

# Science in Classics 经典中的科学

Joseph Needham (李约瑟) [h is silent]

*The Shorter Science and Civilisation  
in China Vol. 1.*



北丐洪七公。  
北方属水。



西毒欧阳锋。  
西方属金。



中神通王重阳，  
入道后改名王喆。  
中央属土。



东邪黄药师。  
东方属木。



南帝一灯。  
南方属火。

| Elements       | Seasons        | Cardinal points |
|----------------|----------------|-----------------|
| <i>hsing</i> 行 | <i>shih</i> 時  | <i>fang</i> 方   |
| WOOD           | spring         | east            |
| FIRE           | summer         | south           |
| EARTH          | — <sup>a</sup> | centre          |
| METAL          | autumn         | west            |
| WATER          | winter         | north           |

# *Science and Wisdom*



- Jürgen Moltmann (1926-), theologian.
- Chapter XII: TAO – The Chinese Mystery of the World:  
Lao Tsu's *Tao Te Ching* Read with Western Eyes
- Lao Tsu = 老子. *Tao Te Ching* = 《道德经》
- The famous beginning: “The way that can be spoken of/ Is not the constant way; The name that can be named/ Is not the constant name.” (Translation by D.C. Lau)  
(道可道，非常道，名可名，非常名。)

# Tao, Nature and Man

West

Divine

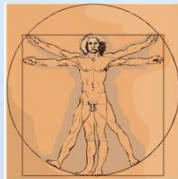


Nature

China

Tao

Nature



answer cannot be 'both-and', but only 'neither-nor'. Since 'person' is a term for the human being, it is not applied in Taoism to the Tao, for it is not the human being who mediates between the divine and nature, as in the biblical traditions, with their concept of salvation. It is nature which mediates between the Tao and the human being.

Man follows the earth.

Earth follows heaven.

Heaven follows the Tao [way].

Tao [the way] follows what is natural.

(Ch. 25)

人法地

地法天

天法道

Consequently nature is not absorbed into the human person. The opposite is the case: the human person is integrated into the Tao, which acts in all things. To live in accordance with the Tao



# Man and Nature

the remark that the sage is the chief representative of the naked animals; this really is a supreme example of the fact that Chinese thought refused to separate man from Nature, or individual man from social man. But it also contains the view, which could not be bettered even by modern evolutionists, that the basic forces seen at work in the lowest creatures are the same as those which at higher levels will develop the highest manifestations of human social and ethical life. The second passage is almost entirely biological:

Text 9  
Para. 24

# Chinese numerology

“Heaven is 1, Earth is 2, Man is 3.  $3 \times 3$  makes 9.  $9 \times 9$  makes 81. 1 governs the Sun. The Sun's number is 10. Therefore Man is born in the tenth month of development.

“ $8 \times 9$  makes 72. Here an even number follows after an odd one. Odd numbers govern time. Time governs the Moon. The Moon governs the horse. Therefore the horse has a gestation period of 11 months.

“ $7 \times 9$  makes 63. 3 governs the Great Bear [the Plough or Northern Dipper]. This constellation governs the dog. Therefore the dog is born after only 3 months.” . . .

‘Now birds and fishes are born under the sign of the Yin, but they belong to the Yang. This is why birds and fishes both lay eggs. Fishes swim in the waters, birds fly among the clouds. But in winter, the swallows and starlings go down into the sea and change into mussels.

Text 9  
Para.24

# Chinese numerology

- Not try to understand the calculation.
- But try to appreciate the belief that man and nature follow the same rules.

# Text

- Joseph Needham, *The Shorter Science and Civilisation in China* Vol. 1. Cambridge: Cambridge University Press, 1978.
- Read: Chapter 10 (The Fundamental Idea of Chinese science), Paragraphs 1-3, 13-42.



# Core Question

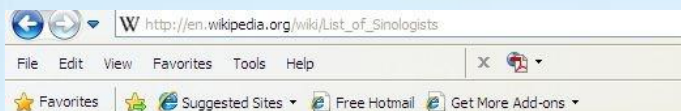
What understanding of Nature did  
Chinese have?



# Sinology (汉学)

<http://en.wikipedia.org/wiki/Sinology>

- Study of China and things related to China.
- Now in the Western world:
  - More about the study of classical Chinese language and literature.
- Sino- ⇔ Late Latin *Sinae*
- Late Latin *Sinae* ⇔ Greek *Sinae*
- Greek *Sinae* ⇔ Arabic *Sin*
- Arabic *Sin* may derive from *Qin* (秦) (Qin Dynasty).



(2007)



(2017)



(2018)



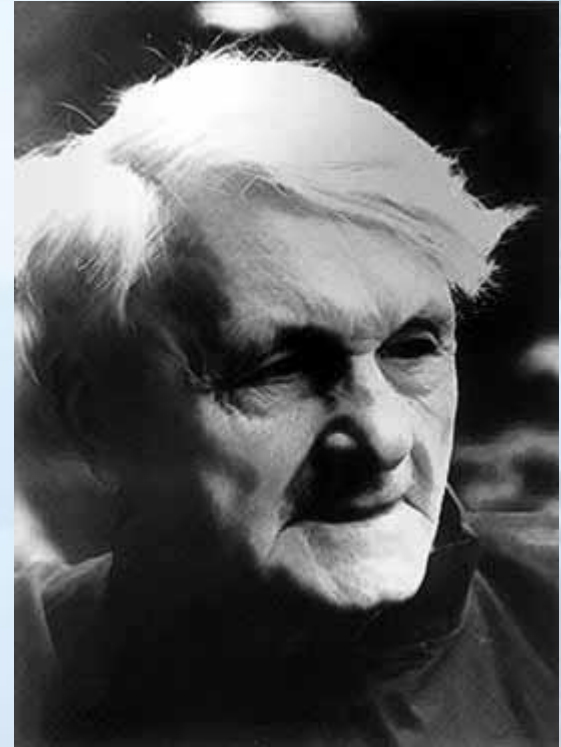
(2019)

# Joseph Needham

- Full name: Noel Joseph Terence Montgomery Needham
- December 9, 1900–March 24, 1995
- British biochemist
- best known for his works on the history of Chinese science.
- known mainly by his Chinese name: 李約瑟.

# His life (Wikipedia)

- Father: a doctor; mother: a composer and music teacher
- received bachelor's (1921), master's (Jan 1925) and doctoral (Oct 1925) degrees from Cambridge University.
- Then worked at Cambridge, specialising in embryology (胚胎学) and morphogenesis (形态生成学).



Credit: Needham Research Institute



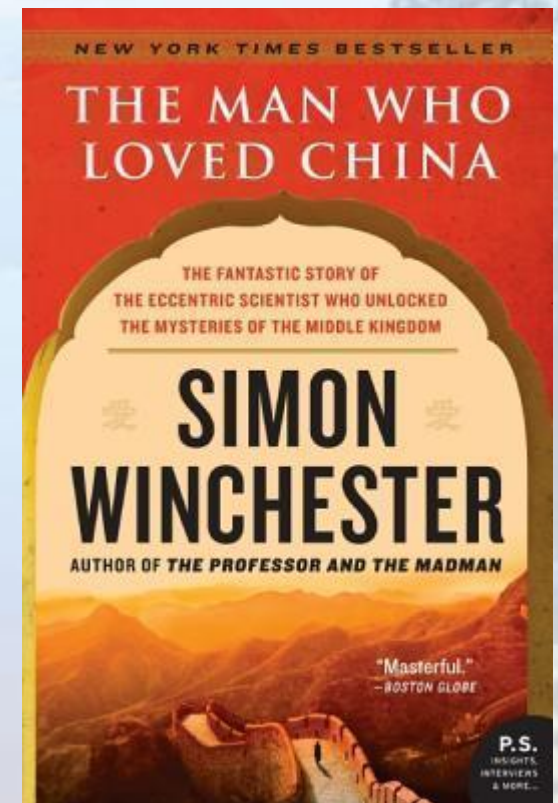


Joseph Needham in his biochemistry lab in Cambridge in the 1930's. (Credit: Needham Research Institute)

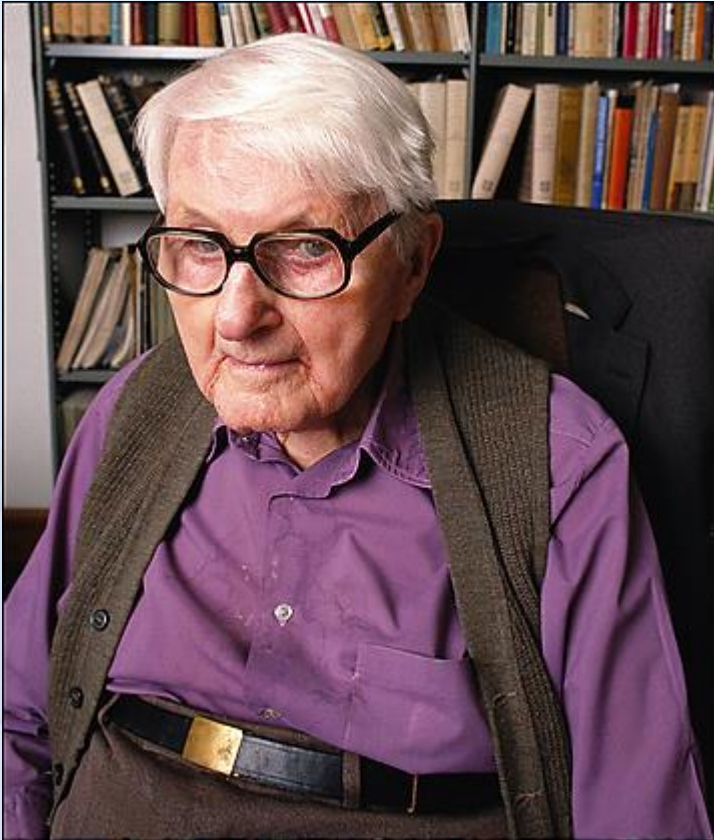
- 1936: Three Chinese scientists, Lu Gwei-djen (鲁桂珍), Wang Ying-lai (王应睐), and Chen Shi-chang (沈诗章) came to work with him.
- Lu (1904–91), daughter of a Nanjingese pharmacist, taught him Classical Chinese, ignited his interest in China's technological and scientific past.
- 1942 to 1946: Under the Royal Society's direction, he was the director of the Sino-British Science Co-operation Office in Chongqing.

- He collaborated with the historian Wang Ling (王铃), who solidified his passion for Chinese scientific history.
- Needham wrote his first book on the history of Chinese technology, *Chinese Science*, in 1945.
- He devoted much energy to the history of Chinese science until his retirement in 1990, even though he continued to teach biochemistry until 1966.

- He was first married to Dorothy Moyle (1896–1987) (李大斐).
- 1982: suffered from Parkinson's disease.
- 1987: Death of Dorothy.
- 1989: Needham (age 89!) married Lu Gwei-djen.
- 1991: Death of Lu.
- 1994: Died at his Cambridge home.

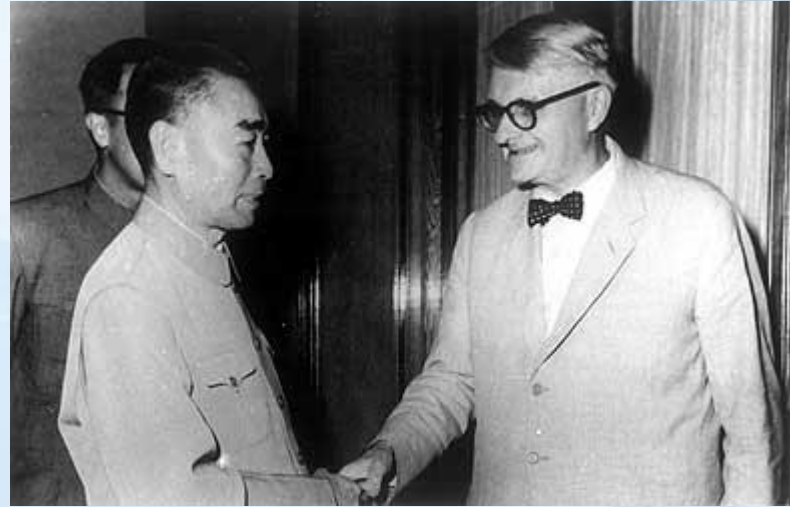






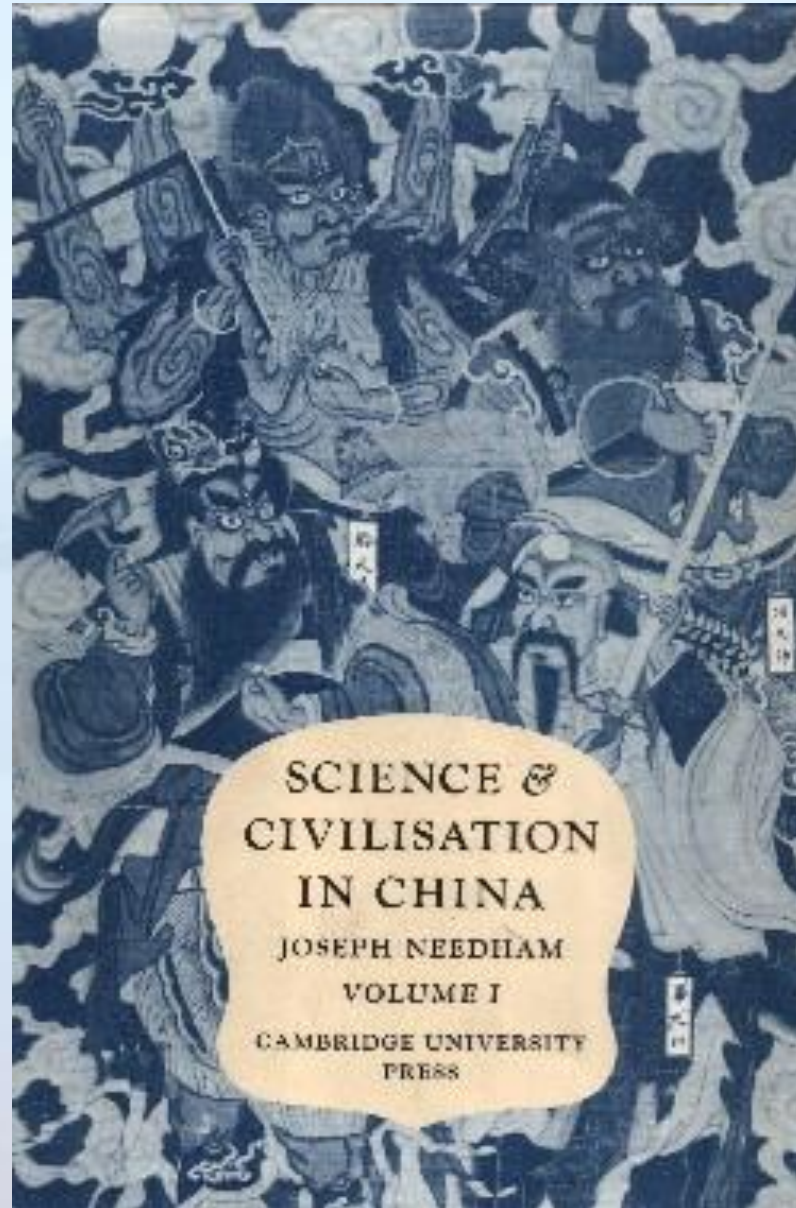
# Joseph Needham in 1992

<http://www.washingtonpost.com/wp-dyn/content/article/2008/05/22/AR2008052203431.html>



Zhou Enlai and Joseph Needham in 1964  
(Credit: Needham Research Institute)





## *Science and Civilisation in China* series

- There are altogether 7 volumes.
- VOL. I. Introductory Orientations. Joseph Needham, with the research assistance of Wang Ling (1954)
- VOL. II. History of Scientific Thought. Joseph Needham, with the research assistance of Wang Ling (1956)
- VOL. III. Mathematics and the Sciences of the Heavens and Earth. Joseph Needham, with the research assistance of Wang Ling (1959)

- VOL. IV. Physics and Physical Technology.
  - Part 1. Physics. Joseph Needham, with the research assistance of Wang Ling, and the special co-operation of Kenneth Robinson (1962)
  - Part 2. Mechanical Engineering. Joseph Needham, with the collaboration of Wang Ling (1965)
  - Part 3. Civil Engineering and Nautics. Joseph Needham, with the collaboration of Wang Ling and Lu Gwei-djen (1971)

- VOL. V. Chemistry and Chemical Technology
  - Part 1. Paper and Printing. Tsien Tsuen-Hsuin (1985)
  - Part 2. Spagyric Discovery and Invention: Magisteries of Gold and Immortality. Joseph Needham, with the collaboration of Lu Gwei-djen (1974)
  - Part 3. Spagyric Discovery and Invention: Historical Survey, from Cinnabar Elixirs to Synthetic Insulin. Joseph Needham, with the collaboration of Ho Ping-Yu [Ho Peng-Yoke] and Lu Gwei-djen (1976)
  - Part 4. Spagyric Discovery and Invention: Apparatus and Theory. Joseph Needham, with the collaboration of Lu Gwei-djen, and a contribution by Nathan Sivin (1980)

- Part 5. Spagyric Discovery and Invention: Physiological Alchemy. Joseph Needham, with the collaboration of Lu Gwei-djen (1983)
- Part 6. Military Technology: Missiles and Sieges. Joseph Needham, Robin D.S. Yates, with the collaboration of Krzysztof Gawlikowski, Edward McEwen and Wang Ling (1994)
- Part 7. Military Technology: The Gunpowder Epic. Joseph Needham, with the collaboration of Ho Ping-Yu [Ho Peng-Yoke], Lu Gwei-djen and Wang Ling (1987)
- Part 9. Textile Technology: Spinning and Reeling. Dieter Kuhn (1986)



- Part 11. Ferrous Metallurgy. Donald B. Wagner (2008)
- Part 12. Ceramic Technology. Rose Kerr and Nigel Wood, with additional contributions by Ts'ai Mei-fen and Zhang Fukang (2004)
- Part 13: Mining. Peter Golas (1999)

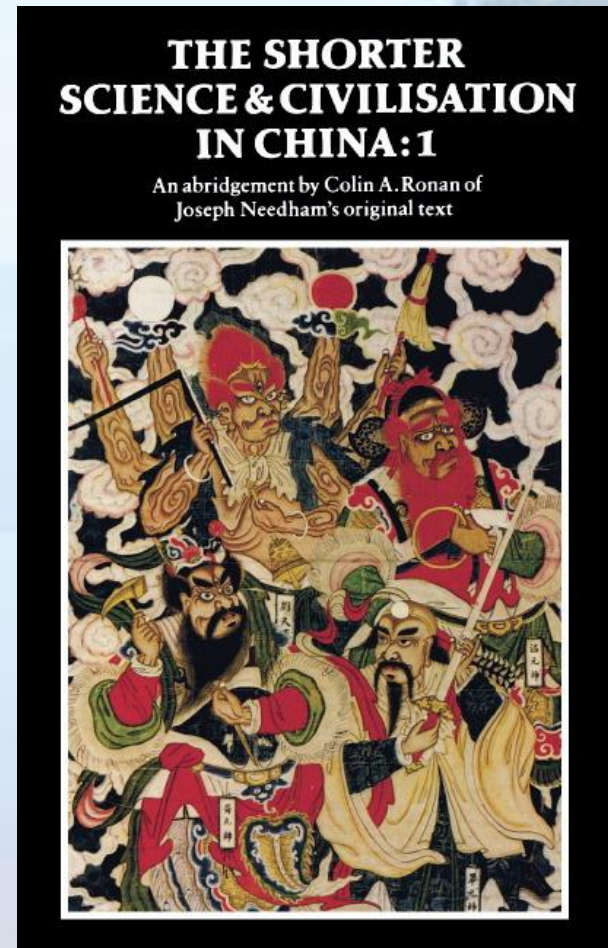


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  - Part 2. Agriculture. Francesca Bray (1988)
  - Part 3. Agroindustries and Forestry. Christian A. Daniels and Nicholas K. Menzies (1996)
  - Part 4. Biology and Biological Technology Traditional Botany: An Ethnobotanical Approach. Georges Métaillé (2015)
  - Part 5. Fermentations and Food Science. H.T. Huang (2000)
  - Part 6. Medicine. Joseph Needham and Lu Gwei-djen, edited by Nathan Sivin (2000)

- VOL. VII. The Social Background
  - Part 1. Language and Logic. Christoph Harbsmeier (1998)
  - Part 2. General Conclusions and Reflections. Joseph Needham ,  
edited by Kenneth Girdwood Robinson, with contributions by Ray  
Huang, and an introduction by Mark Elvin (2004)

# Text

- Joseph Needham, *The Shorter Science and Civilisation in China* Vol. 1. Cambridge: Cambridge University Press, 1978.
- An abridged (节略) version.
- Part of Chapter 10.



# Three foci in the text

1: Introduction.

2-3: Origins of some of the most important Chinese scientific words.

[4-12 skipped]

13-20: The stabilised Five-Element theory. Various orders of the five elements and quantitative approach by Mohists.

21-23: The symbolic correlations.

24: Numerology and scientific thinking. \*\*

25-29: The theory of the Two Fundamental Forces.

30-42: 'Associative' thinking and its significance.

30-33: the two laws — law of similarity and law of contagion.

34-35: Order and Pattern = Organism, a kind of mysterious resonance.

36-40: Comparison between Western thought and Chinese thought in terms of causality, the use of numbers and time/space

41-42: Causality is like an orchestra.

1. Five elements

2. *yin-yang*

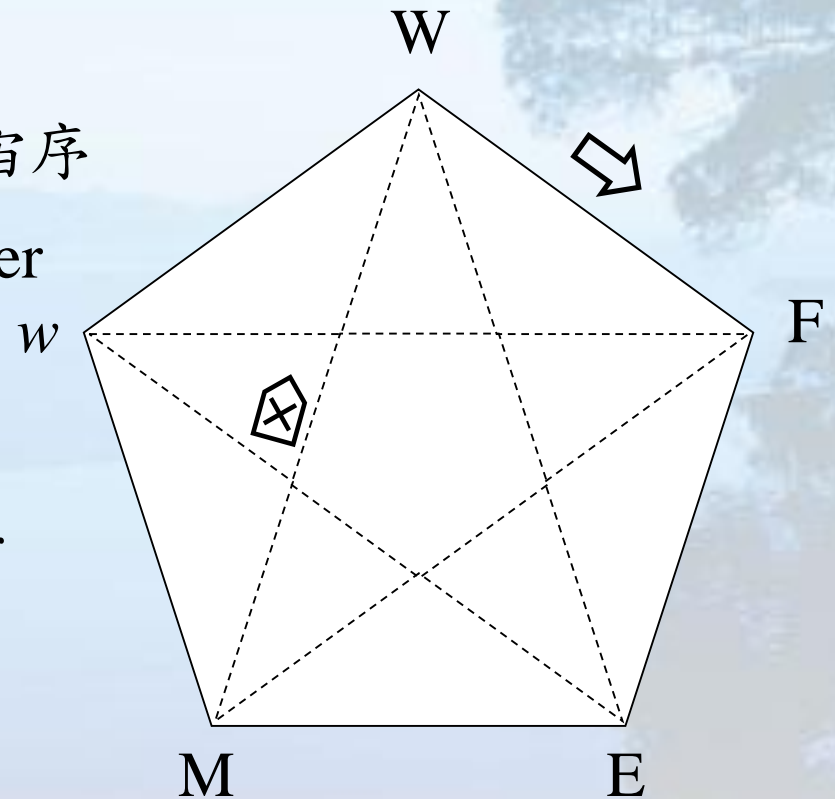
3. 'Associative' thinking





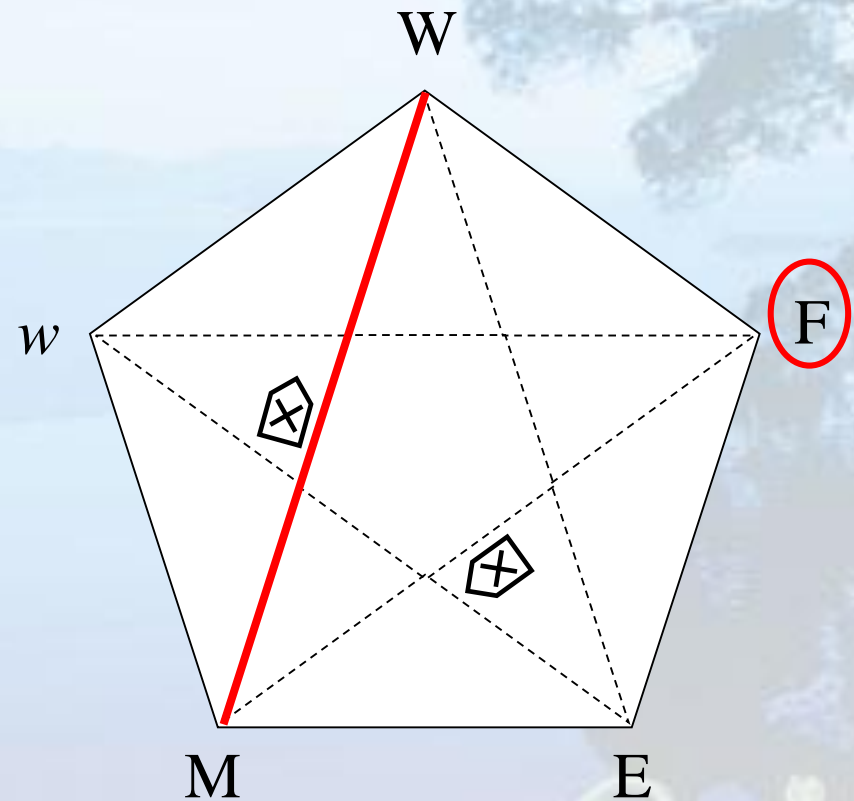
# 1. Five elements

- Four orders (Para. 14)
  - The Cosmogonic Order 宇宙序
  - The Mutual Production Order 相生序  $\Leftrightarrow$  Seasons:
    - $W \Rightarrow F \Rightarrow E \Rightarrow M \Rightarrow w$
  - The Mutual Conquest Order 相克序  $\Leftrightarrow$  Politics:
    - $W \ltimes M \ltimes F \ltimes w \ltimes E$
  - The ‘Modern Order’



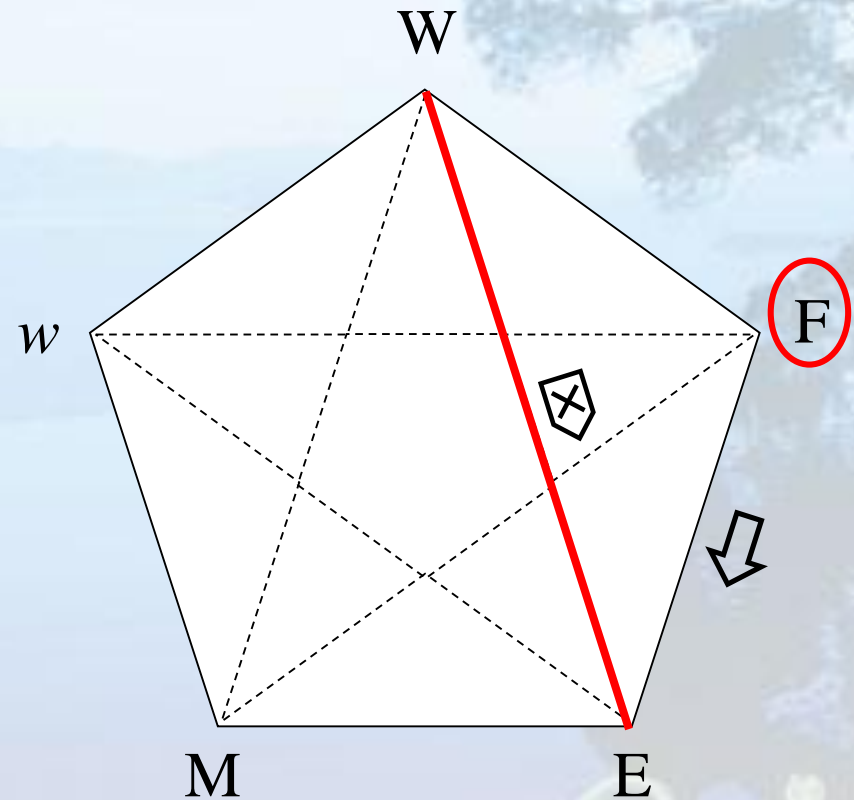
# Two derived principles

- Principle of Control  
相制原理 (Para. 17)
- Example: F controls the process of M conquering W.



# Two derived principles (cont'd)

- Principle of Masking  
隐蔽原理 (Para. 19)
- Example: W conquers  
(reduces) E but F  
masks the process by  
producing E.



# The symbolic correlations (象征的关联)

Table 9. *The symbolic correlations*

| Elements       | Seasons        | Cardinal points | Tastes       | Smells         | Stems (denary cyclical signs) | Branches (duodenary cyclical signs) and the animals pertaining to them                       | Numbers      |
|----------------|----------------|-----------------|--------------|----------------|-------------------------------|--|--------------|
| <i>hsing</i> 行 | <i>shih</i> 時  | <i>fang</i> 方   | <i>wei</i> 味 | <i>chhou</i> 臭 | <i>kan</i> 干                  | <i>chih</i> 支  | <i>shu</i> 數 |
| WOOD           | spring         | east            | sour         | goatish        | <i>chia i</i> 甲 乙             | <i>yin</i> 寅 (tiger) and <i>mao</i> 卯 (hare)   | 8            |
| FIRE           | summer         | south           | bitter       | burning        | <i>ping ting</i> 丙 丁          | <i>wu</i> 午 (horse) and <i>ssu</i> 巳 (serpent)   | 7            |
| EARTH          | — <sup>a</sup> | centre          | sweet        | fragrant       | <i>wu chi</i> 戊 己             | <i>hsü</i> 戌 (dog), <i>chhou</i> 丑 (ox),<br><i>wei</i> 未 (sheep) and <i>chhen</i> 辰 (dragon) | 5            |
| METAL          | autumn         | west            | acrid        | rank           | <i>kêng hsin</i> 庚 辛          | <i>yu</i> 酉 (cock) and <i>shen</i> 申 (monkey)  | 9            |
| WATER          | winter         | north           | salt         | rotten         | <i>jen kuei</i> 壬 癸           | <i>hai</i> 亥 (boar) and <i>tzu</i> 子 (rat)   | 6            |

# cf. Humourism (体液学说) in the west

- Four elements (Text 2): air, fire, earth, water.

| Humour      | Season | Element | Organ        | Qualities    | Ancient name | Modern   | MBTI | Ancient characteristics          |
|-------------|--------|---------|--------------|--------------|--------------|----------|------|----------------------------------|
| Blood       | spring | air     | liver        | warm & moist | sanguine     | artisan  | SP   | courageous, hopeful, amorous     |
| Yellow bile | summer | fire    | spleen       | warm & dry   | choleric     | idealist | NF   | easily angered, bad tempered     |
| Black bile  | autumn | earth   | gall bladder | cold & dry   | melancholic  | guardian | SJ   | despondent, sleepless, irritable |
| Phlegm      | winter | water   | brain/lungs  | cold & moist | phlegmatic   | rational | NT   | calm, unemotional                |

(Wikipedia: Humorism)



# Tsou Yen (鄒衍)

The Mutual Conquest Order described the series in which each element was supposed to conquer its predecessor. It was, in a sense, the most venerable order since it was the one associated with the teaching of Tsou Yen himself. It was based on a logical sequence of ideas that had their basis in everyday scientific facts: for instance that Wood conquers Earth because, presumably, when in the form of a spade, it can dig up earth. Again, Metal conquers Wood since it can cut and carve it; Fire conquers Metal for it can melt or even vaporise it; Water conquers

25 So far, more has been said about the Five Elements and their symbolic correlations than about the two fundamental forces of the Yin and Yang. This is merely because we know more about the Five Elements than the Two Forces, which do not appear in the surviving fragments of Tsou Yen though his school was called the Yin–Yang Chia, and in later books discussion of them was generally credited to him. Nevertheless, there can be little doubt that the philosophical use of the terms began at the start of the fourth century B.C., and that passages in older texts

# Tsou Yen/Zou Yen (邹衍)

- ~305– ~240 BC, Warring States Period (战国时期)
- the founder and representative figure of the “Yin-Yang Chia” (School of Naturalists; 阴阳家)
- a noted scholar of the Jixia Academy (稷下学宫) in the State of Qi (齐).
- In Para. 4 (we have skipped), Needham described him as “the real founder of all Chinese scientific thought” (too exaggerated?).



# Tsou's main ideas (*Wikipedia*)

- Theory of the Cycle of the Five Virtues (五德终始说): the succession of dynasties is a result of the rise and fall of the five elements.
- Nine Great Lands (大九州): around China there are eight Great Lands, each has its own language and culture.

## 2. Two fundamental forces

- *Yang* (阳): maleness, sunshine, warmth ...
- *Yin* (阴): femaleness, cloud, cold ...
- Harmony between Yin *chhi* (= *qi*; 气) and Yang *chhi* of Heaven/Earth and man.

sun

cloud



Great Seal script (大篆)

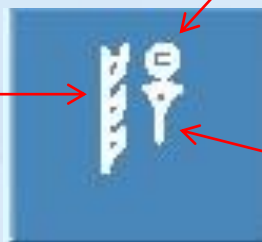
mountain



*Shuowen Jiezi* (说文解字)

sun

mountain



Oracle bone script (甲骨文)

shining



Chinese bronze inscriptions (金文)

three strokes:  
shadows



Some facts about Yin and Yang are, however, clear. We know, for instance, that the Chinese characters for Yin and Yang are connected with darkness and light. Yin involves graphs for hill (-shadows) and clouds, and the Yang character has slanting sun-rays or a flag fluttering in the sunshine (although the latter may represent someone holding a perforated jade disc, which was the symbol of Heaven, and probably the oldest of all astronomical instruments). These correspond well with the way in which the terms are used, for example, in the *Shih Ching* (Book of



## 2. Two fundamental forces (cont'd)

- A quote from Tung Chung-Shu (董仲舒):

‘Heaven has Yin and Yang, so has man. When the Yin *chhi* of Heaven and Earth begins [to dominate], the Yin *chhi* of man responds by taking the lead also. Or if the Yin *chhi* of man begins to advance, the Yin *chhi* of Heaven and Earth must by rights respond to it by rising also. Their Tao is one. Those who are clear about this [know that] if the rain is to come, then the Yin must be activated and its influence set to work. If the rain is to stop, then the Yang must be activated and its influence set to work.’

(Para. 28)

# Connection

- How are *yin-yang* and the five elements connected?

| Elements<br><i>hsing</i> 行 | Rulers <sup>b</sup><br><i>ti</i> 帝 | Yin-Yang<br>陰 陽            | Human<br>psychophysical<br>functions<br><i>shih</i> 事 |
|----------------------------|------------------------------------|----------------------------|---|
| WOOD                       | Yü the Great [Hsia]                | Yin in Yang or lesser Yang | deameanour  |
| FIRE                       | Wên Wang [Chou]                    | Yang or greater Yang       | vision  |
| EARTH                      | Huang Ti [pre-dyn.]                | Equal balance              | thought   |
| METAL                      | Thang the Victorious [Shang]       | Yang in Yin or lesser Yin  | speech  |
| WATER                      | Chhin Shih Huang Ti [Chhin]        | Yin or greater Yin         | hearing   |

(Part of Table 9)

### 3. 'Associative' thinking

- Associative thinking:
  - You eat a lot as a pig does, you will become piggish fat.
- cf. Analytical thinking:
  - You eat a lot. You will gain weight because of the nutrient-rich diet.

# ‘Associative’ thinking

- Someone said that the Chinese ‘associative’ thinking would be better called ‘**correlative** thinking’.
- In fact, Needham also called it coordinative thinking.
- Patterns / relationships, not random, but stratified.



# 黄帝内经·灵枢经·邪客

黄帝问于伯高曰：愿闻人之肢节以应天地奈何？

伯高答曰：天圆地方，人头圆足方以应之。天有日月，人有两目；地有九州，人有九窍；天有风雨，人有喜怒；天有雷电，人有声音；天有四时，人有四肢；天有五音，人有五藏；天有六律，人有六府；天有冬夏，人有寒热；天有十日，人有手十指；辰有十二，人有足十指，茎垂以应之，女子不足二节，以抱人形；天有阴阳，人有夫妻；岁有三百六十五日，人有三百六十五节；地有高山，人有肩膝；地有深谷，人有腋腘；地有十二经水，人有十二经脉；地有泉脉，人有卫气；地有草蓂，人有毫毛；天有昼夜，人有卧起；天有列星，人有牙齿；地有小山，人有小节；地有山石，人有高骨；地有林木，人有募筋；地有聚邑，人有腠肉；岁有十二月，人有十二节；地有四时不生草，人有无子。此人与天地相应者也。

- Correlation between the heavens and humans.

## *Huang Di Nei Jing* "Ling Shu" Chapter 71

Huang Di asked Bo Gao: I wish to be informed of how man's limbs and joints correspond to heaven and earth.

Bo Gao replied: Heaven is round, the earth is rectangular. Man's head is round, his feet are rectangular, thereby corresponding to the [measures of heaven]. Heaven has sun and moon; man has two eyes. The earth has nine regions; man has nine orifices. Heaven has wind and rain; man has joy and rage. Heaven has thunder and lightning; man has the sounds of his voice. Heaven has the four seasons; man has the four limbs. Heaven has the five tones; man has the five long-term depots. Heaven has the six pairs of flutes; man has the six short-term repositories. Heaven has winter and summer; man has cold and heat sensations. Heaven has ten [stems counting the] days; man has ten fingers. [The earth branches beginning with] *chen* are twelve; man has ten toes, the stalk, and the pendant to correspond to them. Women lack [the latter] two parts. [...]

[...] This way they can carry [an additional] human body within them. Heaven has yin and yang; man has husband and wife. A year has 365 days; man has 365 [bone] sections. The earth has high mountains; man has shoulders and knees. The earth has deep valleys; man has armpits and the hollows of the knees. The earth has twelve stream waters; man has twelve stream/conduit vessels. The earth has spring vessels; man has guard qi. The earth has growth of herbs; man has hair on his body and head. Heaven has day and night; man has [times of ] resting and rising. Heaven has the constellations of stars; man has teeth. The earth has small hills; man has small [body] sections. The earth has mountains of stone; man has elevations of bones. The earth has forests of trees; man has gatherings of sinews. The earth has human settlements; man has bulgings of flesh. A year has twelve months; man has twelve joints. On earth it may happen that during all four seasons no herbs grow; among men there are those who have no son. That are the correspondences of man to heaven and earth.



# Pattern

34

In the Chinese thought with which we are dealing, the key words are *Order* and *Pattern*; or one might almost say there is only one key-word, *Organism*, for certainly the symbolic correlations, the correspondences, the hexagrams of the *I Ching*, all formed part of one gigantic whole. Things behaved in particular ways not necessarily because of the prior actions of other things, but primarily because their position in the ever-changing cyclical universe was such that they were endowed with intrinsic natures which made such behaviour natural for them. If they did not behave in those particular ways they would lose their positions, and their relations to other things (which made them what they were) would alter and would turn them into something other than themselves. Their existence depended on the whole world-organism, and they reacted on one another by a kind of mysterious resonance.

# Was the Chinese view of nature primitive?

The classification which Tung Chung-Shu uses is the capacity of various things in the universe to fit into a fivefold, or some other, numerical grouping. And it is interesting that he takes the acoustic resonance of stringed instruments as an example of this, for to those who knew nothing of sound waves it must have seemed very convincing, proving his point that things in the cosmos that belonged to the same class resonated with, or energised, one another. He did not, of course, take the very primitive view that anything could affect anything else: his relationships were part of a closely knit universe with selective effects. Indeed, to Tung Chung-Shu, and to his successors, causation was something very special, since it acted in a sort of stratified pattern, not at random. Nothing was uncaused, but nothing was caused mechanically. The

(Para. 35)



# Examples of ‘Association’

Connection between similar patterns



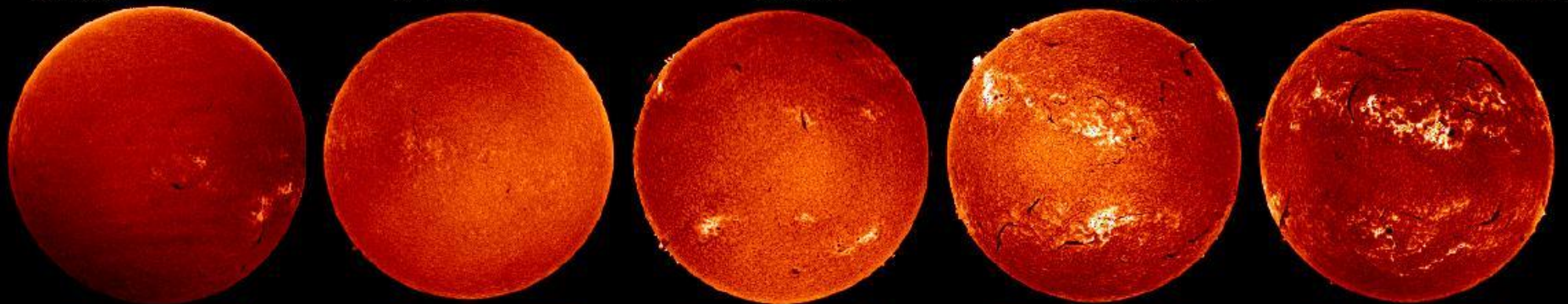
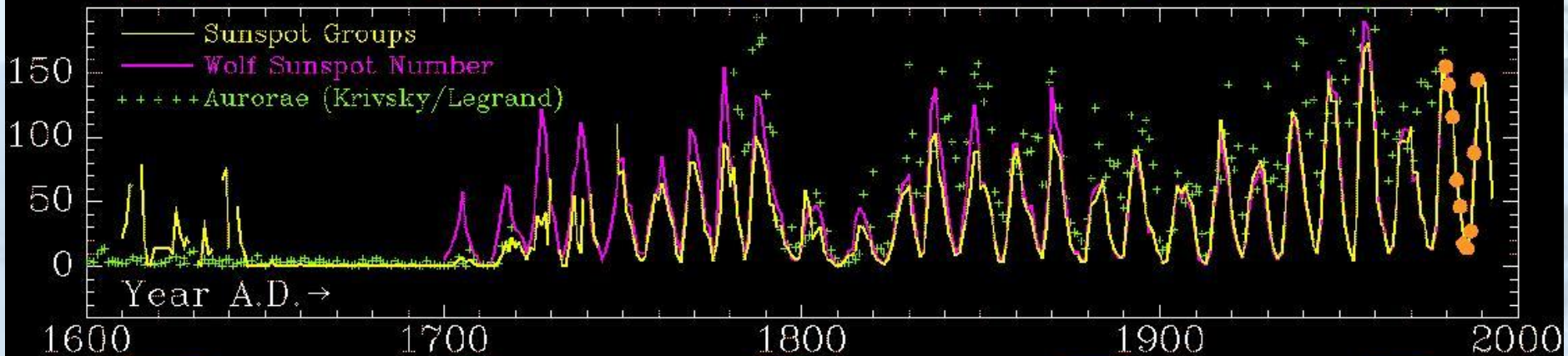
11 Aug 1980

14 Aug 1981

23 Aug 1982

11 Aug 1983

14 Aug 1984



10 Jul 1985

15 Aug 1986

24 Jul 1987

29 Jul 1988

18 Aug 1989

Source: NOAA+Zürich+RDC (D.V. Hoyt)+CNRS/INSU (J.-P. Legrand)+Ondrejov Obs. (K. Krivsky)

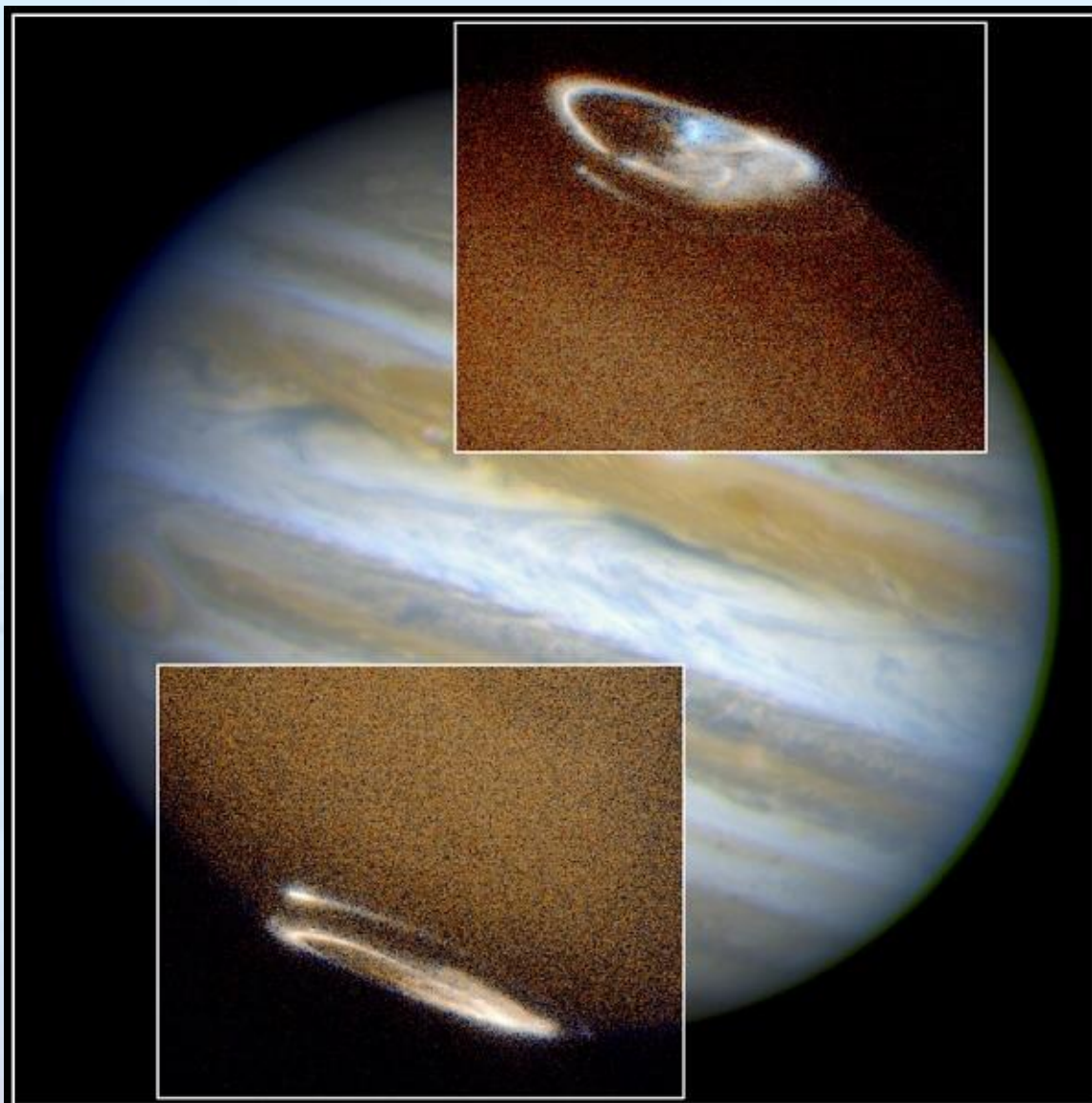
HAO A-017

The occurrence of sunspots and that of aurorae follow the same pattern.



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## Jupiter Aurora

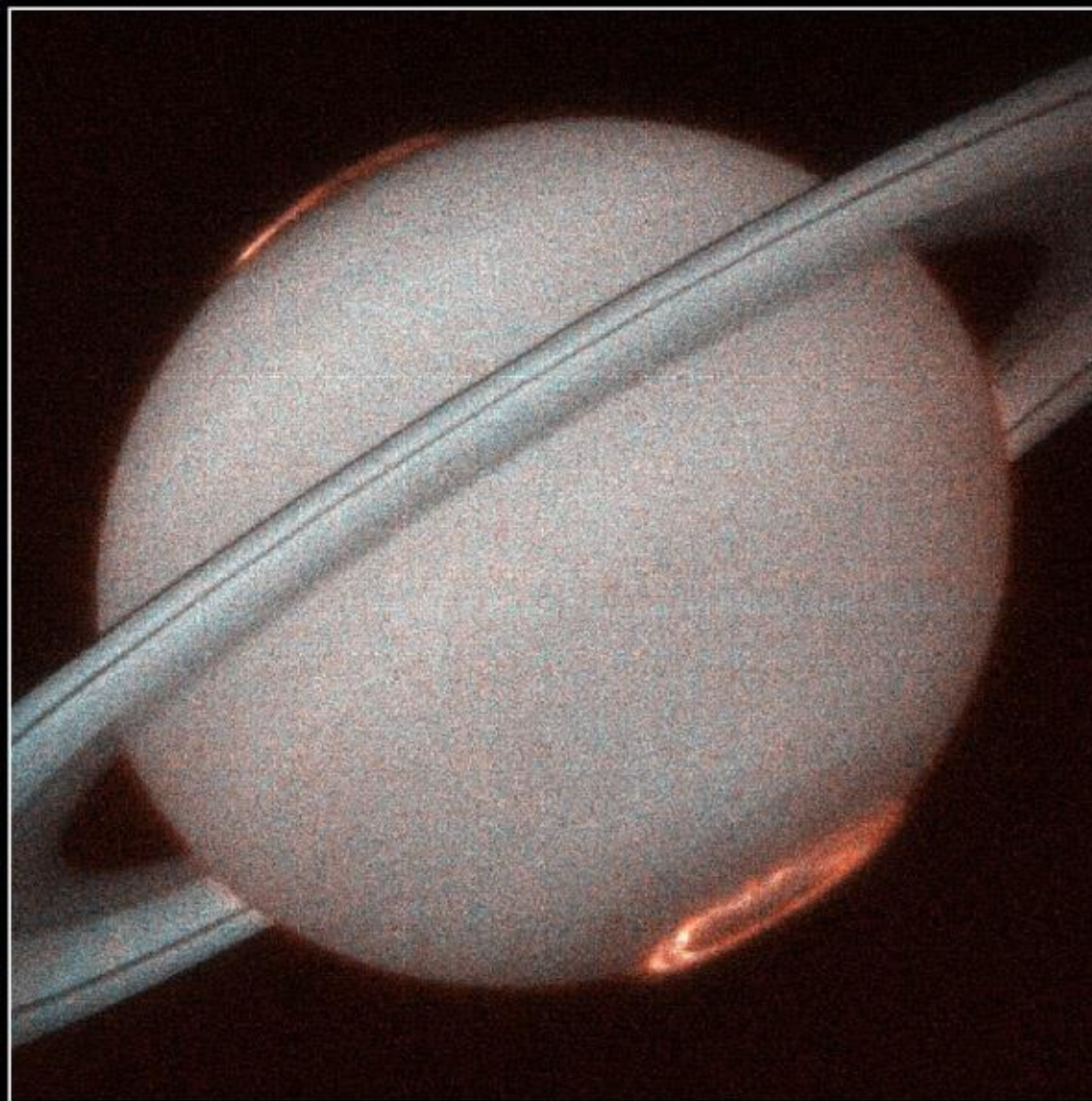
HST • STIS • WFPC2

PRC98-04 • ST Sci OPO • January 7, 1998  
J. Clarke (University of Michigan) and NASA



www.sfsu.edu/~sfsu/astro/





## Saturn Aurora

HST • STIS

PRC98-05 • ST Sci OPO • January 7, 1998 • J. Trauger (JPL) and NASA

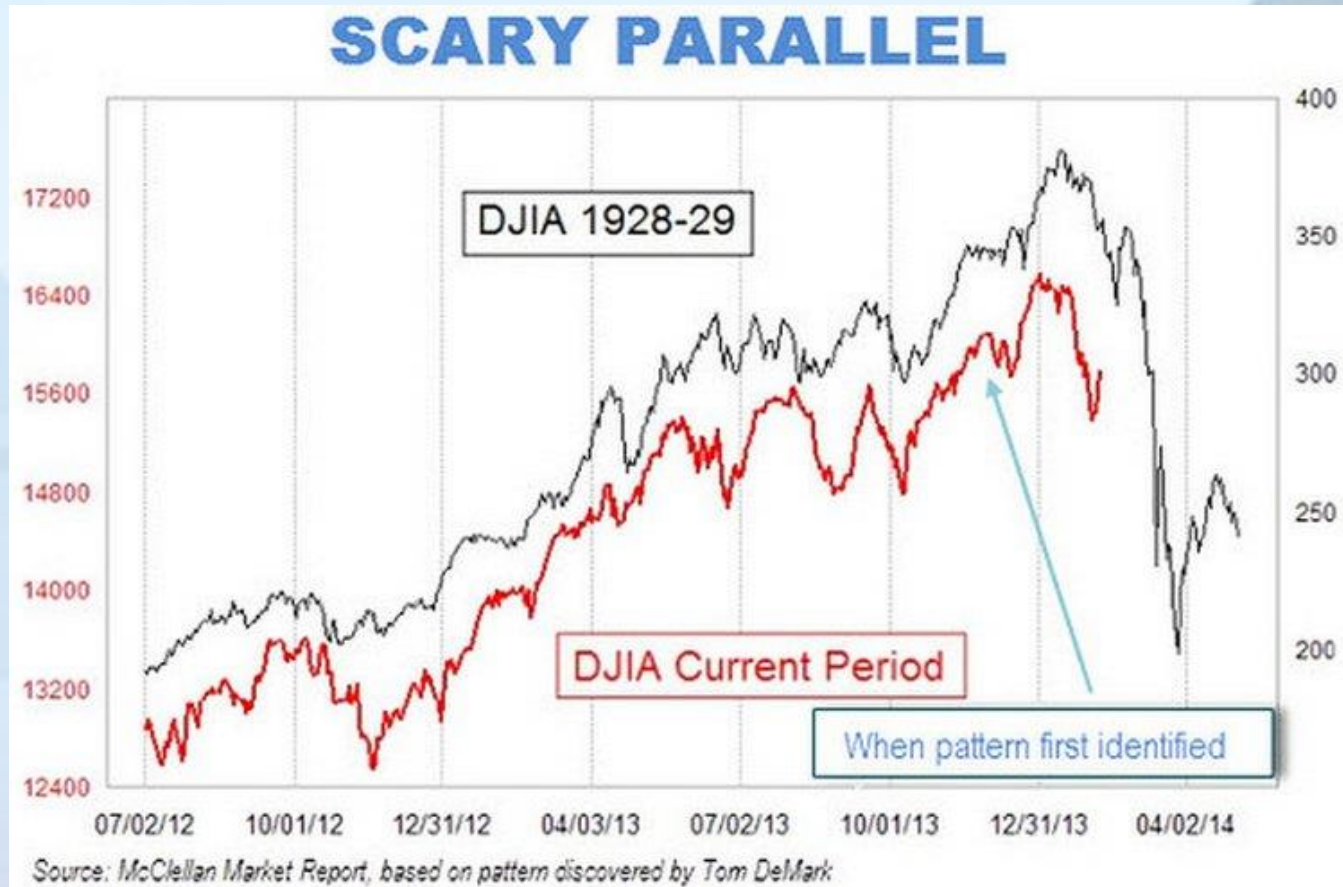


[www.sdsu.edu/~astro/trauger](http://www.sdsu.edu/~astro/trauger)





Recurring patterns make  
the market predictable?



<https://www.businessinsider.com/1929-stock-market-crash-chart-is-garbage-2014-2>

# Three foci in the text

1: Introduction.

2-3: Origins of some of the most important Chinese scientific words.

[4-12 skipped]

13-20: The stabilised Five-Element theory. Various orders of the five elements and quantitative approach by Mohists.

21-23: The symbolic correlations.

24: Numerology and scientific thinking. \*\*

25-29: The theory of the Two Fundamental Forces.

30-42: 'Associative' thinking and its significance.

30-33: the two laws — law of similarity and law of contagion.

34-35: Order and Pattern = Organism, a kind of mysterious resonance.

36-40: Comparison between Western thought and Chinese thought in terms of causality, the use of numbers and time/space

41-42: Causality is like an orchestra.

1. Five elements

2. *yin-yang*

3. 'Associative' thinking

# Chinese Numerology (数秘术)



天一，地二，人三；三三而九<sup>①</sup>，九九八十一<sup>②</sup>；一主日<sup>③</sup>，日數十<sup>④</sup>，故入十月而生。

【今註】 ①三三而九：老子四十二章：「道生一，一生二，二生三，三生萬物。」三，是數之小終，由三交互影響，就能有無窮的變化，所以以三自乘就生出九這極大的數字。②九九八十一：以九這個數字的極限自乘，所得到的尾數却是一，這是個最基本的數字。③一主日：一，是陽的代表，所以用以代表太陽。④日數十：太陽統攝甲、乙、丙、丁、戊、己、庚、辛、壬、癸等十天干。按，淮南子於「日數十」之下還有「日主人」三字，本篇脫漏。天上以太陽為最尊，地上以人為最貴。

【今譯】 宇宙的生成首先有天，天是陽的代表，然後相對的有了地，地是陰的代表，陰陽轉易，於是有人，和天地配合而為三才。三，是種種變化的重要關鍵。以三自乘，就得出數字的極限「九」；可是，以極限的九自乘而為八十一，所得到的尾數，却是最基本的數字「一」。一是陽數，用以代表太陽；太陽又統攝了甲乙丙丁戊己庚辛壬癸十天干。而且太陽在天空為最尊，人在地上為最貴，兩者有其相通之處，所以人正好懷胎十月而誕生。

“Heaven is 1, Earth is 2, Man is 3.  $3 \times 3$  makes 9.  $9 \times 9$  makes 81. 1 governs the Sun. The Sun's number is 10. Therefore Man is born in the tenth month of development.

“ $8 \times 9$  makes 72. Here an even number follows after an odd one. Odd numbers govern time. Time governs the Moon. The Moon governs the horse. Therefore the horse has a gestation period of 11 months.

should be 12?

八九七十二，偶以承奇①，奇主辰②，辰主月③，月主馬④，故馬十二月而生。

【今註】 ①偶以承奇：奇是陽，二是偶，偶是陰，陰是承陽而來。所以易經上說：「坤道其順乎！承天而時行。」 ②奇主辰：辰有十二，分爲四方，則方面各三，三是奇數。按奇字疑其爲「偶」字之訛，否則解釋難免牽強。 ③辰主月：辰有子丑寅卯辰巳午未申酉戌亥十二時辰，而月也有十二月。 ④月主馬：國語周語下：「月在天駟。」注：「天駟，房星也。」

【今譯】 退而用小於九一位的八來乘九，其積七十二，所得的尾數反而增爲二，二是偶數，代表陰，偶是跟着奇而來的，而辰正好是東南西北各三，是奇數，所以這和辰就發生了連繫；而時辰有子丑寅卯辰巳午未申酉戌亥十二個，也正如月的運行有十二月一般；而且月在天空統攝着天駟星，所以和地上的馬有所感應；因此馬正好是懷胎十二月而誕生。



**Original text:**

|   |  |
|---|--|
| <p><u>Paragraph 23</u></p>  |  |
| <p>The [cyclical] sign <i>yin</i> corresponds to Wood, and its proper animal is the tiger. <i>Hsü</i> corresponds to Earth, and its animal is the dog. <i>Chhou</i> and <i>wei</i> likewise correspond to Earth, <i>chhou</i> having as animal the ox, and <i>wei</i> having the sheep. Now Wood conquers Earth, therefore the tiger overcomes the dog, ox, and sheep. Again, <i>hai</i> goes with Water, its animal being the boar. <i>Ssu</i> goes with fire, having the serpent as its animal. <i>Tzu</i> also signifies Water, its animal being the rat. <i>Wu</i>, conversely, goes with Fire, and its animal manifestation is the horse. Now Water conquers Fire, therefore the boar devours the serpent, and horses, if they eat rats [are injured by] a swelling of their bellies.</p> <p>However when we go into the matter more thoroughly, we find that in fact it very often happens that animals do not overpower one another as they ought to do on these theories. The horse is connected with <i>wu</i> (Fire), the rat with <i>tzu</i> (Water). If Water really conquers Fire, [it would be much more convincing if] rats normally attacked horses and drove them away. Then the cock is connected with <i>yu</i> (Metal) and the hare with <i>mao</i> (Wood). If metal really conquers wood, why do cocks not devour hares?</p> | <p>王充，《論衡·物勢篇》</p> <p>曰：寅，木也，其禽虎也；戌，土也，其禽犬也；丑、未，亦土也，丑禽牛，未禽羊也。木勝土，故犬與牛羊為虎所服也。亥，水也，其禽豕也；巳，火也，其禽蛇也；子，亦水也，其禽鼠也；午，亦火也，其禽馬也；水勝火，故豕食蛇；火為水所害，故馬食鼠屎而腹脹。</p> <p>曰，審如論者之言，含血之蟲，亦有不相勝之效。午，馬也；子，鼠也；酉，雞也；卯，兔也；水勝火，鼠何不逐馬？金勝木，雞何不啄兔？</p> |
| <p>In the Chhien Shan district of Hsinchow there is a bitter spring which forms a rivulet at the bottom of a gorge. When its water is heated it becomes <i>tan fan</i> [bitter alum, literally “gall-alum” — probably impure copper sulphate]. When this is heated it gives copper. If this “alum” is heated for a long time in an iron pan, the pan is changed to copper. Thus Water can be transformed into Metal — an extraordinary change of substance.</p>   | <p>沈括，《夢溪筆談》卷二十五，第六段</p> <p>信州鉛山縣有苦泉，流以為澗。挹其水熬之，則成膽礬。烹膽礬則成銅。熬膽礬鐵釜，久之亦化為銅。水能為銅，物之變化，固不可測。</p>   |

Don't forget the reading guide

# Ask ourselves ...

- How much do I know about ancient China?
- What characterize me as a Chinese (or American/Korean/Japanese/etc)? My physical features? My language? My mindset?

End

