

MS Word word-count = 2560.

Table 1: The 10-cycle

	1	2	3	4	5	6	7	8	9	10
Modern graph	甲	乙	丙	丁	戊	己	庚	辛	壬	癸
Pinyin	<i>jiǎ</i>	<i>yǐ</i>	<i>bǐng</i>	<i>dīng</i>	<i>wū</i>	<i>jǐ</i>	<i>gēng</i>	<i>xīn</i>	<i>rèn</i>	<i>guǐ</i>
OC	kʰrap	qrət	praŋʔ	tʰeŋ	muʔ-s	kəʔ	kʰraŋ	sin	nəm	kʷijʔ
Shāng graph (ca. 1200 BC)										

Table 2: The 12-cycle

	1	2	3	4	5	6	7	8	9	10	11	12
Modern graph	子	丑	寅	卯	辰	巳	午	未	申	酉	戌	亥
Pinyin	<i>zǐ</i>	<i>chǒu</i>	<i>yín</i>	<i>mǎo</i>	<i>chén</i>	<i>sì</i>	<i>wǔ</i>	<i>wèi</i>	<i>shēn</i>	<i>yǒu</i>	<i>xū</i>	<i>hài</i>
OC	tseʔ	ŋruʔ	gər	mʰruʔ	der	s-gəʔ	m.qʰaʔ	met-s	lin	m.ruʔ	s.mit	gʰəʔ
Shāng graph (ca. 1200 BC)												

Chinese Cyclical Terms (*tiāngān dìzhī* 天干地支).

From the beginnings of Chinese literacy in the late 2nd millennium BC, Chinese time-keeping has employed two sets of cyclical terms among its notational apparatus. One set consists of ten terms, and is referred to here as the 10-cycle (table 1). The second has twelve, and is referred to here as the 12-cycle (table 2). A cycle of sixty terms (here, the 60-cycle, but commonly referred to as the sexagenary or sexagesimal cycle) combines terms from the 10- and 12-cycles in pairs. Beginning with the pair *jiǎzǐ* 甲子 (the first terms in the 10- and 12-cycles) and repeatedly incrementing both cycles generates sixty distinct pairs, until *jiǎzǐ* recurs and the cycle repeats. These cycles have been used to track a variety of time units, most prominently days and years, and other cyclical or sequential entities (Kalinowski 2007; Lewis 2010).

*** TABLE 1, TABLE 2 ABOUT HERE ***

The usual modern Chinese terms for the 10-cycle and 12-cycle are the "heavenly stems" or "trunks" (*tiāngān* 天干) and the "earthly branches" (*dìzhī* 地支) respectively. The expressions "trunk" and "branch", apparently referring to the primacy of the 10-cycle over the

12-cycle, go back to the Hàn period (206BC-220AD), as does the association of the 10-cycle with heaven and the 12-cycle with earth. However, there is no reason to think that stems, branches, heaven or earth were part of the original conception of the cycles. Early texts also refer to the ten *rì* 日 ("days; suns") and the twelve *chén* 辰 (Shinjō Shinzō 1933:635–638). In Western Zhōu usage, *chén* 辰 may also have meant simply "day" (Shaughnessy 1991:194–195), though confusingly it also appears as the fifth term in the 12-cycle.

The cycles appear frequently on the divination bones and shells of the Late Shāng (ca. 1300-1050 BC) where they are routinely used to date divination records. The 10-cycle was the Shāng ten-day "week" (*xún* 旬) (Cháng Yùzhī 1998:88–94), with clear connections to mythical accounts of ten suns that appear in later literary texts (Allan 1991:19–56). The Shāng royal family were assigned posthumous "day-names", consisting of a kinship term followed by a term from the 10-cycle – Father Jiǎ 父甲, Grandmother Xīn 妣辛, and so on – and received scheduled sacrifices on their corresponding day (Smith 2011a). Tables of 60-cycle dates were repetitively copied by trainee Shāng scribes (Smith 2011b).

The role of the 12-cycle at this early stage may be described as ancillary to the 10-cycle. Although Shāng divinations are regularly dated using the 60-cycle, or sometimes the

10-cycle alone, the 12-cycle is used alone so rarely that the few instances are probably anomalous (Cháng Yùzhī 1998:93–95). The 12-cycle was never used for sacrificial "day-names".

The Shāng use of concurrent cycles tracking the passage of days has obvious parallels with the Maya *tzolkin* cycle of days (Aveni 2010) and the Akan calendar (Bartle 1978).

The Zhōu 周 royal family briefly experimented with the use of day-names for the dead members of its lineage after their conquest of Shāng (ca. 1050 BC). One Western Zhōu inscription refers to Zhōu Wǔ Wáng 武王 using the day-name *dīng* 丁 (Zhāng Màoóng 2009), but there are no subsequent examples. The use of the 10-cycle to name dead kin persisted among other North Chinese lineages. The most famous family to maintain the day-name tradition into the first millennium BC is that represented by the Zhuāngbái 莊白 bronze hoard, with its many inscriptions tracking the family's history (Falkenhausen 2006). However, by some point in the 9th century BC, they too had abandoned the tradition of day-names and it was extinct by the end of the Western Zhōu period. The ten-day week also lost the central organizing role that it had had in Shāng ritual schedules. On the other hand, the 60-cycle remained the uncontested means of tracking the passage of days, and is a standard feature

of the date notations in all texts from the first millennium BC.

The 10-, 12- and 60-cycles were not used to record any other unit of time besides the day until the Warring States period (5th c. – 221 BC), a thousand years after their first appearance. Only with the growth of cosmological theorizing during the Warring States and Hàn periods do we find the cycles being put to innovative uses, prompted in part by a number of physical coincidences involving the number twelve. The monthly position of the full moon against the fixed stars, in opposition with the sun, led to the labeling of twelve constellation groups with terms from the 12-cycle. The passage of Jupiter through the same twelve constellation groups, approximately one group per year, may have prompted the use of the 12-cycle, and the compound 60-cycle, for recording years (Major 1993; Smith 2011a:27–28). The earliest excavated text to feature years recorded with cyclical terms comes from the mid second c. BC Tomb 3 at Mǎwángduī (Kalinowski 1998:135–148). The well-known pairing of the 12-cycle with a zodiac of twelve animals also first appears around this time (Kalinowski 1986, 208).

One might expect these 22 names for days to derive from coherent sets of vocabulary items, but no complete account of their origin has yet emerged. The graphs used to write the

cyclical terms are obscure for the most part. Some are abstract-looking symbols that give no pictographic clue to the terms' semantics. The fifth graph in the 10-cycle, and the eleventh in the 12-cycle seem to be a pair, belonging to a larger class of "hafted weapon" pictograms. The sixth and tenth graphs of the 12-cycle seem to be written phonetically with the "child" 子 *zǐ* pictogram, and with a pictogram of a bottle or similar vessel connected with the word *jiǔ* 酒 "fermented drink". The shifting of the "child" pictogram from sixth position to first, around the middle of the first millennium BC, also demands (but so far defies) explanation. It is difficult to know whether the shift reflects a rearrangement of the 12-cycle terms themselves, or merely a change in the ways in which the first and sixth terms were written.

Hàn period authors understood the cyclical terms according to contemporary usage.

The *Shuōwén Jiězì* 說文解字 treats the 10- and 12-cycle terms as being, in origin, seasons or months, rather than day names. With access to texts from a thousand years earlier, we can now see that this is an anachronism. However, twentieth-century scholarship has also been distracted by the late functional diversity of the cycles. Hypotheses regarding the origin of the cycles have often been incompatible with the single most secure datum: that the cyclical terms were originally names for days.

Léopold de Saussure (1910, 457–458) and Shinjō Shinzō (1933, 635–641) thought that the 12-cycle was devised to record months, with the twelve terms semantically or graphically reflecting seasonal characteristics. On the basis of sporadic semantic and phonetic approximations, Guō Mòruò (1982) proposed that the 12-cycle derived from the Greek and Babylonian zodiac marking the yearly stations of Jupiter. Jonathan Smith (2010) has proposed that the 12-cycle terms were lunar phases, and that the 10-cycle terms referred to constellations along the ecliptic (see also Pankenier 2011). K. C. Chang (1978) proposed that the 10-cycle terms were names of intermarrying clans holding the Shāng kingship in alternation. Pulleyblank (1979; 1995) suggested that all 22 cyclical terms may have been phonograms representing the consonants of the contemporary language. None of these proposals has sustained wide acceptance.

Benedict (1972:172, 174, 176–177, 187–189) and Whittaker (1991:63–95, 140–146) each attempted etymologies for the 12-cycle by seeking animal names in Asian languages corresponding to those of the Chinese zodiac. Although the correspondences offered in these two proposals do not look good from the point of view of up-to-date OC reconstructions, there is no doubt that versions of the 10-, 12- and 60-cycle, as well as the zodiac, have been

transmitted widely among Asian populations (Chavannes 1906; Norman 1985; Ferlus 2010; Ferlus 2012). In some cases, such as Tibetan, it is the 60-cycle as a system that has been transmitted, with native linguistic values supplying the individual terms (Staël-Holstein 1935). The Tai languages are interesting in that several of them use a set of 12-cycle terms cognate with Chinese, but combined with a 10-cycle that is of different (but equally obscure) linguistic origin. The Tai cycles are variously used to record days or years, and have a 12-term zodiac comparable to the Chinese (Li 1945; Davis 1976; Terwiel 1981, 2:123–165). Both the day and year cycles of several Tai groups are out of phase with one another (Terwiel 1981, 2:139, 142), showing that it is possible for the cycles to be reset under certain circumstances.

The Chinese cycles, then, are the earliest to be written down of a complex family of Asian calendrical cycles. We can say with considerable confidence that they arose as names for days of 10- and 12-day weeks. However, the language of origin and the earliest semantics of the Chinese terms remain uncertain.

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