



Some Early Chinese Symbols of Duality

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Schuyler Cammann

SOME EARLY
CHINESE SYMBOLS
OF DUALITY

I. INTRODUCTION

Traditional Chinese philosophy and the religions of Taoism and Neo-Confucianism, as well as China's indigenous folklore, have all stressed the belief that human life, this world, and indeed the whole universe, were shaped and influenced by two interworking forces called the yin and the yang. This concept of a fundamental duality found expression in Chinese arts and crafts, architecture, music and literature, and even in mathematics.¹ The mathematical aspect of Chinese symbols for Duality has been least explored, so that will be the principal subject for investigation here.

The Old Chinese concept of two basic forces in nature—contrasted rather than opposed and, ideally, kept in perfect balance—was far more than a mere philosophical construct. It had its basis in actual, observable phenomena. The sun, for example, was the prime unit chosen to express the active masculine force, yang, because it poured forth heat and light; while the moon was the chief symbol for the more passive feminine force, yin, since it effortlessly received its light at

¹ For the widespread influence of yin-yang concepts in Old China, see Marcel Granet, *Pensée chinoise* (Paris: Éditions Albin Michel, 1950), chap. 2, pp. 115–48.

second hand from the sun. However, the moon was not uselessly inactive, the Chinese thought, because they knew it had been most important since earliest times as an indicator of time, with influence on human biology.² Yin-yang philosophy recognized cycles in life and nature in which constructive action followed quiet thought, and dynamic creativity succeeded periods of rest. Such reasoning was extended to every aspect of Chinese life and thought.

How early did this concept of a fundamental Duality find tangible expression in Chinese culture? Although the terms "yin" and "yang" do not appear in surviving texts until quite late in Chinese history—probably not until the beginning of the fourth century B.C.³—we can never be sure that they, or some equivalent terms, were not mentioned in the ancient volumes that were destroyed during the Burning of the Books by order of the First Ch'in Emperor in 315 B.C., or in the thoroughgoing destruction of his palaces a few years later. However, the basic idea of a dualism would seem to have already been present in China as early as the middle of the second millennium B.C. We can infer this from certain highly emphasized motifs on the bronze artifacts of the Shang dynasty (1700?–1027 B.C.).

The most prevalent Shang motif was a monster mask, known to us as the T'ao-t'ieh;⁴ what the people of that time might have called it is still unknown. Sometimes the entire body of the monster is split, with the two halves extending out on either side of its head.⁵ In other cases, the motif seems to consist of two separate monsters—or a single one split all the way—with two heads in profile, meeting nose to nose at a median line or a projecting flange.⁶ Or else, a single or double head may be shown without a complete body.⁷ In all these examples, the heads have prominent eyes, nostrils, and jaws. They usually sprout horns or antlers, but the powerful faces are seldom those of buffaloes, rams, or deer, to match the horns, as the upper jaws have prominent

² For Chinese knowledge regarding the influence of the moon, see Joseph Needham, *Science and Civilization in China* [hereafter referred to as *Science*] (Cambridge: Cambridge University Press, 1962), 3:227, 390, 483–94.

³ Needham says the philosophical use of the terms "yin" and "yang" probably began about the beginning of the fourth century B.C., and the references to them in older texts are later interpolations (Needham, *Science*, 2:273).

⁴ For a discussion of the T'ao-t'ieh symbol, see Jordan Paper, "The Meaning of the 'T'ao-t'ieh,'" *History of Religions* 18 (1978): 18–41. Though very comprehensive, this is still incomplete.

⁵ See Wen Fong, ed., *The Great Bronze Age of China: An Exhibition from the People's Republic of China* (New York: Metropolitan Museum of Art and Alfred A. Knopf, Inc., 1980), fig. 33, p. 118; fig. 48, p. 180.

⁶ See *ibid.*, frontispiece; fig. 47, pp. 178–79; no. 12, p. 135; no. 17, p. 143.

⁷ *Ibid.*, no. 41, p. 215, shows two single heads, while no. 32, p. 165, seems to show a double one. The double heads are often ambiguous, as are some of the double or twin monsters.

teeth or fangs.⁸ Even the isolated heads—in two cases, with human features—not only wear the horns but also generally have crooked forelegs with hooked claws, like those shown on the actual monsters, probably to indicate their special supernatural powers.⁹

The split body of a single monster, or the pair of monsters, or simply the paired heads—in each case uniting to make a single motif—may have been intended to symbolize the dual aspects of some supernatural spirit or deity: aggressive and protective, or active and passive in its actions. Possibly this spirit was even male and female in one, because a human figure in jade with horns on the head, found in a royal tomb at the last Shang capital in Anyang, represented a male on one side and a female on the reverse.¹⁰

On later bronzes, from the end of Shang and the early Western Chou dynasty, the monster could be replaced by a pair of fanciful birds.¹¹ These even more definitely project the idea of a two-part symbol representing two forces acting together as a Duality.

The ancient Chinese had other, more abstract ways to symbolize the mutual forces at work in the universe. One of the best known consisted of sets of linear figures called trigrams and hexagrams. These were composed of three or six horizontal lines: solid or complete lines to stand for the male principle, and broken or perforated lines to indicate the female.¹² Both types were being used for divination by the end of the Shang dynasty, and some modern authors feel that they must have derived from a primitive, quinary system of reckoning that was regularly used in China during the Shang dynasty.¹³

The idea of taking a solid line to contrast with a broken one could have developed from a primitive system of divination with two sticks. A person with a problem might ask a question, then throw down two

⁸ Having front teeth in the upper jaw, these could not be true horned animals. Several Chinese authors in the Classical period mentioned the fact that horned animals lack upper (front) teeth. For example, see the *Ta Tai li-chi*, ch. 80, in the *Ts'ung-shu ch'ing ch'u-pien* (Shanghai: Commercial Press, 1937), 1028, ch. 13:225. (Modern editions group the old *chüan* into a lesser number of new ones.)

⁹ On two well-known Shang bronzes decorated with human faces, the latter have horns, as well as small arms and hands with claws. See William Watson, *Art of Dynastic China* (New York: Henry N. Abrams, 1981) pt. 2, figs. 193, 222. On the former, the horns and arms are very small and detached, but still visible.

¹⁰ Fong, no. 37, illustrated on pp. 188, 189.

¹¹ *Ibid.*, no. 25, illustrated on pp. 156, 157; no. 53, p. 227.

¹² For the trigrams, see Fung Yu-lan, *A History of Chinese Philosophy*, trans. Derk Bodde (Princeton, N.J.: Princeton University Press, 1953), 2:102–6; Needham, *Science*, 2, table 13: 312–13. For the hexagrams, see Needham, *Science*, 2, table 14: 314–21.

¹³ See René Barde, "Recherches sur les origines arithmétiques du Yi-King [I Ching]," *Archive internationale d'histoire des sciences* 5 (1952): 265–74. See also Needham, *Science*, 2:343.

sticks. If these crossed, or even touched so as to form a single continuous unit, the answer would be "yes" or "favorable"; on the other hand, if they fell without meeting, the reply would be negative.

Since early times, the Chinese have used such lines in sets of three, to make eight possible combinations, knowing these collectively as the *pa-kua*. From this set they took either of two pairs to symbolize the two universal forces. In the primary pair, the yang trigram (*ch'ien*) consisted of three solid lines, while the yin one (*k'un*) had three broken lines. The secondary pair, by contrast, was composed of solid and broken lines in reciprocal alternations: the yang one (*k'an*) was broken-whole-broken, while the yin one (*li*) was whole-broken-whole; but these were more ambiguous and sometimes interchanged, as we shall see.

The people of Old China also used a set of sixty-four six-line combinations, the hexagrams, which confusingly enough were also described as *kua*. These hexagrams appear to have been made up from pairs of trigrams, one being placed atop another; though some scholars have proposed the unlikely idea that the hexagrams came first and that the trigrams must have derived from them.¹⁴

Both sets seem to have originated from an early method of divination with sticks, the present lines having replaced pairs of sticks that were used as described above. In fact, the hexagrams have been used for fortune-telling down to modern times, using a classic called the *I Ching*, which contains traditional prognostications for each hexagram, along with a number of explanatory appendices.¹⁵ In modern times, coins have generally been used for this—"heads" representing the solid lines and "tails" the broken ones—whereas the Ancient Chinese used sticks made from stalks of milfoil.¹⁶ After six castings, the resulting sign, composed of six solid or broken lines, would be looked up in the *I Ching*, after which the resulting prognostication might be further interpreted by the soothsayer to answer the specific question.

That system of divination seems to have evolved from an even earlier system of reckoning, which employed sticks or "counting rods" for

¹⁴ The priority of the hexagrams was proposed in the two references cited in the previous note. For the priority of the trigrams, see Granet, *Pensée chinoise*, p. 185, n. 1; and Richard Wilhelm, trans., *The I Ching or Book of Changes* (rendered into English by Cary F. Baynes), Bollingen Series 19 (Princeton, N.J.: Princeton University Press, 1983), pp. lix–lx, 357.

¹⁵ The *I Ching* apparently derived from an earlier work called the *Chou I*, used for milfoil divination, which has been shown to have reached its present form in the late ninth century B.C. See Edward L. Shaughnessy, "The Composition of the 'Zhouyi'" (Ph.D. diss., Stanford University, 1983) (Ann Arbor, Mich.: University Microfilms International, 1983), pp. 47–49, 104.

¹⁶ Both methods are described in Wilhelm, trans., *I Ching*, pp. 721–24.

calculations in a quinary system (using base 5).¹⁷ Even after the Early Chinese switched to a denary system (base 10), they continued to use counting rods as late as the Sung dynasty, until these were finally displaced by the abacus.¹⁸ In fact, the first three numerals used in Modern China recall a stick notation, as does the old Chinese way for writing 5 as an X, and the still-used cross for the number 10. Both of the latter seem derived from crossed sticks.

Western writers sometimes say that the hexagrams must reflect the use of long and short rods for divination; but such statements ignore the fact that such divination is only practical with sticks of equal length (long or short). The Chinese considered solid lines as male or yang, and divided ones female or yin, doubtless because in using primitive systems of reckoning—with sticks, for example—one could instantly see that odd numbers cannot be halved, while even numbers would neatly split into two equal parts. This rather elementary, but often overlooked fact would be immediately obvious to a speaker of French, because that language refers to even and odd numbers as *pairs* and *impairs*.

Furthermore, on anatomical grounds, 2 is an obvious symbol for the female sex, while 1 and 3 are natural symbols for males; but, since 1 was preempted in China to indicate the Supreme Unity (behind the Duality), 3 became the chief male symbol. In view of all this, it seems convenient to use the words “male” and “female” when referring to the two aspects of the Great Duality in the early periods before the terms “yin” and “yang” were invented—with the understanding that these terms should more broadly include those contrasts of light and shade, active and passive, firm and yielding, et cetera, that were later implied in the terms “yang” and “yin.”

Each set of trigrams and hexagrams was traditionally deployed around a circle. The *I Ching* presents a set of trigrams and hexagrams ascribed to King Wen—Wen Wang, whose son established the Chou dynasty—and another set ascribed to Fu Hsi—a much earlier, completely mythical ruler in prehistoric China (fig. 1).

The set that tradition has ascribed to Fu Hsi is very neatly and systematically presented. When either the circle of trigrams or the associated one for the hexagrams is diagonally bisected by a line from the right side of the topmost symbol to the left side of the one at the

¹⁷ Barde, p. 238, explains that the quinary numeration is characterized by the importance of 5 and 9, the sequence of numbers from 1 to 9 being shown as 1, 2, 3, 4, 5, 5 + 1, 5 + 2, 5 + 3, and 5 + 4, represented in China by stick numbers, which developed from a primitive system of counting on the fingers of one hand. He also states that the symbols on bronze money from Late Chou indicate the existence at that time of a mixed quinary-denary numeration, which eventually gave way to the denary system. He assumes that until the Late Chou the Chinese were still using the quinary system.

¹⁸ See Needham, *Science*, 3:70–71, for the method of using these rods.

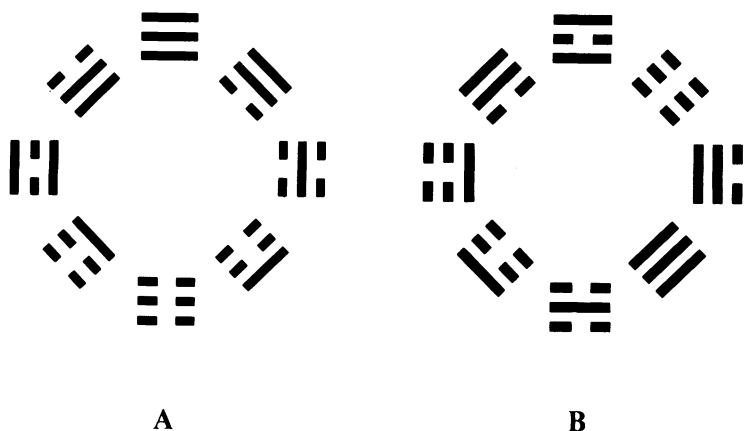


FIG. 1.—A, Trigrams ascribed to Fu Hsi. B, Those ascribed to King Wen

bottom, the signs on the right of it all have a broken bottom line for yin, while those to the left of it have a solid bottom line for yang. Furthermore, every yin trigram faces its yang complement directly across the open center.

The neat balance in this set has led people to suggest a later origin for the circle of trigrams, and some have claimed that the associated one for the hexagrams was probably invented as late as the eleventh century A.D. In addition to questions regarding their age, the exact method by which the numbers in the hexagram circle were originally laid out has been a subject of intense controversy, leading to some serious misunderstandings. The questions regarding how and when these were first constructed cannot be satisfactorily answered unless one assumes that the current arrangement of the Fu Hsi trigrams—on which the one for the hexagrams must have been based—actually represents a relatively late stage of development.

In the set ascribed to King Wen, the circle of trigrams looks as though it had been arranged in a rather haphazard way. At first glance it seems to lack any recognizable order, beyond the fact that the top-most trigram (*li*) represents south and female, while the bottom one (*k'an*) stands for north and male. In fact the clumsy appearance of this set has led some people to consider it earlier (i.e., “more primitive”) than the previous one, which is not the case.

The circle of hexagrams that has been placed with this, as another supposed creation of King Wen, does not appear to have any direct connection with it. This latter group has been deliberately arranged so

that each adjoining pair of hexagrams consists of two contrasting figures, resulting in thirty-two dichotomies. In four of these pairs, the two figures are directly opposite, the solid lines of one of them contrasting with the broken lines of the other, and vice versa. In the other twenty-eight pairs, one figure is simply the reverse of the other (turned upside down). Some scholars have observed that the meanings assigned to the respective units of certain pairs are also complementary or contrasting.¹⁹ However, the arrangement of these pairs in the *I Ching* and the order of their prognostications in this book seem to lack any system, and Arthur Waley has suggested that the hexagrams must have been shuffled several times.²⁰

We can only conclude that both sets of trigrams and the associated hexagrams, in their present arrangements, are end products of a long evolution. However, we shall not attempt to trace the earlier forms of these until Section III. We must first consider some other sets of mathematical diagrams from Ancient China that can provide a fuller background to help us understand more clearly why these particular ones developed in the ways they did.

II. EARLY NUMERICAL SYMBOLS: EVOLUTION OF THE LO SHU AND THE HO T'U

The philosophers of Old China possessed several diagrams composed of actual numbers. They carefully studied these and used them to illustrate some of their basic theories about the Universe and the two great forces that interworked within it. Two of these diagrams they especially favored. The first was known as the "Lo Shu," or "Lo (River) Writing," and the second was called the "Ho T'u," or "River Chart."²¹ In later tradition the former was also called "Kuei Shu," the "Turtle Writing," while the latter was called the "Dragon Writing," in reference to myths that described their (supposed) separate origins.

The name "Lo Shu" was traditionally explained by a legend which told that a mythical sovereign, Yü the Great, had learned it from the pattern on the shell of a turtle that appeared to him out of the waters of

¹⁹ See Shaughnessy, pp. 171–74, and chap. 4.

²⁰ See Arthur Waley, "The Book of Changes," *Bulletin of the Museum of Far Eastern Antiquities* 5 (1933): 141. The apparent disorganization in this hexagram group ascribed to King Wen has led some scholars to suggest how they might once have been arranged more systematically. For one attempt, see Stephen H. McKenna and Victor M. Mair, "A Reordering of the Hexagrams," *Philosophy East and West* 29 (1979): 429–36.

²¹ The Lo Shu diagram and its place in Chinese tradition have been discussed in Granet, *Pensée chinoise*, pp. 173–208; and in S. Cammann, "The Magic Square of Three in Old Chinese Philosophy and Religion," *History of Religions* 1 (1961): 37–80. For the Ho T'u, see Granet, *Pensée chinoise*; Michael Saso, "What Is the Ho T'u?" *History of Religions* 17 (1978): 339–416.

the Lo River. Its other name, "Kuei Shu," is usually explained in the same way. However, we shall see that there very likely was another, more significant reason for both this name and the accompanying legend.

The Lo Shu was simply the elementary magic square of 3, composed of the numbers from 1 to 9, so arranged that all its vertical columns, horizontal rows, and two main diagonals would each produce the sum of 15;²² while the original Ho T'u—later considerably altered—consisted of the same nine numbers deployed in the shape of a cross.

The Old Chinese scholars considered both of these diagrams highly significant. They saw in them the two complementary principles of yin and yang, the cycle of the four seasons, and the workings of the five elements or "movers," along with the designation of the five directions, and a fundamental emphasis on the Cosmic Center.²³

People in the Han dynasty especially regarded the Lo Shu as a reservoir of magic power and a vehicle for wonder-working, and they used it as a base or board for several types of divination.²⁴ And yet, although both diagrams were mentioned by name as early as the Warring States period at the end of the Chou,²⁵ and even though the numbering on the Lo Shu was actually described in detail by a writer in the Han,²⁶ neither of these appears to have been publicly depicted until after the fall of the T'ang, at the beginning of the tenth century. Even after both were openly published in the Sung dynasty, the numerals on each were represented by equivalent numbers of dots or beads on short strings—white ones for the yang and black for the yin—obscuring the fact that they were basically mathematical diagrams.²⁷ However, the similar ways of representing them did serve to demonstrate that they

²² That the Lo Shu was simply a magic square well known in the West seems to have been first recognized by Fr. Antoine Gaubil, S.J., in 1732. See A. Gaubil, "Sur le Lou Chou," app. 8 in his *Histoire abrégée de l'astronomie*, contained in *Observations mathématiques, astronomiques, etc. . . . tirées des anciens livres chinois ou faites nouvellement aux Indes, à la Chine, et ailleurs, par les pères de la Compagnie de Jesus* (Paris, 1732), vol. 2.

²³ The ways in which the Lo Shu expressed centrality, yin-yang concepts, etc., are discussed in Cammann, "Magic Square of Three," pp. 46–60.

²⁴ Some divination practices that employed the Lo Shu are briefly discussed in Cammann, "Magic Square of Three," pp. 70–76.

²⁵ The Lo Shu, e.g., is mentioned in the *Chuang Tzu*. See H. A. Giles, *Chuang Tzu* (London: Quaritch, 1926), p. 174. Needham, *Science*, 3:57, cites some other early references.

²⁶ See the *Ta Tai li-chi*, ch. 66 (in the *Ts'ung-shu chi-ch'eng ch'u pien* ed., 1028, ch. 8: 143).

²⁷ The familiar late renderings of the two diagrams, with numbers indicated by black or white beads on strings, are illustrated in Needham, *Science*, 3:57; Saso, pp. 401, 403 (the latter upside down).

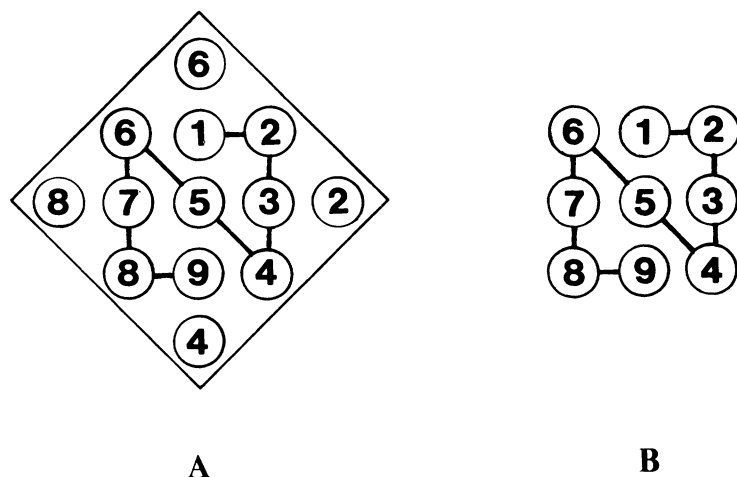


FIG. 2.—*A*, The thirteen-digit Diamond Plan. *B*, Its square core

were interrelated, in spite of the considerable difference in their late, fully developed forms.

It has been suggested that both diagrams have been derived from a larger cosmic diagram of thirteen digits, which was probably known to the people of the Shang dynasty (ca. 1500–1027 B.C.), as shown in figure 2*A*.²⁸

The heart or core of this diamond-shaped plan was the foundation for the whole diagram. Whoever first devised it merely took the sequence of numbers from 1 to 9, and set them out in a reversed S pattern, seeking to create a balanced opposition of the numbers above 5 with those below it, on either side of the 5 at the center.²⁹ Note that this numbering proceeds downward clockwise on the right side, then passes diagonally up through the center, and continues downward counterclockwise on the left.

It seems probable that the numbers at the corners of this basic square were repeated to form the ends of the adjacent crossbars—which would have represented the four cardinal directions of space—so that each arm of the central cross would consist of an odd number and an

²⁸ Bart Jordan, who suggested this, is a scholarly musician. He has spent many years studying systems of musical notation and number symbolism in various cultures. See also n. 42 below.

²⁹ For the significance of this numbering, see n. 16 above.

even one. These contrasting pairs would then have symbolically conveyed the idea that two principal forces—probably considered as male and female, et cetera, like the later yang and yin, with all the extended complementary connotations—were working together throughout the universe.

Another result of that repetition of the corner numbers from the square was that the numbers in the central column of the cross and those on its center row each totaled 25; while all the numbers in the X upon the basic cross, formed by the two main diagonals, also added up to 25. This repeated appearance of the significant 5×5 would have held a special importance for people who were accustomed to calculating on base 5.³⁰ Also, the sum of every pair of numbers in the diagram equidistant from the central 5—on a line through that 5—would halve to 5. Thus, the echoes of the number 5, which occupied the center, provided an underlying unity for the whole plan.

The seemingly magical repetition of the significant 5 would have been almost enough in itself for the people of early historical China to consider this diagram as important, perhaps even sacred; but it also had a practical use that would have greatly enhanced its value for them. We shall see that the whole plan was essentially a diagram by means of which they could express their concepts of space and time.

We have already noted that the four points on the Diamond Plan probably indicated the four cardinal directions, and, by extension, they doubtless also referred to the four seasons, as they did in later Chinese space-time diagrams.³¹ Moreover, the Chinese not only stressed the importance of Center as the fifth direction; like other Asian peoples, they also conceived of an invisible column or pole as the axis pillar of the universe, piercing through the center of the earth, to connect the underworld with heaven beyond the sky. So the focal point on the diagram which contained the esteemed 5 must have been especially revered.

Furthermore, the thirteen numbers in the diagram could have recalled the Shang year of thirteen months—the usual twelve, with an intercalary one. Then, if we set aside for a moment the very significant 5, all the other numbers added together would produce the sum of 60—the number of days in the sexagesimal cycle of two lunations that formed the basis for Shang calendar reckoning, as attested by the

³⁰ Ibid.

³¹ Many of the patterns on the (far later) bronze mirrors were also space-time diagrams. See S. Cammann, "Significant Patterns on Chinese Bronze Mirrors," in *Archives of the Chinese Art Society of America* 9 (1955): 43–58, and "The 'TLV' Pattern on Cosmic Mirrors of the Han Dynasty," *Journal of the American Oriental Society* 68 (1948): 159–67.

inscriptions on the oracle bones.³² Multiplying this 60 by the 6 at the top of the diagram gives 360—an approximation of the days in a solar year, and a familiar early calculation for the year cycle. As people became more sophisticated and made stricter observations, they could have added to this the omitted 5, to mark a full year count of 365 days.

Coming down into the center block, $2 \times 5 \times 6$ again gives us the valued calendrical number 60; $7 + 5 + 3$ (or simply 5×3) could recall a fifteen-day period called *ch'i*, twenty-four of which made up an annual cycle already recognized in the Shang;³³ and either $2 + 4 + 4$ (the numbers along the lower right edge of the diagram)—or, more simply, 2×5 —gives 10, the number of days in one Shang week, traces of which still survived in the ten-day market cycles of central and southwest China as late as the 1930s.³⁴ Meanwhile, 6×2 would give 12, the number of double-hours in a Chinese day.

Then $7 \times 5 \times 8$ gives 280, the 280 days or “nine months” of the birth cycle (or cycle of human gestation); while $4 \times 5 + 8$ gives 28—the number of days in a lunar month, or the women’s menstrual cycle. These latter calculations were primary considerations in human time-reckoning as far back as the Stone Age, and the Shang realm was at least partially a matriarchal state.³⁵

Lastly, all the numbers in the diagram add to 65, and multiplying this total by the 9 at the bottom produces 585, the approximate number of days in the synodic or phase period of Venus, which—as the third brightest object in the sky—early attracted the attention of mankind.

Even these possible calculations may not have exhausted all the possibilities for noting celestial phenomena or the time spans between significant rituals.

Although the Diamond Plan was not in itself a real calendar, it could have served as a reminder of the significant numbers in the calendrical calculations of the Old Chinese, which were largely based on astronomy. Since astronomy was the secret science of the ancient priest-kings of China, and the making of the calendar was their special

³² This was a system of dating by means of the “ten stems” and “twelve branches,” combined in the sixty possible pairs. Later these were also used to indicate year cycles. See Needham, *Science*, 3:396–98.

³³ Tung Tso-Pin believes that the Shang people already had “something of the fortnightly system.” See his work on the calendar of the Yin (Shang) period, *Yin-li p'u* (Lichuang: Academia Sinica, 1945), pt. 2, ch. 3, pp. 27a ff.; ch. 5, pp. 14a ff.

³⁴ I had much experience with—and some frustrations from—this widely spaced market cycle during extensive travels in south and southwest China in 1935–38.

³⁵ Carl Schuster, Bart Jordan, and others interested in studying the relics from Paleolithic man have remarked about the frequency with which these have been found to have twenty-eight man-made lines or nicks and have interpreted them as notations of the menstrual cycle. For matriarchal survivals in the Shang, see n. 63 below.

duty and privilege, a diagram like this would have been regarded as a highly secret thing. Perhaps it was never publicly displayed, lest some unauthorized person might try to misuse it to usurp kingly powers; but it could have been inscribed on cloth or leather, or carved on jade, as part of the royal regalia to be passed down from one king to the next.³⁶ They would not have been likely to place an example in a tomb where robbers could find it; but even if they did, the Shang royal tombs at Anyang have been looted, so it is not likely that archaeologists will ever recover one.³⁷

Yet if there had been such a very significant diagram as a valued possession of the king, one might expect to find some kind of allusion to it among the royal appurtenances, even if only a symbol for it. Perhaps there was such a symbol. On some of the finest late Shang bronzes and some from the earliest Chou, a small, but prominently emphasized, diamond motif is situated between the two opposed profile heads that combined to form the T'ao-t'ieh mask, or else on the brow of a single monster-head.³⁸ A solitary diamond or rhombus motif is rare in Ancient Chinese art. The only time one finds it with any frequency is on these bronzes. Could this be an abbreviated symbol for the thirteen-digit Diamond Plan?

Sometimes this diamond that appears to be guarded by the monster (or monsters) is composite: one diamond stands within another.³⁹ What happens if we set out the thirteen numbers in a concentric frame? (see fig. 3). We find here the odd ("male") numbers set off within a frame of even ("female") numbers, as though this were another example of dualist symbolism—like the double monster or the pair of single ones. Sometimes a third, inner diamond suggests that the 5, too, might have been deliberately set apart. This also could be expected, not only because of the general importance of 5, but also because this number, being composed of 3 plus 2, was considered as being androgynous, sharing both genders.

³⁶ Regarding China's ancient priest-kings, see Richard Wilhelm, *Short History of Chinese Civilization*, trans. Joan Joshua (New York: Viking Press, 1929), p. 16; but for "North Pole" read "the North Star (Polaris)." For the idea that the diamond pattern may have been inscribed on a precious object, see Saso (n. 21 above), pp. 405–9.

³⁷ Robert L. Thorp, "Burial Practices of Bronze Age China," in Fong (n. 5 above), p. 54, states that tomb looting may have taken place in Anyang (the area of the last Shang capital) as early as pre-Han times and that all of the tombs were so thoroughly ransacked before Chinese archaeologists got to them that almost anything that could be used to attribute these burials to the Shang kings had already been removed.

³⁸ See Fong (n. 5 above), frontispiece, no. 14, shown on pp. 138–39 (note the accented vertical line); fig. 48, pp. 180–81; no. 42, p. 216; no. 55, p. 229.

³⁹ Ibid., no. 21 in fig. 6, p. 32, and in fig. 39, p. 127 and on p. 150; no. 20 (a concentric triple diamond), shown on fig. 38, p. 121 and on pp. 148–49. See also Cheng Te-k'un, *Archaeology in China*, vol. 2, *Shang China* (Cambridge: Heffer, 1960), pls. 11c, 13a, 25a, 55c. Plate 16d shows the diamond prominently displayed on a jade turtle.

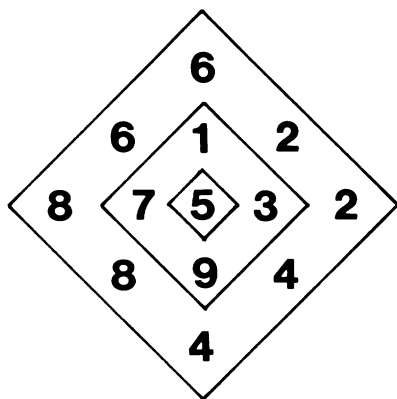


FIG. 3.—The thirteen-number diagram with concentric diamonds

Since we do not have any surviving copies of the original thirteen-digit diagram, we cannot say exactly how its numbers may have been isolated within the single or double diamond frame. Later Chinese magic squares never had their individual numbers contained within square cells (in a square plan subdivided into smaller squares) like those in India, the Middle East, and Europe; instead, each number was enclosed in a small circle.⁴⁰ The thirteen numbers were probably not set down loosely within the frame. Very likely they were placed in small circles, or lesser diamonds, or even little hexagons such as the later Chinese tradition used to indicate the scales on the backs of turtles (described as *kuei wen*). This last suggestion seems quite possible, because it is likely that the Diamond Plan once formed the inner portion of a larger diagram which would have been appropriately called the "Turtle Chart."

In a culture as dependent upon agriculture as was that of the Shang, special attention would have been given to the twenty-four fortnightly divisions of the year (called *ch'i*), some of which marked or determined the times for sowing the crops and the times for gathering them in.⁴¹ Therefore it has been suggested that the thirteen-digit diamond may have been surrounded by a frame consisting of twenty-four units or cells, each marked with the two-character name for one of these

⁴⁰ For magic squares from other lands, see S. Cammann, "Magic Squares," *Encyclopaedia Britannica* (1969–73, eds.). In this, and in other articles for Western readers, I have generally followed occidental custom, illustrating even the Chinese ones by numbers in cells: the Chinese did not do this.

⁴¹ Needham, *Science*, 3:405, has a table showing the twenty-four *ch'i*.

twenty-four *ch'i*. If so, this larger diagram amply deserved to be regarded as a "Turtle Chart," because of its correspondence with the arrangement of the scales or individual plates on the upper shell or carapace of an actual turtle or tortoise. The latter normally consists of thirteen relatively large plates at the center—five vertebrals, flanked by two sets of four costals—surrounded by an outer border of twenty-four smaller scales called marginals.⁴²

Turtles and tortoises were highly regarded in Ancient China because their protective shell—being curved above and flat below—provided an obvious analogy to the traditional Asian concept of the cosmos as consisting of a flat earth covered by the overarching sky. Therefore it could be expected that people would have attributed magical significance to the natural patterning on the upper shell; while the lower shell, or plastron, played a prominent part in later Shang divination. The Shang diviners probably used the latter because it symbolized Earth, and they were seeking prophesies for earthly events; also, being lighter in color, it more clearly showed the cracks made by the diviner's hot metal rod and, being flat, it could be easily stored. The Shang diviners had first used shoulder bones (scapulae) from sheep for their oracle bones,⁴³ then they shifted to tortoise shells,⁴⁴ possibly because of new beliefs regarding the sacredness of turtles. Could these new concepts have been inspired by the invention of the "Turtle Chart" with its associations of supposed magical powers?

The names assigned to the twenty-four *ch'i*, which may have formed a frame around the central diamond to make the "Turtle Chart," refer to aspects of weather; and as late as the 1930s, when I was living in Hunan, the country people of central and southern China associated turtles with the weather and believed that they could foresee weather changes. However, by that time turtles had long been considered as

⁴² A reconstruction of the thirteen-digit Diamond Plan that Jordan believes was known in Shang China, in a frame composed of the twenty-four *ch'i*, appears in a pamphlet outlining a lecture of his, *Man, Music, and the Calendar* (Durham, N.H., 1971). In this pamphlet he also called attention to the correspondence between that total diagram and a turtle's shell. He claims to have discovered that the thirteen-digit plan was the third in a series of cosmic diagrams used in ancient Mesopotamia. Li Chi (*Beginnings of Chinese Civilization* [Seattle: University of Washington Press, 1957], pp. 26–29) cites several examples of Shang traits to show evidence of contact with Mesopotamia. See also Needham, *Science*, 2:352–54.

⁴³ Divination by sheep's scapulae persisted in remote parts of China into the twentieth century. In 1948 I personally saw it being done by Nashi (or Nakhi) tribesmen, in the Likiang region of Yunnan province.

⁴⁴ For further details on oracle bone divination, see Needham, *Science*, 2:347; Shaughnessy (n. 15 above), pp. 59–72. In 1977 a cache of some seventeen thousand pieces of turtle-shell oracle bones was unearthed from the Chou ancestral palace at Ch'i-shan in southwest Shensi, some examples dating from before the conquest. See Shaughnessy, pp. 28–29, 59, with nn. 27–32 on p. 294.

inauspicious or even obscene. Therefore a Chinese would become highly upset when a foreigner spontaneously asked our familiar question, "Do you think it will rain today?" If he gave an answer, that would imply that he was a turtle; but if he failed to reply, he would be considered rude. That placed him in an awkward bind.⁴⁵

Referring back to the central square on the diamond that would have constituted the center of a "Turtle Chart," we may recall that its nine digits were set down in a sequence that resembles a reversed S. This shape immediately suggests a snake. Perhaps this might account for the conventional pairing of a snake with the tortoise in Old Chinese symbolism, following a tradition that must have begun very early. The usual explanation—"all turtles are female, so they have to be fertilized by a snake"—sounds like a far-fetched late rationalization for an ancient relationship no longer understood.

Is there anything else to suggest that this hypothetical "Turtle Chart," or its inner diagram, ever existed? If one can open-mindedly accept the possibility that there may actually have been such things, a number of later developments—especially concerning the Lo Shu and the Ho T'u—suddenly become clear. Not only could the earlier diagram help to explain the evolution of these two later ones, but also the symbolism connected with these latter diagrams seems to reflect an incomplete memory of a system of thought that must once have been far more comprehensive.

Although reliance on this thirteen-digit Diamond Plan may have continued for a very long time, we find evidence to show that it must have suddenly lost favor. In fact, it was very literally overthrown, being inverted in such a way as to upset the traditional symbolism by changing the numbers that referred to specific directions and seasons. Such a drastic change is not likely to have been made until after the fall of the Shang dynasty. This fell when another group of people from the western borderlands—possibly alien, and certainly less sophisticated, in spite of having formerly been vassals of the Shang—overthrew the last Shang king and founded the Chou dynasty.

It seems possible that these usurpers, not recognizing the significance of the old symbolic diagram but finding that it was revered as a magical device, might have deliberately overturned it, partly to "kill" their opponent's magic and partly to signalize the fact that the new regime was initiating a totally new tradition.

This was apparently the motive of the Chou conquerors when they proceeded to discredit the symbolic value of the owl, which seems to

⁴⁵ Personal observations while living in Changsha, Hunan province, in 1935–37.

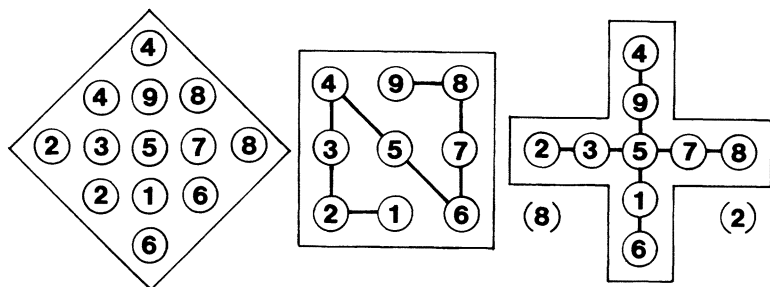


FIG. 4.—The inverted diamond and the two new forms derived from it

have served as a badge or totem for the Shang royal clan.⁴⁶ In fact their efforts were so successful that this impressive bird, so significant in other cultures, was henceforth considered in China as a creature of ill omen. It never appeared again in Chinese art or symbolism and was reviled in subsequent literature. This might also explain the sudden reversal of the earliest arrangement of trigrams (discussed in Sec. III), as well as one of the several suspected scramblings of the hexagrams and their respective omens.

After the thirteen-digit diagram had been inverted, apparently it lost so much of its original *mana*, prestige, or sanctity that people felt no qualms about taking it apart. At any rate, we find that the inverted diagram was divided to make two new ones: the first a square formed by taking its rectangular core, the second a cross formed by taking its central vertical line and the main horizontal one.

Actually, the cross contained exactly the same numbers as the square (see fig. 4). In fact, a person who did not know about the ancient diamond-shaped prototype might get the false impression that the cross had been made by straightening out the bent arms of the swastika-like pattern in the square. Initially, then, the only real difference between the two new diagrams was in their actual shape.

The first of the new diagrams was simply called the Lo Shu, or “Lo (River) Writing,” with the tradition that a turtle in the Lo River had revealed it to Yü the Great after he had tamed the Great Flood;⁴⁷ while

⁴⁶ For a Shang bronze design containing an owl (with a concentric diamond over-head), see Fong (n. 5 above), fig. 4, p. 131. Other owl motifs are shown in Cheng Te-k'un (n. 39 above), pls. 50b, 51c, 53.

⁴⁷ On Tibetan horoscope charts, charm papers, and on circular amulets (often the concave side of small bronze mirrors), the Lo Shu magic square with Tibetan numerals (called *me-wa*), surrounded by eight trigrams, was depicted on the bottom shell of a giant tortoise. Probably this reflects an ancient Chinese tradition—faithfully preserved

the second diagram was named Ho T'u, or "River Chart," and another legend with somewhat similar details was devised to account for the latter. This said that a dragon-horse (*lung-ma*) had emerged from another river, the Huang Ho, to reveal that diagram to another traditional ruler from China's mythical prehistory—the sage Fu Hsi, who is credited with inventing the first set of trigrams.

These elaborate rationalizations inevitably give the impression that two separate schools, or groups of rival scholars, had taken the square and the cross, respectively, as diagrams upon which to organize their own philosophic ideas regarding the universe and time, so that each served as the core of a cult with somewhat different rites and symbols. We shall find further evidence for this in Section III.

Both of these diagrams had to undergo changes before they achieved their final forms—which are the only ones that have been known to scholars (Chinese or foreign) since Han times. The first alteration seems to have been made on the cross form. After this had been detached from the inverted diamond, it must have looked very unbalanced—too heavy on the right—so someone exchanged the 2 with the 8 at opposite ends of the crossbar.

This minor operation not only adjusted the balance, it also served to strengthen the influence of the 5. This number had always dominated all three diagrams from its position at the vital center, and, in addition to this, the upper arm of the detached cross contained 4 and 9 (9 being $5 + 4$), while the lower arm contained 1 and 6 (6 being $5 + 1$). Now, after exchanging 2 with 8, the left arm had 3 and 8 (8 being $5 + 3$), and the right arm had 2 and 7 (7 being $5 + 2$). In short, the influence of the 5 now pervaded the entire diagram. In fact, this number continued to be important in Chinese thought for many centuries. It was stressed by being used for numerous later groups of five things, most of which constantly reappear in Chinese literature and folklore.⁴⁸

Sometime after the exchange of the 2 with the 8 on the outer arms of the cross—perhaps a long time later—it occurred to someone to exchange the 2 with the 8 on the opposite corners of the square diagram, so that its S-shaped sequence now ran 1, 8, 3, 4, 5, 6, 7, 2, 9

by the ultraconservative Tibetans—associating trigrams, too, with the ancient "Turtle Chart." Instead of being composed of bars, the Tibetan trigrams are often made by elongated ovals, and they are apt to be in irregular order around the circle. See Cammann, "Magic Square of Three," p. 75.

⁴⁸ Among the later Chinese groups of five were: the five sovereigns, five canons, five classics, five elements (or "phases"), five planets, five directions, five sacred mountains, also the five colors, five tastes, five virtues, five musical notes, five viscera, etc. As we have seen, this emphasis on the number 5 went back to remote antiquity in the quinary system of numeration, so influential in the Shang.

4	9	2
3	5	7
8	1	6

FIG. 5.—The final form of the Lo Shu

(see fig. 5). This exchange created a neater balance because it caused the numbers on each side of the square to give the same total. In fact, now all its vertical columns, all its horizontal rows, and its two main diagonals each gave a total of 15 (3×5). In short, this small exchange of numbers had transformed the little diagram into a fully effective magic square of 3.⁴⁹

Later, the Chinese became so fascinated by the possibilities of the Lo Shu as a magic square that they experimented with its form until they had found some ingenious magic squares for 5, 6, 7, and 9. Ultimately, however, this influence of the Lo Shu was a liability for them, because they became so satisfied with what they could accomplish with variations on its pattern that they never succeeded in achieving effective methods for making magic squares for other even numbers (they had to borrow some from the Hindus and the Persians) or those for higher odd numbers.⁵⁰

⁴⁹ Evidence from another quarter (the evolution of the trigrams, described in Sec. III) would suggest that a considerable amount of time must have elapsed between the separation of the square pattern from its parent (the thirteen-digit Diamond Plan) and the discovery that exchanging two numbers in it could produce a magic square: the fully developed Lo Shu. If that is true, and if the division of the parent diagram did not occur until after the fall of the Shang—as its inversion implies—the Lo Shu in its complete form could not have been invented until at least the middle of the Chou dynasty. Therefore, recent suggestions that the Lo Shu might be dated back to the Shang would seem totally untenable.

⁵⁰ See S. Cammann, "The Evolution of Magic Squares in China," *Sinologica* 7 (1962): 12–51, esp. 17–38. There I tried to show the great extent to which the later Chinese scholars relied on the Lo Shu pattern as a model for their magic squares. Since writing that, I have found that this dependence was even stronger than I had suggested. The Sung scholar Yang Hui, in his "first set of Chinese magic squares," gave two squares for 4 and one for 8 made by Persian methods, while his principal magic square for 8 and the

The ultimate form of the Ho T'u, by contrast, was only achieved after a number of further changes, which greatly altered its appearance. First, they added to its center a 10, to stand with the original 5. Perhaps they did this because of the new interest in the denary system (base 10).⁵¹ Although it would be hopeless to try to combine a 5 with a 10 using Arabic numerals, that could easily have been accomplished in the Late Chou, Ch'in, and Han, by combining the X-shaped 5 with a cross-shaped 10 to form an eight-pointed star.⁵²

A similar device, with that same intended meaning, appears at the center of the pattern on some of the cosmic mirrors from the Later Han dynasty. Whether or not these patterns also reflected the Lo Shu and/or the Ho T'u, as some have claimed, the makers of these Han mirrors often provided a decorative X form jutting out from under the central mirror boss to represent a symbolic 5 at the axial center of the universe, and some also combined this with a smaller cross to indicate an added 10.⁵³ In terms of Han beliefs, the resulting quatrefoil—like the X at the center of the Lo Shu—or an octofoil—like that at the center of the Ho T'u—would also have symbolized “good influences” or spiritual power emanating from the Cosmic Center.⁵⁴

In making the second alteration on the Ho T'u, the old sages exchanged the upper arm of the vertical bar (9 and 4) with the right-hand arm of the horizontal bar (7 and 2). Then, finally, they also inverted each pair of numbers in the newly transposed arms. This created another form of balance, by putting all the smaller numbers in the inside of the pattern and all the larger ones on the outside. More significantly, these changes enhanced the idea of the reciprocal interaction of the male and female forces, because the male numbers begin near the center with the 1 and 3 and then curve up to take in the 7 and 9

one for 10 were both constructed by Hindu techniques. In fact, Yang did not fully understand how the Indians made the latter; he failed to make a necessary final adjustment and hence produced only a defective example.

⁵¹ A similar 10 could not have been added at the center of the Lo Shu when the latter was considered primarily as a magic square, because that would have destroyed its ability to produce equal sums throughout. But, when the Lo Shu was considered as a focus for meditation, rather than a magic square, it could be imagined to have a latent or hidden 10 at its center. See Cammann, “Magic Square of Three,” pp. 52, 66–67.

⁵² For many centuries, an eight-pointed star, or an eight-petaled flower, marked the center of cosmic diagrams in Asia, including Tibetan Buddhist mandalas and Persian carpets. Perhaps this was the original source for that type of motif.

⁵³ For an example of a stylized 5 on a mirror back, see Cammann, “Significant Patterns,” fig. 2, p. 59; for a smaller 10 combined with a highly stylized 5, see *ibid.*, fig. 3.

⁵⁴ This quatrefoil on mirrors was apparently a prototype for that distinctive symbol called the “cloud collar,” which eventually became an important symbolic motif in China, Mongolia, and Tibet, and on into the Middle East. See S. Cammann, “The Symbolism of the Cloud-Collar Motif,” *Art Bulletin* 33 (1951): 1–9.

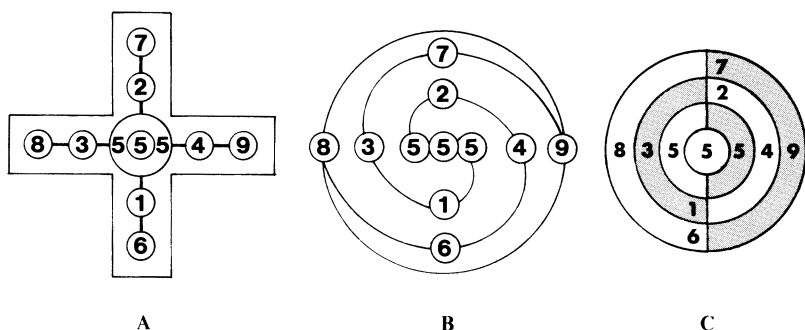


FIG. 6.—*A*, Final form of the Ho T'u. *B*, Same, showing the arcs of yang (odd) numbers and yin (even) numbers. *C*, A Sung dynasty diagram derived from this Ho T'u.

on the outer rim, while the female numbers begin near the center with 2 and 4 and then curve down to take in the 6 and 8 on the outer edges. If a curved line connecting all the yang numbers and another linking all the yin ones are extended to form a circle, together they will outline two interlocking spirals. This is the probable origin of the earliest yin-yang symbol or T'ai-chi T'u (see fig. 6*B*).

It seems beyond question that this final form of the Ho T'u, produced by that rather drastic process of transformation, provided the direct inspiration for a second, lesser-known form of T'ai-chi T'u that has been ascribed to Chou Tun-i, a Sung scholar of the eleventh century A.D. (see fig. 6*C*).⁵⁵ Again, we cannot be sure that it was not devised earlier, because so much esoteric lore was finally revealed at that time.

After all these changes, the arrangement of the numbers in the Ho T'u was so much altered that one could no longer easily see that this diagram had once presented essentially the same numbering as the Lo Shu; nor could one readily guess that both diagrams could have fitted together neatly in a larger plan.

The ignorance regarding the origins and early forms of these two diagrams was compounded when the Sung scholar Liu Mu interchanged their names in the eleventh century. Although Chu Hsi is said to have changed them back a century later, the damage was done.⁵⁶

⁵⁵ See Fung (n. 12 above), 2:439, second diagram from top. There, as on the plan in fig. 6*A* above, note the yin 5 and the yang 5, on either side of the central one. This resulted from the halving of the added 10. Usually 5, being an odd number, would be considered male or yang. However, 5—being a fusion of the principal male number (3) and the chief female number (2)—in symbolic terms could be considered as suitable on either side, yang or yin.

⁵⁶ Liu Mu (1023–63) was a Taoist adept, interested in esoteric lore. Chu Hsi (1130–1200) synthesized the results of his early training in Buddhism and Taoism with

Confusion of names provided further opportunity for pointless conjectures by later Chinese writers, as well as giving grief to Western sinologists, who cannot always be sure which diagram is being discussed.

It is now quite generally recognized that both the Lo Shu and the Ho T'u were known, in the form of individual diagrams with separate legends accounting for their supposed origins, as early as the Warring States period of the Late Chou, which ended in the third century B.C. Indeed, the fact that at that time they were separate, without any remaining tradition of a former unity, suggests that the original source must already have been centuries old by then, and that the combined form in the shape of a diamond probably actually did date back to the Shang period, when the T'ao-t'ieh masks represented two separate but equal forces, long before the terms "yin" and "yang" had been invented.

How can we tell that the Ho T'u had already attained its fully developed form by the Late Chou period? We have important evidence to show an early date for this, from an early Chinese calendar chart preserved in the Kuan-tzu.⁵⁷ Modern investigation has found that the Ho T'u, in its completed form, must have provided the ground plan for that calendar chart, and the latter is said to have been composed sometime during the latter part of the third century B.C.⁵⁸

In later centuries, the Lo Shu and the Ho T'u in their final forms were each burdened with cosmic symbolism and philosophic ideas. As these subsequent phases of their development have already been rather fully covered by Saso and myself, it does not seem necessary to review them here.

We have seen that the Ancient Chinese must have actually known and used the thirteen-digit Diamond Plan, because of the evidence provided by the evolution of the Lo Shu and the Ho T'u, which doubtless had a common source in that. However, in the course of their development, these last-mentioned diagrams also produced offshoots of their own: the two traditional sets of trigrams.

III. THE DEVELOPMENT OF THE TRIGRAMS

We have now acquired enough background to resume discussion of the two traditional sets of trigrams that were introduced in Section I and illustrated there in figure 1. As was previously suggested, the only way to account for the present form of these two sets is to assume that each

the ideas of his Neo-Confucian predecessors into a system of thought that endured until the present century. See Cammann, "Magic Square of Three," p. 59, n. 67.

⁵⁷ W. Allyn Rickett ("An Early Chinese Calendar Chart," *T'oung Pao*, ser. 2, 48 [1960]: 195-225) describes his own research and that of Kuo Mo-jo on this particular problem.

⁵⁸ *Ibid.*, p. 225, and W. Allyn Rickett, *Kuan-tzu* (Hong Kong: Hong Kong University Press, 1965), p. 197.

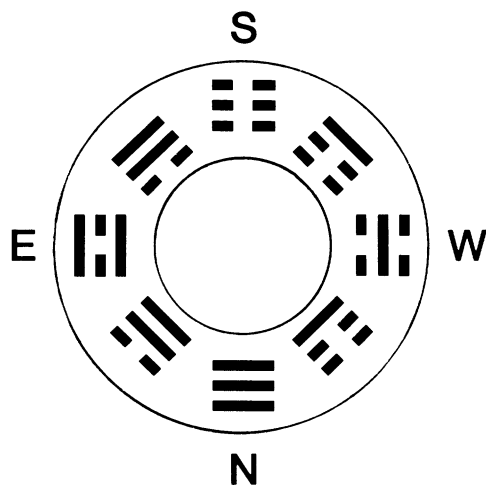


FIG. 7.—A possible Shang ordering of the eight trigrams

of them must have evolved from still earlier ones of somewhat different form.⁵⁹

Since the Chinese of the Shang dynasty used hexagrams at the end of the second millennium B.C., they must also have known the trigrams that undoubtedly preceded them.⁶⁰ The decoration on the ritual bronzes from that period shows that the people of Shang had a strong feeling for pattern and symmetry, so we might expect that their sages would have arranged the trigrams in a strictly symmetrical and meaningful order. A possible Shang arrangement might have looked like the one shown in figure 7.

Since the Chinese have always associated circular diagrams with the Sky (*T'ien*) in contrast to four-sided ones for Earth (*Ti*),⁶¹ it seems probable that such a circle might have been devised to complement or accompany the Diamond Plan. A circular device with an open center was an appropriate symbol for the sky in terms of Old Asian cosmology.

⁵⁹ It was Bart Jordan who first suggested to me that the two traditional sets of trigrams must be late developments, spurring me to undertake the investigations reported here in Sec. III. He himself believes that the Shang people used circles of trigrams to express planetary motions and to represent a music scale derived from western Asia. If they did, I think that must have been a separate, perhaps parallel development—not in the line of evolution that I am discussing here—so it need not concern us.









⁶⁰ Several of the oracle bones from the Late Shang and Early Chou periods, described in n. 44 above, were inscribed with sets of numbers from 1 to 8. Ch'ang Cheng-lan has explained these as "*pa-kua* numerical symbols," associating them with the trigrams. Further study has definitely shown that they occurred on Shang oracle bones. See Shaughnessy (n. 15 above), pp. 28–29, 59.

⁶¹ The Chinese word *T'ien* is ambiguous, referring either to the sky or heaven, and sometimes apparently to a deity or a personified Sky-god. In this context, the reference must be to the sky itself, with its aperture leading to heaven beyond it.

ogy, because the aperture would have represented the "Sky Door," the supposed entrance to heaven, beyond the sky.⁶² Furthermore, as Shang society still had surviving matriarchal elements,⁶³ and Chinese maps were generally inverted (in occidental terms), it would have been fitting to place the chief female trigram at the top, to represent south and summer—the season of growth and fruition—opposite the principal male one at the bottom, representing north and winter—when barren fields and frost-firm ground permitted chariot driving and warfare.

Later evidence (presented below) indicates that originally two or more split or broken lines must have made a female trigram, while two or more solid lines marked a male one. Following this convention, the trigrams on the south and west sides of the circle would have been female, while those on the north and east were male. Note that the first female trigram, at the northwest point of the circle in figure 7, has two split lines at the top; in the next female one, one of the split lines descends; in the third, both split lines come to the bottom, until in the fourth—the principal one—all the lines are split. As the entire circle is arranged in a complementary fashion, with the equivalent male and female trigrams facing each other across the center, we find the same kind of progression on the male side, beginning at the southeast point and continuing counterclockwise to the north.

It seems that these two similar progressions early suggested the concept of two groups within a family, the members of which were represented by trigrams. The first four stood for the youngest daughter, middle daughter, eldest daughter, and mother, while the second four symbolized youngest son, middle son, eldest son, and father, as follows:

			
Youngest daughter	Middle daughter	Eldest daughter	Mother
			
Youngest son	Middle son	Eldest son	Father

⁶² The rulers of the Shang and Chou dynasties are known to have symbolized *T'ien* in the form of a jade disk with a round hole through its center: the ritual *pi*. The first character for the Chinese name for the "Sky Door" (*Ch'ang-ho*) depicts two suns inside a gate as obvious symbols of the glory beyond it. For more about the concept of the "Sky Door" or "Sun Gate" in Asian cosmology, see A. K. Coomaraswamy, "Svayamātrṇā: Janua Coeli," reprinted in Roger Lipsey, *Coomaraswamy I: Selected Papers*, Bollingen Series 89 (Princeton, N.J.: Princeton University Press, 1977), pp. 465–520.

⁶³ As examples of matriarchal power surviving in Shang times, Cheng Te-k'un (n. 39 above), p. 202, says that three of the queens of King Wu-ting of that dynasty were appointed as feudal lords with titles, each governing a state of her own, and he also comments that Shang women had much influence in government and politics.

The idea that trigrams could indicate family relationships later emerges in an appendix to the *I Ching*, but there it was expressed in a somewhat different way, to conform with a later arrangement of the trigrams.⁶⁴

Furthermore, a counterclockwise circuit of this circular plan in figure 7 would have represented the cycle of the year. The waxing strength of the two principles, symbolized by the increasing seniority in each group, would illustrate the female principle advancing to fruition, followed by a similar development of the male principle, in the annual round from spring to summer and then from autumn to winter.

In addition to having the main female trigram as a symbol for south and summer, and the chief male one for north and winter, the secondary female—second daughter (*k'an*)—would have represented west, springtime, and the moon; while the secondary male one—second son (*li*)—would have stood for east, autumn, and the sun. Meanwhile, the four subordinate trigrams would have indicated the intermediate directions, with still other associations. In short, this simple circular diagram would have served as a kind of space-time mandala to symbolize the universe—similar in conception to the elaborate pictorial plans of the cosmos that, centuries later, were displayed on the backs of the Han dynasty's "TLV" mirrors.

If this proposed early circle of trigrams had indeed been closely connected with the Shang Diamond Plan, when the latter was reversed—by rotating it—the circle would have been rotated, too. This would have occurred at the time of the great change, when a new regime attempted to stamp out old modes of thinking to make way for new ideas, among which was a strong emphasis on male dominance.

Such a rotation of the hypothetical early circle would have brought to the top the chief male trigram—as though to emphasize the concept of masculine superiority. It would also have shifted the directional symbolism and altered the old seasonal cycle in terms of male and female trigrams, as shown in figure 8A. However, this second circle may not have remained in use for very long; probably it was soon changed into a third form, for which we fortunately have more solid evidence (see fig. 8B).

⁶⁴ See James Legge, *The Sacred Books of the East: Texts of Confucianism*, pt. 2, the *Yi King (I Ching)*, (New York: Charles Scribner's Sons, 1899), pp. 429–30, and pl. 3, top, for the later arrangement of the trigrams in terms of family relationships. The same can also be found in Legge's translation of the *I Ching*, ed. Raymond Van Over, a Mentor book (New York: New American Library, 1971), pp. 435–36 and pl. 3, p. 373. See also *ibid.*, pp. 364–65, for further comments by Legge regarding the concept of family relationships.

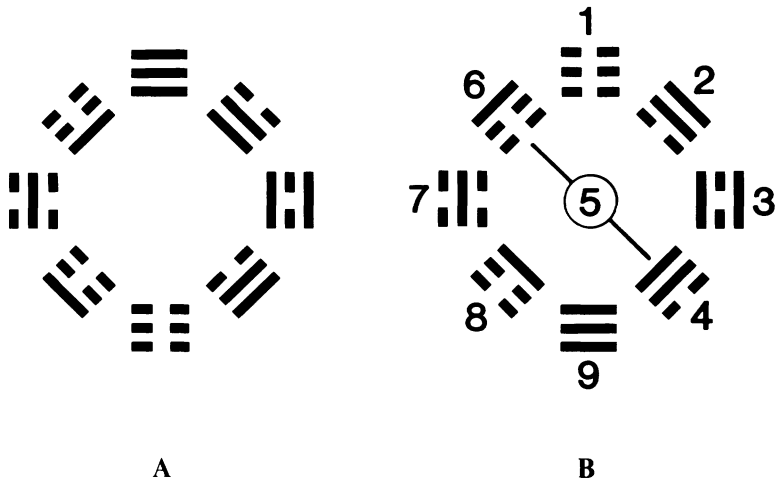


FIG. 8.—*A*, The second set of early trigrams: the first rotated. *B*, The third set: the second inverted and numbered to complement the early Lo Shu square.

In Section II, we saw that, after reversing the ancient Diamond Plan, the innovators seem to have split it into two parts—the square central core that ultimately developed into the Lo Shu magic square, and the cross-shaped one that eventually evolved into the final Ho T'u—and that each of these new symbolic diagrams seems to have been taken over by a separate group. It appears that the people who chose the square also took the second circle of trigrams, making some alterations which changed it into the highly symbolic third set.

Since the Chinese have traditionally associated four-sided things with the Earth, while relating circular ones to *T'ien*—here, probably meaning the Sky, which appears to meet the ground on a circular horizon—apparently the group that had taken the early square adopted this second circle of trigrams because they felt they needed a Celestial Plan (*T'ien T'u*) to complement their square one which symbolized the Earth. As Earth and Sky were considered opposites, this complement had to be precisely contrary. This could easily be achieved by taking the circle and flipping it over upon the square, then numbering it with a sequence which was the exact reverse of that on their primitive Lo Shu, beginning at the opposite end and running in the opposite direction (see fig. 8*B*).

As the people who had appropriated the second circle had only eight trigrams to match the nine numbers, in altering it they would probably have placed in the empty center the number 5—as a symbol for the

axial center above, to match the earthly one below—thus making the complementary action complete. Furthermore, in addition to the importance of 5 in the ancient quinary system, this number could symbolize male and female together, since it was made up of the male number 3 added to the female number 2; while the two triangles, joined at their tips, which formed the early Chinese numeral for 5 (五), made a natural symbol for the junction of the two great cosmic forces—as the later X form also did.

The full significance of the numbering on this third set becomes clear if one undertakes to add the number for each trigram (as well as the central 5) to the number in the equivalent position on the opposing square plan; in every case, the sum of the two numbers will equal 10. This not only demonstrates that the two diagrams were truly complementary, it also shows how the ancient Chinese conceived of a reciprocal action between Earth and Sky, as another expression of dual forces interworking to maintain a universal harmony. That symbolism was further emphasized by the fact that each of these pairs consisted of either two odd numbers or two even ones, and each pair was taken in a regular alteration in the cosmic journey on the S-shaped course, expressing yet another reciprocal activity between male and female forces.⁶⁵









The idea of a cosmic journey on an S-shaped celestial course, and the emphasis on centrality in these diagrams, also found expression in Chinese mythology. The fact that the sky at night appears to be revolving on an invisible pivot marked by the North Star (*Stella Polaris*) led the Early Chinese to think that that point must mark the center of the sky, the place of the “Sky Door” which led to the World Beyond the Sky; and sometime toward the end of the Chou they conceived the idea that the chief god—who in Ch’in and Han times, if not earlier, was called T’ai-yi, the “Supreme One”—lived at that place and traveled in the Nine Halls. (The term “Nine Halls” referred to the Lo Shu or its nine-part celestial equivalent, and here it must have meant the latter.) T’ai-yi’s travels were later explained by saying that he left his palace at the center to visit each of the first four directions in the sky, marked by individual trigrams; then he came home to rest at the center, before resuming his S-shaped tour; finally he visited the last four directions indicated by the remaining trigrams.⁶⁶

⁶⁵ For the idea of reciprocal interaction between the earth and the sky, symbolized by an interaction between the numbers on the Lo Shu and those on the associated Celestial Plan (*T’ien T’u*), considered as being overhead, see Cammann, “Magic Square of Three,” pp. 55–56. For some Chinese ideas regarding the number ten, see *ibid.*, p. 52.

⁶⁶ “The Travels of T’ai-yi” are referred to in the *I-wei ch’ien-tso-tu*, an earlier work edited with commentary by the Han scholar Cheng Hsüan (A.D. 127–200), republished in

Meanwhile, when the trigrams were numbered to make the third circle complementary with the square, they fell into two new groups, breaking up the old family relationships. The male and female family members were now forced to regroup, and they did so in the way that was later specified in the fifth appendix to the *I Ching*.⁶⁷

The earlier idea that every split or broken line constituted a single unit—just as a whole or solid line did—was rendered obsolete. From this time on, each broken line was treated as two separate entities, and a new way for representing “male” and “female” trigrams was conceived. In this new system even quantities of full or half lines (four or six of them) were considered female, while odd sets (of three or five) were called male. Thus, the new designations for family members looked like this:

			
Youngest son	Middle son	Eldest son	Father
			
Youngest daughter	Middle daughter	Eldest daughter	Mother

Note that here a single line for each gender—a solid one for males, a split one for females—descends from the top to the bottom in the first three trigrams of each group, while the fourth one, representing the parent, remains as before.

This second system for indicating family relationships among the trigrams is well attested; but how do we know that people actually used the earlier method described in connection with the first circle of trigrams? The fact that the latter was indeed known and used is easily deduced, because the same appendix to the *I Ching* also states that the trigram *li* (which has two solid lines) represents fire and the sun—both male or yang—though associating it with the middle daughter, hence considering it female; and that the trigram *k'an* (having two broken lines) represents water and the moon—both female or yin—while associating it with the middle son, hence considering it male.⁶⁸

These illogical contradictions can only be accounted for by assuming that the cosmological attributes for these two trigrams must have come

the *Ts'ung-shu chi-ch'eng ch'u-pien*, 688:30. False reasoning in Cheng's commentary about the relevant statement will be discussed in the text below. For the cult of T'ai-yi, see Cammann, "Magic Square of Three," pp. 60–67.

⁶⁷ See references in n. 64 above.

⁶⁸ See Legge, *Yi King*, pp. 431–32; Van Over, ed., *I Ching*, p. 437.

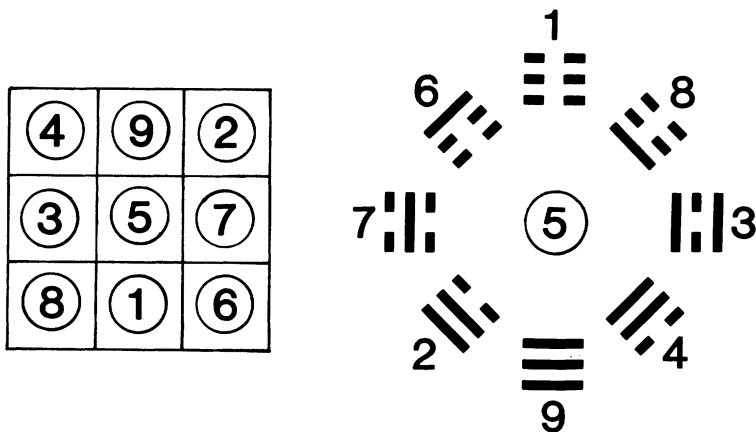


FIG. 9.—The fourth set of early trigrams, after exchanging the second trigram with the eighth to match the numbering in the final Lo Shu.

down from earlier times, before the male and female trigrams were reassigned—that is to say, as they were arranged in the first circle of trigrams—and hence held too much tradition to be altered; while the family relationships—being less sacrosanct—could safely be changed to conform with a new way of thinking.

As another result of this shift of male and female groupings, on this third set of trigrams—and on subsequent sets—the numbers associated with the male (yang) trigrams increased in value as these gained in seniority, while the numbers associated with female (yin) trigrams diminished as those gained in seniority, due to the S-shaped course of the numbering. This situation may have provided the source for a strange-sounding statement in the Early Han book about trigrams: “The Yang in operation advances, the Yin in operation withdraws.”⁶⁹

Both the second arrangement of families and the smooth, orderly journey of the god T'ai-yi were broken by the next—and last—development in the evolution of the first set of trigrams. When the group which used the square discovered that by exchanging its 2 with its 8 they had a magic square—the fully developed Lo Shu—they apparently exchanged the second trigram with the eighth in the circle, in order to keep their celestial diagram fully complementary with their terrestrial one (see fig. 9). We can be sure that this must have actually happened, because later Chinese tradition recalled that there had been a celestial Lo Shu to match the regular one, and because it would be difficult to find any other good reason for exchanging those particular

⁶⁹ *I-wei ch'ien-tso-t'u*, p. 29; Fung (n. 12 above), 2:98.

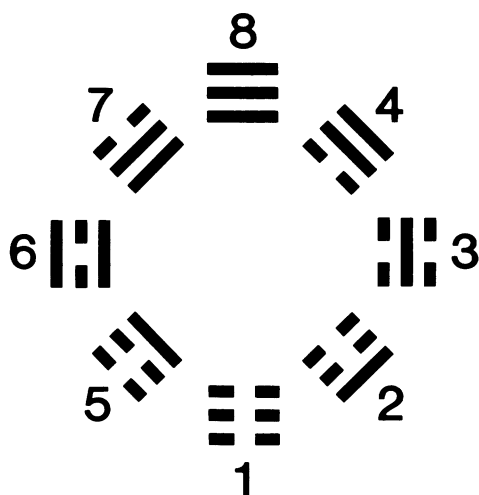


FIG. 10.—The final (independent) set of trigrams, the one ascribed to Fu Hsi: the fourth set rotated and renumbered.

trigrams. One result was a jerky, zigzag course for T'ai-yi's journey—which later provided a pattern for a Taoist's ritual dance.⁷⁰

At some later time—but before the appearance of the *I Ching*—this third set of trigrams was rotated once more, to make it applicable for earthly divination, probably so it could be used as a dial for an instrument called a *shih*, which was a prototype for the compass. This again put the full male trigram, indicating south, at the top. This last adjustment gave the Chinese the final form for the first circle of trigrams, the one that they ascribed to Fu Hsi (see fig. 10).

Another result of exchanging the second trigram with the eighth was that it brought a male one into the female group and a female into the male group. As this upset the second method for denoting specific relationships in the trigram family, another rationalization was needed to explain the classing together of four specific trigrams within each group. This was accomplished by establishing the convention that all trigrams with a solid bottom line belonged to the male group (later called yang), while those with a broken bottom line were female (later, yin). If numbers were still associated with it, they would appear as shown in figure 10.

⁷⁰ See Cammann, "Magic Square of Three," pp. 78–79. As mentioned there, the pattern for the ritual dance, and for the Taoist charms also based on T'ai-yi's mythical journey, differed slightly from the traditional route by starting at one end rather than at the center.

This convention must have been an entirely new one, as I cannot find any earlier example of it, and it does not seem to have been applied elsewhere, except on the Fu Hsi set of hexagrams. One would expect it there, since this hexagram circle was based on the final set of Fu Hsi trigrams and hence shares some of its special characteristics.

A late Chou date for the convention seems likely because a considerable time must have elapsed between the creation of the third and fourth circle of trigrams. The intervening period had to have been long enough to enable the second method for denoting family relationships to become well established, and also long enough after that for this concept to decline in importance until people could come to ignore it as a less essential feature and finally abandon it.

As was suggested above, the hexagram set ascribed to Fu Hsi is closely related to the final set of trigrams ascribed to him, because it was based on the latter's very distinctive construction. Whoever made it did the job in a very mechanical way that did not require any special knowledge of mathematics or any unusual theory.

He appears to have merely taken the last arrangement of trigrams in the Fu Hsi series—after the second had been exchanged with the eighth—as shown in figures 9 and 10.⁷¹ Then, beginning with the principal female trigram (*k'un*), he took the eight trigrams off their circle counterclockwise and, moving from right to left in the usual Old Chinese convention for horizontal writing, he wrote the complete set eight times in succession, to form the tops for the sixty-four hexagrams. Then, again moving right to left, he took the same set of trigrams but used each one individually eight times before going on to the next, to provide bottom halves for these hexagrams. Eventually, the whole long row was copied off in a circle, counterclockwise.⁷²

This relatively simple, mechanical operation also produced the neat effect of having each male hexagram face its female complement across the center of the circle. No special juggling was required to achieve this. It automatically resulted from the systematic deployment of a circuit of trigrams already arranged in this fashion.

Some Western scholars have claimed that this achievement of a well-ordered arrangement of hexagrams cannot be traced back before the philosopher Shao Yung in the eleventh century A.D.⁷³ But he was living at a time when much previously hidden metaphysical lore—

⁷¹ The associated numbers, using the set in fig. 9 above, would be 1, 6, 7, 2, 9, 4, 3, 8; or in the same rotated (fig. 10 above), 1, 2, 3, 4, 8, 7, 6, 5; but the designer of the hexagram circle did not need any numbers, and probably disregarded them.

⁷² The set of sixty-four hexagrams ascribed to Fu Hsi is given in Legge, *Yi King*, pl. 1; in Van Over, ed., *I Ching*, pl. 2, pp. 370–71; and in Fung (n. 12 above), 2:462–63.

⁷³ See Needham, *Science*, 2:341–42.

including the Lo Shu itself—was beginning to emerge into public view, and we now know that the Former Han dynasty had a somewhat similar set, made by a related system (to be described below), so Shao Yung may have merely revealed a far older creation. This Fu Hsi hexagram set could have been invented any time after the exchange of numbers on the Lo Shu and its associated Celestial Plan produced the fourth circle of trigrams.

That exchange of the second trigram with the eighth, in order to make the fourth set conform with the altered numbering of the Lo Shu, had another important sequel. Apparently without realizing it, whoever made that change managed to transform the old circular ordering of the trigrams into a binary cycle. For anyone who understands how this operates, these trigrams could now be read as representing the numbers from 0 to 7, while the related hexagram circle would produce from its similar pattern the numbers from 0 to 63.⁷⁴

However, in order to perceive the binary progression contained in these two sets, one must read the lines in each of the signs beginning at the outside of the circle—that is, from the top down—exactly opposite to the traditional method for reading them. Thus it is doubtful that any Chinese ever came upon it. Furthermore, the numbering from 0 to 7—or from 0 to 63—would have been meaningless. In order for the people of Old China to realize that the arrangers of the trigrams and hexagrams ascribed to Fu Hsi had actually achieved an alternative system of numeration, they would have had to have known, at least by Han times, the concepts of place value and the zero; but, although they had a sense of place value since very early times, they do not seem to have known about the zero until the eighth century A.D., hundreds of years after the invention of these particular trigram and hexagram sets.⁷⁵

⁷⁴ To read the trigrams as examples of binary notation, the value of 0 is given to any split line, 1 to a first solid line on the outside, 2 to a second (middle) solid line, and 4 to a third (inside) solid line, reading the trigrams from the outside in. Beginning with full yin at the bottom of the circle and passing up the right side, then dipping back to the bottom and passing up the left side to end at full yang, the result would be: 000, 001, 020 or 2, 021 or 3, 400 or 4, 401 or 5, 420 or 6, and 421 or 7. For reading the Fu Hsi hexagrams by the same method, a split line would again mean 0, and the solid lines—from outermost to innermost—would have the values of 1, 2, 4, 8, 16, and 32.

⁷⁵ Arthur Waley, in an initial burst of enthusiasm about this subject, wrote, "The invention of the diagrams [trigram and hexagram sets], which (even if we regard Fu Hsi as mythical) appears to have been made in the third millennium B.C., was a mathematical discovery of great importance. . . . This method of position was not used in Europe till the 16th century, when we learnt it from the Arabs, who in turn had taken it from the Hindus. . . . but it appears that the Chinese had mastered the theory of it 3000 years before Christ" (see Waley, "Leibniz and Fu-Hsi," *Bulletin of the London School of Oriental and African Studies* 2 [1921]: 166–67). Needham (*Science*, 3:15) showed that the Chinese had a sense of place value since the Shang; for their late knowledge of the zero, see *ibid.*, pp. 11–12.

In spite of these historical realities, the supposed phenomenon of the appearance of the binary system in the Far East, at a relatively early date, aroused keen interest among scholars in the Western world during the early years of the twentieth century.

Apparently it was first noticed by Fr. Joachim Bouvet, a French Jesuit, living in Peking at the beginning of the eighteenth century.⁷⁶ He had been corresponding with the renowned German scientist Baron von Leibniz regarding the binary system of notation, which Leibniz had happened upon in the course of his experiments. Although the discovery of its unexpected appearance in China has usually been attributed to Leibniz himself, the latter admitted in a letter which he wrote in 1716 that Bouvet deserved the full credit.⁷⁷

Now, it appears that that discovery was actually a liability, as it has led Western scholars off on a wrong track, causing them to waste much time and energy speculating about the mathematical competence of the ancient Chinese.⁷⁸ Some of them have gone so far as to say that the Chinese had discovered the binary system long ago but failed to exploit it, whereas modern scientists in the West have used it to bring about the Computer Revolution. It seems unfair to criticize the people of Old China for failing to appreciate and develop something that they were not even aware of having.

When we turn back to the clumsy-looking set of trigrams ascribed to King Wen and apply to this some of the information that was obtained while tracing the evolution of the first set, we find that this is not as disorganized as it first appears. For example, if we recall the second method for indicating the family relationships and then draw a line diagonally across the center of the plan, all the male trigrams stand above that line while the female ones lie below it—even though neither

⁷⁶ Fr. Bouvet was one of six "mathematiciens du Roi" sent by Louis XIV to the Chinese Court in Peking to demonstrate European science to the K'ang-hsi Emperor (see Waley, "Leibniz and Fu-Hsi," p. 165).

⁷⁷ For this letter, see Henry Rosemont, Jr., and Daniel Cook, *Discourse on the Natural Theology of the Chinese* (Honolulu: University Press of Hawaii, 1977), pp. 157–58, and introduction, p. 13.

⁷⁸ Arthur Waley, writing in 1921 ("Leibniz and Fu Hsi," p. 166), remarked: "It is curious that although this fact about the diagrams was known in the seventeenth century, no subsequent commentator, either Chinese or European, appears to have mentioned it." In addition to his error about the date, he was wrong in thinking that he was the first person since the time of Leibniz to be aware of this supposed phenomenon. Paul Carus, the German-American philosopher and inventor, spoke of the trigrams ascribed to Fu Hsi as corresponding to "Leibnitz's binary system" in 1905, as though it were then well known. Probably it had been well known in Germany and America, though not in England. See Paul Carus, "Chinese Occultism," *Monist* 5 (1905): 506. It was much discussed among Western scholars since the 1920s, and I recall considerable discussion about it among the foreign residents of Chengtu in the 1930s.

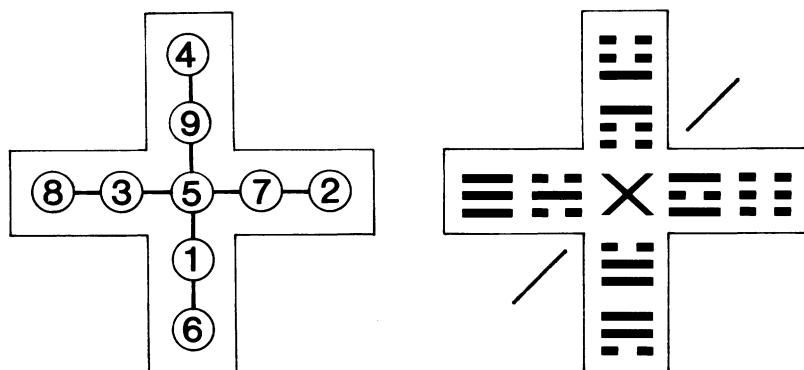


FIG. 11.—The primitive Ho T'u and the trigrams arranged to match it

group has any particular order.⁷⁹ However, in its earliest form, the arrangement of these trigrams seems to have been done in a very neat and satisfying way.

It would seem that after the division of the inverted Diamond Plan, the second school, or rival group, also wanted to use the trigrams for divination, et cetera, but they apparently chose to arrange them in their own distinctive way. They seem to have taken them in complementary pairs—each consisting of a male trigram and a female one, in the second system of family relationships—and placed them on the cross form that had resulted when the two portions of the inverted Diamond Plan were first separated and after the 2 was exchanged with the 8: the early Ho T'u diagram.⁸⁰

The designer must have put the principal male and principal female trigrams at the outer ends of the horizontal bar, with the two secondary ones between them, and then placed the two pairs of subordinate trigrams on the upright column. This segregated the trigrams according to their gender; so a line drawn diagonally across this new diagram from northeast to southwest left those from the male group at the upper left, while the female ones stood at lower right. As he had only eight trigrams to fill nine spaces, he may have left the symbol for 5 (☒ or ✕) standing in the center (see fig. 11).

⁷⁹ Remember that in the second "family system," trigrams with an odd number of lines or parts of lines (five or three) were male, while those with an even number (four or six) were female.

⁸⁰ Note that this disproves the false impression among sinologists that the Fu Hsi set of trigrams was most intimately related to the Ho T'u while King Wen's set was associated with the Lo Shu. Historically, exactly the reverse seems to have been true. This serious mistake is discussed more fully in the text below.

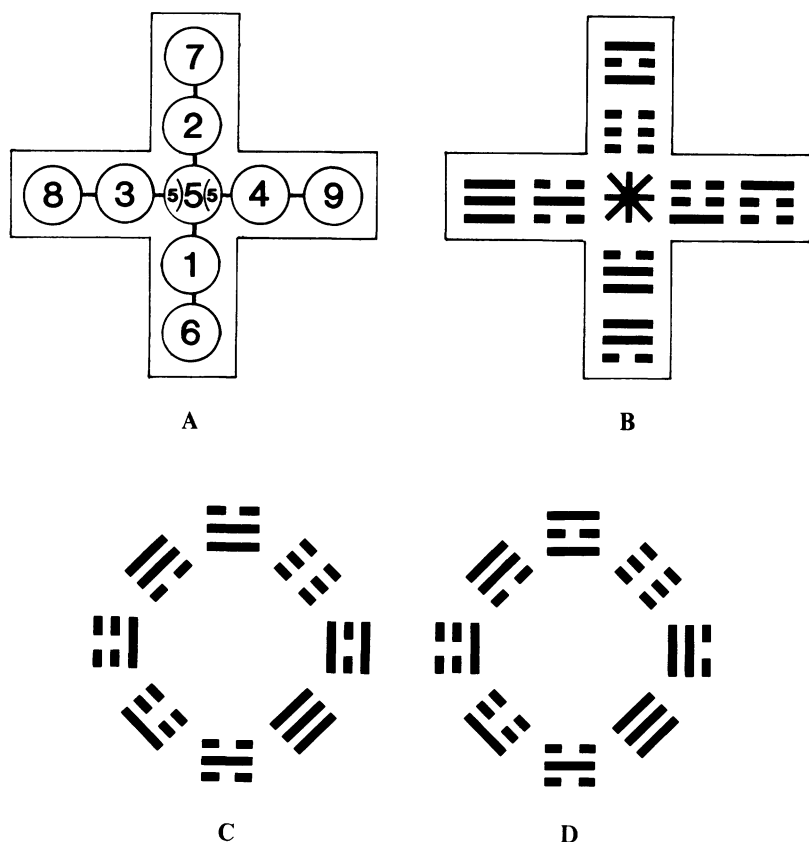


FIG. 12.—*A*, Final form of the Ho T'u. *B*, The trigrams rearranged to correspond. *C*, The preliminary Celestial Plan. *D*, The final King Wen circle.

While reviewing the development of the Ho T'u, we saw that, in creating its final form, the group altered it in several ways. First they added 10 to its central 5 (probably as a small cross upon the central X); then they interchanged the right-hand arm with the upper one; and finally they exchanged the two numbers on each displaced arm. Then they seem to have shifted the trigrams in the same way, to match it.⁸¹ First they interchanged the same two arms of the cross, after which they exchanged the two trigrams on each displaced arm. Again they may have filled the center with the central figure from the Ho T'u.

⁸¹ Apparently the trigrams were not directly associated with the numbers on the Ho T'u but had merely been placed independently of them upon the cross plan. However, when the numbers were shifted, the trigrams that occupied the same relative positions were shifted too. See n. 91 below.

The interchange of arms shifted the placement of the genders. Now all the female trigrams appeared on the upright column, while the male ones were displayed on the horizontal bar (see fig. 12*B*).

Later, the group that had the Ho T'u must have decided that they too needed a Celestial Plan (*T'ien T'u*) to complement it, so they removed the trigrams from the cross and arranged them in a circle. First they took the female ones off the upright column from top to bottom and set them down counterclockwise, beginning at the center of the right side. Then they took the male ones off the horizontal bar from right to left and continued around the circle with them in the same direction.⁸² Finally, because the *li* trigram, which symbolized the sun, had to be at the top of the circle, to maintain the sun versus moon (yang-yin) cosmic axis, they exchanged it with the *tui* trigram, that had come to the top in the transfer. This completed the "King Wen" circle.

The fact that the Ho T'u had undergone its last transformation before the circle ascribed to King Wen was finally completed would seem to indicate that the latter must have been relatively late. Probably it was not made before the Warring States period at the end of the Chou. The other trigram circle, ascribed to Fu Hsi, must be much earlier. Western sinologues have assigned it to the Han dynasty, but it could have been devised considerably earlier—as soon as the first group invented the fully developed Lo Shu and applied its altered numbering to this circle. The Chinese themselves acknowledged the latter's primacy when they called it the "Former Celestial Plan" (*Hsien T'ien T'u*) and spoke of King Wen's set as the "Later Celestial Plan" (*Hou T'ien T'u*).⁸³

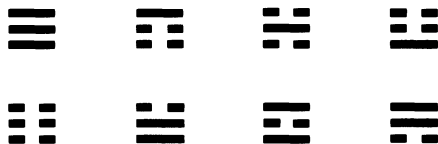
The second group, or school, which devised the King Wen circle of trigrams apparently also had a systematically arranged set of hexagrams, somewhat like the Fu Hsi set. Lost for many centuries, this recently came to light again in a silk manuscript of the *I Ching*, found in 1973 in the Third Tomb at Mawangdui in Changsha. This manuscript contains the oldest extant version of the text of that revered classic, which was one of the few ancient books to be spared in the Burning of the Books in 215 B.C.⁸⁴

⁸² In reading or writing, the people of Old China began at the top of a column and worked down or else moved horizontally from right to left, so it would have been natural to remove the trigrams in the two ways here described.

⁸³ The fact that the second group or school eventually followed the first in devising a Celestial Plan (*T'ien T'u*) to complement their Ho T'u diagram—which itself probably represented the Earth with its four directions—would explain why the Chinese used to call the King Wen circle of trigrams *Hou T'ien T'u*, meaning "Later Sky-Plan," while they referred to the Fu Hsi set as *Hsien T'ien T'u*, meaning "First (or Former) Sky-Plan." Note that, in this particular context, *hsien* and *hou* were simply adjectives modifying the compound noun *T'ien T'u*.

⁸⁴ See Shaughnessy (n. 15 above), pp. 11, 168–71; Kao Gu (1974), p. 39.

This newly recovered set of hexagrams was apparently formed by using two sequences of trigrams. Both of them were made up from those particular pairs that the second group of scholars had taken to arrange on the early Ho T'u cross (illustrated in fig. 11), as shown here:



The first sequence was made by taking the top line horizontally, beginning with the full male trigram; then the bottom line, similarly. The second sequence, by contrast, consisted of a line of opposing pairs, made by taking in turn each vertical pair from this same set. The sixty-four hexagrams were then composed in eight groups. The maker began each group by doubling a trigram from the first sequence, following the order of that sequence. Then he made the tops for the seven other hexagrams in each by using its same initial trigram seven times in succession. Finally, he made the lower halves for each group by using the rest of the trigrams from the second sequence, in their own distinctive order.⁸⁵

The fact that this second set of well-ordered hexagrams was made up from the pairs of trigrams used on the early form of the Ho T'u cross suggests that it might itself have been made quite early. Although the manuscript containing it was placed in the tomb in 168 B.C. and has been assumed to have been written only shortly before that, this set may already have been quite old by that time. If it was indeed pre-Han—as its construction would suggest—and if the very systematic Fu Hsi hexagrams were also much earlier than is generally supposed, perhaps the arrangement now ascribed to King Wen may have been the latest development. Certainly the ordering of this last set by complementary or contrasting pairs (without any other discernible order) would have conformed with the dualistic principles of the yin-yang philosophy, which began at the end of the Chou and flourished among the Confucian scholars in the Former Han,⁸⁶ when the *I Ching* is supposed to have been reedited by Confucianists.

⁸⁵ The full set of hexagrams is presented in Shaughnessy, pp. 169–70, and in Kao Heng, *Chou-i ta-chuan chin-chu* (Chinan, 1979), pp. 9–10. Note that this earliest manuscript of the *I Ching* did not take the final step of arranging its hexagrams in a circle. In fact, the other set—the Fu Hsi hexagrams—may have also existed for some time as a group of eight subsets before it was finally arranged in a circle.

⁸⁶ See Fung (n. 12 above), 1:159 ff., 2:9 (bottom) ff.

A primary reason the scholars of the Han and later dynasties seem to have preferred the hexagram set now ascribed to King Wen—at least for public use—may have been that the extremely arbitrary ordering of its pairs was so unsystematic that it would be difficult for people outside the exclusive circle of scholars to discern its pattern and learn to reconstruct it. Thus, those who maintained their power by manipulating the hexagrams for divination were able to guard their monopoly, and the set could not be easily reconstructed by unscrupulous outsiders who might try to use the hexagrams for malicious, magical purposes.

These same considerations probably also account for the almost exclusive use of King Wen's trigram set during the same period. Its ordering, too, was far from obvious. However, when the trigrams later were adopted to mark the compass dials used by geomancers and mariners, the Fu Hsi circle inevitably proved itself far more effective, precisely because it was so much more easily readable; and it was generally preferred for the Chinese compass rose.⁸⁷

We have seen that the Fu Hsi circle of trigrams must have reached its present state because a group of ancient Chinese scholars applied to its third primitive form the numbering of their early Lo Shu square and then later modified this to conform to the adjusted numbering on the fully developed Lo Shu; while the circle ascribed to King Wen must have attained its present appearance after a second group had previously deployed it on the cross-shaped frames of two successive forms of the Ho T'u. This completely reverses the usual statements made by historians of China's culture—whether Chinese or Western—who have maintained that the trigrams ascribed to Fu Hsi traditionally belonged with the Ho T'u, while those attributed to King Wen belonged with the Lo Shu.⁸⁸

This time we need not cast the blame for the persistent error on Liu Mu, who apparently caused such confusion by exchanging the names of the two diagrams that underlay the respective sets of trigrams. The mistake seems to have come about much earlier.

A significant Early Chinese (perhaps pre-Han) saying declared, "T'ai-yi gathers the numbers (for divination) by traveling the Nine Halls."⁸⁹ As we have seen, T'ai-yi—the object of a special cult—was a supreme god assumed to live at the North Star, at the center of the sky,

⁸⁷ Needham, *Science*, 4:297, says that, although the Chinese compass in its final form adopted the Fu Hsi trigrams for its depicted signs, it also retained the Wen Wang set embedded in its round of azimuthal points.

⁸⁸ For examples of assigning the wrong trigram sets to the two ancient diagrams traditionally associated with them, see Needham, *Science*, 4:296; Granet, *Pensée chinoise*, pp. 185–86; Wilhelm, trans., *I Ching*, p. 310; Saso (n. 21 above), p. 400, and fig. 3, p. 403. See also Legge's comment on Van Over, ed., *I Ching*, p. 336.

⁸⁹ *I-wei ch'ien tso-tu*, p. 30. See also n. 66 above and the related text.

and this remark seems to mean that he was believed to travel from there throughout his realm, in all eight directions, following the S-shaped path established by the Lo Shu's celestial counterpart.

Many years later, the Late Han commentator Cheng Hsüan tried to clarify that statement in a long note. He explained it by assigning a palace hall to each of the trigrams in King Wen's final set, so T'ai-yi could leave his central palace to visit four of them, then return home before setting out again to visit the other four—stopping alternately at yin and yang trigrams as he went. Tracing that route, we find that he would have been following the eccentric, zigzag course of the final Lo Shu pattern.⁹⁰ It would be more natural to assume that originally T'ai-yi was believed to make his journey through the sky on the pattern of the celestial circle of early (Fu Hsi) trigrams to which had been applied the reversed numbering of the early Lo Shu, before the exchange of the 2 with the 8; because if he had followed that, he would have traveled on a smooth reversed-S track, with no sudden zigzags. (In that case, too, he would have also visited male and female trigrams alternately.) Furthermore, the quotation spoke of T'ai-yi's search for numbers, and we have seen that numbers must have been assigned to the trigrams in the Fu Hsi series at an early stage in their evolution, while there is no evidence to show that the trigrams in the King Wen series were ever associated with numbers.⁹¹

In short, Cheng Hsüan's comment shows that by his time (second century A.D.) King Wen's set had definitely become another Celestial Plan, and that the successive steps in the evolution of the two sets must have been forgotten. Anyhow, his authoritative pronouncement about T'ai-yi's journey fixed the error permanently. So ever since people have coupled together the Lo Shu and King Wen's trigrams, leaving the Ho T'u to be grouped with Fu Hsi's.

Only one major Chinese symbol of Duality remains unaccounted for, and that is probably the most important of all, because it is internationally known; yet its origin is still unclear. This is the familiar T'ai-chi T'u, a circle bisected by a reversed-S line, which separates two interfitting comma shapes in contrasting colors.

When this is painted, the yang comma shape is red, while the yin one is black. When printed, the yang side is generally left white to indicate

⁹⁰ Ibid.

⁹¹ We have no evidence that the trigrams in the King Wen series were ever associated with numbers, and such an association would seem impossible. The second set of trigrams, which eventually formed the King Wen circle, when they first appeared in the early and later cross shapes definitely had no connection with the equivalent numbers on either the early Ho T'u or the fully developed one, because that would have involved associating some of the male trigrams with female numbers and vice versa—which would be symbolically unthinkable.

brightness as opposed to the yin's somber black.⁹² Usually the Chinese put a small circle of the yang color into the yin, and vice versa, explaining that only the sun is pure yang and the moon pure yin, while all other things—including living beings—have a mixture of the two, however slight.

Until the mid-twentieth century, Chinese people often placed this symbol in the open center of a circle of trigrams (either set), and this device was popular on folk charms and amulets in paper, metal, or wood. It was often painted on the underside of the ridgepole on the ceiling of the principal room in West China farmhouses, as though to mark the *axis mundi* in the microcosm of the home. Taoist priests wore it on their robes and vestments. The lead mule in Yünnan caravans had it on his bridle to ward off evil. In short, examples could be found everywhere.

This form of T'ai-chi T'u is claimed to have been an innovation of the Sung dynasty, when it was first publicly displayed. Once again, however, it seems probable that by that time it had already been familiar to esoteric groups for many centuries.⁹³

Having seen ancient examples of reversed-S sequences—at the core of the Diamond Plan, on the primitive square derived from that which became the Lo Shu, and on some early set of trigrams—Chinese sages at a relatively early date could have been inspired to draw a symbolic circle bisected by a reversed-S line to set off two equal interlocking shapes. The idea of using contrasting colors to represent opposing forces is obvious. Then, too, the last Fu Hsi set of trigrams—after the exchange of the second trigram with the eighth—could have provided the inspiration for putting a bit of yang in the yin, and vice versa. Just a circle divided by a reversed S, even without any contrasting colors for its two components, could have been an early abbreviated symbol for the circle of trigrams or for the underlying ideas which that contained. It seems inconceivable that the familiar T'ai-chi T'u was not known in China until the Sung period.

In spite of the fact that so many private teachings or "hidden doctrines" actually did emerge into view during the Sung, we have seen that some highly significant relics of ancient lore did not survive until that time. Also, there must have been a great many other expressions of Ancient Chinese thought that were superseded or lost in olden

⁹² With the breakdown of Old Chinese cultural traditions in the early twentieth century, the yang portion was sometimes the one shown in black, with the idea that the presence of "color" was positive and its absence was negative.

⁹³ See Granet, *Pensée chinoise*, p. 280, n. 2. He seems to have felt that the T'ai-chi T'u would eventually prove to be earlier than the Sung period.

times, as well as some that may have survived but are still being concealed.⁹⁴ We can only hope that some of the missing, or as yet unrevealed material can still be recovered—through chance clues or well-checked inferences from what we do have, or through new archaeological discoveries.

Even if archaeology never succeeds in finding an actual example of the Shang thirteen-digit Diamond Plan, it might uncover still more indirect evidence for it, as well as other things that could help to establish a more definite chronology for the various steps in the evolution of the Lo Shu, the Ho T'u, and the two traditional sets of trigrams. Until then, we have to admit that, although it seems probable that each of these did undergo considerable alteration—in the order suggested above—the approximate dates for the changes are still unclear.

At any rate, the examples reviewed here should be enough to demonstrate that the people of Ancient China conveyed some rather elaborate and abstruse ideas by means other than written text and that the yin-yang symbolism of recent centuries was firmly grounded on a very long dualistic tradition: one that was already being symbolized in the Shang dynasty, three thousand years ago, in art motifs like the T'ao-T'ieh and in comprehensive numerical plans and diagrams.

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⁹⁴ Saso (n. 21 above), p. 411, discussing the problems involved in the study of religious Taoism in the present century, remarks, "The rules of esoteric transmission keep the very location of the sources hidden."