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## Two Studies in Shang Chronology and Warring States Historiography

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David S. Nivison, well known for his wide-ranging studies of Chinese history and philosophy, was the Walter Y. Evans-Wentz Professor Emeritus at Stanford University. Before he passed away on October 16, 2014, he sent the following two essays to *BJAS*. Though conceived separately, the relationship between the two essays is self-apparent, and the editors have chosen to present them together in this issue.

Both essays attempt to take seriously the knowledge of Warring States scholars with regard to Chinese chronology as ancient as the beginning of the second millennium B.C. The first essay is entitled “Was Warring States China ahead of Greece in Science?” Using both the *Bamboo Annals* and other early sources, Nivison argues that the compilers of the *Bamboo Annals* had astronomical records from the remote past that were far superior to those of the ancient Greeks. He thus answers his own question in the affirmative with regard to this particular issue. The second, “The 31 Years Problem,” presents an intricate argument regarding a single discrepancy in the chronology of the *Bamboo Annals*, which Nivison argued was an authentic and largely accurate chronology. The essay includes thought-provoking reflections on epistemology and the philosophy of history.

Nivison’s unique combination of historical breadth and rigorous number-crunching leads to countless keen observations, and challenges us to treat ancient texts seriously and with imaginative sympathy. The two essays are presented here with only slight editing, since their informal writing style vividly captures Nivison’s creative thought processes.

**Keywords:** Shang chronology, Warring States historiography, *Bamboo Annals*, philosophy of history, Greek science

## Was Warring States China ahead of Greece in Science?

In at least one respect, yes. When the leading states were declaring themselves kingdoms, the philosopher Mengzi (“Mencius”) once said, “Heaven may be high, and the stars in their seasons far off, but if you just study their regularities (*gu* 故 “causes”), you can sit at your desk and still determine the dates of the solstices a thousand years earlier or later” 天之高也，星辰之遠也，苟求其故，千歲之日至可坐而致也 (4B26). At this time people marveled at the possibilities of precision in the study of astronomy and the calendar, and Mengzi 孟子 shared this attitude. He was talking, here, about the 19-year intercalation cycle, familiar enough so that it was echoed even in popular stories—the butcher in *Zhuangzi* 莊子 who doesn’t need to sharpen his knife for nineteen years; the Lord of Qin in *Mozi* 墨子 who is granted nineteen more years of life because of his good government.

A century earlier than Mengzi, when the last disciples of Confucius were passing away, this knowledge was perhaps still new, and could sometimes be used in ways we would have to call unscientific. Even so, instances show what technical knowledge was available. I want to examine one such instance. The instance involves some historical calculations done between 432 and 428 B.C., concerning two astronomical events in the remote past *fifteen centuries* earlier, in 1953 B.C. and in 1876 B.C. What really amazes me is that the calculator reveals to my analysis that *he had accurate records of these events*. I owe my own knowledge of the first event to Professor. David W. Pankenier<sup>1</sup> and of the second to Kevin D. Pang.<sup>2</sup>

It is not known whether the intercalation cycle was introduced into China from the West, or was constructed independently by the Chinese.<sup>3</sup> The cycle attempts to solve a problem confronting any civilization based on agriculture and using a lunar calendar: such a calendar must be kept aligned with the

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1 David W. Pankenier, “*Mozi* and the Dates of Xia, Shang and Zhou: A Research Note,” *Early China* 9–10 (1983–85): 175–83.

2 David S. Nivison and Kevin Pang, “Astronomical Evidence for the *Bamboo Annals*’ Chronicle of Early Xia,” *Early China* 15 (1990): 87–95.

3 A description of it suggests a third possibility: did it start in China and spread to the West?

solar seasons for planting and harvesting, by adding a lunar month as needed, either at the end of the year or somewhere in the middle. The Chinese divided the solar year into 24 solar seasons of 15 or 16 days, and used a systematic comparison with the lunar calendar to indicate when an intercalation was needed: this would be when a lunar month of 29 or 30 days fitted inside a solar interval of two solar seasons without containing a “*qi*-center,” the winter solstice day being the first of 12 *qi*-centers at equal intervals of 30 or 31 days. Over time, this would reveal a cycle of 19 solar years which must contain 235 lunar months, seven of them being intercalations distributed through each nineteen year period. The Chinese must have been doing this at least as early as the beginning of the Shang Dynasty (1554 B.C.), when there is evidence that a system of 24 solar seasons was already being used.<sup>4</sup> I have found an example of intra-year intercalation on an “oracle bone” which appears to be from 1188, containing two intercalary sixth months (following the regular sixth month)<sup>5</sup> — one of them required by the *qi*-center rule, and the next making up for a missed intercalation several years earlier. The intercalations make the theoretical summer solstice coincide exactly with the actual solstice.

A 19-year cycle, called a *zhang* 章, began ideally with a year having the winter solstice at the beginning of the first day of a lunar month. It was assumed that the solar year was 365.25 days. 19 years would be 6939.75 days, rounded to 6940 days. It could be deduced (or after two or three generations of sufficiently careful record-keeping, it would be discovered) that one day must be deleted after four *zhang* making 27759 days, called a *bu* 部. 27759 divided by 60 leaves a remainder of 39; so 20 *bu*, called a *ji* 紀, were needed to get a number of days (555,180) evenly divisible by 60. Thus a complete cycle was 1520 years, at which point the alignment of day numbers in the cycle of 60 with days of each lunar month in order was expected to be repeated exactly. But 365.25 days per year is not quite correct; back 1520 years, a retrodicted 60-day cycle day number would be four or five days early. So whenever they tried to use the *ji* cycle, the Chinese were misled. But in calculations not

4 Nivison, “The Origin of the Chinese Lunar Lodge System,” in *World Archaeoastronomy*, ed. A. F. Aveni, (Cambridge: Cambridge University Press, 1989), 203–18.

5 Nivison, *The Riddle of the Bamboo Annals* (Taipei: Airiti Press, 2009), 247–48.

exceeding three centuries, their 60-day cycle of *ganzhi* 干支 names for days gave them a great advantage.<sup>6</sup>

The Chinese had all of this apparatus in hand by 432 B.C., as I will try to show. Meanwhile in Greece there was an almanac-maker named Meton of Athens, who became famed as an astronomer. He announced in 432 B.C. when observing the summer solstice as the starting date of his almanac, that he would be using a 19-year cycle of 235 lunar months, totaling (to the nearest whole number) 6940 days. Thus he revealed that he knew about the 19-year cycle, but apparently no more. It was said that he got this information from a “metic” (foreign resident in Athens, perhaps from Babylon) named Phaeinos, which was not a Greek name.<sup>7</sup> Babylon probably had the 19-year cycle by 490. About a century after Meton there was another Greek calendar scientist in the circle of Aristotle, named Callippus, who deduced that a 4x19 year sequence at 6940 days required subtracting one day, thus giving his name to the “Callippic Cycle,” which the Chinese had been calling a “*bu*.”<sup>8</sup>

On the Chinese side, I cannot name names. But in 1984 Pankenier showed me his paper (to be published in *Early China* as above) in which he had demonstrated that a reference in *Mozi* 19 to an astronomical event in lunar lodge Ying Shi 營室 must refer to a tight conjunction of the planets in February of 1953 B.C. This, he argued, must have occurred when Shun 舜 in his 14<sup>th</sup> year, according to the *Bamboo Annals*, had transferred authority to Yu 禹 of Xia, beginning the Xia Dynasty. I knew that the *Annals*' date for the *de facto* beginning of Xia, when Shun transferred authority to Yu, was 2029 B.C., and I noticed that 2029 was one *bu* before 1953. So I was almost persuaded: It appeared that a received chronology of Xia had been altered by moving dates back one *bu*.

6 It was in use already in the Xia Dynasty. Working down though Xia with my results for early Xia, I discovered that the first day of the reign of the 14<sup>th</sup> king Kong Jia was *jiazi*, (01) in the sixty-day cycle. All the kings of Shang had such names. This has enabled me to work out the chronology of Shang.

7 Here I use Alan C. Bowen and Bernard L. Goldstein, “Meton of Athens and Astronomy in the Late Fifth Century BC,” in *A Scientific Humanist: Studies in Memory of Abraham Sachs*, ed. E. Leichty, M. deJ. Ellis and P. Gerardi (Philadelphia: University of Pennsylvania Museum, 1988), 39–81.

8 *Ibid.*, 51.

Confirmation came four years later, when I got a phone call from Ashley Dunn, science writer for the *Los Angeles Times*. Dunn wanted an evaluation (for an article he was writing) of a paper by Kevin Pang (who had been working with UCLA professor Zhou Hongxiang 周鴻翔), on a solar eclipse recorded in the *Bamboo Annals* for the *shuo* 朔 (syzygy) of the 9<sup>th</sup> month of the 5<sup>th</sup> year of the fourth Xia king Zhong Kang 仲康. In the *Bamboo Annals* system the year corresponded to 1948 B.C., and the day was identified as *gengxu* 庚戌 (47 in the cycle of 60). Pang's work identified the Xia eclipse with a solar eclipse he had found dated 16 October 1876 B.C. (But the cycle for the day was *bingchen* 丙辰 [53], not *gengxu*.) I at once set 1953 in place of 2029, assumed *Annals* reign lengths, and posited two-year gaps between reigns of Xia kings (instead of the irregular ones at some times found in the *Annals*) for completions of mourning. This gave me Pang's eclipse date. We published it in *Early China* 15 in 1990 (as above).

Next, I did some Collingwood-style rethinking: The calculator I was tracking wanted his dates to be earlier, because he was trying to justify pushing the date Yao 堯 1 back to the numerologically pregnant date 2145. 2145 would be 1000 years before 1145, when the 27<sup>th</sup> Shang king Wu Yi 武乙 first recognized Dan Fu 亶父 as lord of Zhou; 2145 was apparently taken as a *ji* first year in the Lu calendar, one *ji* later being the *bu*-first year 625.<sup>9</sup> His excuse for moving the date of Xia's first year back would be the possibility that his records had misidentified the *bu*. Trying that out had automatically moved the eclipse date back one *bu* from 1876, to 1952. Why, then, does the *Annals* have the date 1948 B.C.?

There was a check the calculator could make: The *Zuo zhuan* for Zhao Gong 17.2 has a paragraph discussing eclipses, quoting "the [*Shang*] *shu* for Xia," as describing an eclipse "between the equinox and the solstice," when the sun was in lunar lodge Fang 房. This must have been Pang's eclipse: on his date the sun was at 188 degrees, in the middle of Fang (which was 187–191 degrees in 1876, if  $\alpha$  Sco. was the boundary between Fang and Xin 心).<sup>10</sup> This

9 See Zhang Peiyu 張培瑜, *Zhongguo xian Qin shilibiao* 中國先秦史曆表 (Jinan: Qi Lu shushe, 1987), 252, column for the Lu calendar.

10 Nivison, "Chinese Lunar Lodge System," 214.

chapter of the *Shang shu* (“Yin Zheng” 胤征 [The Punitive Expedition of Yin]) is spurious, but it contains the *Zuo zhuan* text (*chen bu ji yu Fang* 辰不集于房),<sup>11</sup> which therefore is probably quoting from the authentic original. The essential information is “9<sup>th</sup> month” and “Fang.”<sup>12</sup>

So with his eclipse now in 1952, the calculator dropped down one 1520-year *ji* to his own times, getting 432, and checked that year to see if the sun was in Fang on the first day of the (Xia) 9<sup>th</sup> month. It wasn’t. So he tried the next year, and so on, ultimately getting a positive result in 428, finding also that in that year and on that day the cycle date was day *gengxu* (47). Therefore he moved back one *ji* to 1948, and made the cooked *Annals* record say that the day was *gengxu*. (For him, applying the cycle was not following a “law” but was simply following a heuristic strategy.)

Am I mind-reading back 2500 years? The false data 1948 and day *gengxu* have to be explained. How else could they be explained? (To make the date be 1948, the calculator had to increase the total of gap years between reigns before Zhong Kang by four. This he did as follows: having increased the mourning completions for Shun and Yu from two to three years each, he kept his new absolute date for the beginning of Xia unaltered, by reducing the gap after the second king Qi 啟 from two to zero. He now made the gap after Qi be four years instead of zero—as it is, in the present *Bamboo Annals*.)

When was this dating of early Xia worked out? The calculations that produced the year 1948 and day *gengxu* for the Zhong Kang solar eclipse

11 The meaning is disputed. I understand *chen* here to be the area of the sky where all stars are hidden from view by the glare of the sun. To say that the *chen* is “unsettled” (*bu ji*) is therefore to say that a celestial phenomenon, i.e., a solar eclipse partly blotting out the sun, has partly reversed this effect, so that some of the background stars can begin to be seen. There are no other instances of this way of describing an eclipse. So one must decide whether this phrase is invented or is very old. The *Zuo zhuan* account makes no sense if one assumes invention: The *Zuo* account itself is an invention (there was no eclipse on the date given). The person made to quote the *Xia shu* struggles to make the quote fit the fictitious eclipse even though it *prima facie* does not. If the whole account is fiction anyway, why doesn’t the writer simply make up a *Xia shu* quote that does fit? Obviously, because what is quoted was too well known. For more analysis, see my “Response” in *Early China* 15 (1990): 164–67 (sections 4.2 through 4.2.4).

12 I am assuming that the trouble, calling for “punitive” action, was that the eclipse was only partial in the Xia capital, and the northern border lord who should have reported it failed to do so. For the actual path of totality see Nivison and Pang, “Astronomical Evidence.”

are based on data for the years 432–428. How did the person who did the calculating obtain the data? There are only two possibilities: Either he had access to a table or rule, which could have allowed him to do his work long after the time, even centuries later; or he did his own observing, starting with year 432 and finishing in year 428. The day he picked for the *shuo* of the 9<sup>th</sup> month is *gengxu* (47), which according to Zhang Peiyu’s *Xian Qin shilibiao* (p. 180) is accurate for the intercalary 9<sup>th</sup> month in the Xia calendar for 428; but all of the classic Six Calendars give *jiyou* 己酉 (46) instead. This is what one could expect, if the Six Calendars were worked out three centuries or more later: they use the *zhang-bu* system, which can give a date one day early when applied to a problem three centuries earlier. Therefore the calculator did his own observing in years 432–428. This is far from being conclusive, because the variation between Six Calendars day dates and true dates is not regular.

But Zhang’s *Shilibiao* can be used to give a confirmation of this inference. If the calculator had had a table of solar positions, or had used a set of rules (like Mengzi at his desk) letting him deduce them for earlier times, he would have seen that in year 433—only one year before his target year instead of four years later—the sun was in Fang on the *shuo* of the Xia 9<sup>th</sup> month. The system for determining intercalations which I described shows me that in 433 there should be an intercalary 5<sup>th</sup> month in the Xia calendar, making Zhang’s 12<sup>th</sup> month the Xia 9<sup>th</sup> month. Its first day (Zhang, *Shilibiao* p. 90) was *wuyin* (15), 22 October. If the calculator had known this, he would have used “*wuyin*” rather than “*gengxu*” in the *Annals*, and would have made the year be 1953 (not 1948), by cutting the mourning interval after the third king Tai Kang 太康 from two years to one year, leaving the interval after Qi at zero years.

Data given in the Nivison-Pang article in *EC* 15 (p. 92) can be extended to show that in 433, 1<sup>st</sup> of Xia 9<sup>th</sup> month, the sun must have been at 204 degrees, which was the first point of Fang in the late-5<sup>th</sup> century.<sup>13</sup> The calculator did not know this, and was therefore doing his own observing, and began his observing in 432. His objective was to reconcile Xia and Shang dates with

13 W. D. Stahlman and O. Gingerich, *Solar and Planetary Longitudes for years -2500 to +2000 by 10-Day Intervals* (Madison: The University of Wisconsin Press, 1963) gives 205 degrees as the sun’s longitude on this date, clearly in Fang.

2145 as the first year of Yao, the key date in a pre-*Bamboo Annals* chronology probably worked out in Lu 魯. The late-5<sup>th</sup> century was probably when this work was done.

Meton may or may not have been a better scientist, but he knew less; and he did not begin to have the historical and astronomical records that were still available in China, at exactly the same time Meton was working. Meton did not have the 76-year cycle of 4<sup>th</sup>-century Callippus<sup>14</sup> confirmed as much more accurate by 2<sup>nd</sup>-century Hipparchus.<sup>15</sup> Chinese experts contemporary with 5<sup>th</sup>-century Meton were apparently already using the whole set of cycles, *zhang* (19 years), *bu* (4 *zhang*), and *ji* (20 *bu*), trying to apply them to accurate dates fifteen centuries earlier.

This is important, because the person or persons who reveal that they had such accurate records reveal this through my analysis of the *Bamboo Annals*. And the *Bamboo Annals* is a book which probably most of the readers of this page think is a very late forgery or reconstructed text, perhaps as late as the Ming Dynasty. On the contrary, the *Bamboo Annals* text does indeed contain a great deal of chronological invention, but this creative work was not work done after the chronicle discovered in the Jin Dynasty was lost. It is the work of clever people working in early and middle Warring States, in the 5<sup>th</sup> and 4<sup>th</sup> centuries B.C., at a time when accurate records of the remote past still existed. It is therefore reasonable to hope that we can discover what they were trying to do, and how they did it. If we can do this, perhaps we can recover, even now, those accurate records which their mischief has concealed for twenty-four centuries. This is exactly what I have just done, for part of the records of Early Xia. I think I can do the same for the rest of Xia, for all of Shang, and for Western Zhou.<sup>16</sup>

14 Bowen and Goldstein, "Meton of Athens and Astronomy," 51–52.

15 O. Neugebauer, *A History of Ancient Mathematical Astronomy*, Part Two (Berlin, Heidelberg, New York: Springer, 1975), 624.

16 For other instances of the use of the *zhang-bu-ji* intercalation cycle in the *Bamboo Annals*, see D. Nivison, "Epilogue to *The Riddle of the Bamboo Annals*," *Journal of Chinese Studies*, no. 53 (July 2011): 7–8, and 17–18 with note 28.

## The “31 Years” Problem

I was a member of the faculty of Stanford University during most of the years 1948–1988, teaching Chinese and Philosophy, and doing research in philosophy and in Chinese history. I am now 91. In 1979, I was directing a small seminar on Western Zhou bronze inscriptions. This led to my discovering that the text of an ancient chronicle, long dismissed by everyone as a fake, is actually authentic. The book, unnamed as discovered, has been given the descriptive name *Zhushu jinian* 竹書紀年 (“annals written on bamboo,” or “Bamboo Annals”; hereafter BA).

This chronicle was discovered ca. A.D. 280 (Western Jin Dynasty) by a peasant perhaps foraging for firewood. The site was a royal tomb or storeroom apparently tunneled into a dry hillside, filled with books and other treasures, of a king of the ancient state of Wei 魏, who died in 299 B.C. or soon after that. The books were bundled bamboo strips threaded together. These were quickly brought to the Jin capital, where some of the books, including the chronicle, were transcribed into currently used script by court scholars. The project was interrupted (by politics, and the death of one of the scholars), but was reopened around A.D. 290 by another group.

The work of the second group survives only in scattered quoted fragments, and for many centuries it was believed that this must have been the fate also of the first group’s work. But printed texts of the “Bamboo Annals” began to appear in the 16<sup>th</sup> century (late Ming Dynasty). It soon caught the interest of scholars, and a long reprint with commentary was published in the middle 18<sup>th</sup> century. But editors of the mammoth “Imperial Manuscript Library” *Siku Quanshu* in the late 18<sup>th</sup> century examined it carefully and concluded that it was a fake. Most prominent scholars agreed. The book continued to have a few defenders; but the matter was settled to general satisfaction in 1917, when Wang Guowei 王國維 published a collection of the quoted fragments, calling it the “Guben” 古本 (ancient text), and also a new edition of the Ming text. This he called the “Jinben” 今本 (modern text). In this, Wang gave a possible source for every sentence.

But, of course, if it were not a fake, it might sometimes actually be the source of the “sources”; and one crucial class of material Wang could not

explain was the dates in the book. It pretends to cover Chinese history from the late 2000's (my date is 2402 B.C.) to 299 B.C. The earliest date in any history generally agreed to be true is 841 B.C., identified in the *Shiji* as the first year of the 14-year regency of Gong He 共和 during the exile of the 10<sup>th</sup> Western Zhou king Li Wang 厲王.

So the authenticity question is not trivial. After convincing myself that the book is authentic, I have used much of my research time during the past thirty-five years proving my case, and also deciphering what the book gives me. I can prove that most of the chronology in it before 841 is wrong; but I think that I have found ways to deduce the correct dates from the dates the “Jinben” gives me. Meanwhile, the Chinese government (PRC) had financed a massive “Three Dynasties Project” (1996–2000) aiming to do what I had been doing. This Project has ignored the *Bamboo Annals*. The Project’s published results are almost completely wrong, and I have become probably one of its most prominent international critics. This led to a book I published in 2009. I am now working on a revision and Chinese translation of that book. All of this is timely: Tsinghua University in Beijing has recently acquired the original bamboo text of a similar chronicle. Articles are beginning to be written about it. Its authenticity is beyond question. Its chronological scope is much less than that of the “Jinben” *Zhushu jinian*; but points of agreement between the two texts appear to be showing that the authenticity of the “Jinben” *Zhushu jinian* too should now be beyond question.

These are the basic dates in what follows (*Annals* dates on left, correct on right):

Yao	2145	2026
Shun	2042	1969
Yu and Xia	2029	1953*
Shang	1558	1554*
Zhou	1050	1040

The Project ventured back to 1250, with a few guesses before that. (\*D. W. Pankenier’s dates)

I shall here try an experiment. People are having trouble understanding my methods, and my application of them to explain how actual dates got changed into the dates in the BA. So instead of merely filling up another book with this (which I am doing anyway), I am going to try presenting the essence of the argument in a few pages, so that it can be seen all at once. (I will omit my recovered strip text.) At the end, I will try to show why all this matters, by presenting an example of what you can do with a reliable chronology, and then probing the philosophical-epistemological interest of what I have been doing.

On page 180 of my book *The Riddle of the Bamboo Annals*, I pose a problem which I do not quite solve:<sup>17</sup>

2.4. The conjunction marking the beginning of Xia (as discovered by Pankenier) occurred in February of 1953, which was the 14<sup>th</sup> year of Shun, according to Pankenier, when Shun transferred *de facto* authority to Yu. The extension of chronology backward (to get Yao 1 to be 2145) involved moving this date back one *bu* of 76 years, to 2029, as in the *Jinben*.<sup>18</sup> Pankenier noticed that the date of the conjunction must be Shun 14, because he noticed an echo of the political event of transfer of authority to Yu in the chronicle for Yao: in 2060 = Yao 86, which was the 14<sup>th</sup> year after Yao abdicated and Shun assumed *de facto* power. At that point Yu is given audience and the use of the Dark Scepter (*Xuan Gui*) symbolizing authority (emblemized in the sky, Pankenier argues, by the configuration of the conjunction of the five visible planets). This was exactly 31 years before the presumably actual event of 2029, re-dated from 1953. The 31 years (the length of the inserted reign of Di Gui) begs for an explanation.

<sup>17</sup> Nivison, *Riddle*, 18.

<sup>18</sup> I insert an explanation: Chronologists of the so-called “Warring States” era (sometimes dated 479–221 B.C.) often used the ancient intercalation cycle: assuming 365.25 days per year, there must be 7 intercalary lunar months in 19 years = 1 *zhang*, 4 *zhang* = 76 years = 1 *bu*, 20 *bu* = 1520 years = 1 *ji*. The first day in a *zhang* is winter solstice day. Dates of solstices and equinoxes, and *ganzhi* dates for days of months, are (it was supposed, incorrectly) repeated from *ji* to *ji*. This is essentially like the system developed by Meton of late 5<sup>th</sup>-century Athens and refined a century later by Callippus in the circle of Aristotle, echoing work in Babylon. It is not known whether the Chinese system is independent.

The question is open, but I will hazard one, hoping that someone else can do better.

I then did hazard an explanation of my own, but I think I can do a bit better now. The explanation solves the last problem in my chronology and ties it all together. I will review the whole argument, and then fit the explanation in place. In doing this, I will be omitting much of the details supporting the argument.

First: mourning for a deceased person of importance—one’s father, or one’s king—was a prehistoric institution, and lasted (25 or 27 months) less than three years, but was normally long enough so that it could not be completed in two years. It was an obligatory period of inactivity for a new king. In the BA (I start with Yao, where *gan zhi* names of years begin to be inserted by the Jin editors) at first the record is explicit: there were three calendar years of mourning after Yao, Shun and Yu (altered, I would argue, from an original two calendar years of mourning-completion).

For the rest of the Xia Dynasty mourning is not mentioned; but the use of *sui* 歲 -names (*gan zhi* for years) inserted by the Jin Dynasty editors imply gaps between reigns, most often two years, which I assume are for mourning. (One gap is a fictional 40 years, and the last reign is a fictional 31 years, inserted to push the beginning date back: see below.) We can therefore make a distinction between a king’s succession year, following the death of the preceding king, and his accession year, following mourning.

In the Shang and Western Zhou parts of the BA chronicle there are no gaps between reigns. But mourning continues to shape chronology, because the gaps were present though not recorded, and during the 300’s B.C. they came to be forgotten or ignored: Normally a king’s year of death in the chronicle is counted from his accession date. The result for both Shang and Western Zhou is that the reigns of the fifth generation kings—Tai Wu 太戊 in Shang, Mu Wang 穆王 in Zhou—are stretched. (After Western Zhou, reign counts are always from the succession year, but the king continued to wait until after completion of mourning before formally calling himself “*wang*” [king].) This basic structure of received chronology is further distorted in ways that have to be discovered.

These further distortions are caused by numerology and astrology,

motivated by politics, and by *zhengtong* 正統 (correct succession) theory. The part of the *Bamboo Annals* into which the Jin editors have inserted *sui*-names for exact dates begins with the reign of Yao; and it is in Yao 75 that Yu, who was to become the first ruler of Xia, first appears. Therefore the Jin scholar-general Du Yu 杜預, who examined the text (or most of it) shortly after its discovery ca. A.D. 280 and reports that it began with Xia, probably means that it began with Yao. The text Du Yu saw must have lacked the first strips, covering Huang Di 帝, Zhuan Xu 顓頊, and Di Ku 帝嚳. Why this is so is not known; but Pei Yin 裴駟 (*Shiji jijie* 史記集解) quotes Xun Xu 荀勗 and He Jiao 和嶠, who worked on the text soon after Du Yu saw it, as saying that it began with Huang Di, as it does now.

A date in the Huang Di part is linked by intercalation cycle arithmetic to 453, the date of the battle (the defeat of Zhi Bo 智伯 by Zhao 趙, Han 韓 and Wei 魏) that made Wei an independent state; so we know it is authentic.<sup>19</sup> The discovered BA text, finalized ca. 300 B.C., was based on an earlier one done ca. 400. The later one was Wei propaganda; it is likely that the pre-Yao parts are Wei creations. There are, however, obvious Wei modifications in later parts of the text (as shown below).

The earlier work was done in Lu, and promoted the prestige of Zhou. This required making 2145 the first year of Yao: 2145 was 1000 years before 1145, the first year of the 27<sup>th</sup> Shang king Wu Yi, and the year when he gave court status to Dan Fu, lord of Zhou. The Zhou founding ancestor Hou Ji 后稷 had been (it was claimed) Minister of Agriculture for Yao. The Lu text also must have made 1045, a century after 1145, the date of the Zhou conquest. This gave great prominence to Zhou Gong Dan 周公旦, the ancestor of the dukes of Lu, by making his seven-year regency a separate regime in history, preceding the

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19 A ritual and supernatural event is found in the chronicle at Huang Di 50, with a long subtext marking it as important. The date in both text and subtext is 7<sup>th</sup> month (I assume the Xia-*zheng* 夏正 first day), *gengshen* 庚申 (57). A fragment of the *Zhushu jinian* from the *Lu shi* 路史 says there were seven years of mourning after Huang Di's death. This implies that the 50<sup>th</sup> year was 2353. The date is 100 *zhang* (1900 years) before 453. The first of the (Xia-*zheng*) 7<sup>th</sup> month of 453 was day *yihai* 乙亥 (12). The *zhang-bu* intercalation cycle requires that in calculating back 100 *zhang* (= 25 *bu*) from a given day, one moves the *gan* for the day back 15. In the 60-day cycle, (12) minus 15 is (57). (I assume that Huang Di is mythical.)

accession reign of Cheng Wang 成王, instead of being merely coincident with the first seven years of Cheng Wang's succession calendar. (2145 was also a *bu* first year in the Lu Li 魯曆 intercalation calendar.<sup>20</sup>)

But Yao's actual first year was not 2145; it was 2026, by my calculation. History had to be improved. This was done by extending Yao's reign from 58 years (when his son Zhu 朱 was exiled and Yao himself was retired by Shun) to 100 years. Also, the first year of Xia was moved back one *bu* of 76 years from the conjunction date 1953 to 2029. (The one more year needed came from extending the mourning completion for Yao from two years to three.) Treating Shun 14 as the first year of Xia implied that the long reign of Yu must be first a period of *de facto* power, Shun 14 through Shun 50, plus mourning for Shun, followed by a short 8-year *de jure* reign. (Shun may not have reigned an even 50 years; if he did not, one must assume a correspondingly longer *de jure* reign for Yu.)

Xia became 76 years longer only by "borrowing" time. The debt was cut to 72 years by the handling of the solar eclipse of Zhong Kang 5. Its actual date—1876, 16 October (*shuo* of month 9), as discovered by K. Pang—moved back one *bu* had become 1952. A reference in the *Zuo zhuan* required that the eclipse be when the sun was in Fang, in the lunar zodiac.<sup>21</sup> I guessed this was tested by checking the date 432, one 1520-year *ji* (20 *bu*) cycle later. (Correlations of *ganzhi* with month dates, and dates of solstices, were supposed to be invariant from *ji* to *ji*.) That did not work, nor did later years until 428, which had a Xia *zheng* 9<sup>th</sup> month beginning October 28, day *gengxu* (47).<sup>22</sup> So

20 See Zhang Peiyu, *Zhongguo xian-Qin shilibiao*, 252; find *wuzi* (25), 625 at left, under Lu Li, and count back 1520 years (= 1 *ji*).

21 *Zuo zhuan*, Zhao 17.2

22 See Zhang, *Shilibiao*, 91. In the year 428, there must be an intercalary 8<sup>th</sup> month, so that Zhang's 12<sup>th</sup> month is the Xia-*zheng* 9<sup>th</sup> month. For this calculation I use the system which I employ successfully on late Shang material in my book *The Riddle of the Bamboo Annals*, Appendix 4, Supplement 2. I assume that a lunar month lacking a *qi*-center is intercalary. (A *qi*-center is the winter-solstice day and every other first day of a weather-period thereafter.) I count from the summer solstice, using lengths of the 24 weather periods as given in *Huainanzi*, "Tian Wen," 12<sup>th</sup> paragraph. (See *Riddle* section 1.4.11; it follows that the official winter solstice day was two days late.) Every one of the ancient "Six Calendars" gives *jiyou* 己酉 (46) rather than *gengxu* 庚戌 (47) for this date in 428; see Zhang, 180. This implies that the "Six Calendars" were much later, and that the persons producing the Xia chronicle were using more nearly contemporary data on the year 428; the real date for the first day of its 9<sup>th</sup> month was *gengxu*.

the eclipse was re-dated (428 plus 1520) to 1948, 9<sup>th</sup> month, *gengxu*. The four years (1952 to 1948) had to be supplied by increasing the preceding inter-reign gap total by 4. Next, the 72-year debt was much reduced by major historical fiction: the two-year interregnum after the fifth king Xiang 相 was made a 40-year story of a warlord named Han Zhuo 寒浞. This used up 38 years leaving a debt of 34. This 34 got increased to 35, when Xia was reshaped to make the first and second 8-reign periods each 200 years. The next year is 1589, the first year of the invented 17<sup>th</sup> king Di Gui 帝癸 (Jie 桀), whose 31-year reign cuts the debt to four years. Then comes 1558, the BA date for the beginning of Shang. This is four years early: Pankenier has shown that Shang began in 1554, which was 496 years before the Zhou Mandate year 1058, the year after the Zhou-heralding conjunction of 1059.

Let us reconstruct Xia's real history rather than its BA history. I assume reign lengths as in the BA, but gaps between reigns as always 2 years, for completion of mourning (no gap after 11<sup>th</sup> king Bu Jiang, who retired). Xia's beginning I take to be February 1953, Pankenier's date for the Xia conjunction. This implies Pang's date 16<sup>th</sup> October 1876 for the Zhong Kang eclipse. So my reconstruction of BA history is being confirmed. Also strongly confirmed is my assumption that the persons working out the BA chronology were using the intercalation cycle, and were applying it to actual dates, 1953 and 1876; for this is the only way to explain the errors 1948 and *gengxu*. *Therefore these persons had in front of them an accurate chronology back at least to 1953, which they were systematically twisting out of shape for political reasons.*<sup>23</sup>

Continuing with the real history of Xia, using the same assumptions—reign lengths as given, gaps after a reigning king's death always two years—

23 This is perhaps the most important argument in my study of the *Zhushu jinian*. It proves, I think, that an accurate chronology of events from the 20<sup>th</sup> century B.C. or earlier existed and was used by the persons who produced the Xia part of the BA, probably in early to middle Warring States. If this is true, it is a reasonable assumption that later Warring States persons responsible for other parts of the *Zhushu jinian* had the same resources. And if they did, then if one can determine their motives and methods, one can use the dates in the present text to deduce or confirm what the actual dates were, for most of the period covered in my study. This is what I have been trying to do. (We scarcely begin to have this kind of chronological control of the history of the contemporary Near East, though we have more detail for the ancient Near East than the BA and other sources provide for ancient China.)

I get 17 February 1577 B.C. (JD 114 5471) as the first day of the reign of the 14<sup>th</sup> king Kong Jia 孔甲. This day was a *jiazi* 甲子 (01) day.<sup>24</sup> One must therefore try assuming that *gan*-names of kings were determined by the first days of their reigns. There is at least one other example in Xia: The BA has 1718 as the succession year of Shang ancestor Shang Jia Wei 上甲微.<sup>25</sup> In the Shang calendar the first day would be the first day of the post-solstice month, which was 18 January, JD 109 3941, *jiayu* (11)—a *jia* day. Pankenier's last year for Xia 1555 turns out to be the last year of Fa, 16<sup>th</sup> king. So the 17<sup>th</sup> king Di Gui (Jie), reign 31 years, is fiction. (And so poor king Fa 發 must bear the opprobrium of being the real Di Gui. The first day of his succession year was *guiyou* 癸酉 [10].) The thirty Shang kings all have *gan* names.

Meanwhile Shang history was also being improved. There were four overlapping reigns (frowned on by *zhengtong*-minded chronologists): Zhong Ren 中壬, the second of Yi Yin's 伊尹 puppets during the second king Tai Jia's 太甲 imprisonment, whose four years were the first four of Tai Jia's accession reign; also 19<sup>th</sup> king Pan Geng 盤庚, whose claimed first four years were the four of the accession reign of his elder brother Yang Jia 陽甲. (There were four kings in that generation instead of the standard two, pointing to repeated attempts at fraternal usurpation of the succession.) The 23<sup>rd</sup> king Zu Geng's 祖庚 11 years were claimed by Zu Jia 祖甲, usurping the succession. And finally the last king Di Xin 帝辛, killed in 1040, was deemed no longer *de jure* king when Zhou promulgated its royal calendar in 1056, 16 years earlier. The total was 35, in agreement with the Xia remaining year-debt (before inventing Di Gui), moving the first year of Shang back from the correct 1554 to 1589.

Finally, assumed but unrecorded mourning-completions during Shang and Western Zhou disappeared during the 300's. The 8<sup>th</sup> Shang king Tai Wu's first year was set back 1 year from 1474 to 1475, a century after the first year of the founder Tang's royal calendar. This extended Tai Wu from 60 to 61 years. Four

24 To obtain the *gan* for a Julian Day number, divide by 60 and subtract 10 from the remainder (or add 50 to the remainder if it is less than 10).

25 I am assuming that after the chronology as in the present text was worked out, independently known dates were translated into it.

3-year mourning-completions prior to Tai Wu's accession disappeared, leaving a gap of 12 years, filled by the 12-year accession reign of Tai Wu's *successor* Yong Ji 雍己 (thus reversing their order), and Tai Wu's credited tenure was extended down through the 2+12 years that had been Yong Ji's, giving him 75 years. Dropping these four mourning-completions had no further effect.

Neither did mourning-completions after 22<sup>nd</sup> king Wu Ding 武丁. The mourning-completions beginning the reigns of 23<sup>rd</sup> king Zu Geng and 24<sup>th</sup> king Zu Jia were included in the 33 years claimed for Zu Jia, and the mourning-completions beginning the reigns of 26<sup>th</sup> king Kang Ding 康丁 and 27<sup>th</sup> king Wu Yi, two years each, were deleted but balanced by giving Zu Jia's son and first heir 25<sup>th</sup> king Lin Xin 廩辛 a 4-year reign, although he never reigned but died before his father. After Wu Yi, the problem disappears, because reigning kings made sure their sons succeeded them by appointing those sons "kings" (with calendars) before their own deaths.

We are left with the problem of mourning-completions beginning the succession reigns of 10<sup>th</sup> king Zhong Ding 中丁 through 22<sup>nd</sup> king Wu Ding. When these were deleted, a 31-year chronological vacuum was created that had to be filled. To understand what had to be done, we must first examine Western Zhou.

The BA gives the 5<sup>th</sup> Zhou king Mu Wang the reign 962–908. He was preceded by three kings whose succession years are between the Zhou conquest and Mu Wang 1: Cheng Wang, Kang Wang 康王 and Zhao Wang 昭王. Mourning-completions in Western Zhou are always two years; so Mu Wang 1 must be 956 (=962 less 2x3). After Mu Wang there were seven kings, but the 8<sup>th</sup> king Xiao Wang 孝王 was the uncle of the 7<sup>th</sup> king Yih Wang 懿王, who was probably still alive at the beginning of Xiao Wang's reign, so there was no mourning to be completed. And the last king You Wang 幽王 was killed in the destruction of his capital, so no mourning at the beginning of his reign was reflected in an official record. Therefore Mu Wang's reign in the BA lasts 10 (=2x5) years too long.

Post-Mu Wang chronology is complicated in other ways. The BA dates for 6<sup>th</sup> king Gong Wang 恭王 ought to be 907–892, 2+16 years minus the '2' and pulled down ten; instead, he gets only 12 years, 907–896. 7<sup>th</sup> king Yih

Wang, 2+25 years, gets the 25 years, but they begin four years earlier than they should. The cause seems to be that Xiao Wang did not withdraw until Yih Wang's son 9<sup>th</sup> king Yi Wang 夷王 had produced a son and heir, after four years of reign; and this overlap was not recognized: Xiao must have 5+4 years, pushing reigns back 4, and cutting Gong Wang to 12. Complicating the picture further, I would expect that 11<sup>th</sup> king Xuan Wang 宣王, dates 827/825–782, would have had years 825–782 in the BA, with 10<sup>th</sup> king Li Wang, dates 857/855–828, getting 28 years (including the Gong He Regency). In the BA his reign does begin in 853 as one would expect, but Xuan Wang's true succession year has been restored, either before the text was buried or by the Jin editors.

It is the deletion of mournings before Mu Wang that determines what is done with the Xia-Shang transition. There were three,  $3 \times 2 = 6$ , moving Mu Wang 1 back from 956 to 962. But it continued to be remembered that Mu Wang's reign had begun exactly 100 year after the beginning of Zhou, in some sense. The sense seems to be that Wen Wang 文王 had begun a royal calendar (possibly for his heir Wu Wang) in 1056, when he moved to a new capital. But now the beginning of Zhou had to become 1062. How?

There were competing claims to the date of the Zhou conquest. I think I have proved that it was 1040. But the BA date 2145 for Yao 1 is probably based on this being 1000 years before 1145, which was Wu Yi 1, the date when Wu Yi recognized Dan Fu ("Tai Wang" 太王 in Zhou history) as ruler of Zhou. The chronology that developed as a result (by the Lu group of chronologists ca. 400) seems to have dated the Zhou conquest to 1045, just 100 years later.

But the BA in its final pre-burial form was the work of chronologists in Da Liang 大梁 in Wei. They were not interested in Zhou and Lu. They left the Lu features in the text if they had no reason to change them, but they needed to change the conquest date. Their task was to make history justify the claim of Wei to be a kingdom, and this meant supporting the claim of Huicheng 惠成 to be *wang*. His royal calendar begins in 334, and he had announced this in 335. The Da Liang experts therefore made the appointment of Tangshu Yu 唐叔虞 to the fief of Tang, beginning the Jin state which became Wei, be in the year 1035, just 700 years earlier. The *Guo Yu* says that when Jin began Jupiter was in Da Huo 大火 (station 10 of 12), and also that when Wu Wang set out

to conquer Shang Jupiter was in Chun Huo 鶉火 (station 7). This requires that the conquest be in 1050, as it is in the BA. But the BA also says—truly—that Wen Wang died nine year after the conjunction heralding Zhou, which we know to be the conjunction of May 1059. It was not acceptable for Wen Wang to have died in the year of the conquest; so the conjunction of 1059 was set back one Jupiter cycle to 1071, allowing Wen Wang to die in 1062.

1062, which was 100 years before 962, could now be taken as the beginning of Zhou. It was both the last of Wen Wang's nine *shou ming* 受命 (“receive-Mandate”) years, and the first year of Wu Wang's exercising power as king.<sup>26</sup> (Wen Wang died in the 3<sup>rd</sup> month.) Furthermore, it made 1061 be Wu Wang's succession year, so that the conquest year became “12<sup>th</sup> year,” as it had been (in a different sense) for the defenders of the date 1045, who counted 12 from 1056.

But also the BA Shang summary (and one of the “apocrypha”) say that Shang lasted 496 years—correct: 1554–1059. If you no longer think of 1058 as the “Mandate” year, nor of 1056 as year 1 of 12, but must instead think of Zhou as beginning in 1062, then the first year of Shang must become 1558.

1558 was just 31 years after 1589. So when the 31 years of mourning-completions for the reigns of Zu Ding 祖丁 through Wu Ding were deleted, all pre-1558 dates moved down 31 years. So what had been 2029, *qua* Shun 14, suddenly became 2029 *qua* Yao 86. (31 years: 14 years for Shun, 3 years before Shun for mourning, plus the difference between 86 and 100 for Yao.<sup>27</sup>) *Which was the real Shun 14?* I know this experience only too well. My right eye has been half blind, and crossed leftward, since birth. Ordinarily my brain simply shuts off awareness of visual input from my right eye. But in the late evening (like right now), when I'm tired, I don't always get this relief. As a

26 *Yi Zhou shu* 25 “Wen Zhuan” opens with the date “*Wen Wang 'shou ming' zhi jiu nian*” 文王受命之九年 (“the 9<sup>th</sup> year of Wen Wang's ‘receiving the Mandate’”).

27 One must reject the idea that the number “31” was deliberately chosen, other elements of the chronology then being adjusted to fit it. (*Ganzhi* for first days of months are repeated almost exactly at 31-year intervals.) The “Jie” interval must first have been 35 years, reduced to 31 when Zhou mournings were dropped, Mu 1 becoming 962, Zhou 1 becoming 1062, and Shang 1 becoming 1558. The first year of Jie was untouched by this (the *wu xing cuo xing* event was redated from Jie 14 = 1576 to Jie 10 = 1580).

result, I can look at a picture on the wall and see it in two places at once, its real position, sharply, and also its crossed position, dimly, to the left.

I suggest that in Warring States China, people were having this kind of trouble with time. First they would see Yao, Shun and Yu as if 1589 were the first year of Shang. Then they would see a picture letting that first year be 1558. The problem was 2029 as the year when Yu of Xia received divine authority. Where was it? Notice the force of the problem: 1589 as first year of Shang seemed to be proved by two independent calculations, counting back through Shang undoing overlaps, and counting down through Xia, adjusting dates using the intercalation cycle and making 8 reigns + 8 reigns ideally 200 years each. But also 1558 seemed to be proved by two independent calculations, one being pulling dates down 31 by deleting mournings from Zhong Ding through Wu Ding, and the other by counting back 496 years from 1062 instead of 1058. The result was a chronological duck-rabbit dilemma.<sup>28</sup>

	Minus 31	Plus 31
2145 Yao 1	(2114) Yao 1	2145 Yao 1
2073 Yao 73	(2042) Yao abdicates, = Shun 1	2073 Yao abdicates (= Shun 1)
2060 Yao 86	(2029) Yu given <i>gui</i> , = <i>Shun 14</i>	2060 Yu given <i>gui</i> (= <i>Shun 14</i> )
2042 Shun 1	(2011)	2042 Shun 1
2029 <i>Shun 14</i>	(1998)	2029 <i>Shun 14</i> Yu given power
1589 Shang 1	1558 Shang 1	1589–1559 Di Gui (Jie), 31 years
		1558 Shang 1

You will retort, “but 2029 is my kind of date! The Chinese didn’t have that!” No; but they did have a system of absolute dating, and I have shown that they had been using it, on just that date 2029. Their system was the intercalation cycle. They would read an ancient date as just 1520 years later,

28 For “duck-rabbit,” see Ludwig Wittgenstein, *Philosophical Investigations*, trans. G. E. M. Anscombe (New York: Macmillan, 1953), 194 ff. (I supply this reference to satisfy the reader’s curiosity, making no use of Wittgenstein’s point. He cites Jastrow, *Fact and Fable in Psychology*. Wittgenstein offers a drawing of a head of a duck; if you turn it 90 degrees it becomes the head of a rabbit.)

remembering the date they got by some event or record familiar in their own historical memory. I have shown that they were doing that too, with the date of the Zhong Kang eclipse. (For another example, look at the long subtext after the Yao chronicle: Strip 35 (in my *Riddle*) identifies the year as Yao 70, and strip 40 makes *xinchou* (38) the first of the 2<sup>nd</sup> month.<sup>29</sup> That was worked out using the Lu Li application of the intercalation cycle, taking 625 as the equivalent of 2145.)

A permanent 31-year pull-down had to be avoided, because it would dislocate the first year of Yao; so a new reign was invented, to fill in the 31-year time-void between 1589 and 1558. Thus was Jie (Di Gui) created. Shun 14 became 2029 again, and Yao 86 became 2060. Shun 1 became Shun 1 in two senses: Shun 1 after the completion of mourning for Yao; but also Shun 1 with Yao's abdication in Yao 73. The visible detail of the giving of the Dark Scepter to Yu, which had probably belonged originally to 1953, ended adhering to Yao 86.

(Now we see why Yao “abdicates” (Yao 73 = 2073) before his reign ends. How much else in the Yao-Shun myth had its origin in this chronological dilemma? The myth has Yao giving his two daughters to Shun in marriage. In the BA this happens in Yao 71 = 2075, and is a mark of Yao's confidence in Shun's “virtue.” Similarly the lord of Yu—Shun's ancestral name—gives his two beautiful daughters to the young Shao Kang 少康 as a sign of confidence in him as he struggles against Han Zhuo to restore the Xia Dynasty.)

The changes I analyze did not get made all at once. Nobody held in his mind simultaneously the dates 1045 and 1050 for the Zhou conquest. Probably 1045 was proposed a century before 1050 was proposed. Deletion of mourning-completions is impossible with the date 1045, but is required by the date 1050. And the deletions for Zhou and for Shang did not have to be done at the same time. Extension of dates back for the beginning of Xia and earlier was probably what was done first. Then Di Xin's last year would be thought of as his last *de jure* year (perhaps 1057), with a *de facto* reign continuing. Only later in Wei would his first year be moved back 16 (for that would destroy 1145 as Wu Yi's first year, and make Dan Fu's recognition year

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<sup>29</sup> Nivison, *Riddle*, 131.

doubtful).

The insight gained from the date *jiazi* for Xia 14<sup>th</sup> king Kong Jia, that *gan* names of kings are determined by the first days of their reigns, must now be usable by finding (by trial and error) a “best explanation” argument, to confirm exact dates for all of the Shang kings. This took me a long time. I did it in 1990, as follows:

The last character in the king’s name must be the same as the first character in the *ganzhi* for the first day of the reign. There are constraints and options in choosing the date: a king cannot have the *gan* of his predecessor; *gui* (last of 10) is forbidden (it was the *gan* of the first king Tang’s father) and defaults to *jia*; but the choice can be either the succession date or the accession date; and usually the succession year is the predecessor’s year of death (resulting in an apparent 3-year mourning-completion). In two unusual cases (Wai Bing and Wai Ren) uncertainty forced resort to confirmation by divination. (This is indicated by *wai* 外, “outside,” = bottom of a turtle shell; in *jiaguwen* it would be *bu* 卜, divination crack on a turtle shell, perhaps polyphonic, pronounced *wai*.) A very few BA dates were impossible, and options among possible explanations created many “down stream” possibilities. I had to find the combination of assumptions that most closely conformed to the entire set of BA reign lengths, and that best explained BA reigns that were impossible. My result, I think, also turned out to be the best possible explanation of the “31-years” problem.

I learned some important things in the process. For example, Pan Geng (19<sup>th</sup> king) in generation 10 had only 24 years, because he was aiming at usurping the succession and claimed the 4-year accession reign of his elder brother Yang Jia as part of his own claimed reign (which thus became 28 years).

Pan Geng is betrayed by the fact that there were four kings in his generation, rather than two, as in earlier Shang times. As I see it, the unpleasantness with Yi Yin at the time of the first succession led to having two

kings in each generation, in order to prevent a prime minister from usurping power while the heir was mourning. A king, designating his heir, would also select one of his own brothers to serve as interim king, with the heir bearing the major burden of mourning, and becoming king after his uncle's death. This system failed in generation 10: 11<sup>th</sup>-generation king Wu Ding was son of the *last* brother in generation 10. Wu Ding tried unsuccessfully to continue the scheme, by using younger sons, since he perhaps lived too long to have brothers to use. His chosen heir Zu Ji 祖己<sup>30</sup> lost out to younger brother Zu Jia. After that, father-son succession was very carefully arranged and guaranteed while the father-king was still living.

In this work, I have been exploiting evidence in ways that some people would not approve (failing to notice that they do it themselves): I am always trying to identify the problems faced by the creators of the BA, and by the kings whose reigns are the BA's content (or by anyone doing anything), and then I try to re-think the way they solved their problems. This is the way all good history is done. Collingwood was right.<sup>31</sup>

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I have devoted decades to this project. Have I been wasting my time? I think I haven't; but the question is serious, and it allows two different answers. One would be to show what the historian can do only if he has an exact chronology to work with.

In 2001 there was published (U.K.: Curzon; U.S.: Columbia) S. J. Marshall's *The Mandate of Heaven: Hidden History in the I Ching*. (Marshall

30 Oracle inscriptions identify Zu Ji as Wu Ding's heir. He appears in the brief *Shang shu* chapter "Gao Zong Rong Ri" 高宗彤日, in which a large bird interrupts a sacrifice which the king is performing, Zu Ji then interpreting the event as a criticism of the king (for trying to make himself chief mourner). But Zu Ji is not recognized there as heir, and most of traditional interpretation since antiquity misinterprets the chapter's title as "the day of the *rong* sacrifice by Gao Zong" (= Wu Ding), rather than "the day of the *rong* sacrifice for Gao Zong," as oracle idiom requires. The incident (if it actually happened) must have been during the reign of Zu Geng (when the heir Zu Ji as king-to-be [*xiao wang*] would have been chief mourner).

31 R. G. Collingwood, *The Idea of History*, Oxford, 1946 (posthumous, edited by T. M. Knox), 282–302, "History as Re-enactment of Past Experience."

admits he is not a seasoned sinologist. I have no trouble with that. I could use more seasoning myself.) Marshall's thesis is that Hexagram 55 in the *Yi jing* refers to a solar eclipse. With careful study he concludes that it must be the eclipse of 20 June 1070 B.C. I think he is right, in a sense: one can make a case that this eclipse caused parts of the text to be what they are. But I think that from the *Yi jing* alone one can almost never get any information; the book is intentionally so murky that it can be claimed to support almost any result a diviner needs.

Marshall proceeds to claim that this gives him the date of the Zhou conquest of Shang. (He is aware of scholarship holding that the conquest must have been some years after the conjunction of 1059. He makes no attempt to refute this, and sneers at it.)

Marshall is wrong, of course, about this, and misses something more interesting. The fact is that 1070 is a very important date in the events preceding and leading up to the Zhou conquest, and it is likely that an eclipse is involved. The BA says that in year 21 of Di Xin of Shang the Zhou court hosted an assembly of regional lords friendly to Zhou. The date must be counted from 1102, the BA date for Di Xin 1, giving 1082. This date must then be reduced by 12, because pre-conquest Zhou dates in the BA are tied to the BA death of Wen Wang, which (as explained above) was moved back one 12-year Jupiter cycle by the chronologists who produced the Wei version of the BA ca. 300 B.C. Therefore the date of this assembly was 1070. It is probable that the June eclipse, with would be interpreted as predicting the death of a king, was what prompted Wen Wang to host this event.

Di Xin was not a fool, and recognized the threat at once. His response was to stage a royal hunting expedition in the Wei valley the next year. The Wei valley was the Zhou homeland, and a royal hunt was a standard way for a king to demonstrate that he had the power to do anything he wished, anywhere he wished to do it. Di Xin followed this demonstration with a general assembly of lords in his own capital in 1068. This is not in the BA. I deduced it by discovering that there was a second Di Xin calendar beginning in 1068. *Yi Zhou shu* 21 "Feng Bao" concerns another pre-conquest assembly of friendly lords in Zhou, closer in time to the conquest. (The tone of anti-Shang ranting

is bitter.) The text contains enough information to date the event 1046, and the date given is “23<sup>rd</sup> year.” Further, tradition—as in *Wenxian tongkao*—has 37 years passing between Di Yi and Di Xin. I had pinned Di Yi to 1105, using inscriptions. It would seem, then, that 1068 was the year when Di Xin promoted himself from *wang* to *di*. The BA identifies Lu Fu 祿父 as Di Xin’s heir, known to history as Wu Geng 武庚; so Lu Fu must have been appointed *wang* sometime before Di Xin’s death; and the first day of the year 1068 was *gengxu* (47).

These events required a big celebration, which all regional lords would be required to attend. This was the way in which a “great king” controlled the local rulers to whom he had to entrust local power: if you failed to attend, you identified yourself as a rebel. Wen Wang, titled Xi Bo 西伯 (“Lord of the West”) had to come, and was promptly arrested. There followed his confinement in the nearby village of Youli 羑里 for seven years, which from the BA can be deduced to be 1068–1062. Apparently Wen Wang had enough support so that Di Xin didn’t dare to kill him; but Wen could hardly forget that his father Ji Li 季歷 had died in a Shang prison in similar circumstances. It is not surprising, then, that *Yi Zhou shu* 25 “Xiao Kai” 小開 has Wen Wang in his 35<sup>th</sup> year advising his court that it should respect the warning of an unpredicted lunar eclipse—possibly foretelling his own death—and focus attention on the selection of a successor to himself. It is implied that Wen Wang is not in Zhou at the time and must be communicating by letter. The eclipse is datable with certainty to 13 March 1065 B.C.

Tradition—I think I can say now at least partly confirmed—has it that it was during his residence in Youli that Wen Wang wrote the part of the *Yi jing* attributed to him—including the text for Hexagram 55, which perhaps was suggested by the eclipse.

So, have I been wasting my time? Knowing more about their past, getting richer and more precise information about it and a deeper understanding of it have been very important to the Chinese. I think this is as it should be, and I hope I have been able to help a little with this. But I want to offer another kind of answer to my question.

An obvious way to start is by looking at what I have just worked out, but

now not with the focus on the information gained, but on what I was doing. I put together the eclipse that Marshall put his finger on and dated to 1070, combining this with BA entries which I had dated to 1070, 1069 and 1068. I got those dates by inferences from assumptions that seemed to me reasonable and almost necessary. I then used them by *filling in* a historical narrative. The BA does not *say* that the royal hunt in the Wei valley in 1069 was intended by the Shang king as a warning to Zhou. And this is only one step in my narrative. The BA does not *say* that Wen Wang was arrested while in the Shang capital; other texts do; but I had to ask why he should have been there, and no text known to me *tells* me that. *Yi Zhou shu* “Xiao Kai” does not *say* that the time was the middle of Wen Wang’s detention in Youli; I deduced that. And that text does not *say* that he was worried about losing his life. I made that up. (I would have been worried too.)

In all of this I notice myself engaging in a complex of filling in data, making deductions from the data, and asking myself why the people doing this and that did those things. This question has the form of asking what I have to assume to make sense of what I read. It seems to me that Collingwood’s “rethinking” is a special case of this procedure; and further, that it amounts to asking what something to be explained implies, that would explain it. This is logically the reverse of trying to find some premises that would imply it, which is often thought to be the proper form of an explanation (in physics, therefore necessarily everywhere). I take what I am doing to be what Charles Sanders Peirce called “abduction,” and to be included in what more recently has been termed “inference to the best explanation.”<sup>32</sup> As Peirce warns, abduction is not a form of inference; it is a strategy, and can use formal inferences of various kinds.

I said “included in,” after due reflection. In a famous three-page article in *Analysis*, Gettier had shown that the common definition of knowledge as justified true belief seriously needs to be amended: there can be odd but not uncommon sequences and connections that leave a belief true, and justified,

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32 An enormous literature has developed on this idea, following Gilbert Harman’s short article a half century ago: “The Inference to the Best Explanation,” *Philosophical Review* 74.1 (1965): 88–95.

but one wouldn't say that the person *knows*: what one thought to be the explanation or justification isn't what happened that actually does justify the belief. Harman applies the idea to a critique of enumerative induction, and argues that such an induction is valid only if it is in effect also an argument to the best explanation. It requires a sensible effort for me to spring the idea loose from Harman's context and apply it to history, and especially historical narrative, where any request for enumerative induction would usually be bizarre.

Further, imaginary examples usually assume imaginary verifiability. Working with the *Bamboo Annals*, where evidence is thin and usually underdetermines anything one needs to say, I cannot make this pretense. I am typically reconstructing the thinking of persons I can never hope to name or locate or date. That is what I did in working on the deformation of Xia chronology. There are persons who will say to me, "Nivison, you are walking on air: I won't listen to any of it." I suggest that any reader who wants to say this read again my proof that chronologists twisting the dating of the Three Dynasties had the use of accurate records for those dynasties, back to the 20<sup>th</sup> century B.C.

I think my conclusion is true. But there is no way to get behind the account I constructed and confront the facts, so as to confirm it; and if someone were to produce an account of a different kind explaining the dates 1948 and *gengxu*, I would have to examine the rival case and give reasons for preferring mine. One cannot dispose of a counter-argument by sneering at it. In other words, in this kind of study we must be able to compare explanations, and this means accepting the idea that an explanation does not have to be true to be a possible explanation. A made-up story can be (and often is) told as an explanation, of otherwise puzzling data. The chronicle of Jie is such a story, and there is a great deal of this in what for centuries has gotten accepted as history in China. There is a lot more of it in the *Bamboo Annals* (and in Livy, and in Herodotus). To deal with this problem, we must be able to tell a story about the story, explaining how it could have come into existence, if untrue. If no such story-about-the-story is even imaginable, then the original story is true. If there is no story-about-the-story that is plausible, then the original story

is almost certainly true. I did find a story about the Jie story, that is almost unavoidable, and I conclude that the Jie story is false.

On the other hand, I encountered what is offered as information about an eclipse in Zhong Kang's reign which I *know* is false: no eclipse occurred in 1948, or on *gengxu* day. But then I must be able to explain *that* as false. I find that I can, and I cannot imagine that there could be another explanation at all, let alone a better one. So the explanation I found must be true. But that explanation requires me to assume something amazing: The Chinese had been keeping accurate records through dynasty after dynasty, for many centuries before we have any evidence of their using writing.<sup>33</sup>

This use of historical imagination cannot be scorned. To scorn it is to throw evidence away. Thinking this out has not been a waste of time, and working on the *Bamboo Annals* has helped me to think it out.

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33 Hume would remind me that I may accept such an improbable conclusion only if it would be even more improbable for the argument leading to it to be wrong.

# 關於商代年代學和戰國史學的兩個問題

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倪德衛教授是斯坦福大學 Walter Y. Evans-Wentz 榮譽退休教授，他對中國歷史與哲學的研究貢獻向來最為人稱道。倪德衛教授於 2014 年 10 月 16 日逝世前，曾向《饒宗頤國學院院刊》投遞兩篇論文。雖然兩篇論文各自獨立，但卻有相當密切的關係，因此本刊編輯決定於是期同時發表這兩篇論文。

兩篇論文以出現於兩千年前的歷史年表《竹書紀年》為基礎，試圖去理解戰國時代學者們的知識水平。第一篇論文題為「戰國時期的中國在科學方面領先於希臘嗎？」借由《竹書紀年》以及其他早期資料，作者認為《竹書紀年》的編撰者對於遠古時期的星象記錄遠勝古希臘人，因此針對這一問題給予了肯定的回答。第二篇論文討論「三十一年問題」，此文談及《竹書紀年》中的複雜問題；作者認為此年表的記載大體準確，應是可信的文獻。除此之外，此篇論文中還反省了認知論與歷史哲學，發人深思。

倪德衛教授治學獨闢蹊徑，以豐富的歷史知識結合嚴謹的史料甄別，提出了許多深具慧眼的敏銳觀察，促使我們以嚴肅且富有想像力的態度去看待古代文獻。兩篇論文的風格不同，但都不拘格套，展現了倪德衛教授富有創造力的思索過程，故在此僅略作格式方面的修改。

關鍵詞：商代年代學 戰國史學 《竹書紀年》 歷史哲學 古希臘科學

