The System of the *Book of Changes* and Chinese Science*

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One of the best known Chinese classics, frequently translated, much venerated by traditional Chinese scholars, yet quite complex, is the *I Ching* 易經, or the *Book of Changes*, compiled sometime between the — 8th and the — 3rd century. The system of the *Book of Changes*, is based on the ancient Chinese concept of the two cosmological forces *Yin* 陰 and *Yang* 陽. The first conveys the idea of something that is feminine, or dark, cloudy, shady and cold while the second reminds one of something that is masculine, bright, sunny and warm, among a host of other meanings. In the *Book of Changes*, *Yin* is represented by a broken line -- and *Yang* by a full line —. Taking these two lines, three at a time, eight different possible combinations are obtained. These are the so-called eight Trigrams, *Ch'ien* 乾 ☰, *K'un* 坤 ☷, *Chen* 震 ☳, *Sun*, 巽 ☴, *K'an* 坎 ☵, *Li* 離 ☲, *Kên* 艮 ☶, and *Tui* 兌 ☱. The significances of these Trigrams are shown in Fig. 1.

Going a step further and taking the *Yin* and *Yang* lines six at a time, the total number of possible combinations is 2^6, *i.e.* 64. These are the 64 hexagrams in the *Book of Changes*. These 64 hexagrams have been put down by the Chinese in two different orders. One of these two orders, namely the 'prior to heaven' (*hsien t'ien* 先天) system, so fascinated the great mathematician Leibniz towards the end of the +17th century that the inventor of the calculus went to the extent of deriving the binary notation to account for it. In the binary notation we can write down the figures 0 to 63 as follows:

$$000000 = 0$$
$$000001 = 1$$
$$000010 = 2$$
$$000011 = 3$$
$$000100 = 4$$
$$000101 = 5$$
$$\cdots\cdots\cdots$$
etc.
$$111110 = 62$$
$$111111 = 63$$