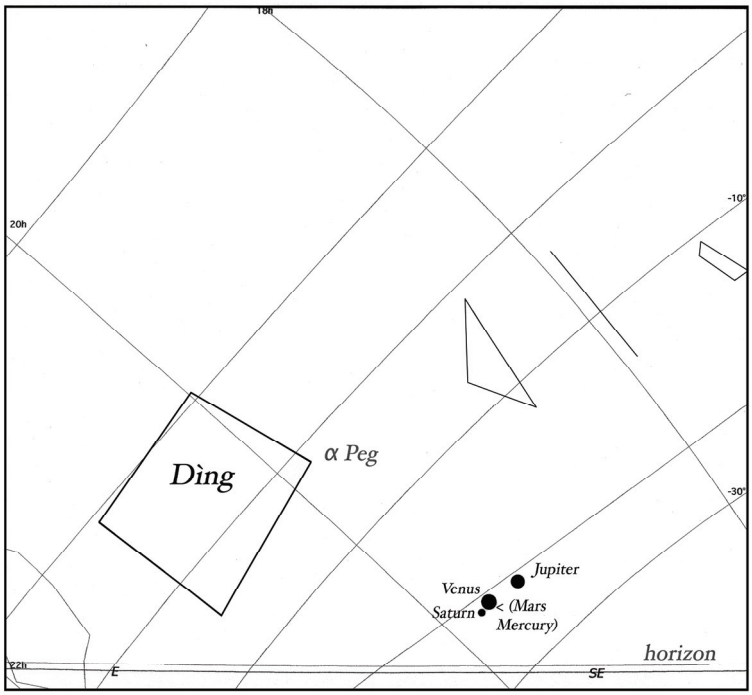

Figure 1.5. The cluster of the five planets in Yingshi at dawn on 26 February 1953 B.C.E. Mars and Mercury are both obscured by the disk of Venus in this view. Starry Night Pro 5, Imaginova Canada Ltd.

contexts.[50] If we now include in the above phonophoric series the fourth heavenly stem *dīng* 丁 (**tteng*), then the celestial inspiration for the "exchanging of knotted cords for written signs" alluded to in the passage from the "Appended Commentary" quoted above comes into sharper focus

50. Or, as Merlin Donald put it: "The critical innovation underlying theoretic culture is visuographic invention, or the symbolic use of graphic devices"; see Donald, *The Origins of the Modern Mind*, 275. The nexus I am attempting to describe signals the formulation of a new theoretic culture, whose manifestation in the advent of urban planning is described by Xu Hong 許宏, "Erlitou yizhi kaogu xin faxian de xueshu yiyi" 二里頭遺址考古新發現的學術意義, *Zhongguo wenwu bao* 中國文物報 (17 September 2004); rpt., http://www.kaogu.cn/cn/detail.asp?ProductID=8497 (2007-12-19) (accessed 2 April 2009).

— asterism Dìng (**ttengs*) is the celestial square or Temple, and in its earliest form, *dīng* 丁 (**tteng*) is written □, a square.[51]

Conclusion

Two sets of cyclical signs, stems and branches, were initially devised to respond to the conceptual and recordkeeping demands of the calendar; the origins of the two are crucially related. Calendrical astronomy lent impetus to the development of writing in China and prefigured its application to other forms of recordkeeping that emerged later, including the Shang divinations, in which we see a mature written language fully formed and capable of expressing virtually anything.[52] Rhyme may have provided a link between orality and functional notation, serving as a notional connection between the practical use of a set of notational ideographs and the *idea* of glottographic writing. In other words, rhyming may have served as a stimulus prompting the realization that the sounds of spoken words could be attached to conventional graphic signs and serve as analogs of speech.

A prominent example of just such a transformational sign is *dīng* 丁, which demonstrates the connection between the early calendar, astronomy, and the inspiration leading to the adoption of that stem-sign. This one

51. See the rubbing of HJ: 24440 reproduced in figure 1.3. In *zhèng* 正 (**tengs*) 'right ~ correct ~ upright', this same element □ evidently combines both phonophoric and semantic roles. Bagley provides further examples from the oracle bone inscriptions and Shang bronzes; "Anyang Writing," 203–4. One example showing the character *zhēng* 征 (fig. 7.6c, 203), reflecting the plasticity of the medium, represents □ with rounded corners. In other bronze inscriptions, □ may be rendered as either a solid or an open circle, a stylistic variation permitted by the plastic medium — curvilinear graphs done with a stylus in the still moist clay mold. By this time, the connection between the graph *dīng* □ and its precursor square in the sky may already have been obscure, at least for members of the artisanal class, such as scribes.

52. On this point, Bagley comments, "without the pressure of new needs, or the lure of new possibilities, full writing would never have come into being. Comparison with these well-charted developments in the Near East argues that the writing system we encounter in the Wu Ding oracle texts is the end product of a gradual spread to a broad range of applications." See Bagley, "Anyang Writing," 225. William G. Boltz maintains, based on comparisons with Egyptian and Mesopotamian evidence, that "glottographic writing is likelier to have emerged as a development from pre-existing non-glottographic notational systems than entirely *ex nihilo*." See Boltz, "Literacy and the Emergence of Writing in China," chapter 2 in this volume.

graph may now be seen to provide a crucial link between the abode of the Celestial Thearch above, time management in the form of the first or *zhèng* 正 month of the calendar, the idea of a supernaturally revealed standard of what is "right" and "true" both spatially and conceptually, and, it could be argued, *the realization that the nexus of these several meanings could be represented graphically as a square*. That is to say, the phoneticization of an ideograph derived from the shape of an asterism produced the glottographic manifestation in writing of *dīng* □. *Dīng/dìng*, therefore, is none other than the grapheme in the pre-Shang language for "a square; be straight ~ be square; make straight ~ square up" and, no doubt, "four ~ the fourth."[53]

The profoundly important cultural innovation of writing was acknowledged in the canonical tradition to have been Heaven bestowed. If the *Yi Zhou shu* can still preserve from more than a thousand years earlier a reference to the common name for the first month of the Shang calendar, "Eat Wheat," and if the "Lesser Annuary of Xia" (Xia xiaozheng 夏小正) and the "Canon of Yao" (Yaodian 堯典) can still preserve the seasonal stellar correlations of a calendar from the second millennium B.C.E., then perhaps it is not merely a rhetorical flourish when the "Appended Commentary" of the *Book of Changes* asserts that Heaven suspended images in the heavens for the Sages to "make of themselves their semblance" and the text says that a "River Diagram" mysteriously emerged from the Yellow River. These are explicit claims about the celestial origins of writing and the supernatural sanction for the

53. John C. Didier, in "In and Outside the Square: The Sky and the Power of Belief in Ancient China and the World of 4500-100 bc," *Sino-Platonic Papers* 192 (2009), offers an interpretation of the cross-cultural significance of a gigantic square constellation, incorporating stars in the handle of the Big Dipper (!), which he imagines to have boxed in the celestial Pole. Didier takes up the significance of stem *dīng* 丁 in the Shang divination inscriptions, finding in its shape support for the centrality of his imagined polar asterism, based largely on questionable readings of sacrifices to royal *dīng* 丁-ancestors (or the four quarters) as sacrifices to his polar "square" qua locus of Shang spiritual power. Only after my formal presentation of an earlier version of the present paper to the Columbia Early China Seminar in February 2009 did Didier (by his own admission, vol. 2, 235), add an appendix to "In and Outside the Square" vigorously attacking my identification of Dìng 定 with the Square of Pegasus. Prior to my formal presentation in 2009, Didier had never discussed the Ode "Dìng zhi fang zhong" or stem sign *dīng* 丁 in connection with asterism Dìng 定, nor did he analyze the *dìng* 定 ~ *zhèng* 正 ~ *zhēn* 貞 ~ *dǐng* 鼎 ~ *dīng* 丁 word family.

"impersonation" of such patterns, an account that appears to have a historical basis.

Yingshi or Dìng is strategically located just south of the Milky Way and is reached from the circumpolar region via the asterism Gedao 閣道 (Cassiopeia) "stepped passageway" spanning that Heavenly River.[54] This special configuration had its terrestrial analog in the actual layout of the Qin 秦 capital of Xianyang 咸陽, according to the "Basic Annals of Qin."[55] Just at the time of the planetary massing of 1953 B.C.E. in Yingshi, the Heavenly River or Milky Way would also have been on brilliant display, arching across the sky from northeast to southwest just above Dìng, the Celestial Temple, and midway between it and the Celestial Thearch's abode at the pole (plate 1).[56] This archetypal alignment of the Milky Way may explain why the Qin began the year with the tenth month, when the northeast-to-southwest orientation of both celestial and terrestrial rivers exactly mirrored each other — precisely also when Dìng, the Great Square, was "right" on the meridian. It is just possible, therefore, that the "diagram" that emerged "out of the River" was none other than the Great Square or Dìng 定 ≈ *dīng* 丁, with the five unblinking planets spectacularly clustered beside it. The well-known representations of the River Diagram as a "magic square" with the number five at its center, the latter conventionally represented by the dots and bars configuration so familiar from the asterisms on traditional star charts, appear quite late. Nevertheless, the two key elements — geometric shape and the number five — figure most prominently, suggesting the persistence of these elements in cultural memory over the centuries as well. As in many other cultures around the world, a kernel of astronomical truth may lie at the heart of several ancient Chinese foundational myths.

54. This special configuration was invoked in the actual layout of the Qin 秦 capital Xianyang 咸陽. See Ban Dawei (David W. Pankenier), "Beiji de faxian yu yìngyong," 284.
55. See "Beiji de faxian yu yingyong," 284.
56. For the Milky Way as the celestial analog of the Yellow River in Warring States "field allocation" astrology, see David W. Pankenier, "Characteristics of Field Allocation (*fēnyě* 分野) Astrology in Early China," in *Current Studies in Archaeoastronomy: Conversations across Time and Space*, ed. J.W. Fountain & Rolf M. Sinclair (Durham: Carolina Academic Press, 2005), 499-513.