

Heavenly Pattern Reading (*tianwen*) and the Origins of Writing

David W. Pankenier
Lehigh University

Part One: The cyclical signs (ganzhi) and the early calendar

It has long been recognized that the *tiāngān dìzhī* 干支 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. From their first appearance in the Shang oracle bone inscriptions the cyclical characters are never used as classifiers. 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* combinations is as ordinals and, uniquely in the case of the ten stems, as cultic appellations for the royal ancestors. As E. 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.”¹ Despite the best efforts of numerous scholars, it is not surprising that the cyclical signs have defied etymological analysis. These unique characteristics

¹ Pulleyblank, “The *Ganzhi* as Phonograms and their Application to the Calendar,” 24. The study presented here suggests a possible alternative to Pulleyblank’s thesis that “the set of twenty-two *tiangan* and *dizhi* signs is a complete and nonrepeating representation of the set of initial consonants in Old Chinese”; Boltz, “Language and Writing,” 103.

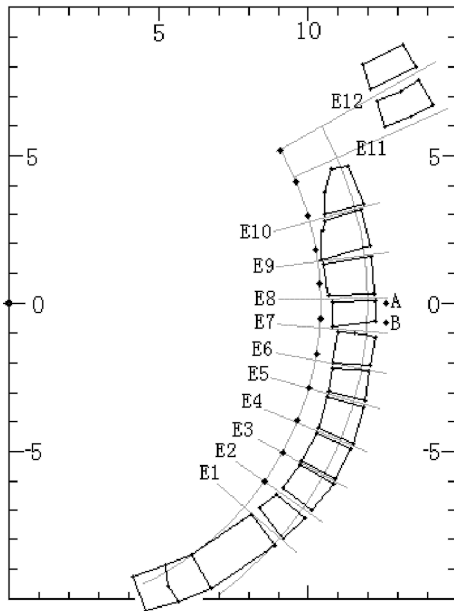
probably indicate that by the Yīnxū 殷墟 period in late Shang any semantic origins of these cyclical signs were thoroughly obscure; indeed, if traditional historiography is any guide the ten stems were already being used as (posthumous?) royal appellations by the rulers of Xià 夏. This would mean that their invention predates the appearance in the archaeological record of the first Chinese writing by several hundred years.

It has been suggested that the origin of the stems and branches may be traced to their use in the late Shāng ancestral cult, but this proposal does not satisfy.² As I will argue below, the calendrical use of the cyclical signs is considerably more archaic and probably originated in a pre-Shāng culture. Moreover, it is difficult to understand why, given an imperative to devise ordinal designations for the deceased ancestors, signs as arbitrary as the ten stems would have been adopted *unless* they possessed a special significance by virtue of their very archaicism, or because of a special connection with numinous origins, or with temporal power and authority (*sc.* the calendar).³ On the other hand, arbitrariness in the initial choice of signs to represent numbers is well documented and illustrates the essential independence of writing in being able to represent ideas directly: it was not initially a “graphic echo of

² See, e.g., Mark E. Lewis, Writing and Authority in Early China, 14-15. In Boltz’s view (“Language and Writing, 108), “we cannot assume writing to have arisen in an exclusively religious context.” For further critical review of such proposals, see Robert W. Bagley, “Anyang writing and the origin of the Chinese writing system,” 226, where he 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.”

³ On this point, see David N. Keightley, The Ancestral Landscape, 51: “The Shang ritualists were . . . certainly calendar, day, and sun watchers, whose temporal and jurisdictional concerns were sanctified by profound religious assumptions.”

speech.”⁴ There is still no scholarly consensus on how the Shāng kings’ temple names were chosen or why they were selectively adopted, though one has to assume that the original ordinal significance of the signs was being invoked in some way, even if the information thus encoded is now obscure.⁵ It is also the case that some stems were thought more auspicious than others, which was certainly the case later.⁶



⁴ Merlin Donald, Origins of the Modern Mind, 287.

⁵ 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 royal temple names is anything but random. Instead, Chang proposed that, “the Shang royal lineages were organized into ten ritual units, named after the ten *kan*-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 Chang, Shang Civilization, 169, 172. David N. Keightley (The Ancestral Landscape, 35) has offered an alternative conjecture.

⁶ Keightley, The Ancestral Landscape, 33. K.C. Chang’s tabulation of 1295 bronze inscriptions with ancestral names containing heavenly stems showed that the even-numbered stems (乙 *yǐ*, 丁 *dīng*, 己 *jǐ*, 辛 *xìn*, 癸 *guǐ*) were far and away the most preferred, and of these the first two outstripped the others in frequency by a wide margin; see Chang, Shang Civilization, 169-170. Chang appears not to have considered the possibility that the stems initially denoted the birth order among siblings, in which case one might reasonably expect a higher frequency of use among the earlier signs.

Fig. 1 Precision drawing of the Táosì solar observing altar-platform (after Pankenier, et al., in press; drawing courtesy Liu Ciyuan.)

Calendrical notation as a cultural imperative

Consider first Figure 1 above showing the layout of the solar observation platform attached to the southeast wall of the middle period city recently excavated at Xiāngfén 襄汾, Táosì 陶寺 in Shānxī. This unprecedented discovery dates from ca 2100 B.C.E. and is both the earliest and the most elaborate Neolithic or Bronze Age structure ever discovered in China which was unequivocally dedicated to astronomical observation. The structure outlined in the drawing consisted of a curved rammed-earth wall facing southeast perched atop three concentric rammed-earth terraces. The curved wall was perforated by narrow slits to form 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. Radiating from it are sightlines extending to twelve slits in the wall. This spot marks the location of a small, round, rammed-earth pedestal from which observations were intended to be made through the wall opposite as the sun rose above the mountain ridge to the east. It has been convincingly shown that this platform 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).⁷ Such a horizontal calendar could yield 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 Táosì's designers were

⁷ David W. Pankenier, et al., "The Xiangfen, Taosi Site: A Chinese Neolithic 'Observatory?'" ; Líu Ciyúan 劉次沅, et al., "A Chinese observatory site of 4,000 year [*sic*] ago," 129-30.

interested in correlating the tropical year with the lunar months, which effort would eventuate in a luni-solar calendar of the type that became conventional by late-Shāng (at least in the context of divination), as demonstrated by the use of intercalary 13th months to maintain synchronization between solar and lunar cycles. Some have even suggested, based on the number of viewing apertures at Táosì, that the observing platform represents an early effort to create a fortnightly scheme of twenty-four solar periods (節氣, *jiéqì*) like that familiar to us from much later times, though this suggestion is problematical.⁸ 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) must have possessed a number of crucial concepts and related terminology. Whether in the construction or use of the facility, those concepts and terms would have included things like sun, moon, stars, horizon, sightline, direction, location, elevation, aperture, diameter, curve, straight line, to measure, units of measure (a Neolithic yard?),⁹ etc. More apropos 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).¹⁰ The implications of this are

⁸ The observing slits are regularly spaced, while the sun moves about six times faster along the horizon near the equinoxes than near the solstices. Consequently, the time when the sun was observed to rise in the successive slits would have been very unequal, varying between about 8 days and well over a month.

⁹ The dimensions and regular spacing of the backsights (viewing slits) indicates that a standard measure of just over one meter was probably used by the builders to lay out the platform.

¹⁰ Achronical rising refers to a star's first visibility after sunset in the evening. Heliacal rising refers to a star's first brief appearance in the dawn twilight before sunrise.

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.¹¹

There can be no doubt that, whatever other cultic or ritual purpose Táosi 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. We know from traditional accounts that other analog methods, presumably inspired by the art of weaving, relied on knotting cords to record information. As the *Xìcí zhuàn* of the *Yì jīng* 易 · 系辭 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 *kipu*. Many of these *kipu* survived the holocaust of the Spanish Conquest, though examples of calendar *kipu* are extremely rare.¹² Maintained by the specialists who were the schedulers of the religious rites of the Inka and guardians of their

¹¹ Merlin Donald, *The Origins of the Modern Mind*, 335).

¹² For an interpretation of the code employed in the *kipu*, see Gary Urton, *Signs of the Inka khipu*, also Charles C. Mann, 1650.

cultural astronomy and cosmology, as repositories of “pagan devil worship” these devices were zealously sought out by the missionaries and consigned to the bonfires of pre-Columbian cultural artifacts.

A unique example of such a calendar *kipu* for the year 1532 has survived, however (Fig. 2), and it is well worth examining in some detail for what it can tell us about this method of record keeping in pre-literate societies.¹³ The thirteen square cartouches arrayed along the top cord are logograms and pictograms 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. These are grouped into ten-day weeks by spacing the knots, and further into groups of fifteen which define mid-month. Tags attached to particular days signify events of note, including astronomical dates of importance: full moons, the Pleiades rising, eclipses, etc. Seven long months of thirty days and five short months of twenty-nine days occur in irregular sequence, and a thirteenth, intercalary month is appended which contains ten epagomenal days, bringing the total number of days represented to 365.

Contemporaneous accounts of Inka *kipu* 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

¹³ See Laura Laurencich-Minelli and Giulio Magli, “A calendar *Quipu* of the early 17th century.”

¹⁴ The cartouche images resembling camel humps are *ceques* or the pairs of pillars bracketing crucial astronomical rising or setting points on the high mountain ridges around Cuzco.

officials known as “knot-readers” or *khipukamayuc* (Fig. 3).¹⁵ This is the type of analog device that preceded the invention of writing and it illustrates the kinds of information that eventually 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 and seasons, a variety of action verbs, etc., essentially the same technical vocabulary employed by the users of the Táosi “observatory.”

In other words, once the mental leap was made from the pictographic and analogue symbolism 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, or other visuographic symbols such as those abundantly documented from the Chinese Neolithic) in order for the transition to a written calendar to be accomplished. The application of writing in this specialized way must have taken place in short order—to be functional such a calendar, once conceived, would need to embody almost from the start several basic elements and concepts itemized above. Once the technique of representing words graphically emerged into consciousness, as it obviously did independently in several cultures, the transition to writing from an analog device like the *khipu* could have

¹⁵ Gary Urton, “From knots to narratives,” 409-438. 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, 1650).

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”; Boltz, “Language and Writing,” 110.

been fairly rapid. It is also not difficult to imagine how the pictographic representation of an idea, say “,” once it became conventional among specialist *kipu* practitioners, could gradually be transformed into the “glotto-graphic” representation of that month, after which the process could quickly be replicated in other contexts and applications. After all, short of pointing to the corresponding *kipu* cartouche, for example, the pictograph “corn-planting month” 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 pictograph.

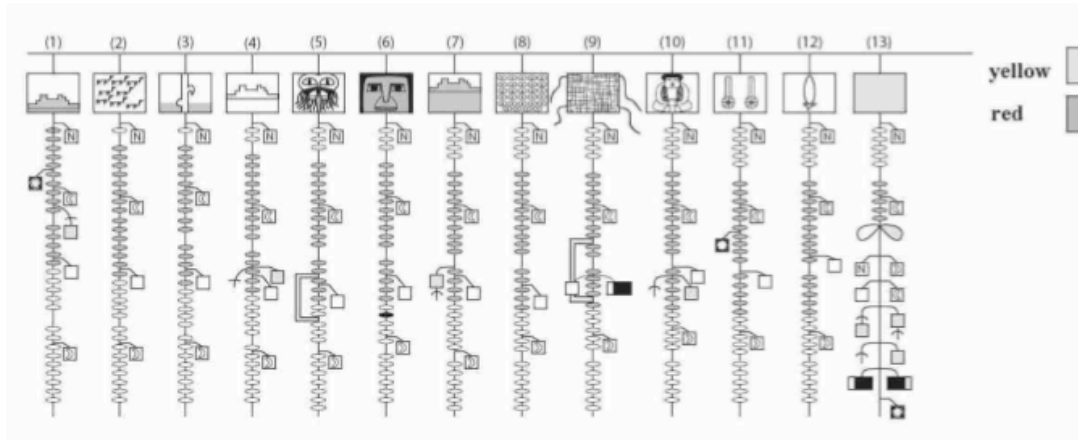


Fig. 2: Inka calendar khipu (after Laurencich-Minelli & Magli, “A calendar quipu of the early 17th century.”)



Fig. 3: Inka “astrologer” carrying in his right hand a forked sighting rod for astronomical observations and in his left a khipu (after Laurencich-Minelli & Magli, “A calendar Quipu of the early 17th century.”)

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

Clearly, for the purposes of counting the days at Táosi between full moons, solstices, harvest festivals and so on, a primitive number system and reliance on memory alone would simply not do. At a minimum one either devised a scheme to represent “1, 2, 3 . . . 10,” or maintaining a horizon calendar over time would have

¹⁷ Donald, *The Origins of the Modern Mind*, 290 (emphasis mine).

been impossible. A number set consisting of “1, 2, 3, many” coupled with an oral narrative listing regularly observed astronomical or meteorological events would certainly be inadequate to the task—biological memory is far too limited.¹⁸ Given the conceptual toolkit of the elite creators and users of the Táosì observing platform during the two centuries or so it was in use, the implication must be that they also possessed some sort of external recording device like a *kipu*, if not a system of written signs, and this some eight centuries before Shāng king Wǔ Dīng 武丁. In what follows, therefore, I will put 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 calendar, and further that it was calendrical astronomy that lent impetus to the invention of writing in China.¹⁹

To begin we'll have a look at some interesting examples of inscribed calendar tables from the Shāng inscriptional materials to see what information may be gleaned from them. They are clearly not divination texts, nor, as we shall see, do they all

¹⁸ On the advantages of writing in particular, Donald (*The Origins of the Modern Mind*, 288) 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."

¹⁹ Stephen D. Houston makes the important 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”; see Houston, “Overture to the First Writing,” 11-12.

represent calligraphy “practice.”²⁰ The two transcribed in (a) and (b) below, were analyzed in 1929 by Guō Mòruò 郭沫若 in his pioneering monograph on the origins of the cyclical signs, *Shì zhīgān* 释支干[sic].²¹ Guō points out that examples which repeat the first three ten-day weeks (*xún*) several times in succession are actually about as numerous as those that reproduce the whole series of sixty cyclical signs. Guō inferred that these 30-day tables are an indication that the Shāng months originally comprised three *xún* of thirty days, which means that every month would have begun with day *jiǎzǐ* 甲子 [1] and ended with *gǔisī* 癸巳 [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 twelve months of thirty days are actually some five days longer than twelve lunations of 354.4 days. This has been borne out by more recent research on the Shāng calendar by Cháng Yùzhī 常玉芝 and others.²²

What clinched for Guō the argument that these tables are certainly calendars are examples like (a) and (b) below. In (a) we see the cyclical signs from *jiǎzǐ* [1] through *gǔihài* [60] arranged in four registers, the first two registers together comprising twenty-nine days and the second two comprising thirty-one days.

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. David Keightley (*The Ancestral Landscape*, 39) concluded that many examples such as those identified by Guō are, in fact, written calendars used for reference.

²¹ This is not the place for a thorough study of Guō’s hypothesis concerning the astral correlates of the stems and branches and their supposed Babylonian origins. A number of his philological analyses have not stood the test of time; for a recent critique, see Wáng Níng 王寧, “*Shì zhīgān biànbǔ* 释支干辨補.

²² Cháng Yùzhī, *Shāngdài zhōujì zhìdù* 商代周祭制度.

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. Most tellingly, however, in example (b) the scribe has again reproduced two sequences of thirty signs from *jiǎzǐ* [1] through *gǔisī* [30], but in this unique inscription the months are actually named—“Month One Regular *zhèng* is called ‘Wheat is eaten’” 月一正曰食麦 and “the 2nd 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 one through sixty, with one fortnight per column. (Since adequate space was available it is curious that the scribe would split *jǐsī* 己巳 [5] [bottom of column one] and *gēngxū* 庚戌 [47] [bottom of column six] for no apparent reason.) Remarkably, the inscription supplies what must be the conventional names for the first two months of the year, the first of which, *shí mài* “eat wheat,” is corroborated by later textual evidence from *Yí zhōu shū* 逸周書, “Monthly Ordinances” *Yuè lìng* 月令.²³ Guō

²³ “*Yue ling jie*” 月令解 (第五十三) says: “In the first month of spring, the sun is in *Yingshi*, at dusk *Shēn* culminates, and at dawn *Wěi* culminates . . . eat wheat and mutton 孟春之月，日在營室，昏參中，旦尾中 . . . 食麥與羊.” Winter wheat is harvested in late spring, so that many have argued on this basis that if the month was named for the first fruits of the wheat harvest, the *Shāng* first month should have fallen near the summer solstice; See Yáng Shēngnán 杨升南, *Shāngdi jīngjì shǐ* 商代經濟史, 121.

Mòruò called this inscription “China’s earliest calendar.”²⁴ That it certainly is. It must reflect early calendrical usage, since, with the exception of *yuè yī zhèng* “Month One Regular,” none of the noteworthy features of this calendar are used in the dating formulas of the actual Shāng divination texts, which invariably alternate twenty-nine and thirty-day months and invariably enumerate the months rather than naming them.²⁵

²⁴ The OBI graph for *shí* 食 is not immediately recognizable on the rubbing as strokes have been omitted; for analysis, see Guō Mòruò, *Shì zhīgān*, 161. See also Yáng Shēngnán 杨升南, *Shāngdì jīngjì shǐ* 商代經濟史, 121.

²⁵ The dual nature of the calendar shown in this table calls to mind 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, not the second, agricultural system, that gave rise to the numbered moons recorded in the divination inscriptions”; see Keightley, *The Ancestral Landscape*, 44.

(a) (HJ 21783)

			丁丑 14	丙子	乙亥	甲戌	癸酉 10	壬申	辛未	庚午	己巳	戊辰	丁卯	丙寅	乙丑	甲子 1
		壬辰 29	辛卯	庚寅	己丑	戊子	丁亥	丙戌	乙酉	甲申	癸未 20	壬午	辛巳	庚辰	己卯	戊寅
己酉 46	戊申	丁未	丙午	乙巳	甲辰	癸卯 40	壬寅	辛丑	庚子	己亥	戊戌	丁酉	丙申	乙未	甲午	癸巳 30
			癸亥 60	壬戌	辛酉	庚申	己未	戊午	丁巳	丙辰	乙卯	甲寅	癸丑 50	壬子	辛亥	庚戌
				癸亥 60	壬戌	辛酉	庚申 57									48
				戊戌 35	丁酉	丙申 33										23

(b) (HJ 24440)

月一	巳庚	戊寅	丁亥	甲午	壬寅	戌辛	己未
正	午辛	寅巳	亥子	午乙	寅癸	亥壬	未申
日	未壬	巳庚	子己	乙未	卯甲	酉壬	申辛
食	申癸	辰辛	己丑	丙申	辰乙	戌癸	酉壬
麦	酉甲	巳壬	丑庚	丁酉	巳丙	亥癸	戌癸
	戌乙	午癸	庚寅	酉戊	午乙	未戌	亥癸
	亥丙	未甲	寅辛	戌己	卯丙	申戌	亥癸
	子丁	申乙	卯壬	己亥	辰丁	巳戊	
	丑	酉丙	辰癸	庚子	巳戊	午	
		戌	巳	辛丑	庚		
			二月				
			父				



After pondering the implications of these idiosyncratic tabulations it occurred to me to look into the reconstructed readings of the twenty-two signs to see what

patterns might emerge from different arrangements. Below are reproduced the Old Chinese reconstructions of the cyclical signs. To the right of the OC 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).²⁶

<u>天干</u>	<u>OC</u> ²⁷	<u>Rhyme</u>
1. 甲 [八部]	* <i>kkrap</i>	
2. 乙 [十二部]	* <i>qrik</i>	
3. 丙 [十部]	* <i>prang</i>	D
4. 丁 [十一部]	* <i>tteng</i>	
5. 戊 [三部]	* <i>mu-s</i>	
6. 己 [一部]	* <i>kəγ</i>	
7. 庚 [十部]	* <i>kkrang</i>	D
8. 辛 [十三部]	* <i>sing</i>	
9. 壬 [七部]	* <i>nəm</i>	
10. 癸 [十五部]	* <i>kWijγ</i>	

<u>地支</u>	<u>OC</u>	<u>Rhyme</u>
1. 子 [一部]	* <i>tsəγ</i>	A
2. 丑 [三部]	* <i>hnruy</i>	B
3. 寅 [十二部]	* <i>lin</i>	C
4. 卯 [三部]	* <i>mmruy</i>	B
5. 辰 [十三部]	* <i>dər</i>	a
6. 巳 [一部]	* <i>s-ləγ</i>	A
7. 午 [五部]	* <i>ngngay</i>	X
8. 未 [十五部]	* <i>mət-s</i>	a
9. 申 [十二部]	* <i>hlin</i>	C
10. 酉 [三部]	* <i>luγ</i>	B
11. 戌 [十二部]	* <i>s-mit</i>	X
12. 亥 [一部]	* <i>ggəγ</i>	A

Several things are immediately apparent regarding the earthly branches, the second element in each pair of cyclical signs, which one would expect to occupy the stressed, rhyming position when the series was recited. First, apart from *wǔ* 午 and *xū* 戌, the other ten signs all share only four rhymes, one of which, “a” is in assonance

²⁶ I am grateful to Paul Goldin and Wolfgang Behr for comments and corrections with regard to Old Chinese rhyming and phonetics.

²⁷ Doubled initial consonants indicate type A syllables; glottal stop is indicated by *γ*.

with “A”. Second, the “A” rhymes divide the twelve signs roughly in two. Third, remarkably, there are no labials or velars among the set. Compare these features with those of the ten stems above. Rhymes are almost entirely lacking, but the ten stems display a full range of final articulations. 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 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. The implications of this become apparent when we examine a thirty-day tabulation of *gānzhī*, only now with the rhymes indicated as in (d).

Highlighting the rhymes and patterns in Solution #1 (on the right), we have:

1st column: A B C, B a A, X a C, B
 2nd column: X A|A B C, B a A, X a
 3rd column: C, B X A|A B C, B a A . . .

Vertical slashes show where the rhyme sequence begins to repeat, so that we have here two and one-half iterations of a sequence of four triads. If one accepts that *chén* 辰 [十三部] **dər* might have rhymed with *yín* 寅、*shēn* 申 [十二部] *-*in*, then this would further reinforce the pattern by adding three additional “C” rhymes, yielding the result:

1st column: A B C, B C A, X a C, B
 2nd column: X A|A B C, B C A, X a
 3rd column: C, B X A|A B C, B C A . . .

(d) Rhyming pattern of cyclical signs

	干支	1-30
21 甲	11 甲	1 甲
申C	戌X	子A
22 乙	12 乙	2 乙
酉B	亥A	丑B
23 丙	13 丙	3 丙
戌X	子A	寅C
24 丁	14 丁	4 丁
亥A	丑B	卯B
25 戊	15 戊	5 戊
子A	寅C	辰C?
26 己	16 己	6 己
丑B	卯B	巳A
27 庚	17 庚	7 庚
寅C	辰C?	午X
28 辛	18 辛	8 辛
卯B	巳A	未a
29 壬	19 壬	9 壬
辰C?	午X	申C
30 癸	20 癸	10 癸
巳A	未a	酉B

The apparently inconsistent readings that remain—for 午、未、戌—if that is indeed what they are, may have other explanations, including possible problems with the Old Chinese reconstruction, or ancient misinterpretation of the original graphs, or even more primitive, generic rhyming.²⁸ Even without speculating about sources of uncertainty in the reconstructions, the features of the earthly branches suggests that rhyme may well have played a role in their selection.

To this it might be objected that the recursive pattern is merely an artifact of the pairing of twelve branches with ten stems that produced the cycle of sixty signs,

²⁸ ‘Generic rhyme’ refers to “rhyming between any one member of a phonetic group and itself, or any member of the same group (for example, ‘b’, ‘g’, or ‘d’)”; see McKie, “The origins and early development of rhyme in English verse,” 822.

since a repetitive pattern must inevitably emerge. This is true, of course, but one cannot ignore the consequences of the stark contrast between the two sets of words—the ten stems with their random selection of rhymes and finals and the twelve branches with their prominent rhymes and a series of finals that conspicuously avoids labials and velars.²⁹ If the phonological characteristics of the twelve branches had resembled those of the ten stems instead, no mnemonically useful sequence of rhymes could emerge. Then, of course, some will object that extrapolating Old Chinese reconstructions back in time a thousand years beyond the *Shījīng* is a very speculative proposition. To this I can only respond that while the criticism may apply to the precise details of the reconstructed pronunciation, phonetic change is systematic and 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 mid-2nd millennium BCE may not have been exactly as represented, the fundamental *contrast* between the linguistic features of the two sets is unlikely to have changed very much. A further objection might be that there is no unequivocal evidence of rhyming earlier than the Western Zhōu bronze inscriptions. Here, however, I am not arguing for self-conscious use of rhyme as literary embellishment but merely as a mnemonic device, one which may have aided in recalling the sequence of binary cyclical signs whose recitation would necessarily have been rhythmic.³⁰

²⁹ This latter feature was brought to my attention by Paul Goldin (personal communication), who stressed that this is unlikely to be a random occurrence. By contrast, fully half the ten stems have labial or velar finals.

³⁰ For this advantage of rhyming we have explicit testimony from the medieval Latin West: according to practitioners, the form known as “the *sequentia* began as a

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 the stems complemented by the twelve branches. Originally the days would have been named using just the ten stems, an arbitrary series 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 devised and paired with the ten stems in sequential fashion, by matching one branch with each of the ten stems. Proceeding in this fashion for six ten-day weeks until the first pair—*jiǎzǐ*—reappeared would produce the familiar series of sixty unique signs (in fact, only half the 120 possible combinations). But now each combination of signs would only repeat 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, of course, that the number of unique combinations requiring memorization would have increased by a factor of six, so that at this point rhyming might conceivably have been called upon as a mnemonic device. The rhymed sequence of four triads illustrated above would repeat five times within the entire scheme of sixty cyclical signs, perhaps providing a useful memory aid.

The above is conjectural, of course, so it remains for us to establish a *direct* connection between the early calendar, astronomy, and the inspiration leading to the invention of the cyclical signs. This will be the aim of Part Two.

mnemonic aid: it was far easier to remember a melody tied to a text than a wordless melisma, and a rhymed text was more memorable than an unrhymed one”; McKie, “Origins and early development of rhyme in English verse,” 826, esp. n. 41.

Part Two: 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,³¹ used the circumpolar stars to find true north, a task complicated during the last two millennia BCE by the absence of a comparatively bright star near the pole. Similarly, archaeological discoveries from the Xià, Shāng, and Zhōu periods show 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.³² There are, of course, nearly ubiquitous methods for achieving cardinality described in the growing literature on cultural astronomy, most involving observations of the sun’s shadow using a gnomon. Variations on these methods documented in Warring States period China have been known for some time, but here I wish to briefly describe a much earlier solution to the problem of correctly orienting

³¹ As early as the mid-3rd millennium B.C.E. the ancient Egyptians were capable of aligning immense structures like the great pyramids of Giza on true north with an accuracy of a fraction of a degree; see Spence, “Ancient Egyptian chronology and the astronomical orientation of pyramids,” Belmonte, “On the orientation of the Old Kingdom pyramids,” Rawlings, “Astronomical orientation of the pyramids,” Miranda, et al., “Uncovering Seshat: new insights into the ‘stretching of the cord’ ceremony”. In 2004, still unaware of Spence’s posited “simultaneous transit” method used by the Egyptians to find true north ca -2500, I proposed that the Chinese employed essentially the same direct method to locate the pole by aligning circumpolar stars on opposite sides of the pole; see Pankenier, “A brief history of *beiji* (northern culmen).” Miranda, et al., “Uncovering Seshat: new insights into the ‘stretching of the cord’ ceremony,” offer persuasive evidence of the use of a hand-held standard to align stars in the bowl of the Dipper on the pole. Fig. 3 above shows a more primitive, but conceptually analogous implement. On the celestial inspiration for the archaic kingship and the concept of Heaven’s Mandate, see Pankenier, “The cosmo-political background of Heaven’s Mandate.”

³² Keightley, *The Ancestral Landscape*, 82.

high value structures in the landscape using the stars. Until now, researchers have overlooked this method, which takes advantage of the unique orientation of the Great Square of Pegasus (known as *dìng* 定 in pre-Warring States China). As one might expect, this method underscores the distinctive polar-equatorial focus of Chinese astronomy, but more surprisingly it also clearly 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 zhī fāng zhōng* 定之方中 in the *Yōng fēng* 鄘風 “Airs of Feng” section of the *Odes*. The theme of this poem is how Duke Wén 文公 of Wèy 衛 carried out the re-building of his destroyed capital, as a peapen to his rectitude and uprightness:³³

When [the asterism] *Dìng* just culminated, he started work on the *Chǔ* Palace;
 when he had measured it by the sun, he started work on the *Chǔ* Hall.
 定之方中，作於楚宮；揆之以日，作於楚室
 He planted it with hazel and chestnut, with *yì*-tree, *tóng*-tree, catalpa, and lacquer, so that they could fashion zithers.
 He ascended the tell in order to look out over *Chǔ* ; he looked out over *Chǔ* and Tang; he measured hills and mounds by their shadow;
 昇彼虛矣，以望楚矣；望楚與堂，景山與京

³³ The ode celebrates the restoration of Duke Wén of Wèy at *Chǔqiū* 楚丘 in 658 B.C.E. (Duke Mǐn 閔 of Lǔ 魯, 2nd year) after Wèy had been destroyed by an invasion of the *Dí* 狄. Resettlement of Duke Wen and the remnant population of Wèy was brought about through the intervention of Duke *Huān* 桓 of *Qí* 齊 who drove the *Dí* out of the area; see Legge, *The Ch'un Ts'ew and the Tso Chuen*, 128. Much later, in his *Jūndào* 君道 chapter, Xúnzǐ 荀子 chooses a similar metaphor to characterize the *jūnzǐ*'s 君子 rectitude: "The lord is the sundial; if the sundial is straight, the shadow is straight 君者，儀也，儀正而景正; see Xúnzǐ *jíjié* 荀子集解, 154; cf. Goldin, *After Confucius*, 45.

He descended and inspected the mulberry grounds; the tortoise-shell oracle was auspicious, all through it was truly good . . .³⁴

Pride of place among the activities described is the correct orientation in the landscape of the main ancestral hall.³⁵ Commentators all agree that the time to commence work, *dìng zhī fāng zhōng* (lit. “just when *dìng* was centered”), refers to the moment when the asterism *Dìng* transited the local meridian due south in the evening. Then we also read that “when he measured it by the sun” *kuí zhī yǐ rì*, he started work on the hall.³⁶ The *Chǔ* Hall is then surveyed (*wàng* 望) from atop a hill, from which the location (presumably on the south-facing slope) of an elevation is gauged by means of shadows. The *Máo* 毛 commentary on the first of these lines reads as follows:

‘*Dìng*’ is *Yingshì* (lunar lodge #13, Peg). ‘*Fāng zhōng*’ [means] at dusk to rectify (正) the four directions. ‘*Chǔ gōng*’ is the hall at *Chǔqiū* . . . ‘*Kuí*’ is to measure: to measure sunrise and sunset in order to ascertain east and west. Watching to the south [he] observes *Dìng*, and to the north he aligns

³⁴ Karlgren, The Book of Odes, 33 (modified).

³⁵ Indeed, Hwang Ming-chorng adduces evidence to suggest that the structure being built is in fact the highly symbolic ritual center of the state, the *míngtáng*; see Hwang, “Ming-tang: cosmology, political order and monuments in early China,” 346: “*Shī xù* says this poem is about the rebuilding of the capital city of the state of Wè in 658 B.C.E. There is no dispute about this interpretation . . . however, we believe what is described in this poem is the entire process of rebuilding a sacred architecture—a *míng-táng*.”

³⁶ The second mention of a “hall” here is to a *táng* 堂 (**dang*), and it was the *-*ang* end rhyme that dictated the substitution of *táng* for *shì* 室. The parallelism suggests we are dealing with the same two structures, rather than a distinction between “temple” and “residence,” as some commentators would have it. For the rhyme scheme of *Dìng zhī fāng zhōng*, see Baxter, A handbook of Old Chinese phonology, 601: the OC reconstructions given here are Baxter’s.

on the pole, in order to rectify (正) south and north. A ‘*shi*’ is just like a ‘*gōng*’ (hall).³⁷

定營室也。方中昏正四方。楚宮楚丘之宮也... 揆度也。度日出日入以知東西。南觀定北准極以正南北。室猶宮也。

Since the sun and shadows are explicitly mentioned, we can guess at the method: a gnomon was used to measure the sun’s shadow at sunrise and sunset to lay out a proper east-west line. What then did Máo Hēng’s comment—“watching to the south [he] observes *Dìng*, and to the north he aligns on the pole, in order to rectify south and north”—refer to? Zhèng Xuán 鄭玄 (127-200) expands on the Máo commentary:

‘*Chǔ gōng*’ means the ancestral temple. When asterism *Dìng* culminates on the meridian at dusk it is upright, so that one can use *Yìng*[-*shì*] to construct temples and halls. That is why it is called ‘Align the Hall.’ ‘When *Dìng* culminates on the meridian at dusk and is upright,’ means that at the time of Lesser Snow,³⁸ its [*Dìng*’s] shape and [that of] *Dōngbì* “Eastern Wall”³⁹ join in rectifying the four directions.⁴⁰

楚宮謂宗廟也。定星昏中而正。於是可以營制宮室。故謂之營室。定昏中而正。謂小雪時其體與東壁連正四方。

Zhèng Xuán has added some important clarification, which will become more meaningful shortly, but for now it is apparent that there is much more of a technical nature going on than meets the eye in this deceptively straightforward, terse comment.

³⁷ Shísānjīng zhùshū 十三經註疏, 1970, vol. 1, 59.

³⁸ “Lesser Snow” is the fortnightly solar period or “*qi*-center” 中氣 that begins thirty days before Winter Solstice.

³⁹ “*Dōngbì*” is lunar lodge #14 immediately to the east of *Yìngshì*, comprising the two stars Alpheratz and Algenib in Pegasus, about which more below.

⁴⁰ Shísānjīng zhùshū, 1970, vol. 1, 59.

*Bringing down the pole*⁴¹

Notice, however, that in our ode *Dìng zhī fāng zhōng*, it was deemed inadequate merely to use the sun to lay out a true east-west line—it was also essential to bring down a true north-south line using the pole. The question is how was this done? We have seen from commentary on this ode and elsewhere that the asterism *Dìng* is none other than *Yingshì*, lunar lodge #13.⁴² We saw above that *Yingshì* means something like “align the hall,” and *yíng* has this meaning in just such contexts in both *Shàngshū* and the *Shījīng*.⁴³ So the asterism’s function is actually embodied in its name, one which evidently had supplanted the name *Dìng* by Warring States times. The two bright stars of *Yingshì* on the north and south are β and α Pegasi (*Scheat* and *Markab*), which form the western side of the prominent asterism known to us as the “Great Square of Pegasus,” which forms the body of the celestial winged horse.

⁴¹ The following section is an abbreviated version of the philological and astronomical analysis of the evidence establishing the accuracy of the method for locating the pole referred to as *Dìng zhī fāng zhōng*. For details, see Ban Dawei 班大為 (D.W. Pankenier). “Beiji de faxian yu yingyong 北極的發現與應用.”

⁴² *Er ya* 爾雅, “*Shitiān*” 釋天 says, “*Yingshì* is called *Dìng*” 營室謂之定. Guō Pú’s 郭璞 (276-324) comment reads: “*Dìng* is *zhèng* (正). In building temples and halls all take *Yingshì*’s culmination [on the meridian] to be straight and true” 定, 正也. 作宮室皆以營室中為正. *Shísānjīng zhùshū*, vol. 2, 2609. My rendering of *zhèng* as “true” here means “exact, accurate, precise; correct” as in “straight and true.” The *Shuōwén* glosses *zhèng* 正: “*Zhèng* 正 is *shì* 是. *Shì* 是 is *zhí* 直 ‘straight.’ From *rì* ‘sun’ and ‘*zhèng*’ ‘correct.’ 正, 是也. 是, 直也. 從日、正. Duàn Yùcái 段玉裁 (1735-1815) comments: “to take the sun as correct; to pattern on the sun. The meaning is compounded from ‘sun’ and ‘correct.’” 以日為正, 則日。從日、正, 會意. Whether or not Xǔ Shèn’s 許慎 (ca. 55-ca. 149) etymology is correct, it is evident that he had in mind an association of *zhèng* with the utilization of the sun as a normative reference.

⁴³ See Ban Dawei 班大為. “Beiji de faxian yu yingyong 北極的發現與應用,” 281ff.

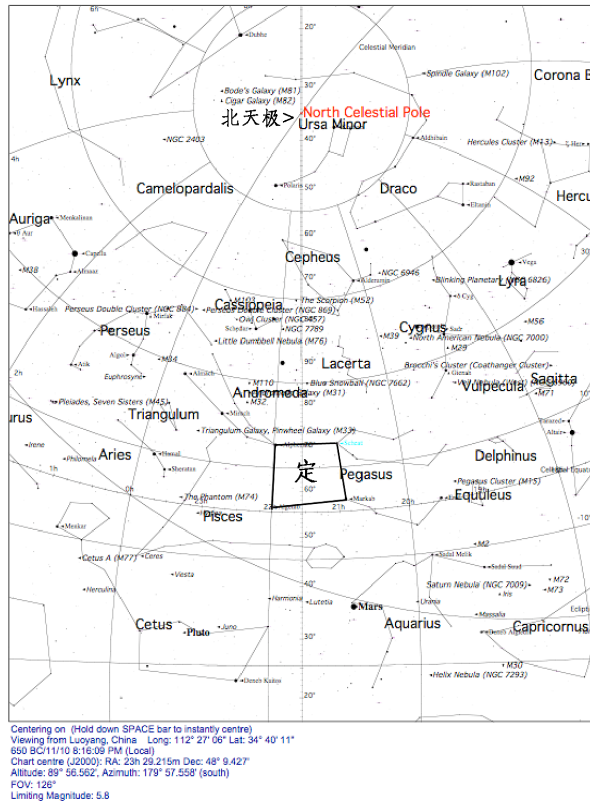
Immediately to the east of *Yingshì* is *Dōngbì* or “Eastern Wall,” lunar lodge #14, comprising the two stars δ and γ Pegasi (*Alpheratz* [alt. α And] and *Algenib*).

Looking at Figure 4, one can see why the nearly parallel orientation of “Eastern Wall” also implicates *Dōngbì* in the alignment function ascribed to *Yingshì*, as suggested by Zhèng Xuán in his comments above: “[*Dìng*’s] shape and [that of] *Dōngbì* “Eastern Wall” combine in rectifying the four directions.” In *Erya*, *Shìtiān* “Heaven Explained,” where *Yingshì* is glossed as *Dìng*, the text goes on to say: “*Zōuzǐ*’s ‘mouth’ is *Yingshì* and *Dōngbì*.” 媯觜之口，營室東壁也。 *Zōuzǐ* 媯觜 is the late Warring States and Han designation for chronogram *hài* 亥, which comprises lunar lodges *Yingshì* and *Dōngbì*, and *kǒu* 口 “mouth” in the gloss refers to the Great Square of Pegasus.⁴⁴

The Alignment Function of Asterism Dìng

⁴⁴ Guō Pú’s comment reads: “The four sides of asterisms *Yingshì* and *Dōngbì* resemble a *kǒu*, hence the name.” *Shísānjīng zhùshū*: 1970, vol. 2, 2609. The memory of the unitary early history of asterism *Yingshì-Dōngbì* persisted into the Táng, since the *Kāiyuán zhānjīng* 開元占經 (729; ch. 61) preserves a comment by the Eastern Han astronomer Xī Méng 郗萌 (fl. ca. 100) stating that “the two stars of *Yingshì* are the west wall, and together with the two stars of *Dōngbì* they combine to form a foursome, their shape an open square resembling a *kǒu* ‘mouth’” 營室二星為西壁，與東壁二星合而為四，其形開方似口。 *Yingshì-Dōngbì* are also clearly identified as a Celestial Temple in the same sources. For analysis and discussion of this Celestial Temple as the ancient archetype of the iconic *mingtang* 明堂 “Hall of Light,” see Ban Dawei 班大為. “Beiji de faxian yu yingyong 北極的發現與應用,” 292-295.

Fig. 4: Asterism Ding, the Great Square of Pegasus (center), due south on the local meridian, 10 November 650 BCE. Note the exact alignment of the meridian and Dōngbì, the “Eastern Wall,” defined by Alpheratz – Algenib (Starry Night Pro 5).



If one looks at the longitudinal meridian lines in the chart in Figure 4 below, which reflects the situation in 650 BCE, one immediately realizes that the eastern and western walls of *Yingshi* and *Dōngbì* align perfectly with the meridians converging on the pole over 70° to the north. Therefore, for all intents and purposes, by early Zhōu 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-Dōngbì* to the pole means that it was not possible to observe the circumpolar sky in the north and the *Ding* asterism in the south at the same time. In addition, the diurnal and annual revolutions of Pegasus also mean that *Yingshi-Dōngbì* would only have been useful for the purpose of aligning on the pole at a particular moment—on transiting the meridian in the evening when the two parallel sides of *Ding* would have been perpendicular to the horizon and pointing overhead through the zenith to the pole at one’s back. 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, we have the true meaning of Máo Hēng's obscure comment above whose discussion we deferred:

'*Dìng*' is *Yingshi*; '*fāng zhōng*' [means] at dusk to rectify (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.

Investigation reveals that the optimal time for such alignment observations in late Shang and Western Zhou would have been in early evening in late autumn. In mid-November, *Dìng* would have been optimally positioned at nightfall right after sunset. Various sources confirm that it was in late autumn, after the end of the agricultural season, that this activity would have taken place. In *Guóyǔ* 國語, *Zhōuyǔ* 周語 we read, "When *Yíng* palace is centered [on the meridian], the work of building begins" 營宮其中, 土功其始.⁴⁵ In *Zuǒzhuàn* 左傳, (Duke Zhuāng 莊公, 29th year) it says, "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' culminates at dusk the foundations are built; at winter solstice [the work is] finished." 凡土功, 龍見而畢務, 戒事也. 火見而致用, 水昏正而裁, 日至而畢.⁴⁶ Similarly, in

⁴⁵ *Guóyǔ*, 2:9b

⁴⁶ *Shísānjīng zhùshū*, vol. 2, 1782. Compare the translation at Legge, *The Chinese Classics*, Volume 5, *The Ch'un Ts'ew with The Tso Chuen*, 116. Legge identifies "Water" here as Mercury, the "watery" star, and translates *hūn zhèng* as "culminates at dusk." This is unacceptable for several reasons. Mercury is a denizen of dusk and dawn twilight and, consequently, hard to observe since its elongation from the sun can never exceed 29°. It follows, therefore, that Mercury can never cross the local meridian. If Legge is using "culminate" in the astronomical sense "to reach the highest point above an observer's horizon," then in Mercury's case this occurs three

the Springs and Autumns of Master Lü (Lüshì chūnqiū 呂氏春秋), in the *Yuè lìng* 月令 “Monthly Ordinances” chapter concerning the activities appropriate to mid-autumn, it says: “in this month one can construct inner and outer walls and build capitals and cities” 是月也可以築城建都邑.⁴⁷ Here then we have the full explanation of Máo Hēng’s entire commentary on *Dìng zhī fāng zhōng* as well as Zhèng Xuán’s amplification—implicit in the reference to the culmination of *Dìng* (Guóyǔ’s “*Yíng* Palace”) is that asterism’s identity as the prototypical Celestial Temple and its specialized function as an accurate guide for aligning sacred terrestrial structures on the pole. *Dìng*’s evening culmination precisely marks the season reserved for laying out walls and temples whose construction is to follow.

***Dìng* “right and true”**

天主正，地主平，人主靜... 能正能靜，然後能定。《管子·內業》

“For the heavens, the ruling principle is to be *regular*. 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*.”⁴⁸

Guǎnzǐ: Nèiyè

In all references to these alignment procedures above the word 正 *zhèng*

(**tjeng*s) “right ~ straight ~ correct ~ true” characterizes both the observations

to four times a year, with the planet most readily observable in evening twilight in spring and morning twilight in fall. This is impossible to reconcile with the plain meaning of the text. “Water” here must instead be an allusion to the Five Phases scheme in which the three northern or “watery” chronograms *chōu* 丑, *zǐ* 子, *hài* 亥 were correlated with lunar lodges #8 *Nándǒu* 南斗 through #14 *Dōngbì*, which “culminate” in autumn in the sense of “reach the highest point on the local meridian”; Kǒng Yíngdá’s 孔穎達 (574-648) *Zhèngyì* 正義 commentary confirms this interpretation.

⁴⁷ Lüshì chūnqiū xīn jiàozhèng 呂氏春秋新校正, vol. 7, 76.

⁴⁸ *Nei ye* 《內業》 vii-viii, tr. Roth, Original Tao, 58-61. For the significance of *zheng* 正 “to square up~center~align” in the *Nei ye*, see pp. 109ff.

integral to, as well as the outcome of, the specific alignment procedures. Similarly, *jīng* (**keng*) “arrange in order” and *yíng* (**wjeng*) “delimit ~ delineate ~ lay out,” in both *Luò gào* and *Shào gào* in *Shàng shū*, refer to the large-scale arrangement of walled settlements or temple compounds, as well as 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, as the phonologically attuned reader will no doubt already have noticed, they share a rhyme with the name of the asterism actually used to accomplish the task, *dìng* 定 (**dengs*) “fix [in true orientation].”⁴⁹ When, therefore, the *Shào gào* represents King Chéng 成王 as saying, “when the Duke had fixed the site 公既定宅,” *dìng zhāi* 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.

In the *jìng shòu rén shí* 敬授人時 “respectfully confer the seasons on the people” passage in *Yáo diǎn*, *zhèng* 正 (**tjengs*) and *yīn* 殷 (**?jin*) are used alternately in the sense “determine correctly” mid-season, for example, in *yǐ zhèng zhòng dōng* 以正仲冬 “to regulate correctly mid-winter.” It seems clear that *dìng* 定 and *zhèng* 正 are essentially the same word in such contexts, so that alignment procedures like those described draw on the root meaning of *zhèng* “straight, erect, correct, regular.”⁵⁰ According to Paul R. Goldin:

⁴⁹ Takashima, “Settling the cauldron in the right place,” 408-9, gives the root meaning of this well-established word family as “fixed ~ stable ~ settled ~ secure ~ certain”; cf. Boltz, “Three footnotes on the *ting* ‘tripod’.”

⁵⁰ Yú Xīngwú 于省吾, *Jiǎgǔwén gǔlín* 甲骨文詁林, vol. 1, 790. In this connection it is appropriate to consider Starostin’s compilation of cognate words in Sino-Tibetan

“What's going on with all these words is even more interesting when you try to unravel the affixes. The root seems to be *dǐng* 鼎, which I'd reconstruct as **ttengy* . . . must mean something like ‘stable/stability.’ The simplest derivative is *dìng* 定, or **ttengs* (**tengs* for Baxter), but, significantly, only in the name of the asterism. As the common verb ‘fix,’ etc., it's read **ddengs* (**dengs* for Baxter), which has to reflect some kind of voicing prefix. (These are pretty common in Sino-Tibetan, and often have the function of making something into a verb.) Your observation that 定 and 正 seem to be interchangeable is borne out by the fact that 正 (**tengs*, or **tjengs* for Baxter) is merely the B-syllable version of 定 **ttengs*. People rage over what the whole A/B syllable distinction represents, both phonologically and semantically, but it's clear that such words must be cognate. Lastly, 貞 . . . is apparently yet another derivative; it's OC **treq* (**trjeng* for Baxter), which shows an r-infix. Also, I believe that *dǐng* 丁 (**tteng*, or **teng* for Baxter), as well as most (if not all) of the words in that family (e.g. 訂, 町, 頂), must be related to 定 as well.”⁵¹

— Chinese: 正 **tens* straight, correct, 貞 **treq* id.; Tibetan: *dray* straight; Burmese: *tanʔ* be straightward, direct from one point to another; Kachin: *dinʹ* be straight, rectilinear; Lushai: *din* right, right-handed (cf. also *din* go straight or direct, as arrow); Lepcha: *din* (1) to be erect, to be high, to be perpendicular; the highest point or degree (2) to stand, to remain, to exist. These cognates confirm the postulated root meaning of *zhèng* and the fact that it is very old indeed; see Starostin, “The Tower of Babel Project: Evolution of Human Language Project; Sino-Tibetan Etymology.”⁵¹ Goldin (personal communication). David Branner offered some qualification: “The character 定 has two medieval readings . . . both come out as *dìng* in Mandarin, but they are historically distinct and would be distinguished in many modern dialects. . . . The second reading {deingH-4} corresponds regularly to the one we consider “normal” for the graph 定 in all dialects, meaning ‘to set, fix,’ etc. The former reading {teingH-4} is highly specialized and does not mean ‘to set.’ Barring much better evidence about early morphology than we have today, we should consider these to be distinct words rather than regular morphological variants — a case of polyphony. Baxter (Handbook of Old Chinese phonology) gives OC **dengs* for {deingH-4} ‘to set’, and the other reading {teingH-4} would come out as **tengs* in his system. Compare his **tjengs* for 正. If my hypothesis about type A and B syllables and the history of palatalization in Chinese is correct, then the two syllables **tengs* and **tjengs* are originally identical (theoretically, both **tengs*), and probably the same word is meant. However, the *Guǎngyùn*’s gloss ‘題額’ [“forehead”] needs to be figured into that relationship; it, too, comes from the tradition of *Shī* commentary (周南, “麟之趾”, *Máo zhuàn* commentary ‘題也’ cited in a note on *Huáinán zǐ*, also Guō Pú ‘額也’ cited by Kǒng Yǐngdá). . . in sum, our word *dìng* ‘to set’ is related to *zhèng* ‘upright; to right’ only indirectly, in that it is written with a graph whose other reading is comparable to *zhèng*. From the *Shījīng*’s usage of 定 to 正 there is only a single phonological step and the two words may be isomorphic; however, from our

Zhèn 貞 and *dǐng* 鼎

This semantic series also includes the cognate *zhēn* 貞 **trjeng* used to introduce the charge to the bone in the Shang divinations. The meaning of this word is often rendered by means of functional circumlocutions such as “divining” or “testing the proposition” (*bǔ wèn* 卜問 according to the *Shuōwén*), which do not get at the root meaning. The character *dǐng* 鼎 “cauldron” **trjeng* is used interchangeably with *zhēn* in the oracle bone divinations, in some instances even in the same line.⁵² Elsewhere, I alluded to the politico-religious imperative 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’

popular usage of 定 to the *Shījīng*’s usage of 定 there is an additional step of uncertain validity, and the evidence of the script (possibility of polyphony of 定, graphic relationship between 定 and 正) is distracting”; Branner (personal communication). What is clear in the *Shījīng* usages is that 定 is a noun in both: “forehead” of the *lin* “unicorn” and the name of the Great Square in Pegasus. Relevant in reference to Branner’s “additional step of uncertain validity,” therefore, may be the observation that the –s suffix in the name of the asterism *dìng* 定 **ttengs* (**tengs* for Baxter) conforms with the interpretation that –s “makes abstract nouns concrete, otherwise derives nouns, i.e., the ‘concrete’ thing itself, from verbs”; see Boltz, “Language and Writing,” 93. (It is tempting to speculate about a common astral origin for Hellenistic Pegasus “winged horse” and Sinitic *lin* “unicorn,” but it is just possible that *dìng* 定 in *Shījīng* refers to the asterism in both odes.)

⁵² Yú Xīngwú, *Jiǎgǔwén gǔlín*, vol. 3, 2718 ff; Karlgren, *Grammata Serica Recensa*, #834; Boltz: 1990, 2, characterizes the graphic interchange between *dǐng* and *zhèng* as “long settled.”

method.”⁵³ We have seen above how the method attested in *Dìng zhī fāng zhōng* could have produced accurate alignment on the pole throughout Shang and Zhou, and possibly earlier. More importantly, 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 – *zheng* 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.⁵⁴ 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

⁵³ Pankenier, “A Brief History of *Beiji*,” 229; also Ban Dawei 班大為, “再談北極簡史與「帝」字的起源.”

⁵⁴ Cf. David Nivison’s gloss of *zhēn* 貞 in the oracle bone inscriptions, “officially verify the correctness of the results of a divination about”; Nivison, “The ‘Question’ Question,” 125) and that of Paul Serruys, “If we try to explain 貞 of the introductory formula of divination, not in the light of *Shuōwén* and later, rare usages, but of a majority of usages, we can only think of a verbal sense ‘to test, to try out, to make **true**, correct’ in the sense of ‘find out the **right** (course of action)’ parallel with ‘tried, tested, reliable, correct, good’ already points to a good morphological pair: *zhèng*/**tjings* 正 ‘to be right, correct’ and *zhēn*/**trjing* 貞 ‘to test’ (quoted in Takashima, “Introduction,” *English Translation of Fascicle Three of Inscriptions from the Yin Ruins*, in press). See also Karlgren, *Glosses on the Book of Documents*, 76, #1752, glossing the line in *Luò gào* 洛誥, “We two men have both verified (sc. the reading of the oracles) 我二人共貞.” Zhèng Xuān’s gloss quoted in *Shuōwén jiězì zhù* reads, “*zhēn* as ‘ask’ [means] to inquire as to correctness; first one must rectify it (i.e., ‘cause to conform to a prescribed standard form’?), and subsequently ask of it [sc. the oracle]” 貞之為問, 問於正者. 必先正之, 乃從問焉. Clearly, the equivalency between 貞 and 正 was uppermost in Zhèng Xuān’s mind. On the causative interpretation of the morphological function of the infix *-r- in the word *zhēn*/**trjing* 貞 ‘test [the following proposition to gain intelligence from the numen of the turtle or bone], see Takashima (“Introduction”).

proposition through oracular communication *zhēn* 貞 with those supernatural entities.

Given the great antiquity of a preoccupation with proper orientation, reaching back into the early Neolithic, one might conjecture that the direction of lexical extension proceeded from the physical application toward the psychological intentionality manifested in the context of divination.⁵⁵

From celestial imagery to writing

There are innumerable references in classical Chinese literature to the vital necessity of maintaining conformity with the normative patterns of the cosmos. Before this core idea became axiomatic in late Warring States and Han thought, before it appeared in the figurative language of the earliest lyrics, the archaeological record clearly shows this noetic disposition was firmly established as fundamental already by the formative period of Chinese civilization in the early 2nd millennium BCE. 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 design and symbolism 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 ode, insight into the ancient method of aligning on the pole

⁵⁵ In the specialized language of the “Inward Training” 內業 *Nèi yè*, the practice of *zhèng* “aligning” means “adjusting or lining up something with an existing pattern or form,” though there the focus is the physical alignment of the body; see Roth, *Original Tao*, 109. This, of course, also calls to mind that it was said of the Sage *xí bù zhèng bù zuò* 席不正不坐 “if the mat was not straight, he did not sit”; *Lùnyǔ* 論語 “*Xiāng dǎng*” 鄉黨, 10/7. Perhaps there was more to Confucius’ fastidiousness than previously suspected.

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 patterns *xiàng* 象 down to earth. 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-Zhōu 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 *Guóyǔ*, *Zhōuyǔ*, where the calendrical function of the Farmer’s Auspice *nóngxiáng* 農祥 (lunar lodge *Fáng* in Scorpius) was mentioned: 農祥晨正，日月底於天廟; that is, “when Farmer’s Auspice is ‘right’ on the meridian at dawn, the sun and moon are in the Celestial Temple.” Wéi Zhào’s commentary provides a detailed explanation:

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 *Fáng*. ‘Right’ at dawn means to say, on the day ‘Spring Begins,’ at dawn [*Fáng*] is on the meridian. [*Fáng*] is the harbinger of the agricultural season, so it is called ‘Farmer’s Auspice.’ ‘*Dǐ*’ is ‘to reach.’ ‘Celestial Temple’ is *Yíngshì* (Align the Hall). In the first month of spring, sun and moon are both in *Yíngshì*.”⁵⁶

Not only is the astronomy in *Guóyǔ* 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 Yī of Zēng (ca 433 BCE), the same tomb that

⁵⁶ See above n. 45.

yielded the famous lacquer hamper with a depiction of the entire scheme of twenty-eight lunar lodges on its lid. This second box bears the inscription: 民祀唯房, 日辰於維, 興歲之駟 “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.” “Heavenly Quadriga” is another name for the array of four stars comprising lunar lodge *Fáng*.⁵⁷ The meridian passage near dawn of Farmer’s Auspice or Heavenly Quadriga (and by implication, the new moon marking the Beginning of Spring near the Celestial Temple), would have been serviceable as a harbinger of the arrival of spring throughout the Xià, Shāng, and Zhōu dynasties. Not to be overlooked is the allusion to the location of the sun in *Dìng* (*Yingshi-Dōngbi*) in the first, or *zhèng* 正 month of the year.

Now, we know that ancient Chinese calendar priests from Táosì in Shānxī were observing sunrise daily at least as early as 2100 BCE.⁵⁸ Needless to say, they and their successors would also have paid attention to the regular sequence of

⁵⁷ In a recent article discussing previously unidentified imagery on the front of the famous lunar lodge hamper from the tomb, Wǔ Jiābì 武家壁 identified the asterism depicted as lodge *Fáng* 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 *Guóyǔ* and documented in the inscription on the second box. See Wǔ Jiābì, “*Zēng Hóu Yǐ mù qīxiāng fáng xīng túkǎo*” 曾侯乙墓漆箱房星圖考,” 90-94. See also *Húběi shěng bówùguǎn* 湖北省博物館, *Zēng Hóu Yǐ mù* 曾侯乙墓.

⁵⁸ Líu Ciyuán, et al., “A Chinese observatory site of 4,000 year [sic] ago.” Wǔ Jiābì, et al., “Táosì zhōngqī xiǎochéng dàxíng jìnzhù jīzhǐ II FJT1 shídi móni guānxiàng bàogào 陶寺中期小城大形建築基址II FJT1 實地模擬觀象報告,” 3-14; Hé Nǚ 何鷲, “A preliminary study about the astronomical date of the large building IIFJT1 at Táosì,” 50-55; Wǔ Jiābì, et al., “Táosì guānxiàngtái yízhǐ de tiānwén gōngnéng yǔ niándài 陶寺觀象台遺址的天文功能與年代.” Pankenier, et al., “The Xiāngfén, Táosì site: A Chinese Neolithic ‘Observatory?’”

asterisms rising in regular succession just prior to sunrise and after sunset during each month of the year. They could not have failed to notice the correlation of the Cerulean Dragon constellation (and lunar lodge *Fáng* near its center) with the arrival of spring and the all-important initiation of farming activity. No doubt, this is a principal reason why the Dragon came to figure so prominently in myth, iconography, and as a seasonal indicator in popular astral lore (including the line texts of hexagram *Qiān* 乾 in the *Yījīng* 易經).⁵⁹ Ancient skywatchers awaiting sunrise in the 20th century BCE could also not have failed to notice still another dawn phenomenon. Elsewhere I have described the impressive massing of all five visible planets in late February 1953 B.C.E. in the longitude of the star α Peg (Fig. 4) the earliest such phenomenon referred to in the early texts.⁶⁰

⁵⁹ Léopold de Saussure was the first modern scholar to discuss the correlation between the Dragon asterism's appearance as it seasonally rose and traversed the sky with hexagram *Qiān*'s 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," 378. See also Feng Shi 馮時, Zhongguo tianwen kaoguxue 中國天文考古學, 416-417. Shaughnessy ("The composition of 'qian' and 'kun' hexagrams of the Zhouyi") draws on the commentaries to the Book of Changes to illustrate the correlations between the hexagrams' line statements and the dragon constellation's appearance in the sky. In focusing almost exclusively on the agricultural season, however, Shaughnessy overlooks that the dragon constellation was an extraordinarily useful seasonal indicator throughout the entire year, nor was the connection with hexagram *qian* as obscure as Shaughnessy seems to believe. Early commentaries on the Changes make it clear that this astronomical aspect of the two hexagrams' symbolism was well understood. And even Shuō wén jiě zì 說文解字 in glossing "dragon" *lóng* 龍 says: "... 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 also Hàn shū, 21A.961. Even today there is the popular saying, *èr yuè èr lóng tái tóu* 二月二, 龍抬頭 "on the second of the second month, the dragon lifts its head."

⁶⁰ Pankenier, "The Cosmo-political Background of Heaven's Mandate," 123.

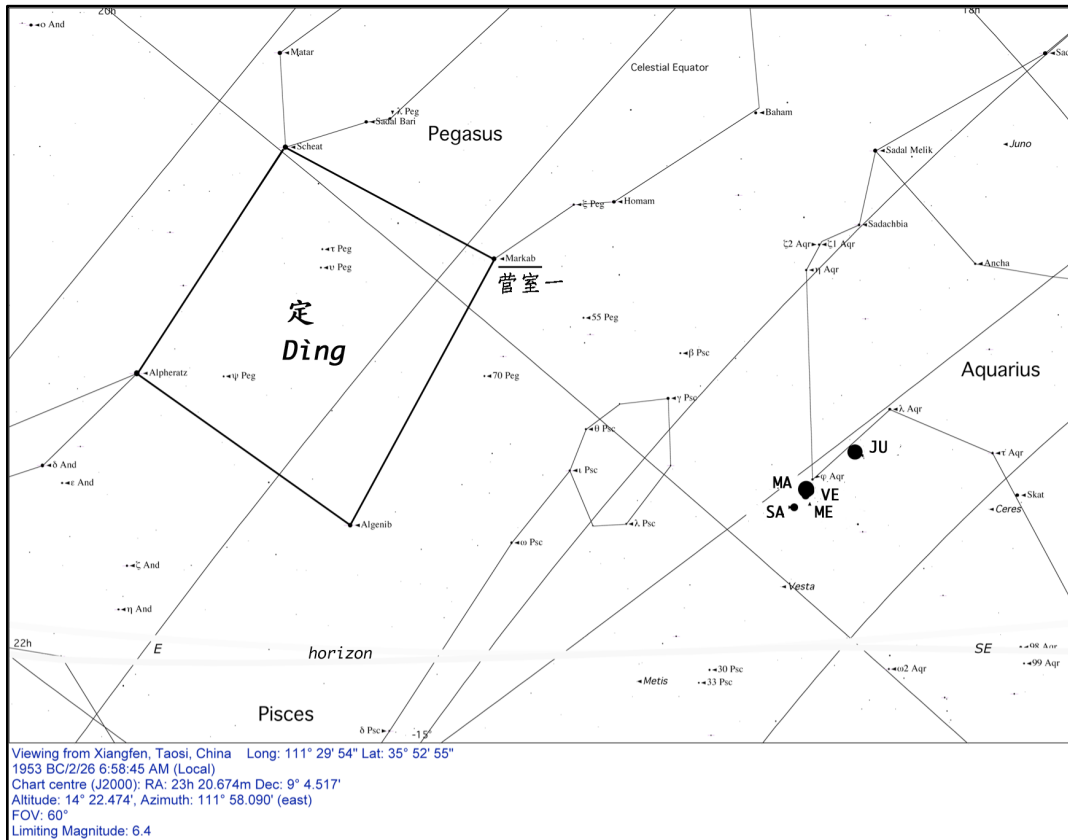


Fig. 4: The cluster of the five planets in *Yingshi* at dawn on 26 February 1953 BCE (Mars is obscured by the disk of Venus in this illustration). Markab or α Peg is near the center (Starry Night Pro 5).

This star α 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 would have been powerfully drawn to asterism *Ding* as early as the 20th century BCE. This sanctioning by means of a spectacular celestial phenomenon, together with the fact of *Ding*'s unique polar alignment, could well explain that asterism's later function as the standard in architectural, calendrical, and ritual contexts. Indeed, it is probably no coincidence that it is precisely this juncture in the early 2nd millennium BCE that marks the transition between organic growth

and unplanned towns vs planned capital cities—quadrilateral in shape, with street grid, rectilinear palace buildings with rows of columns, multiple courtyards, and pounded-earth foundations all arranged around a longitudinal axis. Summing up insights into the layout of Èrlítóu deriving from recent excavations that disclosed the above characteristics, Xǔ Hóng 許宏 has the following to say:

If we shift our field of view to the period before Èrlítóu, even at exceptionally large-scale agglomerations like Xiāngfén, Táosì and Xīnmì, Xīnzhài 新密新砦, without exception the construction of walls follows the lay of the land and does not attempt a square shape. To date, no [pre-Èrlítóu] palace enclosure has been found to exhibit a group of orderly, pounded-earth foundations with a regularly shaped, square wall surrounding them. If we compare the large-scale walled cities of Táosì and Xīnzhài with the pattern of the agglomeration at the Èrlítóu site, a vast change has occurred, while comparison with the Shāng cities at Zhèngzhōu and Yānshì, as well as later Chinese capitals, shows even greater continuity. Accordingly, Èrlítóu is the earliest capital discovered to date which can be acknowledged to clearly display planning, one which is in the direct line of succession to later Chinese capitals in planning and construction.⁶¹

Recall now that “the nexus of phonetic and semantic linkages within the *dìng* 定 (**dengs*) – *zhèng* 正 (**tjengs*) – *zhēn* 貞 (**trjeng*) – *dǐng* 鼎 (**trjeng*) word family reveals this to have been the ‘right and true’ method designed, literally, to bring the normative celestial patterns *xiàng* 象 down to earth.”⁶² If we now expand the above list of word family members to include one of the cyclical signs of interest in Part

⁶¹ See Xǔ Hóng, “Èrlítóu yízhǐ kǎogǔ xīn fāxiàn de xuéshù yìyì 二里頭遺址考古新發現的學術意義。”

⁶² Or, as Merlin Donald, (*The Origins of the Modern Mind*, 275) perhaps more soberly put it, "The critical innovation underlying theoretic culture is visuographic invention, or the symbolic use of graphic devices." The nexus I am attempting to describe signals the formulation of a new theoretic culture, whose architectural manifestation was described by Xǔ Hóng above.

One above— *dīng* 丁 (**tteng*)—then we can begin to discern a possible celestial inspiration for the “exchanging of knotted cords for written signs” so memorably alluded to in the passage from the *Xici zhuan* quoted above. The asterism *Dìng* (**dengs*) is the celestial *square* or temple in Pegasus; in the oracle bone inscriptions *dīng* 丁 (**tteng*) is written 𠄎.⁶³ In *zhèng* 正 𠄎 (**tjengs*) “right ~ correct ~ upright” this same element 𠄎 evidently combines both phonophoric and semantic roles.

Discussion

In Part One, I argued that the two sets of cyclical signs, stems and branches, were initially devised to respond to the conceptual and record keeping demands of the calendar, and that the origins of the two are crucially related. I suggested further that it was calendrical astronomy that lent impetus to the development of writing in China and prefigured its application to other forms of record keeping that emerged later, including the Shang divinations in which we see a mature written language fully formed and capable of expressing virtually anything.⁶⁴ In Part One above we saw that rhyme may have provided a link between orality and functional notation, acting as a bridge between the use of a visuo-graphic set of signs and the *idea* of glottographic writing. In other words, rhyming may have served as the notional stimulus prompting

⁶³ See the rubbing of HJ 24440 reproduced in (c) above. Bagley (“Anyang Writing and the origin of the Chinese writing system,” 203-204) provides further examples from the oracle bone inscriptions and Shang bronzes.

⁶⁴ On this point, Bagley commented: “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”; “Anyang writing and the origin of the Chinese writing system,” 225.

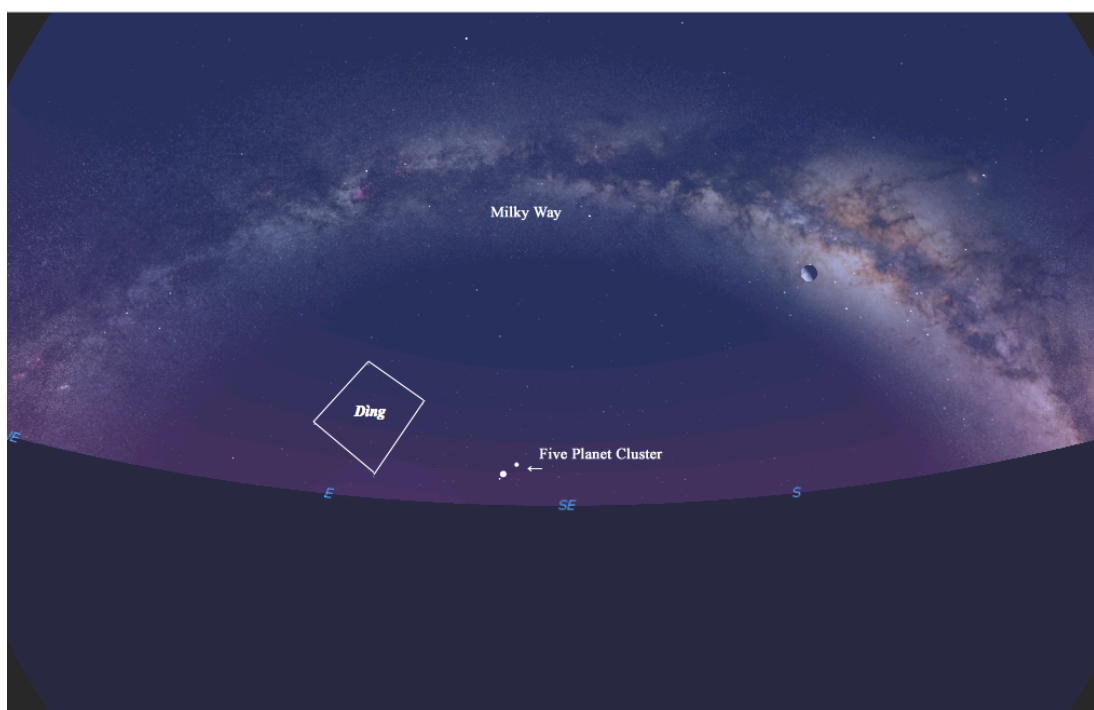
the realization that the sounds of spoken words could be attached to conventional graphic signs and serve as analogs of speech, in that new medium.

In Part Two, I identified a prominent example of just such a transformational sign, establishing a connection between the early calendar, astronomy, and the inspiration leading to the adoption of that stem-sign *dīng* 𠄎 (丁). This one 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 “straight” both spatially and conceptually; and, I would argue, the realization that the nexus of these several meanings could be represented graphically as a square. That is to say, the phoneticization of a pictograph derived from the shape of an asterism produced the manifestation in writing of *dīng* 𠄎. *Dīng/dìng*, therefore, is none other than the graph in the pre-Shang language for the sememe “a square; be straight ~ be square; make straight ~ make square” (and, conceivably, “four sides ~ four ~fourth”).

The profoundly important cultural innovation of writing was acknowledged in the canonical tradition to have been Heaven bestowed. If the *Yi Zhōu shū* can still preserve from over a thousand years earlier the common name for the first month of the Shāng calendar, *shímài* “Eat wheat,” and if the *Xià xiǎo zhèng* 夏小正 or *Lesser Annuary of Xià* and other Warring States period texts can still preserve the stellar correlations of a calendar from the early second millennium B.C.E., then perhaps it is not merely a rhetorical flourish when the *Xìcí zhuàn* claims that, “anciently, in ruling all under Heaven, Pāoxī looked up to observe the images in Heaven, and looked down to observe the patterns of Earth” 古者，包犧氏之王天下也，仰則觀象於天，俯則

觀法於地” and that, “Heaven suspends images, to manifest the propitious and the inauspicious, and the Sage makes of himself their semblance. Out of the River there emerged a diagram, and from the Luò there emerged a writing; the Sage models himself on them” 天垂象，見吉凶，而聖人象之。河出圖，雒出書，而聖人則之。 This is an explicit claim about the celestial origins of writing and the supernatural sanction for the “impersonation” of such patterns, which account, if I am correct, does indeed have a historical basis.

Fig. 5: The unique seasonal configuration of the Heavenly River at the time of the planetary massing of 1953 BCE in Dìng, the Celestial Temple (Starry Night Pro 5).



Elsewhere,⁶⁵ I show how *Yingshi* is strategically positioned just south of the Milky Way and is reached from the circumpolar region via the “stepped passageway”

⁶⁵ Ban Dawei, “Beiji de faxian yu yingyong 北極的發現與應用.”

that spans that Heavenly River—asterism *Gédào* 閣道 (Cassiopeia). This special relationship found its terrestrial analog in the actual layout of the Qín 秦 capital of Xiányáng 咸陽, according to *Shǐjì*.⁶⁶ At the time of the planetary massing of 1953 B.C.E. in *Yíngshì* the Heavenly River or Milky Way would also have been on brilliant display, arching across the sky from northeast to southwest midway between *Dìng*, the Celestial Temple, and the Celestial Thearch’s abode at the pole.⁶⁷ It is just possible, therefore, that the “diagram” that emerged “out of the River” was none other than the Great Square or *Dìng* 定 \approx *dīng* 丁 with the five planets prominently clustered alongside.⁶⁸ As in many other cultures around the world, at the heart of the ancient Chinese tradition there may lie a kernel of astronomical truth.

⁶⁶ “Thus he laid out and started to build the audience halls to the south of the Wei [River] in the *Shanglin* [Menagerie]. He started first with the *E-pang* 阿房 [palace], which was five-hundred *bu* 步 from east to west and fifty *zhang* 丈 from north to south . . . From all sides ran stepped passageways reaching directly from the hall to the *Nan* 南 “Southern” Mountains. He built an elevated passageway from *E-pang* [palace] across the Wei [River] to connect that hall to *Xiányang*, thereby symbolizing the *Gedao* 閣道 “Stepped Passageway” (Cassiopeia), [which runs] from near the Celestial Pole across the Milky Way to connect with the lunar mansion *Yingshi* ‘Align the Hall’ 營室.” Tr. Nienhauser, *The Grand Scribe’s records*, 148 (modified). Cf. also Zhang Shoujie’s 張守節 (*fl.* 725-735) *Zhengyi* 正義 commentary in *Shiji* quoting the *Sanfu huangtu* 三輔黃圖 (“Yellow Plans of the Three Capital Commanderies”; ca. 3rd to 6th century) to the same effect. For the analogous layout of the Han capital of Chang’an, see Ban Dawei, “Beiji de faxian yu yingyong,” 284.

⁶⁷ For the Milky Way as the analog of the Yellow River in Warring States “field allocation” astrology, see David W. Pankenier, “Characteristics of Field Allocation (*fenyé* 分野) Astrology in Early China.”

⁶⁸ Needless to say, the famous representation 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, appears quite late. Nevertheless, the two key elements, geometric shape and number five figure most prominently, suggesting the persistence in cultural memory of both elements over the centuries.

References

- Ban Dawei (D.W. Pankenier). “Beiji de faxian yu yingyong,” Ziran kexueshi yanjiu (Studies in the History of Natural Sciences). 27.3, 281-300, 2008.
- Ban Dawei (D.W. Pankenier). “Zai tan beiji jianshi yu di zi de qiyuan” (Once again—a brief history of *beiji* 北极 [Northern Culmen] and the origin of the graph *di* 帝 [Supreme Lord]). In Xi fang Zhongguo shi yanjiu luncong (Western Research on China: Collected Essays), Patricia Ebrey & Yao Ping eds. Vol. 1. Gudai shi yanjiu (Research on Ancient History), Chen Zhi ed. Shanghai: Shanghai guji chubanshe, in press.
- William H. Baxter. A handbook of Old Chinese phonology. Berlin: Mouton de Gruyter, 1992.
- Juan Antonio Belmonte. “On the orientation of the Old Kingdom Egyptian pyramids,” Archaeoastronomy. 26, 1-20, 2001.
- Juan Antonio Belmonte, et al. “On the orientation of ancient Egyptian temples (4): epilogue at Serabit al Khadem and overview.” Journal of the History of Astronomy. 39, in press.
- Edouard Biot. Le Tcheou-Li ou Rites des Tcheou (The Zhou Li or Rites of the Zhou). 2 vols. Paris: L’Imprimerie Nationale, 1851.
- William G. Boltz. “Three footnotes on the *Ting* ‘tripod’.” Journal of the American Oriental Society. 110.1, 1-8, 1990.
- William G. Boltz. “Language and Writing.” In The Cambridge History of Ancient China: From the Origins of Civilization to 221 B.C., 74-123, 1999.
- Chang Kwang-chih. Shang civilization. Hew Haven: Yale University Press, 1980.
- Chang Yuzhi, Shangdai zhouji zhidu (The ritual cycle system of the Shang period). Beijing: Zhongguo shehui kexueyuan, 1987.
- Feng Shi. Zhongguo tianwen kaoguxue (Archaeoastronomy in China). Beijing: Zhongguo shehui kexue chubanshe, 2007.
- Paul. R. Goldin. After Confucius. Honolulu: University of Hawaii Press, 2005.
- Guo Moruo. Shi zhigan (An explanation of the cyclical signs). In Guo Moruo quanji (Complete works of Guo Moruo), archaeology series, vol. 1. Beijing: Kexue chubanshe, 1982.
- Guoyu. Taiwan rpt. *Sibu beiyao* ed., 1975.
- He Nu. Taosi zhongqi xiaocheng nei daxing jianzhu II FJT1 fajue xinlu licheng zatan (Notes about the excavations of the large building II FJT1 in the small city of middle

Taosi Phase). Gudai wenming yanjiu tongxun 古代文明通訊 (Ancient civilizations review). 23, 47-58, 2004.

He Nu. "A preliminary study about the astronomical date of the large building IIFJT1 at Taosi." Gudai wenming yanjiu tongxun (Ancient civilizations review). 8, 50-55, 2005.

He Nu. "Taosi zhongqi xiaocheng daxing jianzhu jizhi II FJT1 shidi moni guanxiang baogao (Report on simulated observations at the massive building foundation II FJT1 in the inner city of the mid Taosi period)." Gudai wenming yanjiu tongxun (Ancient civilizations review). 29, 3-14, 2006.

Hubei sheng bowuguan (Hubei provincial museum), Zeng Hou Yi mu (The tomb of Marquis Yi of Zeng). Beijing: Wenwu chubanshe, 1989.

Hwang Ming-chornng. "Ming-tang: cosmology, political order and monuments in early China," Harvard University, PhD dissertation, 1996.

Bernhard Karlgren. The Book of Odes. Stockholm: Museum of Far Eastern Antiquities, 1950b.

David N. Keightley. The ancestral landscape: time, space, and community in late Shang China (ca. 1200-1045 B.C.). Berkeley: Institute of East Asian Studies, 2000.

Mikhail Kryukov. 1986. "К проблеме циклических знаков в Древнем Китае (Toward the problem of cyclical signs in Ancient China)." In Ю.В. Кнорозов ed., Древние системы письма—этническая семиотика (Archaic writing systems--ethnic semiotics), 107-113. Москва: Наука.

Laura Laurencich-Minelli and Giulio Magli. "A calendar *quipu* of the early 17th century and its relationship with the Inca astronomy." ArXiv e-prints. January 2008. [<http://adsabs.harvard.edu/abs/2008arXiv0801.1577L>]

James Legge. The Chinese Classics, etc. Vol. 5. The Ch'un Ts'ew and the Tso Chuen. Rpt. Shanghai: Commercial Press, 1872.

Jiang Xiaoyuan 江晓原, et al. "Shanxi, Xiangfen xian, Taosi chengzhi tianwen guance yiji gongneng taolun 山西襄汾縣陶寺城址天文觀測以及功能討論 (A discussion about the function of the observatory ruin in the city of Taosi, Xiangfen county, Shanxi)". Kaogu. 11, 81-94, 2006.

Luo Qikun. "Xi'an Jiaotong daxue Xi Han muzang bihua ershiba xiu xingtu kaoshi An investigation of the wall painting of the 28 lunar lodges from the Western Han tomb at Xi'an Jiaotong University." Ziran kexue shi yanjiu (Research in the history of the natural sciences). 10.3, 236-245, 1991.

Shuihudi Qin mu zhujian zhengli xiaozu (Shuihudi Qin tomb bamboo slips working group) ed. Shuihudi Qin mu zhujian (The bamboo slips from the Qin tomb at Shuihudi). Beijing: Wenwu chubanshe. Pl. 151, slip nos. 987, 988, 1990.

Lüshi chungqiu xin jiaozheng. Xinbian Zhuzi jicheng, Vol 7. Taipei: Shijie shuju, 1974.

John S. Major. Heaven and earth in early Han thought. Albany: State University of New York Press, 1993.

Charles C. Mann. “Cracking the *kipu* code,” Science. 300, 1650-51, 13 June 2003.

Michael McKie. “The origins and early development of rhyme in English verse.” The Modern Language Review. 92.4, 817-831, 1997.

Noemi Miranda, et al. “Uncovering Seshat: new insights at the stretching of the cord ceremony.” In Proceedings of the 15th International Conference of the European Society for Astronomy in Culture (SEAC 2007), in press.

Joseph Needham, et al. Science and Civilisation in China, Vol. 3, Mathematics and the Sciences of the Heavens and the Earth. Cambridge: Cambridge University Press, 1959.

William H. Nienhauser, et al., tr. The Grand Scribe’s Records, Vol. 1, The Basic Annals of Pre-Han China. Bloomington: Indiana University Press, 1994.

David S. Nivison. “The ‘question’ question.” Early China. 14, 115-125, 1989.

Shiji. Beijing: Zhonghua shuju, 1959.

Shisanjing zhushu. 2 Vols. Taipei: Wenhua tushu gongsi, 1970.

David W. Pankenier. “The cosmopolitical background of Heaven’s Mandate.” Early China. 25, 121-176, 1995.

David W. Pankenier. “A brief history of *beiji* 北极 (northern culmen), with an excursus on the origin of the character *di* 帝.” Journal of the American Oriental Society. 124.2, 211-236, 2004.

David W. Pankenier. “Characteristics of Field Allocation (*fenye* 分野) Astrology in Early China.” In Current Studies in Archaeoastronomy: Conversations across Time and Space, J.W. Fountain & R.M. Sinclair, ed. Durham: Carolina Academic Press, 499-513, 2005.

David W. Pankenier, Liu Ciyuan, Salvo de Meis. “The Xiangfen, Taosi site: A Chinese Neolithic observatory?” In Proceedings of the Oxford VIII (SEAC 15) international conference on archaeoastronomy (July, 2007), 2008.

Edwin G. Pulleyblank. “The *Ganzhi* as Phonograms and their Application to the Calendar.” Early China. 16, 24, 1991.

Daniel Rawlings and Keith Pickering. “Astronomical orientation of the pyramids,” Nature. 412, 699-700, 2001.

Harold D. Roth. Original Tao: inward training (*Nei-yeh*) and the foundations of Taoist mysticism. New York: Columbia University Press, 1999.

Léopold de Saussure. "Les Origines de l'astronomie Chinoise: la règle des cho-ti (The origins of Chinese astronomy: the rule of sheti)." Toung Pao. 12, 347-374, 1911.

Mosalam Shaltout, et al. 2007. "On the orientation of ancient Egyptian temples (3): key points in Lower Egypt and Siwa Oasis, Part I." Journal of the History of Astronomy. 38, 141-160.

Kate Spence. "Ancient Egyptian chronology and the astronomical orientation of pyramids." Nature. 408, 330-334, 2000.

Sergey Starostin. The Tower of Babel: Evolution of Human Language Project, 1998-2003. <http://starling.rinet.ru/intrab.php?lan=en - bases>

Ken'ichi Takashima. "Settling the Cauldron in the Right Place: A Study of 鼎 in the Bone Inscriptions," 405-421. In Wang Li Memorial Volumes (English volume). 1987.

Ken'ichi Takashima. English Translation of Fascicle Three of Inscriptions from the Yin Ruins: General Notes, Text, and Translations, Volume 1, in press.

Gary Urton. Signs of the Inka *kipu*, Austin: University of Texas Press, 2003.

Gary Urton. "From knots to narratives: reconstructing the art of historical record keeping in the Andes from Spanish transcriptions of Inka *kipus*," Ethnohistory 45.3, 409-438, 1998.

Wang Ning. "*Shi zhigan bianbu*." Zhongguo xian Qin shi. http://www.zgxqs.cn/article/2006/0730/article_905.html (2006-07-30).

Wu Jiabi, Chen Meidong, Liu Ciyuan. "Taosi guanxiangtai yizhi de tianwen gongneng yu niandai (The astronomical function and date of Taosi observatory)." Forthcoming.

Wu Jiabi, He Nu. "A preliminary study about the astronomical date of the large building IIFJT1 at Taosi." Gudai wenming yanjiu tongxun (Ancient civilizations review). 8, 50-55, 2005.

Wu Jiabi. "Zeng Hou Yi mu qixiang fang xing tukao" (A study of the illustration of asterism Fang on a lacquer box from the tomb of Marquis Yi of Zeng), Ziran kexue shi yanjiu (Research on the history of the natural sciences). 20.1, 90-94, 2001.

Xu Hong. "Erlitou yizhi kaogu xin faxian de xueshu yiyi (The scholarly significance of the new archaeological discoveries at the Erlitou site)." Zhongguo wenwu bao (China Cultural Relics Daily). Sept. 17, 2004. (rpt. <http://www.kaogu.cn/cn/detail.asp?ProductID=8497>, 2007-12-19).

Xunzi jijie. Xinbian zhuzi jicheng, Vol 3. Taipei: Shijie shuju, 1975.

Yang Hongxun. Jianzhu kaoguxue lunwenji (Collected essays on architectural archaeology). Beijing: Wenwu chubanshe, 1987.

Yang Shengnan. Shangdai jingji shi (Economic history of the Shang period) Guiyang: Guizhou renmin chunbanshe, 1992.

Yu Xingwu. Jiagu wenzi gulin (Collected glosses of the oracle bone characters). Beijing: Zhonghua shuju, 1996.