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THE SYMBOLS OF YI KING

OR

THE SYMBOLS OF THE  
CHINESE LOGIC OF CHANGES

BY

Z. D. SUNG

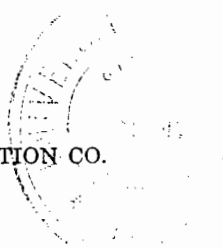
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## THE UNIVERSAL REASONING SYMBOLS

Extracted from the text of Chinese ancient philosophers

For mediate inference of systematic changes

By method of analogy

Interpreted freely into modern terms

THIS WORK CONSISTS OF THREE PARTS:

PART I. — INTRODUCTION

PART II. — EXHIBITS

PART III. — REMARKS

APPENDIX.

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## PREFACE

One of the sacred books of China, written by four ancient sages and ever supported by the leading philosophers of the times, is Yi King of which the full text and appendixes in the Chinese original and in the English translation will be soon published as a second volume of this work.

The work in the first volume consists of a special treatise on all of the symbols of the Yi King and that of the second volume is the text of Yi King and its appendixes. The essential feature of the work is the record of the writer's discoveries, after his life study on the fundamentals of this subject, namely, the perfect agreement of these symbols with those of the algebraic terms of the expanded expression of a binomial sixth power, and the concord in the numerical value of the two technical terms, assigned in their elementary forms, to the length of day and night of the two solstices in China, or the explanation as to why those technical terms, 9 and 6, are used throughout the whole text in delineation of those symbols. This is fully illustrated by the Exhibits.

The uses of Yi have been kept as esoteric secrets by philosophers mainly as a precaution against abuses, and therefore as yet remain a mystery. It is supposed that one who really understands them would know everything and thus attain a knowledge of the future. The attempt of the writer, in trying to develop these secrets, has not yet proved to be such a great success, but those intuitive

discoveries as mentioned, might, perhaps, give as a sidelight the basis for the furtherance of this study, with the hope that through the present gropings like those of the ancient alchemist, a state of science, comparable to modern chemistry, may some day be attained.

Demonstrative of these discoveries, are the facts brought out in the various Exhibits mathematically, physically, astronomically, and also logically. All these proofs tend to support one fact, namely, that these symbols, when they are together cover one whole, and when separate, cover its parts, and when once assigned with a concept of our universe, they may be applied to entities such as, space, matter, force and time, as marks representing the Changes with which the said Yi King mainly treats as its principle philosophy.

For guidance and advance in this study, it is safe to say that the student interested in it should rely principally on the original text and its appendixes which appear in the second volume of this work, rather than on the first volume which concerns itself solely with a study of the symbols. The English translation of the original text and its appendixes is compiled from Dr. Legge's translation of the Yi King, and will be found to be frequently quoted in the writer's work. The writer has re-arranged Dr. Legge's translation and has inserted the two technical terms, Nine and Six, exactly as found in the Chinese original, and this latter, in Chinese is given side by side with the translation. For the detailed commentaries on the text in English, the reader should refer to Dr. Legge's original work as published in 1899 by the Oxford University Press as Part II of "The Sacred Books of China."

The writer wishes to express his indebtedness to the work of Dr. James Legge and of Dr. Herbert Chatley for materials used in these volumes, and his thanks to Mr. Gunther Schmitz, B. Sc., F.A.I.C., for his literary corrections to the manuscript of this publication.

Z. D. SUNG.

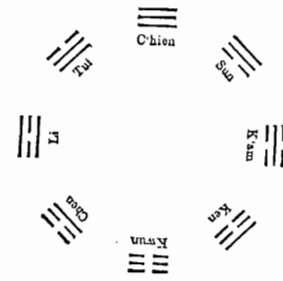
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THE YI KING SYMBOLS

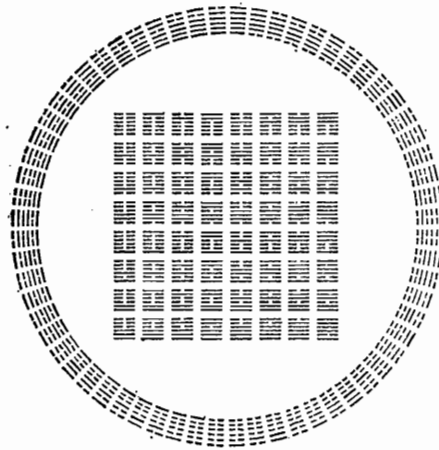
YAOS



TRIGRAMS

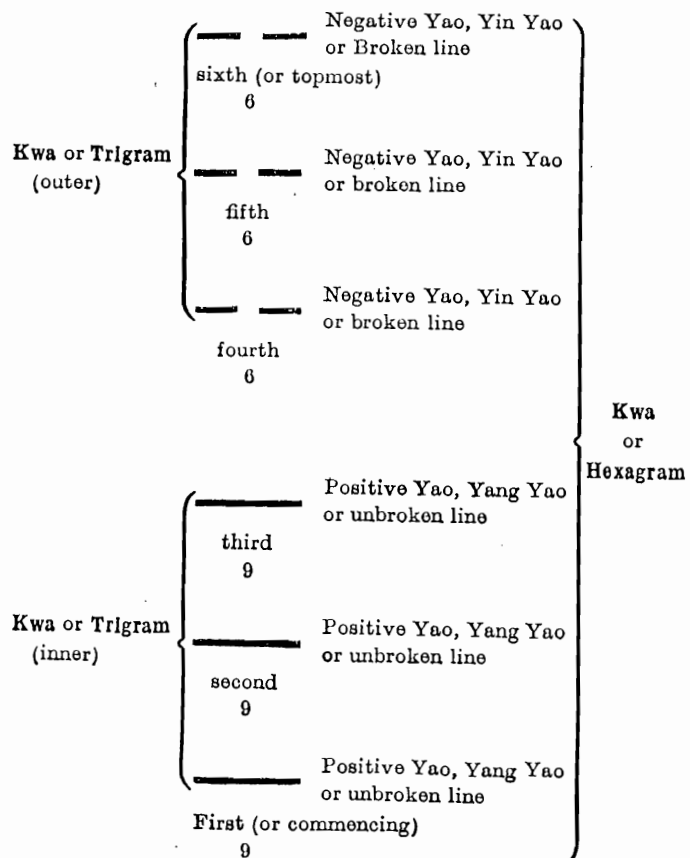


HEXAGRAMS



## DEFINITION OF THE TECHNICAL TERMS OF YI KING SYMBOLS

(Analytically from the Hexagram "T'ai" below)



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## PART I

### INTRODUCTION

# THE SYMBOLS OF YI KING

## INTRODUCTION

**Yi King** :—Is the name of a book phonetically translated from the Chinese with the meaning of Yi being “Changes” and that of KING “Warps,” or a Bible of Philosophy to Chinese thinkers.

It can be referred to in many ways, such as YI being an abbreviation of YI KING, YI of Kau or Cheu YI meaning belonging to Kau or Cheu dynasty, CLASSIC OF CHANGES being translated from its meaning and ranking among Chinese branches of literature, BOOK OF CHANGES as it is commonly named; or CHINESE LOGIC OF CHANGES being a name used throughout this work, named after many other sciences, having the same termination “LOGY” which means LOGIC, or a special logic dealing with Changes, which differs from ordinary logic such as Kinematography from Photography,—as one change in nature from another more fixed, though they are both sciences of formal thought.

It is composed of material developed from its very origin of only eight primitive symbols, called EIGHT TRIGRAMS (or figures composed of three lines each) devised by Fu Hsi, B.C. 3322, being then the name symbols for eight worldly natural objects or phenomena, such as Heaven, Earth, Thunders, Winds, Fire, Water, Mountains and Marshes. From those eight symbols they were extended to sixty four

The Meaning of  
Yi King

Its Various  
Names and  
Now Called a  
Logic of Changes

Its Composition  
of Material of  
the Development  
from its Symbols  
as the Very Origin  
of a Text and  
Appendixes



combinations of two combined, called SIXTY FOUR HEXAGRAMS (or figures composed of now six lines each) by the king Wan being the founder of the CHEU dynasty, B.C. 1143 who also gave these names with their relative explanations. Again from those explanations which were for each and every entire one of those figures, there were added explanations for each and every separate one of their component lines, which are called YAOS. Since the names and meanings of Trigrams to trigrams, Hexagrams to hexagrams, and Yaos to yaos (or lines to lines) are either particular terms or merely indicating phrases of particular judgment of divinations from experiences, they were reasoned and deduced by Confucius, B. C. 550-478, into truths of greater generality in his work called the TEN APPENDIXES.

It was used originally perhaps as an official book of divination by ancient rulers until the time of Confucius who began to utilize the material of the same to be interpreted into a philosophy, while many other great thinkers of inferior rank turned the same into their doctrine of many other branches of sciences,—such as politics, sociology, ethics, medicine, law, military, mathematics and probably many others, and likewise thinkers of Buddhism and Taoism into their own religions. In fact, in ancient times, the art of divinations was also an important science.

Having enumerated the meanings of the book, its various names, its composition of materials of development and its diversity of uses, all of which belong to the text and appendixes of the YI KING proper, it is not yet the subject matter of the writer's present work but merely a brief

Its Diversity of  
Uses

Its Text and  
Appendixes

introduction to their symbols. For the YI KING and appendixes proper, readers are referred to the many valuable translations of foreign scholars, such as mentioned by James Legge, the work of P. Regis and his coadjutors titled Y-KING, ANTIQUISSIMUS Sinarum LIBER, given to the public in 1834 by Jules Mohl, the work of the Rev. Canon McClathie, M.A. published with the title of A TRANSLATION OF THE CONFUCIAN YI KING, or THE CLASSIC OF CHANGES with NOTES and APPENDIX, —in 1876, that of James Legge himself titled THE YI KING, PART II of THE SACRED BOOKS OF CHINA, and that of Joseph Edkins with the title of THE YI KING, WITH NOTES ON THE 64 KWA as published in the CHINA REVIEW. While in its original Chinese version, the wonderful works of hundreds of Chinese native scholars with their titles found in the catalogues of both official and private famous libraries in China, if obtainable, would serve to give exhaustive and consistent explanations to the earnest students.

ITS SYMBOLS:—Since its very origin YI KING, consisted of only EIGHT SYMBOLS, TRIGRAMS OF FU HSI, or symbol names of either nature objects or phenomena, such as heaven, earth, etc., until the time of Confucius, when he began to extend their uses deductively in many ways according to his thought of reasoning. As in his conclusion of such symbols, they all apparently mean merely the eight component parts of a whole, viz., from those parts of the universe as a whole, against those of the other worlds:—the world of their corresponding qualitative natures, or attributes, such as strengthening, obeying, etc., that as a whole of a family of parents and children, such as father, mother, etc., that

Its Symbols

as a whole of human bodily parts, such as the head, belly, etc., and that of tamed animals such as horse, ox, etc., which have been in most cases of MERE HYPOTHESIS.

**Their New Discovery:**—But when asked to prove physically, or positively on these eight symbols, especially in this day of so many available developed sciences, and taking the reason that a real good truth is never too far from our approach, it is this question that the writer after the toils of at least ten years of his leisure hours, with a library of a hundred varieties of YI KING, and a considerable collection of other divination books or manuscripts, assisted by primary study of western sciences, DISCOVERED accidentally a certain night when using a match box in place of a school globe, and holding its two opposite vertices diagonally for the study of the rotation of the earth as both around its own axis and the sun. It revealed before his eyes

three faces of the box positively, and other three negatively, forming into two vertices, physically exhibited in a definite and apparent manner that every body could see, the two TRIGRAMS, namely CHIEN and KWUN, the one of figures composed of three unbroken lines and the other of three broken lines, or referred to in this work as *positive* and *negative Yaos*, or originally, in phonetical translation, as *Yang Yao* and *Yin Yao* respectively (Yang meaning Sunny, while Yin moony, and Yao, the component parts of the trigrams). After having established these two TRIGRAMS by the said two vertices, there are found the remaining six TRIGRAMS:—TUI, LI, SUN in one series and CHEN, KAM, KEN in another series, as by the rest of the six other vertices:

The Discovery  
of Their New  
Interpretation to  
the Exhibits and  
Remarks of  
this Work

From the Form of  
a Match Box

the three figures composed of two unbroken and one broken lines each, and three other figures of one unbroken and two broken lines each, as revealed correspondingly by the three vertices having two positive and one negative face each, and the other three vertices having one positive and two negative faces each. Now, in connection with this match box, it led up to his thinking and reasoning that while the words "World and its eight component parts" are also symbols which could be used to imply as of the real world and its parts, or a conception of both of them, why not also something else, like, the form of the said match box, and its eight vertices, a binomial cube and the eight component terms of its expansion, or the whole of YI and its EIGHT TRIGRAMS? And in backward turn, why not the last named EIGHT TRIGRAMS to symbolize themselves into those of other imaginary worlds for the extension of our thought?

**Their Exhibits and Remarks:**—It is from this form of a cube, that the writer in his association of reasoning, gave in Part II of this volume THEIR EXHIBITS geometrically, algebraically, arithmetically, and again in bringing them into best possible harmony with the truths of the Confucius APPENDIXES, annexed in Part III their remarks presented in a manner as scientific as possible.

The work of the writer in this volume contains entirely new methods of interpretations, which have never been found in any book of YI KING, and these were published in two successive days in the literal section of the Chinese daily paper "China Times", dated the 3rd and 4th of January, 1924, a paper contributed to at that time by a number of eminent scholars including,

To the Exhibits  
and Remarks of  
this Work

such as Liang Chi Chao, Dr. Hu Shih, etc., although the materials themselves used, are not new in sciences of today. The most important item of it all which the writer could present as being worthy of one's attention, is the two ALGEBRAIC EXHIBITS of the symbols of YI KING, the EIGHT TRIGRAMS and SIXTY FOUR HEXAGRAMS which he discovered to be in perfect agreement with the corresponding eight and sixty-four terms of a binomial cube and sixth power respectively.

**Their Values:**—The support given to the value of the study of these symbols of YI KING appeared to the writer to be of manifold reasons. Only Their Values figuring on its antiquity, it could be one of the wonders in the literary world, for they are symbols of five thousand years ago, the earliest, and those of three thousand years past, the latest, and alone relying on the fame of the four mentioned sages who either devised or explained the symbols, and that of so many great thinkers of inferior rank of times who supported them, it would be sufficient enough to assure to one's belief that there are good reasons for their labour.

Though primitive, they are but in this day of complexity, a dose of simplicity of five thousand years ago and should be more valuable to us than ever, for one could find in works of great thinkers even in recent days, that symbols are extensively used in demonstrating their principles out of great complexity, and even in this day of developed sciences, there are left many subjects still undeveloped, as if we were in the time of that antiquity, requiring yet the use of these as primitive tools for the advancement of work towards truth.

Moreover, the world in which we are is changing in

times and spaces, while we are its subjects, and so also our affairs. Therefore, it could not be perfect if our science of thought and reasoning should not be on this changing basis. It warns us to take such immediate advantages that would lead eventually to our future disadvantages, and encourages us to bear such immediate hardship that would lead finally to future happiness.

We could not denounce it as a worthless study simply for the reason of its being a book of divination, or in other words, for the reason that we are unable to find many other desirable properties of nowadays, besides that of divination, which is not suitable to our present times.

In concluding this introductory writing, as an appeal for interest to readers of thought and reasoning, the writer has extracted from Jevon's logic the Figures and Moods of Syllogisms interpreted in these Symbols of YI KING, and the Division of Genus to Species according to Dichotomy of Logic, graphically explained in a system of its symbols, and newly added together as the fourth chapter of THEIR EXHIBITS, as instances of the new uses of these ancient symbols.

ASTRONOMICAL EXHIBITS are also newly added as the fifth chapter, to prove the bearing of the whole system of YI symbols to the heavenly changes, especially regarding the two numerals, 9 and 6 which assigned respectively to the positive and negative YAO (or A & B by the writer's interpretation) in the original text in Chinese, were regarded as JARGON and called as the line undivided, and the line divided, throughout

From a Logic as  
its New Name to  
Logical Exhibits  
of the  
Fourth Chapter

From the Changes  
of the Length of  
Day and Night to  
the Astronomical  
Exhibits of the  
Fifth Chapter

the translation work of the 64 Hexagrams by Legge, and those exhibits are the fruit of the writer's labour in the recent few years, being considered as the second discovery of parallel importance to those of the first, as figures, and therefore, the one includes explanation as to why 9 and 6 are originally assigned to Positive and Negative Yaos while the others, refer to the Trigrams and Hexagrams. The whole line of exhibits gives a graphical account of the conception of the universe underlying the whole system of YI symbols to their symbolism, and show that they have an unlimited power of covering, and applicability in dealing with our thought of space, matter, and time. They are therefore the added realistic proof of the earlier EXHIBITS and REMARKS of this work to the original CONFUCIUS APPENDIXES, and also of the latter to our actual experience of the UNIVERSE. This volume does not give any translation or interpretation of the full text of YI KING, as this has already been done by others, but does however, fill the part that has been left undone by them,—especially regarding the YI symbols themselves which yet required explanation by facts, having the proper bearing to them and interpreted by the present sciences. Though the writer has the positive belief that one who has a proper understanding of YI KING, could understand things more perfectly and deeply with the assistance of the sciences as could be acquired nowadays, nevertheless, he would like to correct the wrong thought as usually existed with our elder scholars, that one could do without them, since the importance of one is the same as the other like logic and science, law and the facts from which it is derived, shadow and figure, and knowledge and experience. As

the YI KING, the Book of CHANGES, concerns changes, one should never forget that the world we are in is changing in space and time, and that one would, after a study of YI KING, regard it as living at all times and useful to us, and that it will help to expand and concentrate one's thought, but this is nevertheless not easy, as it will only benefit one in a degree dependent on the magnitude of one's own effort in the study of the proper text. Probably the present work would be found helpful as introduction to the proper text to the enthusiastic student. In this connection, as it is further found to be necessary, a sixth chapter is newly added consisting of the various

From all of the Exhibits of the First, Second, Third and Fifth Chapters to the Conclusion of the Exhibits of Symbolism of Changes of the Sixth Chapter

exhibits of the symbolism of the changes taking place from all of those of earlier chapters which can be considered only as materials of changes, that is, in other words, most of those Geometrical Exhibits in the first and second chapters, could be taken as of space, or of matter as it occupies space and those Physical Exhibits in the third chapter which is lately inserted, as of force while those of Astronomical Exhibits in the fifth chapter, as of time. To make the exhibits more complete, the writer has also newly added to the first and second chapters, EXHIBITS of the geometrical equivalent of algebraical formula of both the binomial cube and sixth power, and also of Analytic Geometry on Cartesian Coördinates in space, in explanation of YI symbols.

Just when I sent the work to the printers, I was rather fortunate and thankful in having received by the kind courtesy of Dr. H. Chatley his work in similar line, titled "The Chinese Mystical Philosophy in Modern Terms"



which I find is a very valuable piece to be added as Appendix to my work for the benefit of the readers, as mostly related to Physics. The work had been published in The China Journal of Science and Arts, and I have newly added a few illustrations. His work would be valuable quotations to mine, especially regarding the Sun and Earth in the sense of being the giver and receiver of the energy, and also the Kinetic and Potential energies described as Yang and Yin, to mine of the Astronomical exhibits, Part II and the example (B) of Remark XI, Part III respectively.

Exhibits of Yi Symbols assigned with various forms and graduations, other than the cubic one principally treated in this work, called 'YI SYMBOLS AS IMAGINARY GAUGES' will also be found in the Appendix.

## PART II

### THEIR EXHIBITS

# THEIR EXHIBITS

## CHAPTER I

### EIGHT TRIGRAMS

What really results when these Eight Trigrams are combined together as a whole?

The combination is a Binomial Third Power or a Binomial Cube.

The following diagrams will show how this conclusion is reached.

Diagrams Nos. 1 and 2 are Geometrical Exhibits:—

Shown in one is a cube described by Positive and Negative faces, and in the other by Positive and Negative lines, when these Eight Trigrams are combined. They are either eight constitutional positions, or parts, of the cube when they are taken separately.

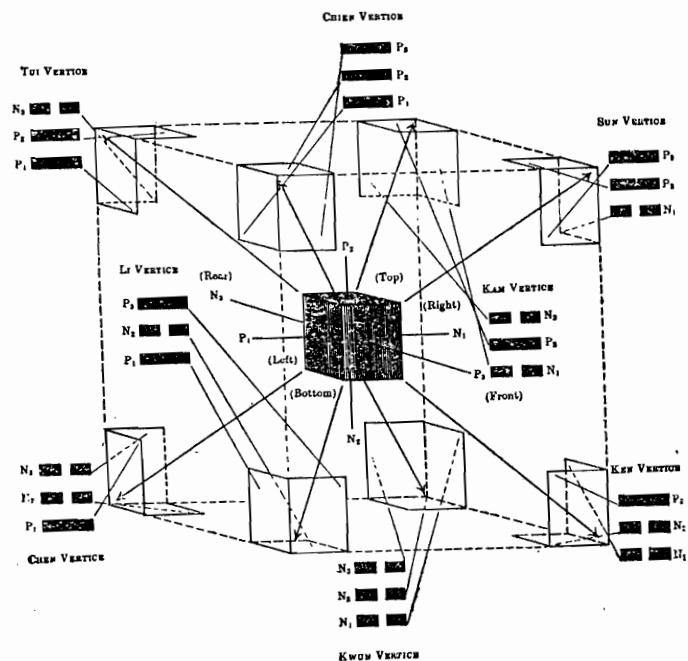
Diagrams Nos. 3 and 4 are Mathematical Exhibits:—

- (1) One is Algebraic and
- (1) the other Arithmetic (using arbitrary figures).

Diagrams Nos. 5 and 6 are other Geometrical Exhibits:—

- (1) One is by Octants of Analytic Geometry, and
- (1) the other, of the Geometrical Equivalent of the Algebraic Formula.

## GEOMETRICAL EXHIBIT (BY CUBICAL FACES)



- P = Positive (Yao, or Unbroken line)  
 N = Negative (Yao, or Broken line)  
 Yao = Line (or Elementary form of Yi Symbols)  
 1 = 1st (or Lower Yao position)  
 2 = 2nd (or Middle Yao position)  
 3 = 3rd (or Upper Yao position)

Fig. 1

## Description of the Diagram No. 1 (Geometrical Exhibit, by cubical faces)

This is to prove Eight Trigrams by the Positive and Negative faces of a cube, thus:—

Taking the three faces, namely, left, top and front which form half of a cube, to be called Positive Faces, and any one of these Positive Faces as... ..(The constitutional element of the symbol Trigram is called Yao).....Positive Yao (陽爻)

Taking the other three faces, namely, right, bottom and rear which form another half of the cube, to be called Negative Faces, and any one of these Negative Faces as.....Negative Yao (陰爻)

Taking the positions:—

Front and rear as.....Position of Upper Yao(上爻)

Top and bottom as.....Position of Middle Yao (中爻)

Left and right as.....Position of Lower Yao (下爻)

Taking the eight vertices of a cube as.....Eight Trigrams (八卦)

and any one of these vertices, say:—

the one having 3 Positive Faces as.....“Chien” Trigram (乾卦)

the one having 2 Positive Faces and 1 Negative if located in the middle as.....“Li” Trigram (離卦)

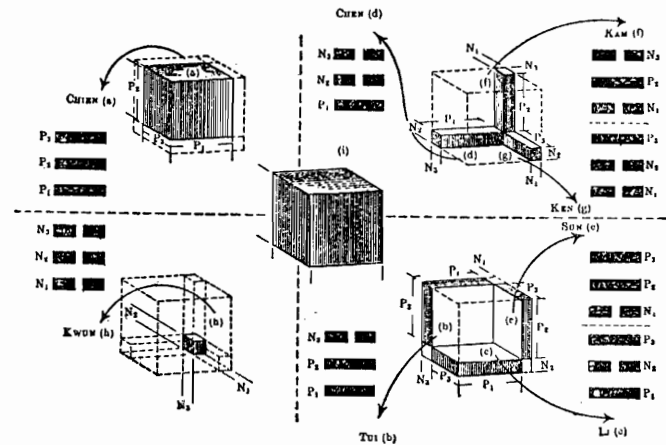
if located on the left as.....“Tui” Trigram (兌卦)

if located on the right as.....“Sun” Trigram (巽卦)

the one having 1 Positive and 2 Negative Faces  
 if located in the middle as....."Kam" Trigram  
 (坎卦)  
 if located on the left as....."Chen" Trigram  
 (震卦)  
 if located on the right as....."Ken" Trigram  
 (艮卦)  
 the one having 3 Negative Faces as....."Kwun"  
 Trigram (坤卦)  
 or as follows:—

<p>乾立角 CHIEN VERTICE</p> <p>Front (P<sub>3</sub>) — 前(陽☰)                      Top (P<sub>2</sub>) — 上(陽☰)                      Left (P<sub>1</sub>) — 左(陽☰)</p>	<p>兌立角 TUI VERTICE</p> <p>Rear (N<sub>3</sub>) — 後(陰☱)                      Top (P<sub>2</sub>) — 上(陽☰)                      Left (P<sub>1</sub>) — 左(陽☰)</p>
<p>離立角 LI VERTICE</p> <p>Front (P<sub>3</sub>) — 前(陽☲)                      Bottom (N<sub>2</sub>) — 下(陰☷)                      Left (P<sub>1</sub>) — 左(陽☰)</p>	<p>震立角 CHEN VERTICE</p> <p>Rear (N<sub>3</sub>) — 後(陰☷)                      Bottom (N<sub>2</sub>) — 下(陰☷)                      Left (P<sub>1</sub>) — 左(陽☰)</p>
<p>巽立角 SUN VERTICE</p> <p>Front (P<sub>3</sub>) — 前(陽☴)                      Top (P<sub>2</sub>) — 上(陽☰)                      Right (N<sub>1</sub>) — 右(陰☷)</p>	<p>坎立角 KAM VERTICE</p> <p>Rear (N<sub>3</sub>) — 後(陰☷)                      Top (P<sub>2</sub>) — 上(陽☰)                      Right (N<sub>1</sub>) — 右(陰☷)</p>
<p>艮立角 KEN VERTICE</p> <p>Front (P<sub>3</sub>) — 前(陽☶)                      Bottom (N<sub>2</sub>) — 下(陰☷)                      Right (N<sub>1</sub>) — 右(陰☷)</p>	<p>坤立角 KWUN VERTICE</p> <p>Rear (N<sub>3</sub>) — 後(陰☷)                      Bottom (N<sub>2</sub>) — 下(陰☷)                      Right (N<sub>1</sub>) — 右(陰☷)</p>

GEOMETRICAL EXHIBIT (BY CUBICAL EDGE LINES)



P = Positive (Yao, or Unbroken line)  
 N = Negative (Yao, or Broken line)  
 Yao = Line (or Elementary form of Yi Symbols)  
 1 = 1st (or Lower Yao position)  
 2 = 2nd (or Middle Yao position)  
 3 = 3rd (or Upper Yao position)

Fig. 2

Description of the Diagram No. 2 (Geometrical Exhibit, by cubical edge lines)

This is to prove Eight Trigrams by the Positive and Negative bisegments of the edge lines of a cube, thus:—

Taking the two bisegments of each edge line (as if A & B), to be called Positive and Negative Bisegments, and any of these Positive and Negative Bisegments as.....Positive and Negative Yaos (陽陰爻)

Taking the numeral 3 of the three edge lines in raising into a cubical power as.....The Number of Three of the Three Yaos (三爻的三)

Taking the parts of the diagram marked:—

- (a) as.....The Trigram "Chien" (乾卦) of 3 Positive Yaos  
 (h) as.....The Trigram "Kwun" (坤卦) of 3 Negative Yaos  
 (d), (f) & (g) as.....The three Trigrams, "Chen" (震卦), "Kam" (坎卦) & "Ken" (艮卦) respectively, each having 2 Negative and 1 Positive Yaos  
 (e), (c) & (b) as.....The three Trigrams, "Sun" (巽卦), "Li" (離卦) & "Tui" (兌卦) respectively, each having 2 Positive & 1 Negative Yaos

and (a) to (h) combined into one (i) in the middle, as.....The Eight Trigrams combined as One Whole (八卦合一)

or those parts defined in particular as follows:—

乾立體 CHIEN SOLID Width $A(P_3)$ — 闊A Depth $A(P_2)$ — 高A Length $A(P_1)$ — 長A	兌立體 TUI SOLID Width $B(N_3)$ — 闊B Depth $A(P_2)$ — 高A Length $A(P_1)$ — 長A
離立體 LI SOLID Width $A(P_3)$ — 闊A Depth $B(N_2)$ — 高B Length $A(P_1)$ — 長A	震立體 CHEN SOLID Width $B(N_3)$ — 闊B Depth $B(N_2)$ — 高B Length $A(P_1)$ — 長A
巽立體 SUN SOLID Width $A(P_3)$ — 闊A Depth $A(P_2)$ — 高A Length $B(N_1)$ — 長B	坎立體 KAM SOLID Width $B(N_3)$ — 闊B Depth $A(P_2)$ — 高A Length $B(N_1)$ — 長B
艮立體 KEN SOLID Width $A(P_3)$ — 闊A Depth $B(N_2)$ — 高B Length $B(N_1)$ — 長B	坤立體 KWUN SOLID Width $B(N_3)$ — 闊B Depth $B(N_2)$ — 高B Length $B(N_1)$ — 長B

Those translated side by side with Eight Trigram Symbols in the following diagram No. 3, when added together, will be found as the algebraic expression given below:—

$$(A+B)^3 = A^3 + 3A^2B + 3AB^2 + B^3$$

ALGEBRAIC EXHIBIT

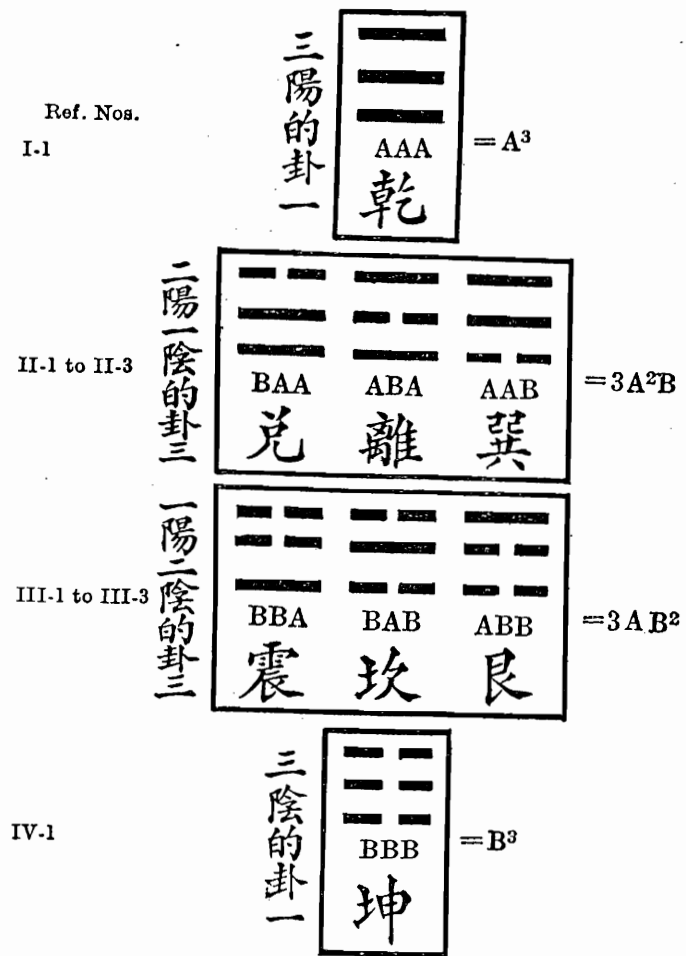


Fig. 3

A Translation of the Preceding Algebraic Exhibit

As indicated by the reference numbers and algebraic term translations, Legge's phonetically translated names, Joseph Edkins' names, and meanings of the various Trigrams are shown to be as follows:—

$$A^3$$

One Trigram of 3 positive Yaos  
(or term of 3 A factors):—

I-1 AAA Khien Chien The symbol of strength  
(or strengthening), of heaven,  
of father, of the head and of a  
horse (乾).

$$3A^2B$$

Three Trigrams of 2 positive and 1 negative Yaos  
(or terms of 2 A and 1 B factors):—

II-1 BAA Tui Tui The symbol of pleasure  
and satisfaction (or freeing),  
of marsh, of youngest daughter,  
of the mouth and of a  
sheep (兌).

II-2 ABA Li Li The symbol of what is  
bright (or separating), of fire,  
of the second daughter, of the  
eyes and of a pheasant (離).

II-3 AAB Sun Sun The symbol of penetrat-  
ing (or entering), of wind, of  
the oldest daughter, of the  
thighs and of a fowl (巽).

$3AB^2$ 

Three Trigrams of 1 positive and 2 negative Yaos  
(or terms of 1 A and 2 B factors):—

III-1 BBA Kan Chen The symbol of stimulus to  
movement (or moving), of  
thunder, of the oldest son, of  
the feet and of the dragon (震).

III-2 BAB Khan Kam The symbol of what is  
precipitous and perilous (or  
sinking), of water, of the  
second son, of the ears and of  
a pig (坎).

III-3 ABB Kan Ken The symbol of stoppage  
or arrest (or ceasing), of a  
mountain, of the youngest son,  
of the hands and of a dog (艮).

 $B^3$ 

One Trigram of 3 negative Yaos  
(or term of 3 B factors):—

IV-1 BBB Khwan Kwun The symbol of docility (or  
obeying), of earth, of the  
mother, of the belly and of an  
ox (坤).

The above eight algebraic terms, which agree in every  
respect with Trigrams shown in the second column, when  
summed up, being a cube of the binomial  $A+B$ , appear  
as below:—

$$A^3 + 3A^2B + 3AB^2 + B^3 = (A+B)^3$$

**Description Of The Diagram No. 3** (Algebraic Exhibit)

This is to translate the Eight Trigrams by the  
letters of the alphabet employed in Algebra, thus:—

Taking the binomial, a sum of the two numbers, the  
cubic root, as.....A combination of Positive  
and Negative Yaos (陽陰合爻)

Taking the letters to translate:—

(A) as.....Positive Yao (陽爻)

(B) as.....Negative Yao (陰爻)

Taking the exponent 3 of a third power as.....The  
Number of Positions of the three Yaos of a  
Trigram (三爻位的三)

Taking the eight products resulting from the expansion  
of the cube of a binomial, as.....The  
Eight Trigrams (八卦)

ARITHMETIC EXHIBIT (BY ARBITRARY FIGURES)

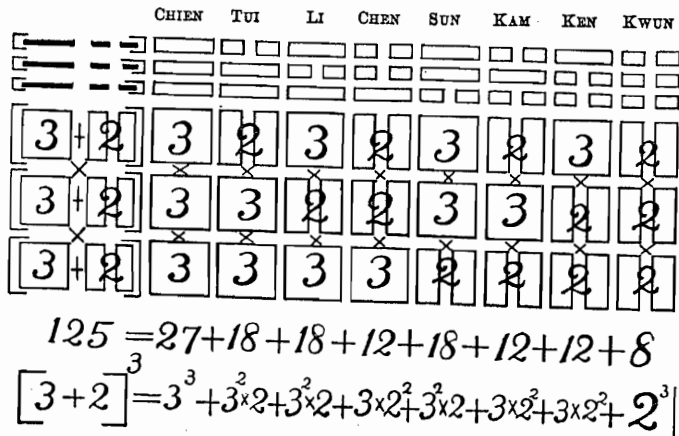


Fig. 4

Description Of The Diagram No. 4 (Arithmetic Exhibit, by arbitrary figures)

This is to check the Eight Trigram Symbols being afterward combined together as a Binomial Cube by using arbitrary arithmetic figures in place of their Yaos as one does in the similar algebraic expressions of the foregoing diagram No. 3, thus:—

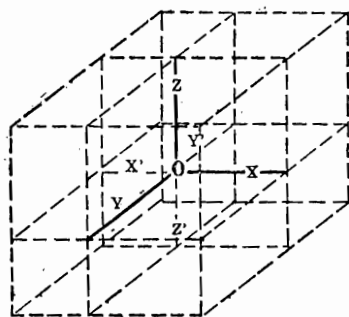
Taking the following arbitrary arithmetic figures as Yaos:—

- 3 as.....Positive Yao (陽爻)
- 2 as.....Negative Yao (陰爻)

By assigning figure 3 to the elementary Positive Yao symbols, 2 to Negative Yao symbols of all trigrams, then after the operation of the multiplication of the numbers in the each trigram, summing them up, the total of the sum is equal to the third power of the sum of 3 and 2.



ANALYTIC GEOMETRICAL EXHIBIT (BY OCTANTS)



The Octant O.X Z Y.



The Octant O.X' Z Y



The Octant O.X Z' Y



The Octant O.X' Z' Y



The Octant O.X Z Z' Y'



The Octant O.X' Z Z' Y'



The Octant O.X Z' Z' Y'



The Octant O.X' Z' Z' Y'



Fig. 5

Description of the Diagram No. 5 (Analytic Geometrical Exhibit, by Octants)

This is to prove Eight Trigrams by the Eight Octants of space in solid analytical geometry, thus:—

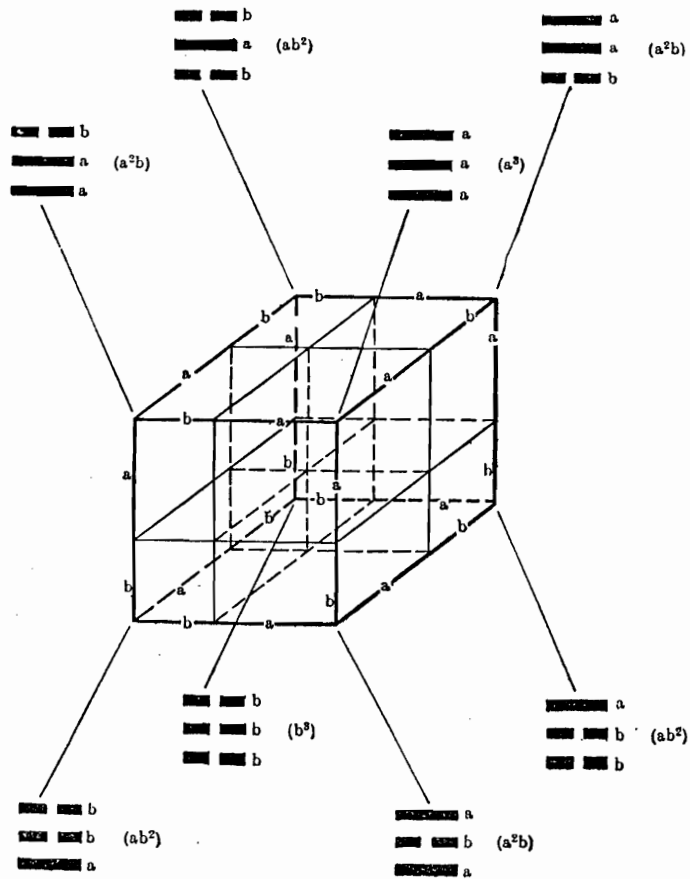
Taking the three Cartesian Coördinates in space x, z, and y to be.....The three Yao of the Upper, the Middle and the Lower positions

Taking the three Positive Coördinates X, Z, and Y (or x, z, and y) to be.....Yang Yao (—) or unbroken lines of the Upper, the Middle and the Lower positions respectively

Taking the three Negative Coördinates X', Z', and Y' (or -x, -z, and -y) to be.....Ying Yao (— —) or broken lines of the Upper, the Middle and the Lower positions respectively

Taking the Eight Octants to be.....The Eight Trigrams

EXHIBIT OF THE GEOMETRICAL EQUIVALENT OF THE ALGEBRAICAL FORMULA



$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 \quad \text{or}$$

$$(a+b)^3 = aaa + baa + aba + bba + aab + bab + abb + bbb$$

Fig. 6

Description of the Diagram No. 6 (Exhibit of the Geometrical Equivalent of the Algebraical formula)

This is to prove Eight Trigrams by the Geometrical Equivalent of the Algebraical Formula of the cube of the binomial  $A+B$ :—

Taking the eight component division-solids to be .....The Eight Trigrams

Taking the three segments of the bisected edge lines to be.....The three component lines or Yaos of a Trigram.

**CHAPTER II**  
**SIXTY-FOUR HEXAGRAMS**

What really results that when these Sixty-four Hexagrams are combined together as a whole?

The result is, of course, a Binomial Sixth Power and the following diagrams are to prove to this conclusion.

Diagram No. 7 is inferred from diagram No. 3:—

Shown correctly it is a binomial sixth power when the sixty-four hexagrams with their positive and negative Yaos, translated by algebraic letters A and B, are combined. They are the sixty-four products resulting from the expansion of the binomial sixth power when taken separately.

Those translated, side by side, with the sixty-four hexagrams in the following diagram when summed up, will appear to be the following algebraic expression:—

$$(A+B)^6 = A^6 + 6A^5B + 15A^4B^2 + 20A^3B^3 + 15A^2B^4 + 6AB^5 + B^6$$

Diagrams Nos. 8 to 19 are of the Geometrical Equivalent of the Algebraical Formula of the sixth power of the binomial A+B, inferred from No. 7, and developed indirectly from that of the third power of the quadri-nomial AA+BA+AB+BB. They are in particular as follows:—

1. Diagram No. 8 shows the sixty four products of its expansion being classified into eight Divisions of eight Subdivisions each.

1. Diagram No. 9. presents one of these Divisions and two of its own Subdivisions with the explanations of their relation to the lines of the Hexagrams, indirectly through those other ones, serving as illustrating examples for the rest.
1. Diagrams Nos. 10 and 11 point out respectively the eight varieties of those Divisions, and of their Subdivisions.
1. Diagrams Nos. 12 to 19 exhibit in complete scale and each in particular of those Divisions and their respective Subdivisions with similar explanations to follow as in the preceding diagram No. 9.
1. Diagrams Nos. 20 and 21 to 22 show 64 Hexagrams in the form of a cube of three quadri-nomial dimensions, and that of a product of the cube by itself of three binomial dimensions respectively.

ALGEBRAIC EXHIBIT

Ref. Nos.

A-1

B-1 to B-6

C-1 to C-15

D-1 to D-20

E-1 to E-15

F-1 to F-6

G-1

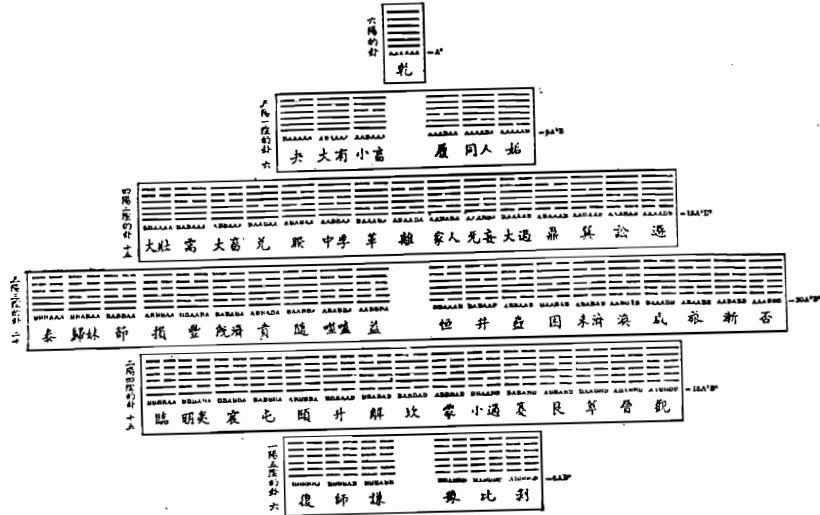


Fig. 7

SIXTY-FOUR HEXAGRAMS

A Translation Of The Preceding Algebraic Exhibit

Showing the reference numbers, algebraic term translations, Legge's phonetically translated names, Joseph Edkins' names and the meanings interpreted by the latter, of the various hexagrams as follows:—

$A^6$				
	One	Hexagram of 6 positive Yaos (or term of 6 A factors):—		
A1	AAAAAA	Khien	C'hien	The Kwa (or Hexagram) of firmness symbolizes heaven (乾).
$6A^5B$				
	Six	Hexagrams of 5 positive and 1 negative Yaos (or terms of 5 A and 1 B factors):—		
B1	BAAAAA	Kwai	Kwai	The Kwa of decision (夬),
B2	ABAAAA	Tayu	Tayeu	The Kwa of great possession (大有),
B3	AABAAA	Hsiaokhu	Siotok	The Kwa of small restraint (小畜),
B4	AAABAA	Li	Li	The Kwa of stepping carefully (履),
B5	AAAABA	Thungzan	T'ungnin	The Kwa of companionship (同人),
B6	AAAAAB	Kau	Keu	The Kwa of meeting (姤).

15A<sup>4</sup>B<sup>2</sup>

Fifteen Hexagrams of 4 positive and 2 negative Yaos  
(or terms of 4 A and 2 B factors):—

C1	BBAAAA	Takwang	Tachwang	The Kwa of great vigour (大壯),
C2	BABAAA	Hsü	Sü	The Kwa of waiting (需),
C3	ABBAAA	Takhu	Ta'chu	The Kwa of great accumulation (大畜),
C4	BAABAA	Tui	Tui	The Kwa of joy (兌).
C5	ABABAA	Khwei	Kw'ei	The Kwa of strangeness and disunion (睽),
C6	AABBAA	Kungfu	Chungfu	The Kwa of central sincerity (中孚),
C7	BAAABA	Ko	Kek	The Kwa of change (革),
C8	ABAABA	Li	Li	The Kwa of brightness and of separateness (離),
C9	AABABA	Kiazan	Kianin	The Kwa of the family (家人),
C10	AAABBA	Wuwang	Momong	The Kwa of freedom from error (无妄),
C11	BAAAAB	Takwo	Takwo	The Kwa of great passing (大過),
C12	ABAAAB	Ting	Ting	The Kwa of the caldron (鼎),
C13	AABAAB	Sun	Sun	The Kwa of bending to enter (巽),
C14	AAABAB	Sung	Sung	The Kwa of contention (訟),
C15	AAAABB	Thun	T'un	The Kwa of retirement (遯).

20A<sup>3</sup>B<sup>3</sup>

Twenty Hexagrams of 3 positive and 3 negative Yaos  
(or terms of 3 A and 3 B factors):—

D1	BBBAAA	Thai	T'ai	The Kwa of successfulness (泰),
D2	BBABAA	Kweimei	Kweimei	The Kwa of the marriage of the younger sister (歸妹),
D3	BABBAA	Kieh	Tsie	The Kwa of restrictive regulations (節),
D4	ABBBAA	Sun	Sun	The Kwa of lessening (損),
D5	BBAABA	Fang	Feng	The Kwa of prosperity (豐),

D6	BABABA	Kizi	Kitsi	The Kwa of what is already past (既濟),
D7	ABBABA	Pi	Pi	The Kwa of decoration (賁),
D8	BAABBA	Sui	Sui	The Kwa of following (隨),
D9	ABABBA	Shihho	Shiho	The Kwa of mastication and punishment by pressing and squeezing (噬嗑),
D10	AABBBA	Yi	Yi	The Kwa of addition (益),
D11	BBAAAB	Hang	Heng	The Kwa of constancy (恒),
D12	BABAAB	Zing	Tsing	The Kwa of the well (井),
D13	ABBAAB	Ku	Ku	The Kwa of destruction (蠱),
D14	BAABAB	Khwan	K'wun	The Kwa of repression and confinement (困),
D15	ABABAB	Weizi	Weitsi	The Kwa of what is not yet past (未濟),
D16	AABBAB	Hwan	Hwan	The Kwa of dispersion (渙),
D17	BAAABB	Hsien	Hiem	The Kwa of exerting influence (咸),
D18	ABAABB	Lu	Lü	The Kwa of traveller (旅),
D19	AABABB	Kien	Tsien	The Kwa of progressive advance (漸),
D20	AAABBB	Phi	Pi	The Kwa of closing (否).

15A<sup>2</sup>B<sup>4</sup>

Fifteen Hexagrams of 2 positive and 4 negative Yaos  
(or terms of 2 A and 4 B factors):—

E1	BBBBAA	Lin	Lin	The Kwa of advance and arrival (臨),
E2	BBBABA	Ming-i	Ming-yi	The Kwa of the appearance of clear intelligence wounded (明夷),
E3	BBABBA	Kan	Chen	The Kwa of startling movement (震),
E4	BABBBAA	Kun	Chun	The Kwa of bursting (屯),
E5	ABBBBB	I	Yi	The Kwa of the cheek and of nourishment (頤),
E6	BBBAAB	Shang	Sheng	The Kwa of rising and advancing (升),
E7	BBABAB	Kieh	Chie	The Kwa of loosening (解),
E8	BABBAB	Khan	K'am	The Kwa of sinking (坎),

E9	ABBBAB	Mang	Meng	The Kwa of covering (蒙),
E10	BBAABB	Hsiaokwo	Siaukwo	The Kwa of excess in small things (小過),
E11	BABABB	Kien	Kien	The Kwa of difficulty (蹇),
E12	ABBABB	Kan	Ken	The Kwa of checking and stopping (艮),
E13	BAABBB	Khui	Ts'ui	The Kwa of gathering into one (萃),
E14	ABABBB	Zin	Tsin	The Kwa of forwardness (晉),
E15	AABBBB	Kwan	Kwan	The Kwa of steady observation (觀).

6AB<sup>5</sup>

Six Hexagrams of 1 positive and 5 negative Yaos  
(or terms of 1 A and 5 B factors):—

F1	BBBBBA	Fu	Fu	The Kwa of returning (復),
F2	BBBBAB	Sze	Shi	The Kwa of multitude and of army (師),
F3	BBBABB	Khien	K'im	The Kwa of humility (謙),
F4	BBABBB	Yu	Yu	The Kwa of harmonious joy (豫),
F5	BABBBB	Pi	Pi	The Kwa of subaltern assistance (比),
F6	ABBBBB	Po	Po	The Kwa of falling or flaying (剝).

B<sup>6</sup>

One Hexagram of 6 negative Yaos  
(or term of 6 B factors):—

G1	BBBBBB	Khwan	Kwun	The Kwa of submission symbolizes earth (坤).
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The above sixty-four algebraic terms which agree in every respect with the Hexagrams shown in the second column, when summed up, being a sixth power of the binomial A+B, appear as shown below:—

$$A^6 + 6A^5B + 15A^4B^2 + 20A^3B^3 + 15A^2B^4 + 6AB^5 + B^6 = (A+B)^6$$

## Description of the Diagram No. 7 (Algebraic Exhibit)

This is to translate the Sixty-four Hexagrams by using the letters of the alphabet as employed in Algebra, thus:—

Taking the binomial, the root of a sixth power, as...A combination of Positive and Negative Yaos (陽陰合爻)

Taking the letters to translate Yaos as follows:—

(A) as.....Positive Yao (陽爻)

(B) as.....Negative Yao (陰爻)

Taking the exponent 6 of a sixth power as.....

The number of Positions of the six Yaos of a hexagram (六爻位的六)

Taking the sixty-four products resulted from the expansion of the sixth power of a binomial, as.....The Sixty-four Hexagrams (六十四卦)

EXHIBITS OF THE GEOMETRICAL EQUIVALENT OF THE ALGEBRAICAL FORMULA

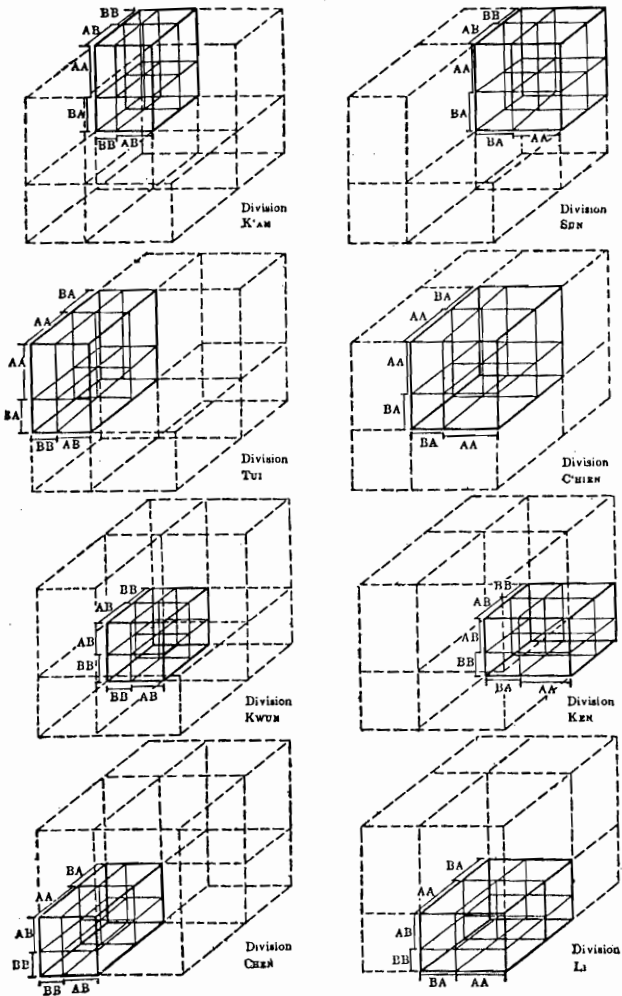
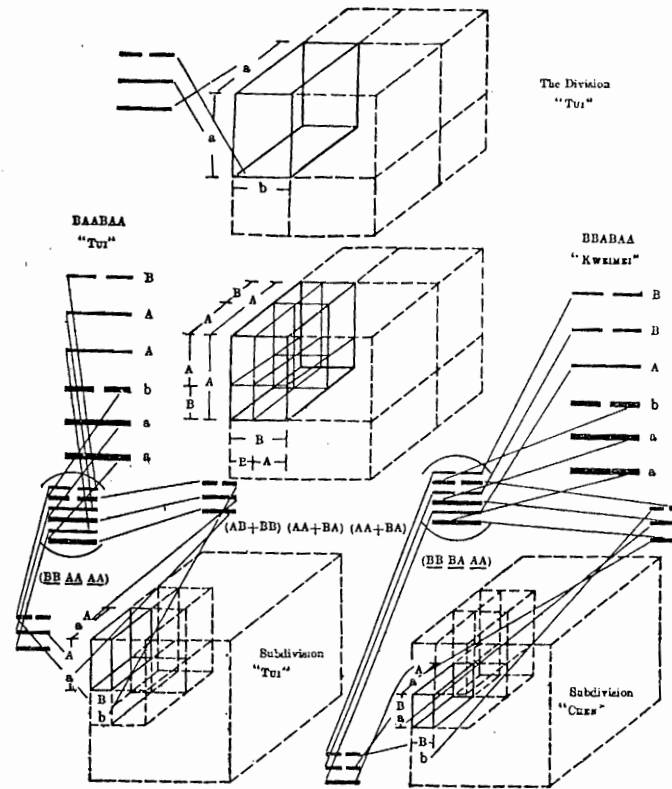


Fig. 8



The development of the above two Hexagrams from those in parentheses is similar to that of the binomial from quadrinomial dimensions.

Fig. 9

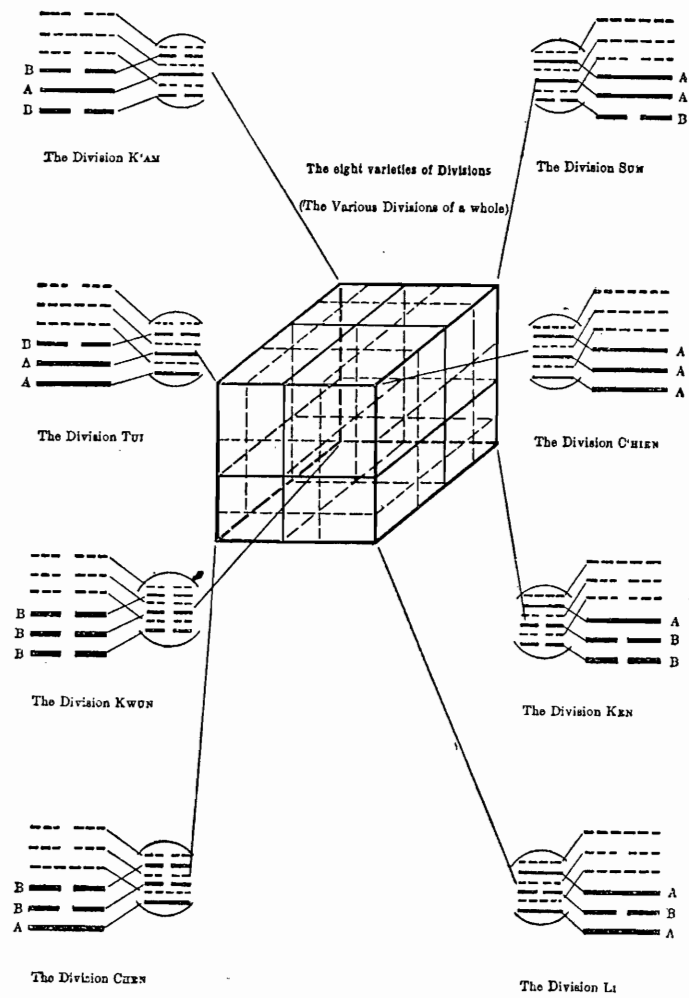


Fig. 10

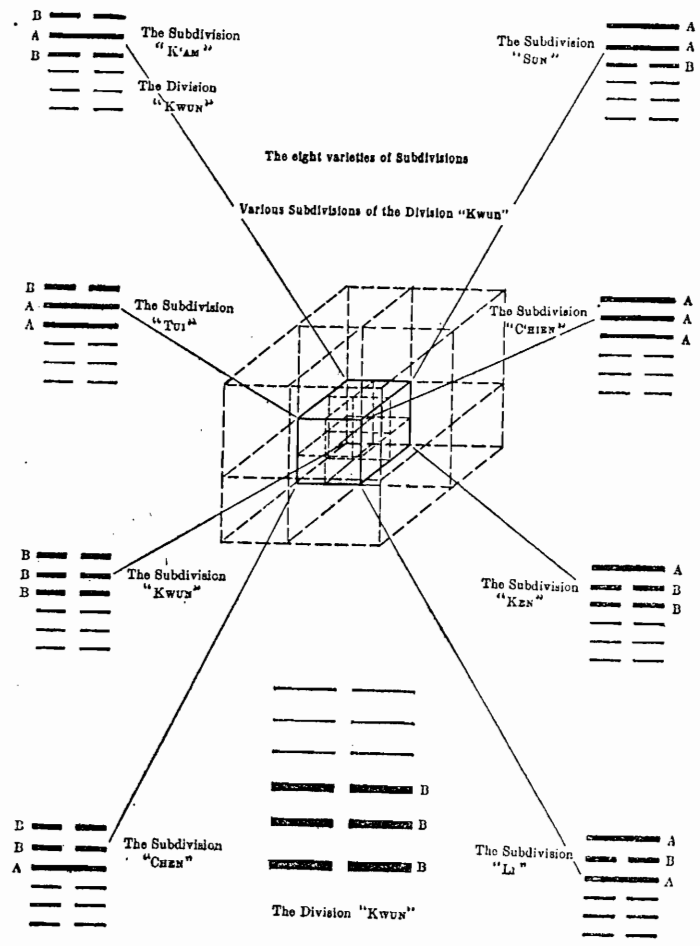


Fig. 11



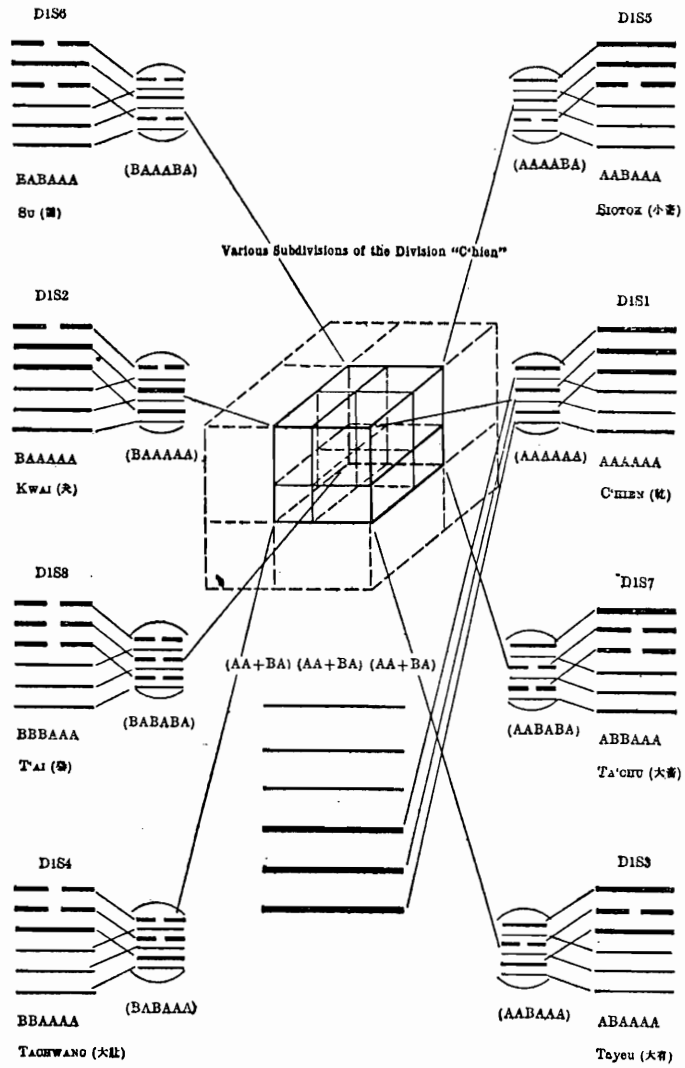


Fig. 12

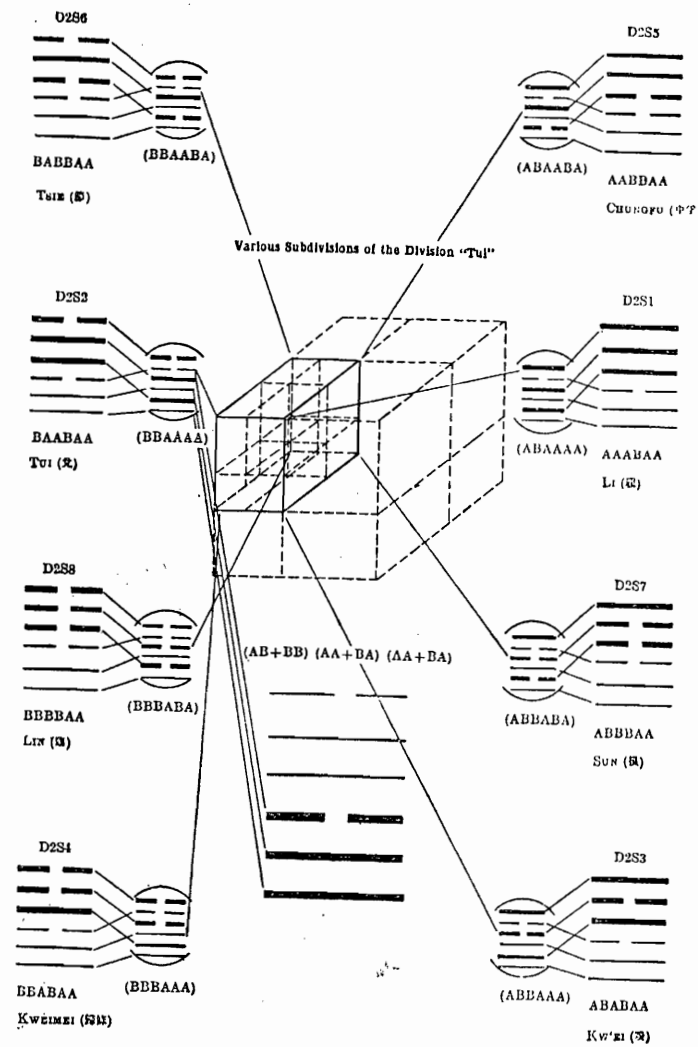


Fig. 13

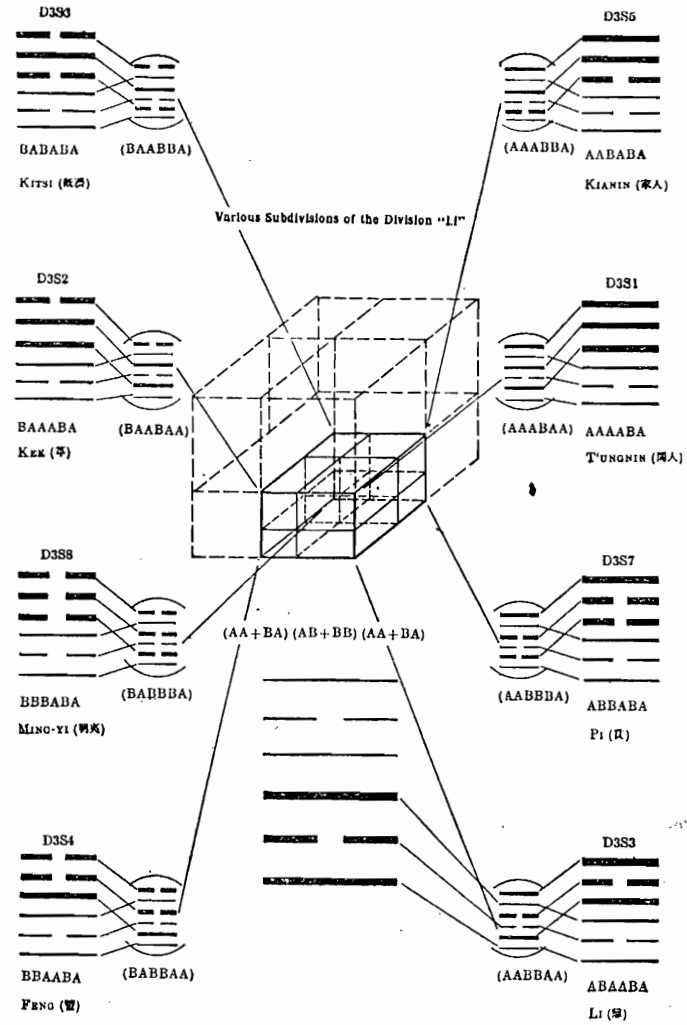


Fig. 14

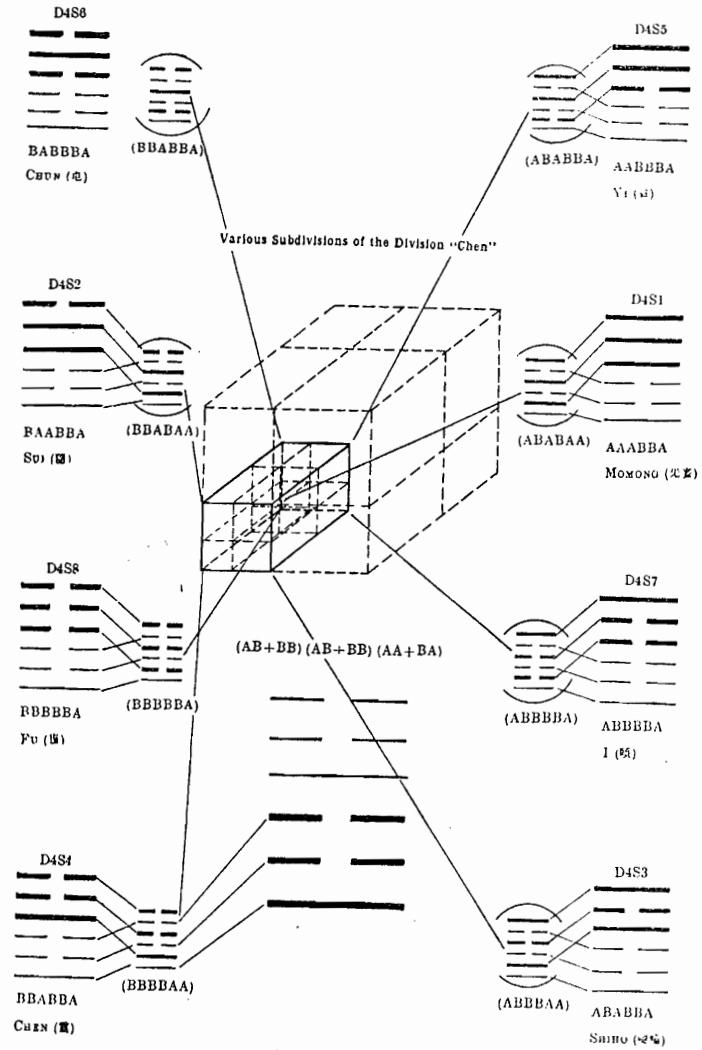


Fig. 15

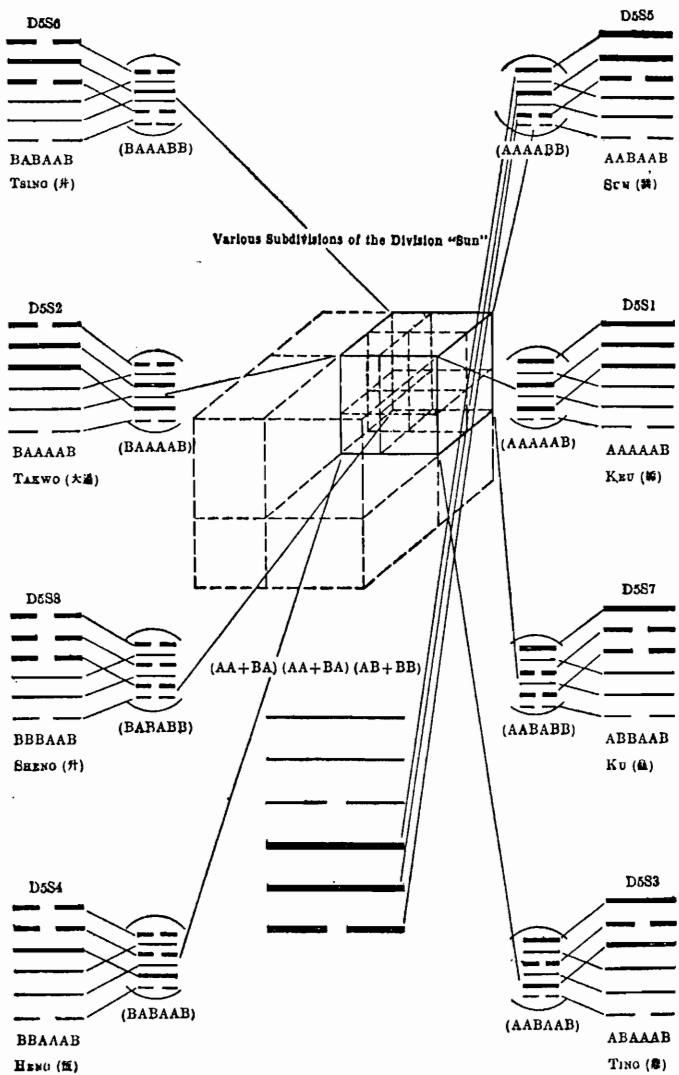


Fig. 16

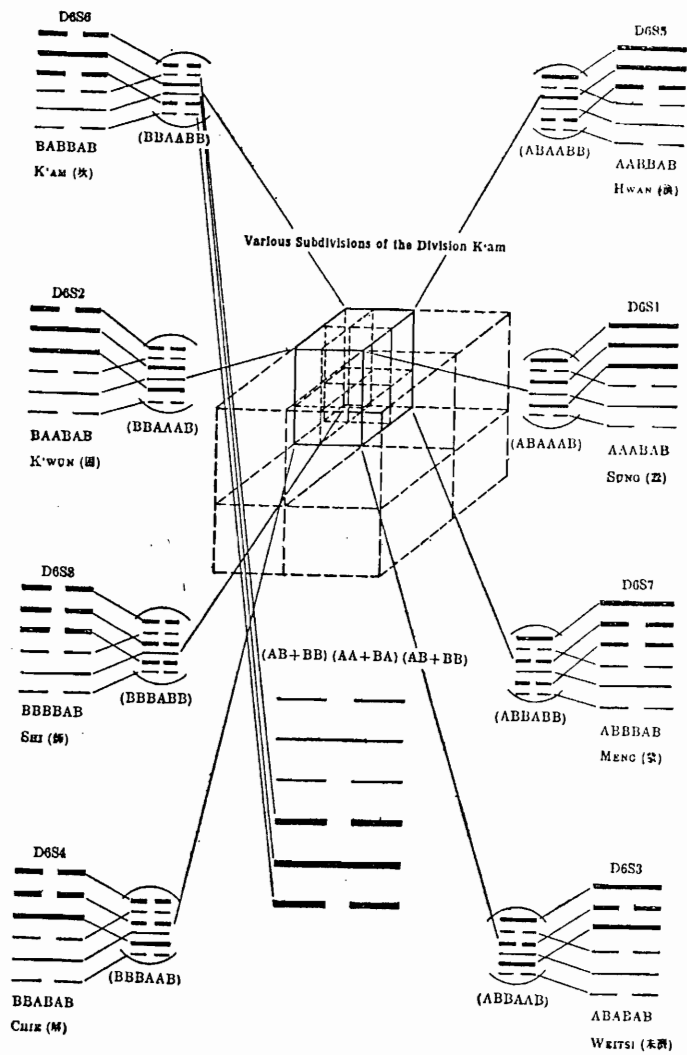


Fig. 17

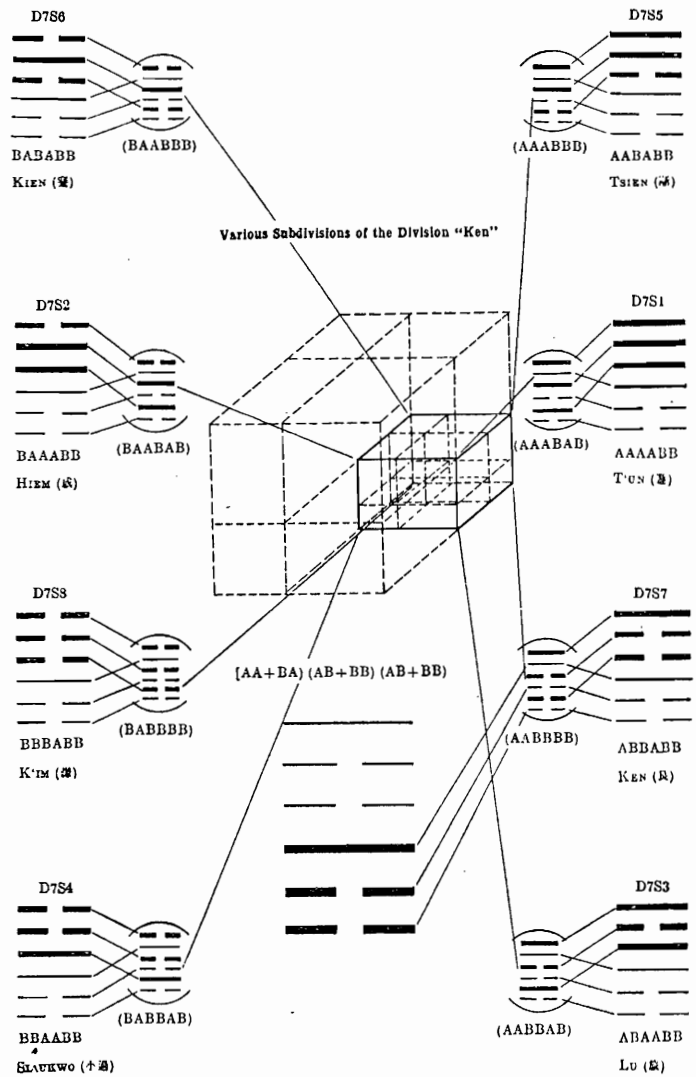


Fig. 18

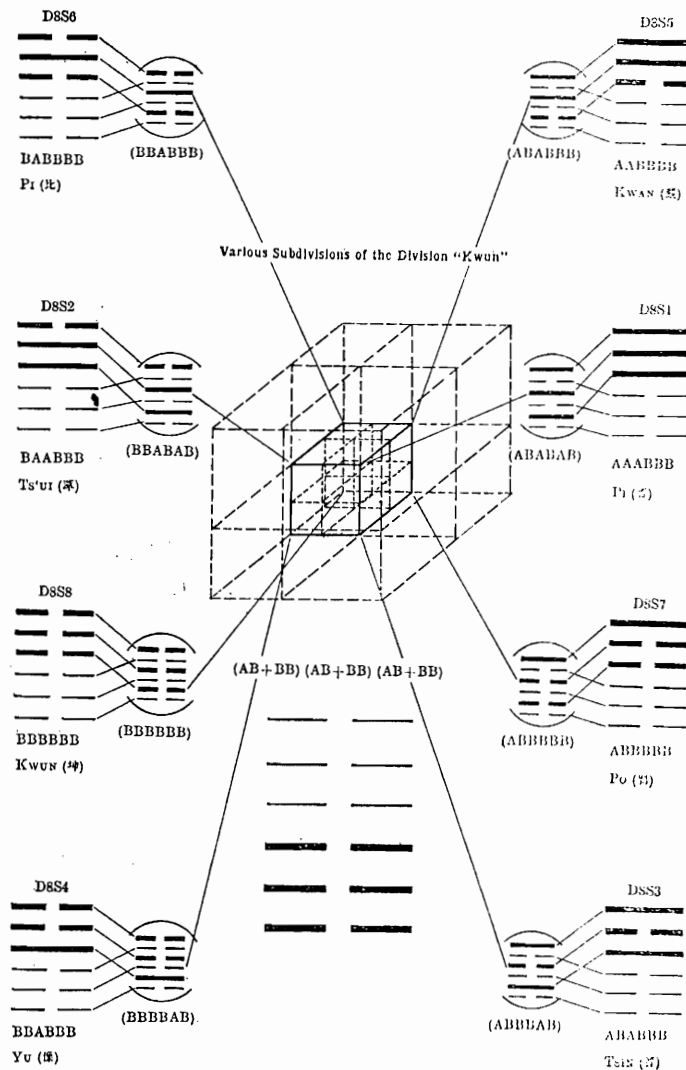
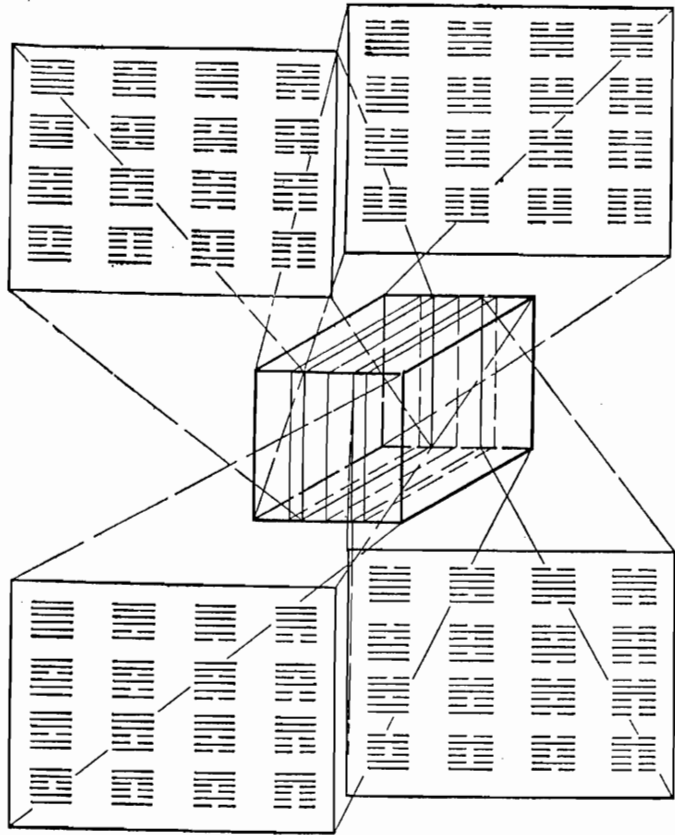
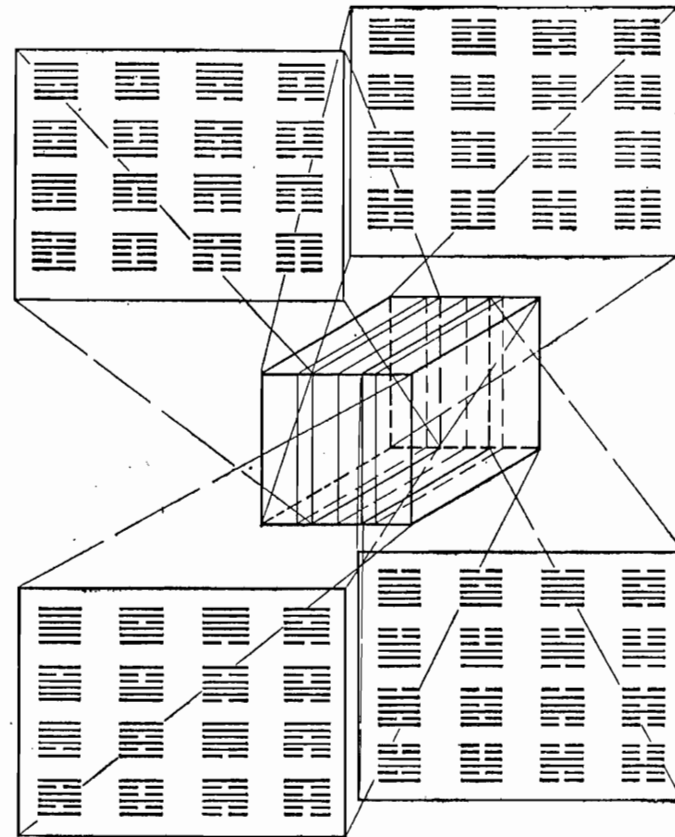


Fig. 19



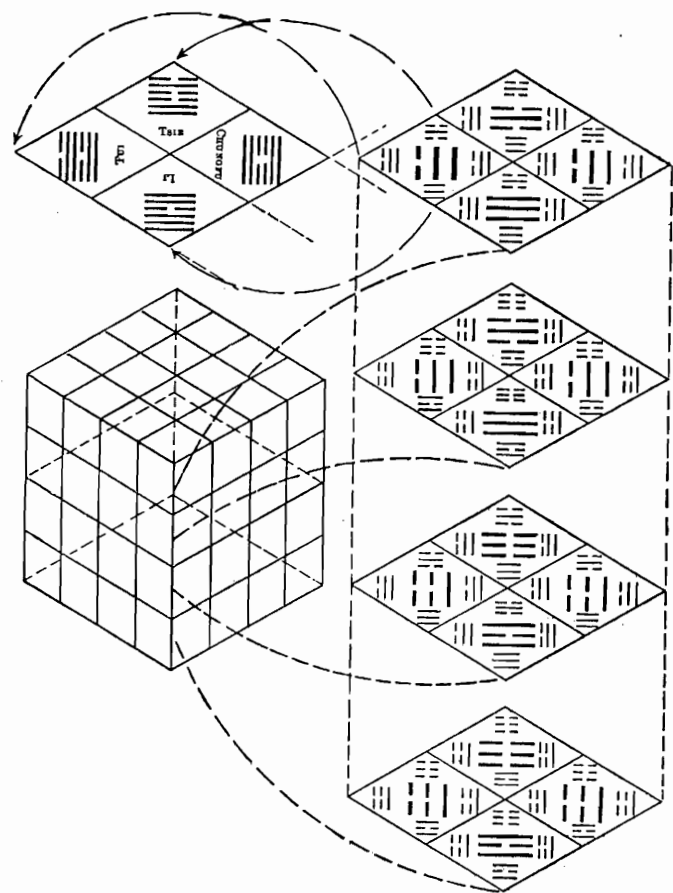
The cube of three quadrinomial dimensions

Fig. 20



The product of a binomial cube by itself

Fig. 21



The product of a binomial cube by itself

Fig. 22

**Description of the Diagrams Nos. 8 to 22** (Exhibits of the Geometrical Equivalent of the Algebraical formula)

This is to prove Sixty-four Hexagrams by the Geometrical Equivalent of the Algebraical formula of the sixth power of the binomial  $A+B$  or of the product of a binomial cube by itself, indirectly, through that, of the cube of the quadrinomial  $AA+BA+AB+BB$ , thus:—

**Diagram No. 8**

Taking the eight division-solids of eight subdivision-solids each to be.....The eight groups of eight Hexagrams each

**Diagram No. 9**

As illustrating example, taking the two subdivision-solids or outer Trigrams, 'Tui' and 'Chen' belonging to their division-solid or inner Trigram 'Tui,' or two of products of the binomial sixth power developed from quadrinomial cube to be .....The Hexagrams 'Tui' and 'Kweimei' respectively

**Diagram No. 10**

Taking the eight varieties of the Division-solids to be .....The Eight Inner Trigrams of Hexagrams

**Diagram No. 11**

Taking the eight varieties of the Subdivision-solids to be.....The Eight Outer Trigrams of Hexagrams

**Diagrams Nos. 12 to 19**

As these eight diagrams are the particulars of the diagram No. 8, each exhibiting one of the eight division-solids, being composed of eight subdivision-solids each, and each of the last bears its own algebraical expression and also index number (with the letters D and S signifying Division and Subdivision respectively, and consecutive numbers from 1 to 8 representing the order of the eight Trigrams as from 'Chien,' 'Tui,' 'Li,' 'Chen,' 'Sun,' 'Kam,' 'Ken,' to 'Kwun' (the eighth), they show completely.....The Sixty-four Hexagrams

**Diagrams Nos. 20 to 22**

Taking those various Subdivision-solids of the various Division-solids as detailed in those diagrams Nos. 12 to 19, like the various products of the expansion of either a cube of quadrimomial (seen in the diagram No. 20) or of the sixth power of binomial (seen in the diagrams Nos. 21 and 22) combined together into one whole to be.....  
A collection of the Sixty-four Hexagrams

**CHAPTER III****Sixty Four Hexagrams**

What is their use in Physics?

One of the uses of these symbols is the symbolic expression of directions and graduations of the component lines in the *Composition and Resolution of Forces* as shown in the following diagrams:—

Diagram No. 22A is a Physical Exhibit:—

Showing an interwoven plane of Sixty-four Hexagrams (i.e., Hexagram is a combination of two Trigrams or figures of three lines each) formed from two series of Eight Trigrams arranged at right angles to each other, in a parallelogram of forces resulting from two components of different directions.

Diagram No. 22B is a Physical Exhibit:—

Showing an interwoven solid of Sixty-Four Hexagrams (i.e., Hexagram is also a combination of three Emblematic-symbols or figures of two lines each) formed from three series of Four Emblematic Symbols arranged to meet at right angles, in a parallelepiped of forces resulting from three components of different directions.

PHYSICAL EXHIBITS  
(BY COMPOSITION AND RESOLUTION OF FORCES)

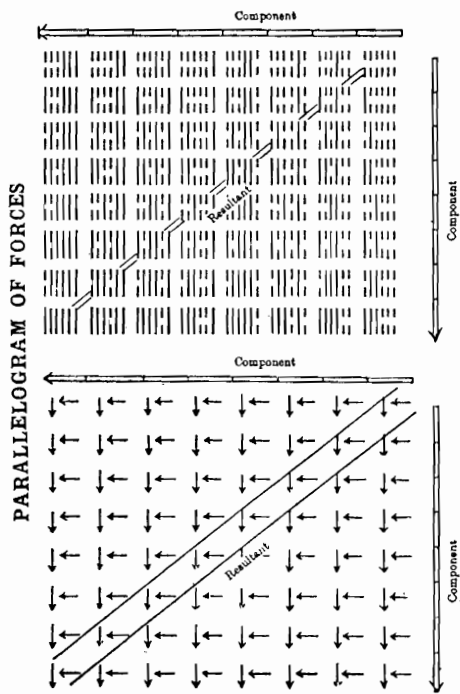


Exhibit of a directed and graduated line of a polynomial of eight terms in EIGHT TRIGRAMS



Fig. 22A

Description of the Diagram No. 22A (Physical Exhibit, by parallelogram of forces)

This represents an interwoven plane of Sixty-four Hexagrams by a parallelogram of forces of sixty four divisions, thus:—

Taking any one of the two component directed and graduated lines of forces as.....

.....A series of Eight Trigrams in lineal arrangement (i.e., 八卦橫圖)

Taking any one of these lines of forces again as.....

.....A plane of force in one direction and two of them at right angles to each other as.....Two planes of forces of different directions interwoven at right angles to each other.

Taking the sixty four sixty-fourths of this parallelogram of forces as.....Sixty Four Hexagrams.

Taking one of the components of any one of these sixty-fourths of parallelogram to be symbolized as.....

.....The Upper Trigram (or a figure of three lines) of a Hexagram and the other component as.....The Lower Trigram (or a figure of three lines) of the

same Hexagram since a Hexagram is a figure composed of six lines or two figures of three lines each.



PHYSICAL EXHIBIT  
(BY COMPOSITION & RESOLUTION OF FORCES)  
PARALLELOPIPED OF FORCES

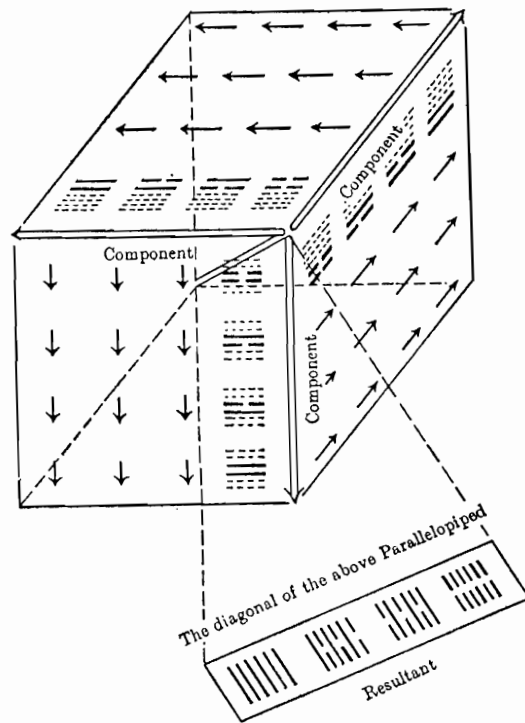


Exhibit of a directed and graduated line of a ploynomial of four terms in FOUR EMBLEMATIC-SYMBOLS

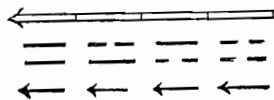


Fig. 22B

Description of the Diagram No. 22B (Physical Exhibit, by parallelopiped of forces)

This represents an interwoven solid of Sixty-four Hexagrams by a parallelopiped of forces of sixty four divisions, thus:—

Taking any one of the three component directed and graduated lines of forces as.....  
.....A series of Four Emblematic-Symbols in lineal arrangement (i.e., 四象横圖)

Taking any one of these lines of forces again as.....  
.....A plane of force in one direction and three of them meeting at right angles as.....  
.....Three planes of forces of different directions met and interwoven at right angles.

Taking the sixty four sixty-fourths of this parallelopiped of forces as.....  
.....Sixty Four Hexagrams

Taking the one of the components of any one of these sixty-fourths to be symbolized as.....  
.....The Upper Emblematic-symbol (or a figure of two lines) of a Hexagram, the other and the third components as.....  
.....The Middle and the Lower Emblematic-symbols (or figures of two lines each) of the same Hexagram respectively since a Hexagram is a figure composed of six lines or of three figures of two lines each.

CHAPTER IV

A Whole System of the Symbols Of Yi King

What are their uses in Logic?

The uses of the Eight Trigrams and the Sixty-four Hexagrams in Syllogisms are its Figures and Moods respectively while those of the Eight Trigrams and the earlier and earliest series of the primary Yi Symbols of the system in Divisions are the corresponding series of species of a Genus, and the following diagrams are to prove this conclusion.

Diagrams Nos. 23 and 24 are Logical Exhibits :—

Showing in one that the use of the Eight Trigrams in Syllogism is that of Figures, and in another that the use of the Sixty-four Hexagrams in Syllogism is that of Moods but that the principle assigned to the pair of symbols of the Positive and Negative Yaos or lines in one as representing the Directions Of Order, is different from that to the same pair in another as representing Kinds, has to be carefully noted.

Diagrams Nos. 25A-C are also Logical Exhibits :—

Showing the system of kinds of Divisions of Genus into species interpreted into the system of series of the symbols of Yi King including the Eight Trigrams and the earlier and earliest series of primary Yi symbols.

EIGHT TRIGRAMS

LOGICAL EXHIBIT (BY FIGURES OF SYLLOGISM)

The Four Figures of Syllogism with unconverted conclusion

	1st Fig.	2nd Fig.	3rd Fig.	4th Fig.
Major Premise	——— YX	——— XY	——— YX	——— XY
Minor Premise	——— ZY	——— ZY	——— YZ	——— YZ
Conclusion	——— ZX	——— ZX	——— ZX	——— ZX

The Four Figures of Syllogism with converted conclusion

	1st Fig.	2nd Fig.	3rd Fig.	4th Fig.
Major Premise	——— YX	——— XY	——— YX	——— XY
Minor Premise	——— ZY	——— ZY	——— YZ	——— YZ
Conclusion	——— XZ	——— XZ	——— XZ	——— XZ

DEFINITIONS

The Unconverting signifying symbol. = ———→ = ———  
 The Converting signifying symbol = ———← = ———

	Unconverted	Converted
Major Premise	——— YX	——— XY
Minor Premise	——— ZY	——— YZ
Conclusion	——— ZX	——— XZ

X.....to denote.....The Major term  
 Y.....,, ,, .....The Middle term  
 Z.....,, ,, .....The Minor term

Fig. 23

**Description of the Diagram No. 23 (Logical Exhibit, by figures of syllogism)**

This is to prove Eight Trigrams by the four figures of each mood of the syllogism with unconverted conclusion, and by four of those with converted conclusion, thus :—

Taking the three syllogistic propositions :—the major premise, the minor premise, and the conclusion, formerly as the top two lines, the middle two, and bottom two of the 6-line figure symbol of a Hexagram as described in the following exhibit, now respectively as.....The top one line, the middle one line, and the bottom one line of the 3-line figure symbol of a Trigram

Taking the syllogism formed by a triplet of the said three propositions, as.....The Trigram

Taking the signifying symbol of unconverted, like an arrow mark in positive direction, and that of converting, like an arrow mark in negative direction, of any one of the syllogistic propositions, respectively to be.....  
 .....The Positive Yao (—),  
 .....The Negative Yao (— —).

**SIXTY FOUR HEXAGRAMS**

**LOGICAL EXHIBIT (BY 64 MOODS OF LOGICAL SYLLOGISM)**

AAA	IAA	OAA	EAA	AIA	IIA	OIA	EIA
AOA	IOA	OOA	EOA	AEA	IEA	OEA	EEA
AAI	IAI	OAI	EAI	AII	III	OII	EII
AOI	IQI	OOI	EOI	AEI	IEI	OEI	EEI
AAO	IAO	OAO	EAO	AIO	IIO	OIO	EIO
AOO	IOO	OOO	EOO	AEO	IEO	OEO	EEO
AAE	IAE	OAE	EAE	AIE	IIE	OIE	EIE
AOE	IOE	OOE	EOE	AEE	IEE	OEE	EEE

Fig. 24

Description of the Diagram No. 24 (Logical Exhibit, by moods of syllogism)

This is to prove Sixty-four Hexagrams by the moods of arranging propositions into syllogisms, thus:—

Taking the three propositions:—the major premise, the minor premise, and the conclusion, as..... The top two lines, the middle two lines, and the bottom two lines of the figure symbol of Hexagram.

Taking the syllogism formed by a set of the said three propositions, as.....The Hexagram.

Taking the four logical symbols:—A, I, O, E, indicating the four distinct kinds of propositions, namely, the universal affirmative, the particular affirmative, the particular negative, and the universal negative; translated algebraically in letters of the alphabet in the foregoing diagram No. 7 as AA, BA, AB, BB; now respectively as.....

The Four Emblematic Symbols, namely:—

The Greater Yang (or Positive) ≡≡

The Smaller Yin (or Negative) ≡≡

The Smaller Yang (or Positive) ≡≡

The Greater Yin (or Negative) ≡≡

Taking the sixty four moods of arranging the said four distinct kinds of propositions into syllogisms, or combinations of three each of their four symbols:—A, I, O, E, or terms of products of the expansion of (A I O E)<sup>3</sup>, or of (AA BA AB BB)<sup>3</sup>, as of (≡≡+≡≡+≡≡+≡≡)<sup>3</sup>, i.e., AAA IAA OAA EAA etc., etc., (moods of syllogism), AAAAAA BAAAAA ABAAAA BBAAAA etc., etc., (terms of products of the expansion of a quadrinomial cube, as converted from a binomial sixth power formerly algebraically translated), respectively as.....

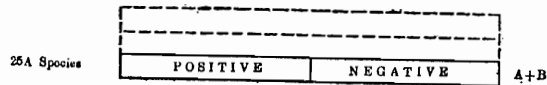
... ≡≡≡ ≡≡≡ ≡≡≡ ≡≡≡ etc., etc., (Hexagrams).

EIGHT TRIGRAMS AND THE EARLIER SYSTEM OF YI SYMBOLS

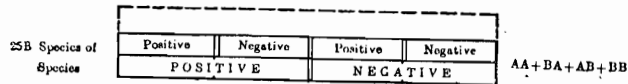
LOGICAL EXHIBITS (BY THE DIVISIONS OF GENUS TO SPECIES ACCORDING TO DICOTOMY &c.)

(Development from bottom upward)

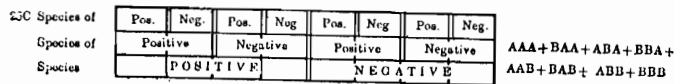
The Division by Dichotomy



The Division by Tetrachotomy

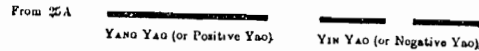


The Division by Octochotomy

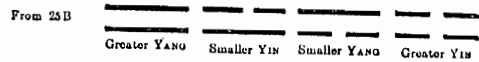


(Development of the above system into the following one with lines in unbroken and broken forms)

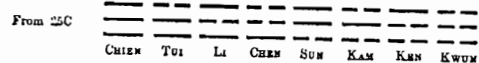
The Two Elementary Forms of Yi



The Four Emblematic Symbols of Yi



The Eight Trigrams of Yi



The Yi

YI.—Shows a CHANGE as the Genus, or its two alternately changing factors, SUN and NOT(-SUN) or MOON (the most prominent of the NOT(-SUN) as its SPECIES.

Fig. 25A-C

Description of the Diagrams Nos. 25A-C (Logical Exhibits, by the divisions of Genus into species as by Dichotomy, etc.)

This is to prove Eight Trigrams, Four Emblematic Symbols, and Two Elementary Forms of Yi by the respective series of Species of the Genus divided by the Logical processes, thus :—

Taking the series of species of the Genus, divided by a process called by the writer as Octochotomy, that of those by Tetrachotomy, and that of those by Dichotomy, respectively to be as.....Eight Trigrams, Four Emblematic Symbols, & Two Elementary Forms.

Taking the whole system of the Exhaustive Division, or Dichotomy, to be as.....The whole system of the gradual developments of Yi or a pair of Positive and Negative Yaos or lines.

Taking the Genus to be the Dividend and series of the Species, its respective Divisors as of logic, so also the corresponding number-symbols in letters of alphabet, viz., X, the Dividend, and those A+B, AA+BA+AB+BB, etc., its Divisors as of algebra, finally so also as of Yi King..... Yi, the Dividend, and respective series of its corresponding symbols, its Divisors.

## CHAPTER V

## A Whole System of the Symbols of Yi King

What do the numerals, 9 and 6 mean when they are respectively used as the technical terms for all positive and negative Yao (or assigned to them), and also in their relation to other pairs of numerals, such as, 3 and 2; 216 and 144?

The numerals, 9 and 6 are the ratio of the length of day and night at Summer Solstice, or of night and day at Winter Solstice.

The ratio of 9 and 6 to 3 and 2, is that of circumference to its approximate diameter.

The ratio of 9 and 6 to 216 and 144, is proportionate of a circular measure of 360°.

In connection with the above answers, quotations from the text of Yi and its Confucius Appendixes are given together with the following diagrams:—

Diagrams Nos. 26, 27 and 28 are relating to the first answer, supplemented by a table of data, leading finally to the Diagram No. 29 which explains as to what kinds of Yao (or lines) the numerals, 9 and 6 represent, and so also to its auxiliary Diagram No. 30, of Trigrams.

Diagrams Nos. 31 and 32 are concerning the second answer respecting the two numerals, 3 and 2 of which, the most significant is the two alternating periods of the tidal times as seen in another table of data.

Diagram No. 33 belongs to the third answer while Nos. 34 and 35 are its auxiliaries which show in measure of right angles, and No. 36, another one, of the angle 60°.

## re The Numerals 9 and 6

In the Text of Yi, throughout its 64 Hexagrams, all of their Positive or Yang Yao (or the undivided line) is called 9, and all Negative or Yin Yao (or the divided line), 6, as can be seen illustrated in the following quotations:—

## Concerning the numeral 9

Text, Section 1, (周易上經)

The Khien Hexagram, (乾卦)

Explanation of the separate lines by the duke of Kau, (周公爻辭)

Paragraph 1, reads:—

“In the first (or lowest) 9 (or line, undivided), (we see its subject as) the dragon lying hid (in the deep). It is not the time for active doing.” (Legge)

The original in Chinese “初九·潛龍勿用”

## Concerning the numeral 6

Text, Section 1, (周易上經)

The Khwan Hexagram, (坤卦)

Explanation of the separate lines by the duke of Kau, (周公爻辭)

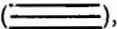

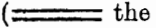
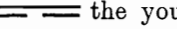
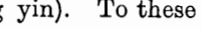
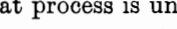
Paragraph 1, reads:—

“In the first 6 (or line, divided), (we see its subject) treading on hoarfrost. The strong ice will come (by and by).” (Legge)

The original in Chinese “初六·履霜堅冰至”

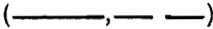
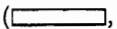

The above quotations are taken exactly from Legge's translation with the only exceptions of the above two

numerals which the writer holds in favor of retaining as they are in their original in Chinese, in view of the supports of the diagrams in this chapter but contrary to Legge's preference extracted in detail from his notes as follows:—

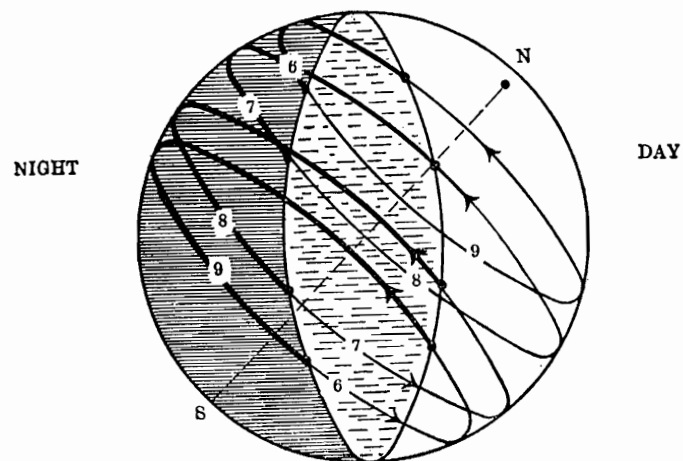
“Each Hexagram consists of two of the Trigrams of Fu-hsi, the lower being called ‘the inner,’ and the one above ‘the outer.’ The lines, however, are numbered from one to six, commencing with the lowest. To denote the number of it and of the sixth line, the term for ‘commencing’ and ‘topmost’ are used. The intermediate lines are simply ‘second,’ ‘third,’ &c. As the lines must be either whole or divided, technically called strong and weak, yang and yin, this distinction is indicated by the application to them of the numbers nine and six. All whole lines are nine, all divided lines, six. Two explanations have been proposed of this application of these numbers. The Khien Trigram, it is said, contains 3 strokes () and the Khwan 6 (). But the yang contains the yin in itself, and its representative number will be  $3+6=9$ , while the yin, not containing the yang, will only have its own number or 6. This explanation, entirely arbitrary, is now deservedly abandoned. The other is based on the use of the ‘four Hsiang,’ or emblematic figures ( the great or old yang,  the young yang,  the old yin, and  the young yin). To these are assigned (by what process is unimportant for our present purpose) the numbers 9, 8, 7, 6. They were ‘the old yang’ represented by 9, and ‘the old yin’ represented by 6, that, in the manipulation of the

stalks to form new diagrams, determined the changes of figure; and so 9 and 6 came to be used as the names of a yang line and a yin line respectively. This explanation is now universally acquiesced in. The nomenclature of first nine, nine two, &c., or first six, six two, &c., however, is merely a jargon; and I have preferred to use, instead of it, in the translation, in order to describe the lines, the names ‘undivided’ and ‘divided.’”

which shows that Legge was then in favor of using the names ‘the line, undivided’ and ‘the line, divided,’ instead of the numerals, 9 and 6.

From the above notes, mention is made of the explanation of the numerals including the other two, say, 7 and 8, that they are all based on those as derived from the manipulation of stalks in the divination process but to ask further into the explanation as from what, those of the process originate, it is best to be answered by the diagrams in this chapter. The writer would like to add that the lines undivided, and divided being in Yi called 9 and 6, it is understood to be only when changes took place in those lines as otherwise, they are, 7 and 8 as according to the recording of changes in the divination process, and in the former case, their lines originally as () will have to be changed into other kinds as (, ). To explain further as to why in Yi they are only called 9 and 6, not the other two numerals, it is because Yi only deals with changes in those lines. In divination process, those numerals, 9, 6, and 7, 8, are however, expressed in four times their value as, 36, 24, and 28, 32, corresponding to those fractions of the angle  $60^\circ$  as seen in the diagram No. 36.

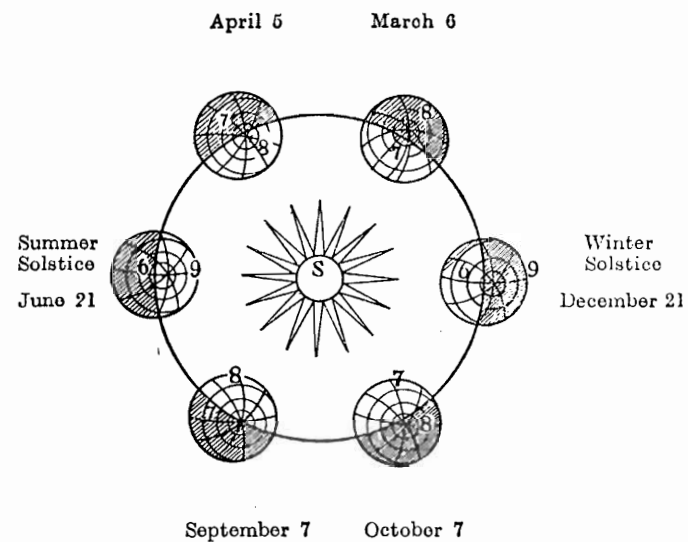
## YAO (or LINES OF HEXAGRAMS)



Ratios of day to night at different mid-latitudes varying in the four numerals, 9, 8, 7, 6.

Fig. 26

## YAO (or LINES OF HEXAGRAMS)

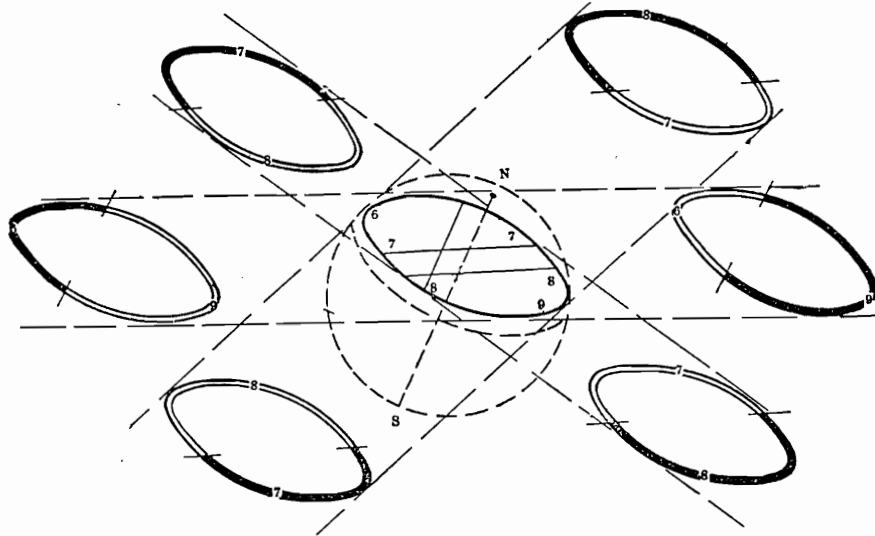


Ratios of day to night of different seasons at one place in mid-latitude varying in the four numerals, 9, 8, 7, 6.

Fig. 27



YAO (or LINES OF HEXAGRAMS)



Ratios of day to night at different seasons at one place (mid-latitude) varying in the four numerals, 9, 8, 7, 6.

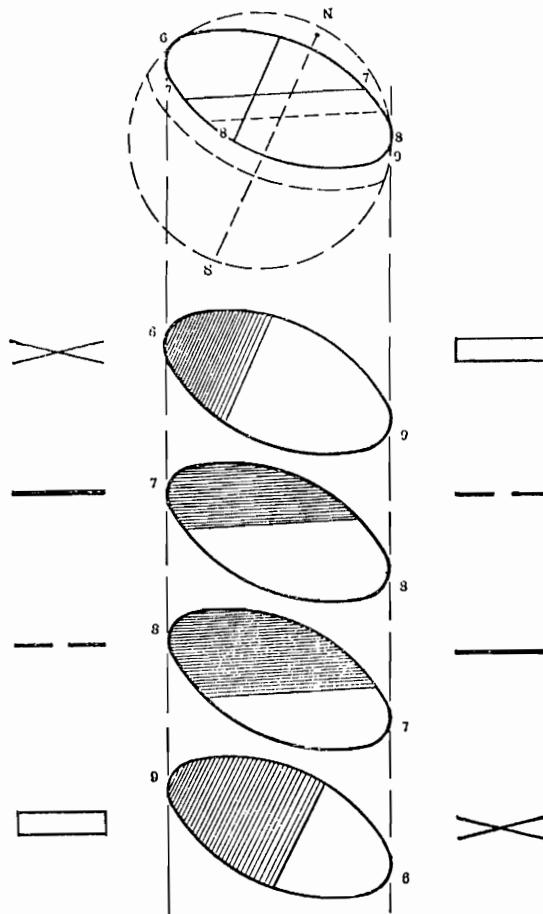
Fig. 28

	Sunrise	Sunset	DAY	NIGHT
<b>KAIFENG, HONAN, CHINA</b> 34 52N, 114 32E.				
June 22, Summer Solstice	4 49	7 11	14 hr. 22 m. (9)	9 hr. 38 m. (6)
April 6, 15 days after Spring Equinox	} 5 47	6 13	12 ,, 24 ,, (8)	11 ,, 36 ,, (7)
Sept. 7, 15 days before Autumn ,,				
March 7, 15 days before Spring Equinox	} 6 13	5 47	11 ,, 36 ,, (7)	12 ,, 24 ,, (8)
Oct. 7, 15 days after Autumn ,,				
Dec. 22, Winter Solstice	7 11	4 49	9 ,, 38 ,, (6)	14 ,, 22 ,, (9)
<b>PEIPING, CHINA</b> 39 55N, 116 30E.				
May 23, 30 days before Summer Solstice	} 4 47	7 13	14 hr. 26 m. (9)	9 hr. 34 m. (6)
July 22, 30 days after ,, ,,				
Nov. 22, 30 days before Winter ,,	} 7 13	4 47	9 ,, 34 ,, (6)	14 ,, 26 ,, (9)
Jan. 21, 30 days after ,, ,,				
April 6, 15 days after Spring Equinox	} 5 39	6 21	12 ,, 42 ,, (8)	11 ,, 18 ,, (7)
Sept. 7, 15 days before Autumn ,,				
March 7, 15 days before Spring ,,	} 6 21	5 39	11 ,, 18 ,, (7)	12 ,, 42 ,, (8)
Oct. 7, 15 days after Autumn ,,				
<b>NANKING, CHINA</b> 32 04N, 118 46E.				
June 22, Summer Solstice	4 57	7 03	14 hr. 06 m. (9)	9 hr. 54 m. (6)
April 6, 15 days after Spring Equinox	} 5 50	6 10	12 ,, 20 ,, (8)	11 ,, 40 ,, (7)
Sept. 7, 15 days before Autumn ,,				
March 7, 15 days before Spring ,,	} 6 10	5 50	11 ,, 40 ,, (7)	12 ,, 20 ,, (8)
Oct. 7, 15 days after Autumn ,,				
Dec. 22, Winter Solstice	7 03	4 57	9 ,, 54 ,, (6)	14 ,, 06 ,, (9)

NUMERALS	9 as	8 as	7 as	6 as
	$\frac{9}{15} = 14 \text{ hr. } 24 \text{ m.}$	$\frac{8}{15} = 12 \text{ hr. } 48 \text{ m.}$	$\frac{7}{15} = 11 \text{ hr. } 12 \text{ m.}$	$\frac{6}{15} = 9 \text{ hr. } 36 \text{ m.}$
				$\frac{6}{15} = 24 \text{ hr.}$

These Numerals, 9, 8, 7, 6, being the proportional varying lengths of day or night of different seasons, will be found approximately agreeing with the above data

## YAO (or LINES OF HEXAGRAMS)



The Numerals, 9, 8, 7, & 6, being shown by the preceding exhibits to be the varying lengths of the day and night of various seasons, were originally used as the Names of the above four kinds of Yao symbols (or the lines of Trigram and of Hexagram).

Fig. 29

## Yao (or Lines of Hexagrams)

**Description of the Diagrams Nos. 26 to 29** (Astronomical Exhibits, by the ratios of day to night in their length)

The following diagrams show why in 64 Hexagrams of Yi, all unbroken lines (or Yang Yao, or Positive Yao) are called 9, and all broken lines (or Yin Yao, or Negative Yao), 6; and also why in records of its divination, their respective auxiliary lines, are called 7 and 8.

**Diagram No. 26**

Showing the ratios of day to night in their length varying at different mid-latitudes (or of one time at different places)





**Diagram No. 27**

Showing the same ratios at different seasons (or of one place at different times)

**Diagram No. 28**

Showing same as No. 27 but with their relative proportionate magnitude more magnified.

**Diagram No. 29**

Showing in conclusion of all of the preceding diagrams, the kinds of lines or Yao, called 9 and 6 (principally), 7 and 8 (auxiliaries), correspondingly to be..... , , , .

while the table of data inserted in between those Nos. 28 and 29 is given in verification of the said numerals, 9, 6, 7, 8 which will be found to be the corresponding numerators of the four fractions of 24 hours, with the number 15 as their common denominator, or lengths of times, such as, 14 hrs. 24 m., 9 hrs. 36 m., 11 hrs. 12 m., and 12 hrs. 48 m.

## EIGHT TRIGRAMS

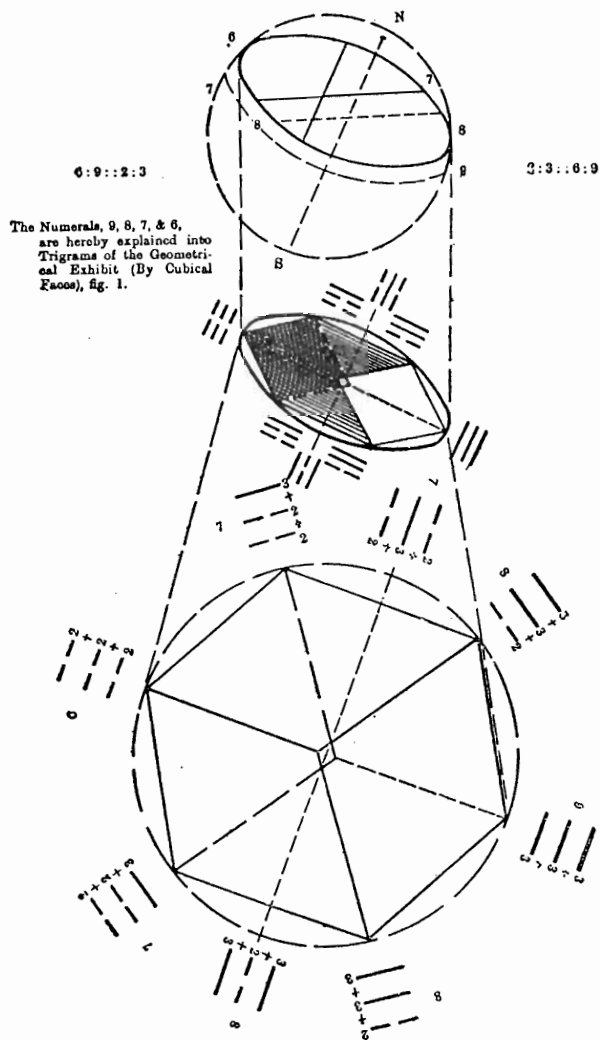


Fig. 30

**Description of the Diagram No. 30** (Astronomical Exhibit, by the ratios of day to night in their length)

This is to prove the numerals, 9 and 6, 7 and 8, formerly by Yao or lines, now by Trigrams as follows:—

**The top portion of the diagram**

Showing the ratios of day to night in their length varying at different seasons of mid-latitude, north of equator, same as the preceding diagrams.

**The middle portion of the diagram**

Showing the numerals of those ratios now in terms of the Eight Trigrams of the diagram No. 1 (Geometrical exhibit, by cubical faces).

**The bottom portion of the diagram**

Showing those four numerals, 9 and 6, 7 and 8 analytically composed only of two numerals, 3 and 2, being like the four quantitative classes of Trigrams made up only of two kinds of lines, say, unbroken and broken, and that the accumulations of the latter into the former are not arithmetic but rather logarithmic additions.

## re The Numerals 3 and 2

In the Confucius Appendixes of the Text of Yi, mention is made of the above two numerals as per the following quotation:—

Treatise of Remarks on the Trigrams, (說卦傳)

Chapter 1, paragraph 2, reads:—

“The number 3 was assigned to heaven, 2 to earth,  
and from these came the (other) numbers”  
(Legge)

The original in Chinese “參天兩地而倚數”

## THE CONSTITUENTS OF YAO (or LINES OF HEXAGRAMS)

The Numerals, 9 and 6, in their relation to those, 3 and 2 are hereby explained as of the circumference, to diameter.

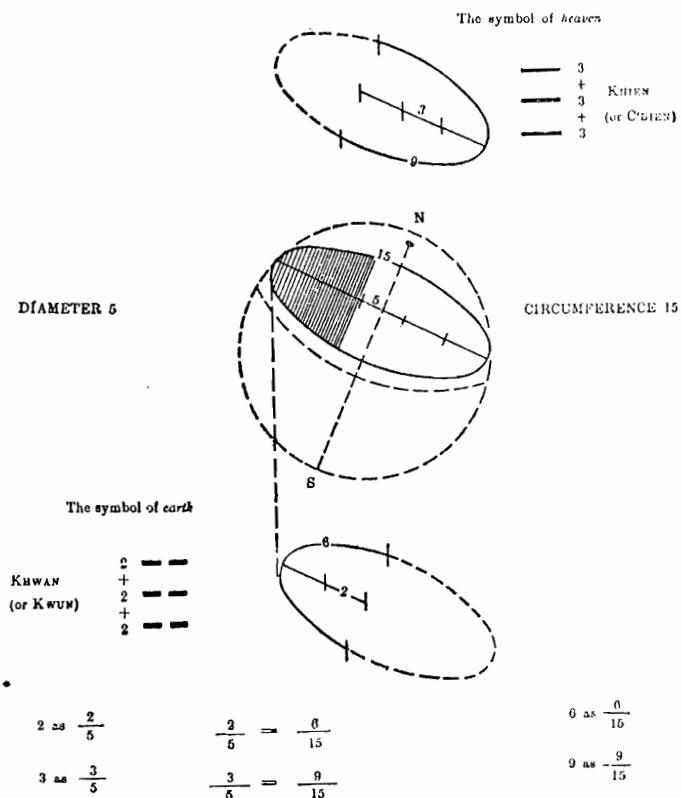
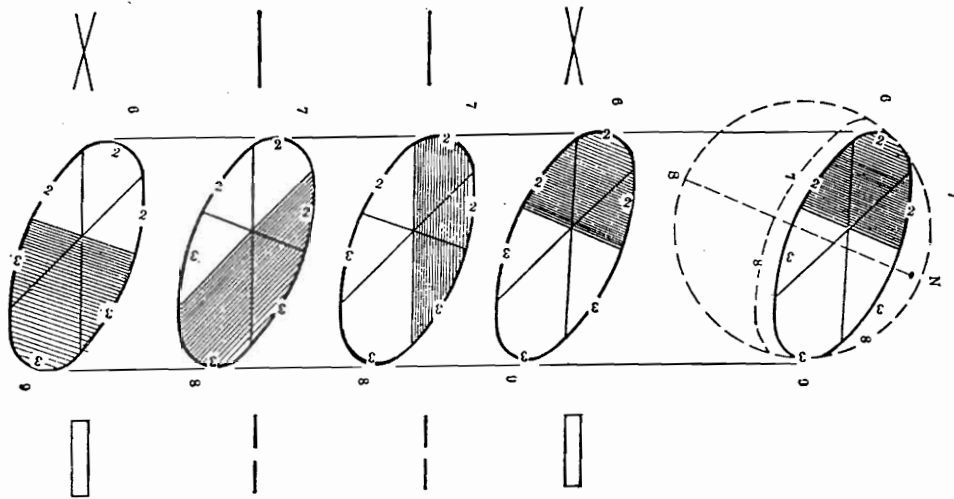


Fig. 31

THE CONSTITUENTS OF YAO (or LINES OF HEXAGRAMS)



The Numerals, 9 and 6, 7 and 8, are analytically composed of the mere two numerals, 3 and 2, as their constituents.  
Fig. 32

THE TIME OF TIDE (Woosung & Shanghai)

DAYS OF LUNAR MONTH		Flood Tide		Ebb Tide	
Three (3)	Two (2)				
1st, 2nd & 3rd	4th & 5th	11 p.m. to 1 a.m.	11 a.m. to 1 p.m.	About 6 hours later to the time of flood tide detailed on the left.	
6th, 7th & 8th	9th & 10th	1 a.m. to 3 a.m.	1 p.m. to 3 p.m.		
11th, 12th & 13th	14th & 15th	3 to 5 a.m.	3 to 5 p.m.		
16th, 17th & 18th	19th & 20th	5 to 7 a.m.	5 to 7 p.m.		
21st, 22nd & 23rd	24th & 25th	7 to 9 a.m.	7 to 9 p.m.		
26th, 27th & 28th	29th & 30th	9 to 11 a.m.	9 to 11 p.m.		

The above times are only approximate.

(For comparative study, printed in the following page, tables of predicted tides of the above two locations from Whangpoo Conservancy Board of June 1933 issue.)

NUMERALS

3 = 3 days  
2 = 2 days

The Numerals, 3 and 2, are hereby explained into periods of their like number of days, in which the tides will occur at certain hours.

These Numerals, 3, 2, being the numbers of days of the two alternate periods in which the tides will occur at certain hours as can be seen from the above data, will be found in direct proportion to those two numerals, 9 and 6 of the length of day and night of two solstices.

The relation of the numerals of the former pair to the latter, say, 3 and 2 to 9 and 6, can be better seen from that of the position of the moving of the moon to the earth in causing tides that as the daily motion of the former planet is 12° or 360° divided by 30, the accumulations in the two alternating periods, i.e., one of 3 days and the other of 2 days, are 36° and 24° respectively, summing up 60° or 4 hours in every 5 days. Here, the numerals, 36 and 24 explained in terms of 9 and 6, are 4 times of their respective own numbers.

# WHANGPOO CONSERVANCY BOARD PREDICTION OF TIDE

(UNDER NORMAL METEOROLOGICAL CONDITIONS)

JUNE, 1933

## SHANGHAI—PUBLIC GARDEN TIDE GAUGE STATION

Day of Month	Week	Moon's Age	Moon's Phases	Time (China Coast Standard: 120° E Meridian)												Magnitude (Approximate)				Velocity in knot (approximate)					
				H.W.		L.W.		Flood Makes		Ebb Makes		Max. Flood		Max. Ebb		H.W. Height above L.L.W.		L.W.		Velocity in knot (approximate)					
A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
6	Tues.	14		11.07	11.36	6.55	7.15	8.40	8.52	1.11	1.30	10.50	10.56	6.15	6.35	9.40	9.50	3.05	2.84	1.8	2.0	1.1	1.1	1	1
7	Wed.	15		—	12.06	8.03	8.05	9.44	9.51	2.00	2.20	11.35	11.42	7.06	7.26	—	9.50	3.05	2.77	1.8	2.2	1.1	1.1	1	1
			Per. 11 a.m.																						
8	Thur.	16	1:05 p.m.	12.14	12.89	8.54	8.55	10.40	10.49	2.50	3.01	—	12.07	7.59	8.15	11.13	10.00	3.00	3.24	—	2.0	1.3	1.1	1.1	1
9	Fri.	17		12.52	1.12	9.40	9.40	11.22	11.32	3.30	3.34	12.12	12.42	8.57	9.02	11.95	10.95	3.87	3.65	2.4	1.9	1.4	1.4	1	1
10	Sat.	18		1.31	1.56	10.29	10.30	—	12.16	4.10	4.15	12.56	1.26	9.46	9.47	12.50	10.50	3.32	3.10	2.4	1.8	1.5	1.5	1	1
11	Sun.	19		2.15	2.45	11.13	11.15	12.16	1.15	4.50	5.00	1.33	2.15	10.30	10.33	11.83	9.60	3.05	2.97	2.3	1.6	1.4	1.4	1	1
12	Mon.	20		3.08	3.40	11.52	11.53	1.00	1.56	5.40	5.46	2.36	3.11	11.08	11.15	11.20	8.60	2.97	3.00	2.3	1.5	1.2	1.2	1	1
13	Tues.	21		4.03	4.38	—	12.53	1.33	2.40	6.33	6.38	3.33	4.03	11.38	11.50	10.38	8.28	—	3.30	2.2	1.3	1.2	1.2	1	1
14	Wed.	22		5.00	5.40	12.07	1.27	2.12	3.22	7.25	7.32	4.27	4.37	—	12.37	9.75	7.85	3.63	3.48	2.1	1.2	—	—	1	1
15	Thur.	23	7:26 a.m.	6.02	6.50	1.07	2.12	3.02	4.17	8.20	8.37	5.32	6.10	12.12	1.35	9.20	7.90	4.10	3.90	1.9	1.1	1.2	1.2	1	1
16	Fri.	24		7.10	8.05	2.12	3.07	4.09	5.10	9.13	9.52	6.42	7.32	1.25	2.35	8.68	7.66	4.78	3.26	1.6	1.3	1.2	1.2	1	1
17	Sat.	25		8.18	9.18	3.23	4.05	5.28	6.08	10.10	11.03	7.53	8.45	2.48	3.38	8.00	8.13	3.90	3.05	1.4	1.4	1.1	1.1	1	1
18	Sun.	26		9.26	10.11	4.35	5.06	6.45	7.00	11.02	11.55	8.56	9.41	4.06	4.31	7.88	8.48	3.85	3.00	1.4	1.6	1.1	1.1	1	1
19	Mon.	27		10.30	10.55	5.45	6.10	7.55	7.58	11.55	—	9.55	10.25	5.10	5.20	8.12	8.90	3.65	2.90	1.3	1.8	1.0	1.0	1	1
20	Tues.	28		11.15	11.30	6.45	7.01	8.51	8.56	12.35	12.49	10.40	10.57	6.01	6.11	8.22	9.14	3.28	3.05	1.4	2.0	1.2	1.2	1	1
21	Wed.	29	Ap. 10 p.m.	11.42	—	7.37	7.42	9.32	9.37	1.21	1.32	—	11.30	6.55	6.57	8.52	—	3.25	2.94	1.6	2.1	1.2	1.2	1	1
22	Thur.	30		12.00	12.25	8.20	8.25	10.06	10.10	2.20	2.25	—	12.05	7.37	7.40	9.40	8.30	2.92	2.80	—	1.9	1.3	1.1	1.1	1
			9:22 a.m.	M.N.																					
23	Fri.	1		12.43	1.08	8.58	9.05	10.30	10.33	3.15	3.18	12.13	12.38	8.10	8.15	9.88	8.53	3.00	2.92	2.3	1.8	1.4	1.4	1	1
24	Sat.	2		1.15	1.40	9.30	9.40	11.00	11.05	4.00	4.05	12.35	1.00	8.45	8.55	10.28	8.20	2.80	2.60	2.5	1.9	1.6	1.6	1	1
25	Sun.	3		1.52	2.17	10.05	10.11	11.34	11.40	4.85	4.45	1.12	1.37	9.15	9.30	10.17	8.60	3.05	3.10	2.6	1.8	1.4	1.4	1	1
26	Mon.	4		2.27	2.47	10.35	10.42	—	12.12	5.07	5.17	1.52	2.12	9.55	10.05	10.30	8.00	3.03	2.93	2.4	1.6	1.4	1.4	1	1
27	Tues.	5		3.02	3.25	11.07	11.10	12.12	12.37	5.32	5.40	2.32	2.52	10.40	10.43	9.96	7.98	3.07	3.32	2.3	1.4	1.2	1.2	1	1
28	Wed.	6		3.36	4.06	11.41	11.43	12.35	1.16	6.06	6.15	3.06	3.36	11.15	11.22	9.50	7.50	3.10	3.52	2.0	1.2	1.2	1.2	1	1
29	Thur.	7		4.10	5.00	—	12.30	1.06	2.00	6.50	7.05	3.45	4.30	11.45	11.54	9.40	7.75	—	3.40	1.7	1.0	1.0	1.0	1	1
30	Fri.	8		4.54	6.09	12.05	1.04	1.48	2.49	7.34	8.14	4.34	5.34	—	12.24	8.72	7.80	3.70	3.40	1.5	0.9	—	—	1	1

### TABLES OF PREDICTED TIDES

#### WOOSUNG TIDE GAUGE:

Latitude, 31 degrees, 23 minutes, N.; Longitude, 121 degrees, 30 minutes, E.      Side Saddle Tide Gauge:  
 Latitude, 30 degrees, 49 minutes, N.; Longitude, 122 degrees, 36 minutes, E.      Tidal Information:

Side Saddle. . . . . H. W. F. and O.      X h. 22m.  
 Gutzlaff . . . . . "      "      XI h. 30m.  
 Shawsishan . . . . . "      "      XI h. 22m.  
 Tungsha Light Vessel. . . . . H. W. F. and O.      XI h. 22m.  
 Entrance to the Whang (Woosung) . . . . . "      "      O h. 40m.

The tidal streams in the approaches of the Yangtze River are rotary, making one revolution in about 12 hours. The times of high and low waters on the Fairy Flats, in the South Channel Entrance to the Yangtze River, occur nearly in the middle of the time interval given in the tables for tidal occurrences of the same date and flow at Side Saddle and Woosung.

#### PREDICTED TIDES FOR WOOSUNG      JUNE 1933

Day	Moon Age	HIGH WATER			LOW WATER		
		A.M.	P.M.	Height	A.M.	P.M.	Height
6 Tuesday	14	10.20	11.8	10.0	5.47	4.4	6.03
7 Wednesday	15	11.14	10.4	11.42	6.56	4.0	7.04
8 Thursday	16	*	*	0.02	10.8	3.5	8.03
9 Friday	17	0.28	13.1	0.48	10.9	3.3	8.56
10 Saturday	18	1.15	13.2	1.40	11.0	3.3	9.43
11 Sunday	19	2.02	13.1	2.27	10.8	3.4	10.25
12 Monday	20	2.50	12.8	3.16	10.5	3.7	11.05
13 Tuesday	21	3.37	11.2	4.05	10.2	3.9	11.84
14 Wednesday	22	4.27	11.4	4.55	10.0	*	12.42
15 Thursday	23	5.18	10.9	5.50	9.9	4.9	0.58
16 Friday	24	6.03	10.4	6.56	9.9	5.3	1.52
17 Saturday	25	7.14	9.9	8.01	10.2	5.6	2.50
18 Sunday	26	8.17	9.7	9.04	10.6	5.4	3.51
19 Monday	27	9.18	9.6	9.56	11.3	5.1	4.53
20 Tuesday	28	10.15	9.8	10.40	11.8	4.8	5.47
21 Wednesday	29	10.59	10.9	11.23	12.4	4.3	6.40
22 Thursday	30	11.41	10.7	*	7.25	3.9	7.31
23 Friday	1	0.03	13.1	0.21	10.9	3.7	8.20
24 Saturday	2	0.32	13.2	0.55	11.2	3.3	8.57
25 Sunday	3	1.07	13.3	1.27	11.1	3.3	9.31
26 Monday	4	1.42	13.3	2.02	10.8	3.3	9.59
27 Tuesday	5	2.18	13.2	2.39	10.5	3.5	10.27
28 Wednesday	6	2.58	12.8	3.17	10.2	3.6	10.56
29 Thursday	7	3.41	12.3	3.58	9.8	3.8	11.23
30 Friday	8	4.19	11.7	4.44	9.5	*	12.00

THEIR EXHIBITS

### The Constituents of Yao (or Lines of Hexagrams)

**Description of the Diagrams Nos. 31 and 32** (Astronomical Exhibits, by the ratio of day to night in their length)

It is to prove the two constituents, 3 and 2, of those numerical names of Yang Yao and Yin Yao, 9 and 6, by the measure of the line of longitude, either in its circumference or diameter, thus:—

#### The relation of the sun to the earth (forming day and night)

As explained by the preceding diagram No. 29, the numerals, 9 and 6 being Yao or one unbroken and one broken line at first were then magnified into the 'Chien' and 'Kwun' trigrams consisting of three unbroken and three broken lines respectively, will be found again in this diagram to be purely composed of the constituent numerals, 3 and 2 which, therefore, could be either parts of circumference or of diameter as according to which of them, the former pair of the numerals, 9 and 6 are.

The numerals, 3 and 2, in their relation to those, 9 and 6, however, could be also considered as of diameter, to circumference.

### The relation of the moon to the earth (causing flood and ebb of tide)

The relation of the numerals of one pair to another, as aforesaid, could be significantly seen by the tidal time as per the tables of data annexed therewith, and its explanation of the tidal chief causing agent, the moon that the numbers of degrees of the accumulation of her daily motion in the two alternating periods of those number of days, say, 3 and 2 are 36 and 24 being 9 and 6 in four times of their own numbers.

#### The quantitative explanation

The numerals, 3 and 2 to those 9 and 6, in integers, are in proportion of 1 to 3 but in fractions, the formers in one-fifth to the latters in one-fifteenth are equal to one another.

## re The Numerals 216 and 144

In the Confucius Appendixes of the Text of Yi, mention is made of the above two numerals as per the following quotation :—

The Great Appendix, Section 1, (繫辭上傳)

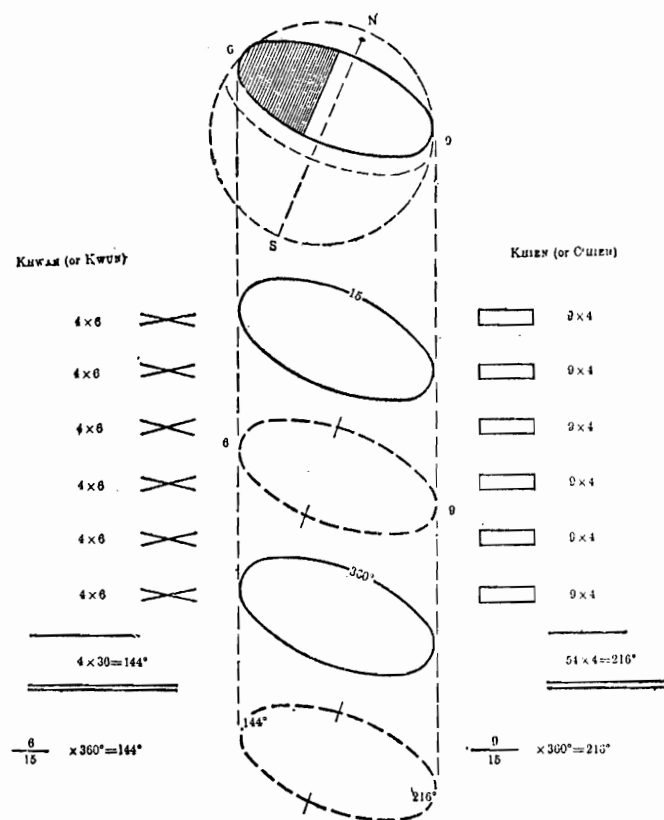
Chapter IX, paragraph 52, reads :— (第九章)

“The numbers (required) for Khien (or the undivided line) amount to 216; those for Khwan (or the divided line), to 144. Together they are 360, corresponding to the days of the year.”

The original in Chinese

‘乾之策二百一十有六。坤之策百四十有四。凡三百有六十。當期之日。’

## THE HEXAGRAMS

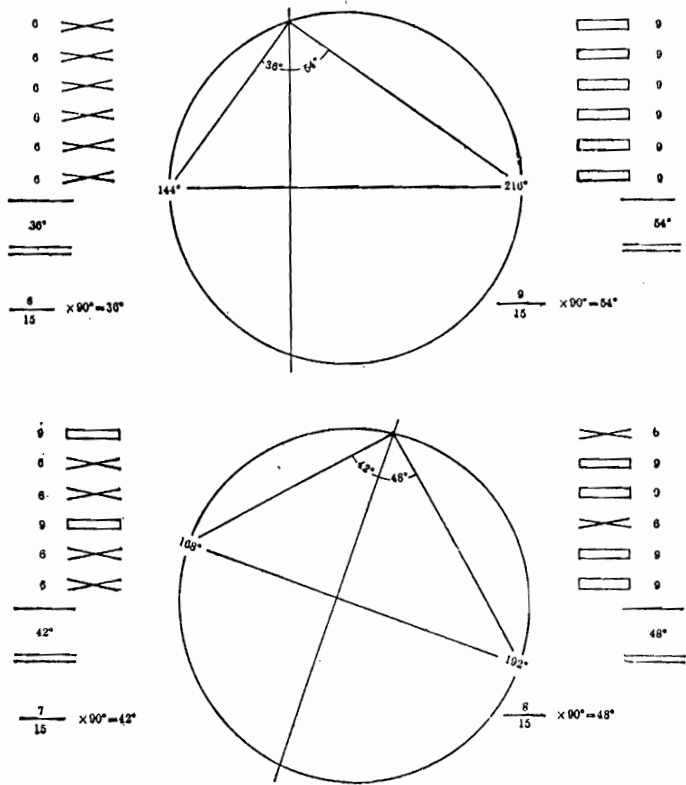


The Numerals, 9 and 6, are hereby resolved into Hexagrams, and also their respective, and relative proportionate number of degrees of a circular measure 360°.

Fig. 33



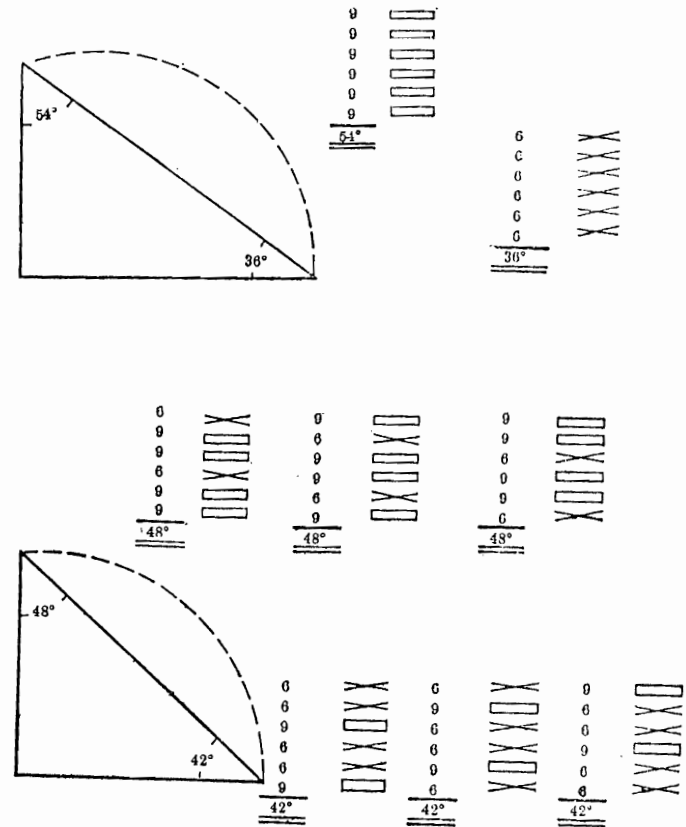
THE HEXAGRAMS



The Numerals, 9 and 6, are hereby resolved into Hexagrams, and also the two acute angles, of two right-angled triangles, respectively, having their relative proportionate number of degrees.

Fig. 34

THE HEXAGRAMS



The Numerals, 9 and 6, are hereby resolved into Hexagrams, and also the two acute angles, of a right-angled triangle, respectively, having their relative proportionate number of degrees.

Fig. 35

THE HEXAGRAMS

The Numerals, 9 and 6 (and the others, 7 and 8, alike) are hereby resolved into lines of Hexagrams, and also into the two fractions of the angle 60°, respectively, having their relative proportionate number of degrees, corresponding to those of divination process, such as, 36 and 24 (and 28 & 32 of the others).

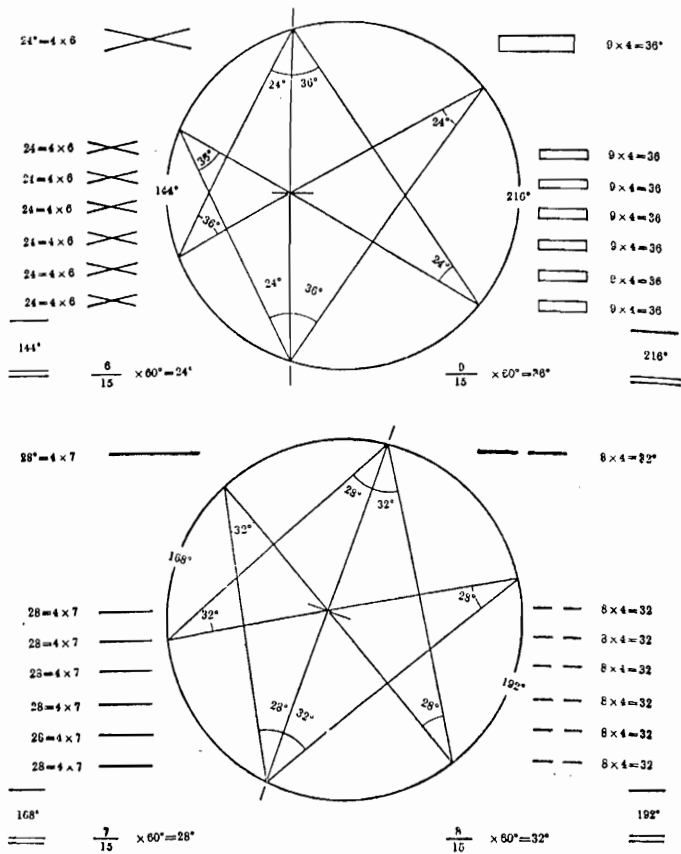


Fig. 36

Description of the Diagrams Nos. 33 to 36 (Astronomical Exhibits, by the ratio of day to night in their length)

It is to prove the numerals, 9 and 6, 7 and 8, formerly by Yao (of the diagram No. 29) and by Trigrams (of the diagram No. 30), now by Hexagrams in the diagrams as follows:—

Diagram No. 33

Showing the numerals, 9 and 6 being reduced into their relative proportionate number of degrees of a circular measure 360°, say, 216° and 144°, respectively.

Diagram No. 34

Showing the numerals, 9 and 6, 7 and 8, being reduced into their relative proportionate number of degrees of the angular measure 90°, say, 54° and 36°, 42° and 48°, respectively.

Diagram No. 35

Showing those two pairs of numerals same as the diagram No. 34 which exhibited then only 4 standard Hexagrams but exhibits now such Hexagrams which their number increased up to 8.

Diagram No. 36

Showing those two pairs of numerals, formerly, of the angular measure 90° as seen in the diagrams Nos. 34 and 35, now reduced into their relative proportionate number of degrees of 60°, say, 36° and 24°, 28° and 32°, respectively.

CHAPTER VI

THE TRIGRAMS AND HEXAGRAMS

In what do they symbolize the Changes? And how do they symbolize the Changes as from simplicity to complexity?

The Trigrams could be interpreted divergently as to symbolize Changes in Time, Space and Matter, as their various simple units, the Hexagrams, complex multiples from those units, and those Hexagrams containing Changing line or lines (or Yao), greater complex multiples from those multiples.

The diagrams (or Geometrical Exhibits) in greater part of the first and second chapters, which treat of Eight Trigrams and Sixty-four Hexagrams, could be interpreted as to symbolize, of the Changes, their respective numbers of the points in Space or parts of a Matter (as matter occupies space), and those in the fourth chapter (Astronomical Exhibits), to represent the Times.

In addition to the above mentioned ones, more exhibits on same respects concerning the Changes in Trigrams either as multiplying or divisional units, could be found in the diagrams Nos. 37 and 38 while those of the Changings from divisional units to others forming subdivisional ones, and from such subdivisional ones to others forming further subdivisional ones, are convergently shown in the diagrams Nos. 39 to 41.

THE TRIGRAMS

EXHIBIT OF CHANGES in ORDER OF TIME or SPACE

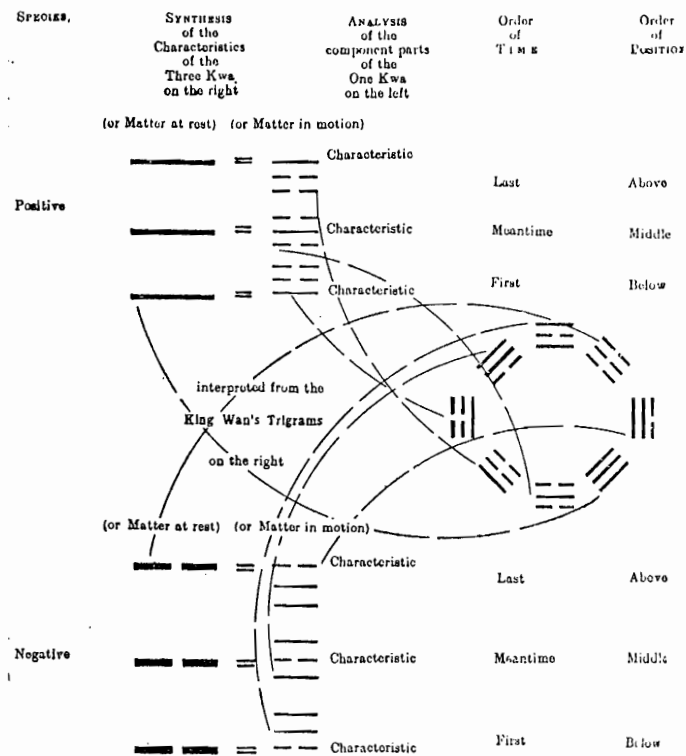


Fig. 37

THE TRIGRAMS

EXHIBIT OF CHANGES in QUANTITY

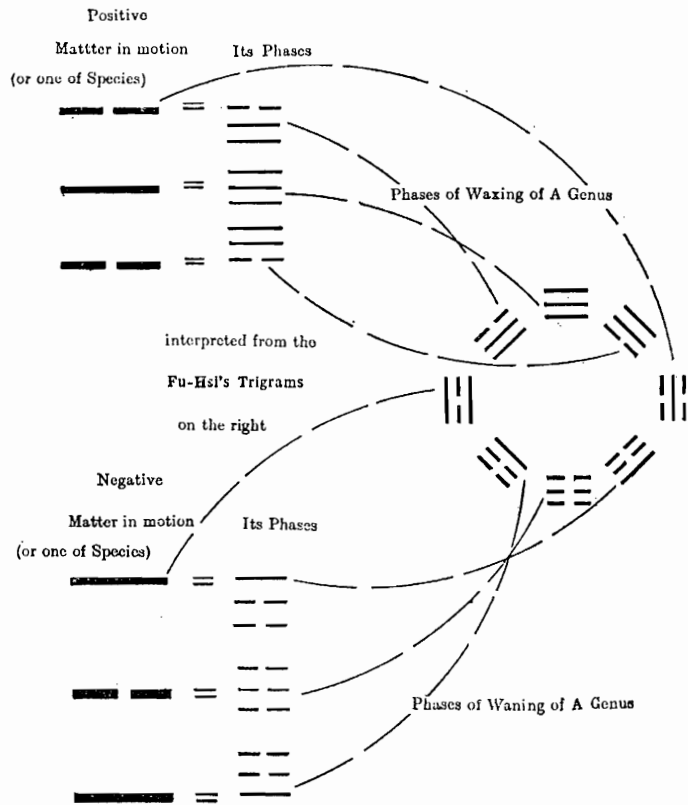


Fig. 38

THE TRIGRAMS

EXHIBIT OF THE CHANGING OF ONE TRIGRAM TO ANOTHER TRIGRAM

(From the Trigram 'C'hien')

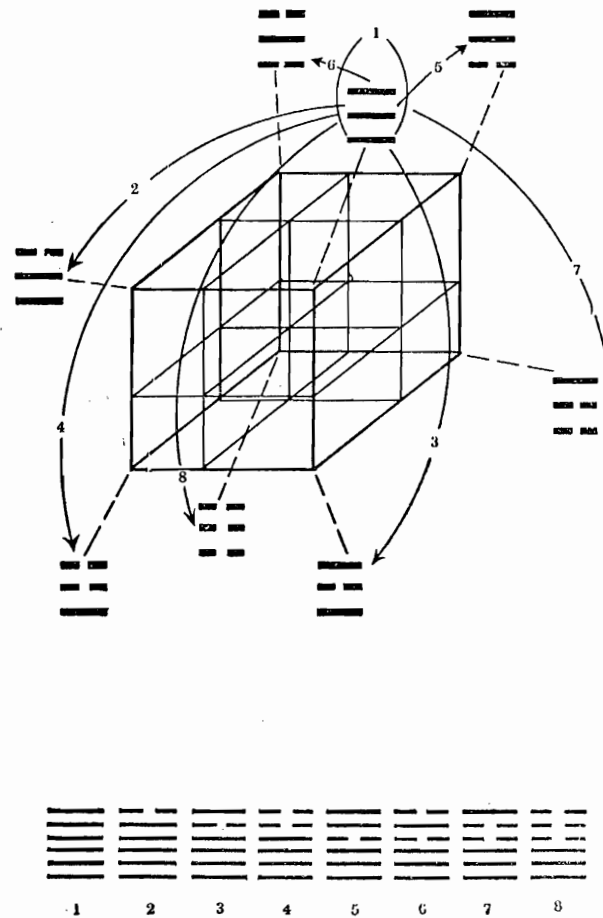


Fig. 39

THE HEXAGRAMS

EXHIBIT OF THE CHANGING OF ONE HEXAGRAM TO ANOTHER HEXAGRAM

(From the Hexagram 'C'hien')

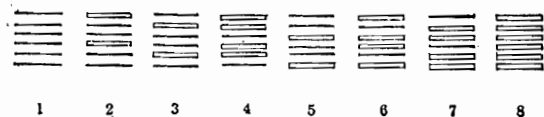
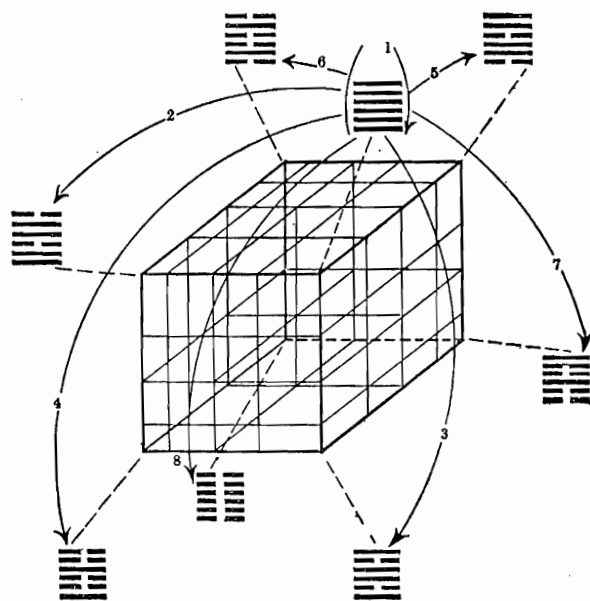


Fig. 40

THE HEXAGRAMS

EXHIBIT OF THE CHANGING OF ONE HEXAGRAM TO ANOTHER HEXAGRAM

(From the Hexagram 'Kwun')

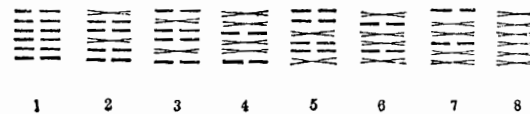
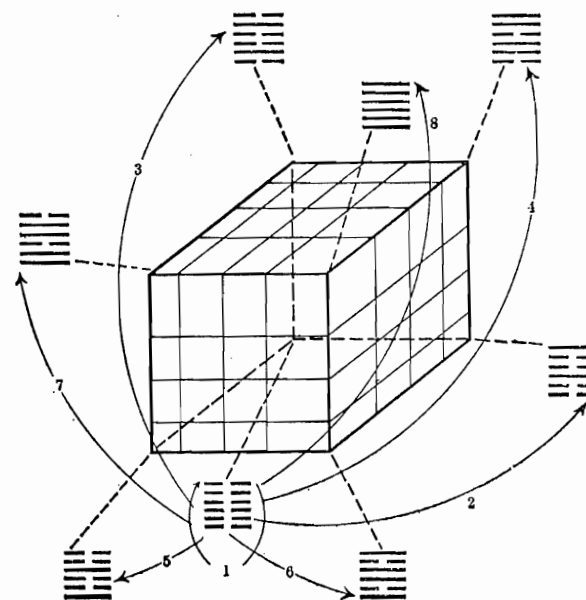


Fig. 41

**Description of the Diagrams Nos. 37 to 41** (Exhibits of the Symbolism of Changes)

It is to show the symbolism of Changes by the Trigrams and Hexagrams in the following diagrams :—

In What the Changes are :—

**Diagram No. 37**

Showing the interpretation of Changes in order of Time or Space as manifested by the positions of the characteristic one of lines, from King Wan's Trigrams (which are considered as Functional Trigrams).

**Diagram No. 38**

Showing the interpretation of Changes in Quantity as manifested by the phases, from Fu Hsi's Trigrams (which are considered as Material Trigrams).

How the Changings Progress :—

**Diagram No. 39**

Showing the Changing of Trigrams to Trigrams, forming Hexagrams, as of divisional units to others, forming subdivisional ones. As the Hexagram is composed of two trigrams, the lower is the one from which the Change starts and the higher, to which it finishes.

**Diagrams Nos. 40 and 41**

Showing the Changing of Hexagrams to Hexagrams forming such Hexagrams as containing Changing line or lines, as of subdivisional ones to others forming further subdivisional ones.

**PART III**  
**THEIR REMARKS**

## THEIR REMARKS

### REMARK I.

#### The Symbolism of World as A Whole

Considering that the world which we are in has a definite volume, the Chinese Logic of Changes (易) takes this volume and calculates formulæ of binomial third and sixth powers, for its proper definition.

### REMARK II.

#### The Symbolism of World as in Parts

Seeing that the world has as its component parts, heaven (天), earth (地), mountains (山), marshes (澤), water (水), fire (火), thunders (雷), and winds (風), the Chinese Logic of Changes took the component terms of the expanded formulæ of binomial third and sixth power of sum of two numbers, for their appropriate definition. The origin of the names of those parts, can be quoted from the Chinese Logic of Changes of Legge's translation as follows:—

“Appendix V, Treatise of Remarks on the Trigrams (說卦傳), Chapter XI (第十一章);— Paragraph 15, says, Khien (or Chien 乾) suggests the idea of heaven; that 16, Khwan (or Kwun 坤), of the earth; that 17, Kan (or Chen 震), of thunder; that 18, Sun (巽), of wind; that 19, Khan (or Kam 坎), of water; that 20, says, Li (離), suggests the emblem of fire; that 21, Kan (or Ken 艮), of a mountain; that 22,

Tui (兌), of a low-lying collection of water (or a marsh).”

### REMARK III.

#### The Covering Sphere of that Symbolism

Since the Chinese Logic of Changes makes the universe the subject of its symbolism, just as the Chinese national law makes all the citizens its subjects, nothing can escape from this sphere of symbolism any more than any of the individuals can escape the circle of national jurisdiction. For the basis of the origin of this system of symbolizing, including the preceding remarks, one may refer to Legge's Translation which reads as follows:—

The Great Appendix (繫辭), Section I (上傳), Chapter IV (第四章), *Paragraph 20 reads:—*

“The Yi was made on a principle of accordance with heaven and earth, and shows us therefore, without rent or confusion, the course (of things) in heaven and earth.”

*Paragraph 21 reads:—*

“(The sage), in accordance with (the Yi), looking up, contemplates the brilliant phenomena of the heaven, and, looking down, examines the definite arrangements of the earth;— thus he knows the cause of darkness (or, what is obscure) and light (or, what is bright). He traces things to their beginning, and follows them to their end;— thus he knows what can be said about death and life. (He perceives how

the union of) essence and breath form things, and the (disappearance or) wandering away of the soul produces the change (of their constitution);— thus he knows the characteristics of the anima and animus.”

*Paragraph 22 reads:—*

“There is a similarity between him and heaven and earth, and hence there is no contrariety in him to them. His knowledge embraces all things, and his course is (intended to be) helpful to all under the sky;— and hence he falls into no error. He acts according to the exigency of circumstances without being carried away by their current;— he rejoices in Heaven and knows its ordinations;— and hence he has no anxieties. He rests in his own (present) position, and cherishes (the spirit of) generous benevolence;— and hence he can love (without reserve).”

*Paragraph 23 reads:—*

“(Through the Yi), he comprehends as in a mould or enclosure the transformations of heaven and earth without any error; by an ever-varying adaptation he completes (the nature of) all things without exception; he penetrates to a knowledge of the course of day and night (and all other connected phenomena);— it is thus that his operation is spirit-like, unconditioned by place, while the changes which he produces are not restricted to any form.”

### REMARK IV.

#### The Two Basic Elements of that Symbolism

The reason why the cube and sixth powers in question should have as their own root a binomial, or a pair of



terms, is that they are representing a positive and a negative (陽陰), and the latter again, a positive and negative Yao (爻) of Trigrams (三畫卦) and Hexagrams (六畫卦). (A Yao is the most elementary form of symbol since a multiple of them make the Trigram and the Hexagram).

#### REMARK V.

##### The Three States of that Symbolism

The exponent 3 of a third power represents the 3 states in the world, namely, gaseous, liquid and solid. In the Chinese Logic of Changes, the Trigrams "Chen" (震) and "Sun" (巽) (thunders and winds) are taken as symbols of the gaseous state, "Kam" (坎) and "Li" (離) (water and fire) of the liquid, and "Ken" (艮) and "Tui" (兌) (mountains and marshes) of the solid.

#### REMARK VI.

##### The Kinematographical Explanation of those Two Basic Elements

A term of three factors is a symbol of a figure of a certain body while a term of six factors is a combination of two symbols of figures of the same body but at two different times, say, before and after its change. The latter, therefore, is an analyzed picture of a motion of a change. In other words, a Trigram is a symbol of a figure of a certain body like a tiny photograph of moving picture film, and two Trigrams connected together make a combination of symbols of figures of that body before and after its change like two tiny photographs in one run,

and to show a motion or a change of moving pictures, it requires at least two of them filmed together. Furthermore, a show of the change of figures of this kind is the exact meaning of the elementary symbol "Yao" (爻) and therefore, in the Chinese Logic of Changes, the latter can be quoted, thus:—

The Great Appendix (繫辭), Section II (下傳), Chapter I (第一章), *Paragraph 1*, says:—

"The eight trigrams having been completed in their proper order, there were in each the (three) emblematic lines (or Hsiang, a figure). They were then multiplied by a process of addition till the (six) component lines (or YAOs) appeared"

and again

the same Appendix, Section I (上傳), Chapter III (第三章), *Paragraph 15*, says:—

"The YAO speak of the changes (taking place in the several lines)."

Both of them also appear to give the same meaning, say, that of Trigram is a symbol of a figure and that of one of its component parts, YAO, a symbol of change of that part, and are extracted from *The Yi King, Part II of The Sacred Books of China*, translated by James Legge.

#### REMARK VII.

##### The Geometrical Definition of that System of Symbols

The Eight Trigrams (or KWA 卦) and Sixty-four Hexagrams are, when they are held together like all the

terms of products in the algebraic expansion formula, already proved to be a cube and sixth power of a binomial, the Two Elementary Forms (or "I" 儀) and Four Emblematic Symbols (or "Hsiang" 象) to be a simple binomial and square of a binomial respectively. Speaking geometrically, Eight Trigrams (as they are combined together) make the form of a cube, Four Emblematic Symbols that of a square, Two Elementary Forms that of a line (since a line like an arrow has two directions, say, positive and negative) and the Grand Terminus (太極) alone that of a point. For the terms already mentioned such as Eight Trigrams, Four Emblematic Symbols, Two Elementary Forms and the Grand Terminus, they can be quoted from The Great Appendix, Section I, Chapter XI, Paragraph 70 which reads:—

"Therefore in (the system of) the YI there is the Grand Terminus, which produced the two elementary Forms. Those two Forms produced the Four Emblematic Symbols which again produced the Eight Trigrams,"

and it really means:—

"Therefore in a system of symbols of Chinese Logic of Changes, there is one undivided whole, which produced the two of its component parts. Those two of its component parts produced the four of its component parts, which again produced the eight of its component parts"

which is similar to the Dichotomy of logic.

### REMARK VIII.

#### The Symbolic Relation of those Basic Elements to the Influences of the Heavenly Bodies

The Sixty-Four Hexagrams, the Eight Trigrams, the Four Emblematic Symbols and the Two Elementary Forms when translated into Algebraic language, are all the products resulting from the expansion of a sixth, third, second and first power of a binomial (or a pair of terms). That basic binomial has already been said to be a positive and a negative which, in turn, could be deemed to be the positive and negative effects of the influences of all kinds of heavenly bodies on the earth. Among the positive and negative effects of their influences, is the sun, or sunlight, which everybody knows, and the Chinese character "Yi" (易) when analyzed, is split into two characters "Zi" (日) and "Fui" (勿) meaning in Chinese the word "Change" (易), a combination of the two, "Sun" (日) and "Not (sun)" (勿). In other words, the word "Sun" in Chinese character split from the word "Change" is to represent the positive side of the downward shining influence of all kinds of heavenly bodies and the word "Not (sun)" the negative side of that influence. If a binomial is taken to represent the resting of a changing body, then, the second, third and sixth powers must represent a number of its periodic changes. This is something like the sunlight which appears periodically and consequently any given point on the earth will undergo many alternations of light and darkness.

**REMARK IX.****The Applicability of the Symbolism to Bodies  
of Two Different Forms**

If anybody questions the appropriateness of symbolizing the world by a cube and taking it to be a cube in form, which it really is not, one may answer that, since in mathematics, the volume of a sphere may be obtained from the cube of its diameter multiplied by a fixed known ratio, and that this ratio is a mere matter of the numerical difference between two particular forms, it does not hurt the general symbolic formula of expansion in this discussion.

**REMARK X.****The Extension of the Generality of the Algebraic  
Formulæ to Other Uses**

The algebraic terms and their symbols, representing numbers only, are still limited in their uses in a numerical circle but in Jevon's logic there is also an algebraic reasoning which deals with reasoning in such terms and which could therefore be said to be a wider one. In Chinese Logic of Changes, Eight Trigrams and Sixty-Four Hexagrams, like all the terms of the algebraic expansions of a binomial cube and sixth power, are taken as the reasoning symbols of the logic of its own kind similar to the reasoning terms of algebra. Symbols of letters of the alphabet, for uses other than those of numbers, could be found in the logic of the said author in the form of reasoning representing terms and again in modes of the syllogism representing propositions, and those in

alphabet translated side by side with the Trigrams and Hexagrams of the diagrams Nos. 3 and 7, could be said to belong more closely to uses of this type.

**REMARK XI.****The Importance of the Kind of Orders of the Symbolism**

By referring to the Arithmetic Exhibit, diagram No. 4, which shows numbers only in four varieties, besides those of the two Trigrams, "Chien" and "Kwun" those of the three, "Sun", "Li" and "Tui" are all eighteen, and the other three, "Chen", "Kam" and "Ken" all twelve. Out of these two sets of the same numbers, without showing the order of their component factors in each term, there could never be revealed in each set such a distinction as exists among its three members, i.e., that there are yet three peculiarities, three different kinds of order of arrangement. The revelation of the difference of such orders as made possible by the figures of Trigrams, is the special advantageous feature of the Trigrams. To explain the serious importance of such orders, three examples are given as follows:—

Example (A), concerning the order of time:—

Let us suppose three persons are drawing lots. Two of the lots are the same and one is different. The lots are drawn in order from under cover.

Whoever draws either one of the two similar lots, is the loser and the other the winner. In this case, according to the order of the component lines (or Yaos) of the Trigram "Sun", the winner

belongs to the first person and the losers the second and third. The question of winning belonging to the first person and not to the second or third, may be taken to illustrate the importance of the order of the component lines (or Yaos) of a Trigram.

Example (B) concerning the order of position in space as relative to the nature of the tendency of a physical force :—

That heavier matter occupies a lower position and lighter a higher one is naturally an unchangeable truth, and if they are placed in the reverse order of their natural positions so that the heavier matter is lifted up to a higher position and the lighter pressed down to a lower one, it will develop at once that both of them will have three kinds of natures of tendency of their own forces, as soon as the forces of these unnatural placings are released. Again in the course of these developments, they could be divided into three kinds, i.e., the start, the finish and the combined middle of them.

For instance, once the gravitating heavier matter which was lifted up drops down, it will be free from the lifting at the start, and since the matter of so doing is of a heavier kind and its force great, it will therefore sink at the middle and enter at the finish of the course. This "Freeing" (脫), "Sinking" (陷) and "Entering" (入) are just the three kinds of reactionary tendency of a force during three steps of time, i.e., the start, the combined middle of both the start and finish, and the finish. While the floating lighter matter which was once pressed down,

will also have three kinds of force, and in this case, requiring only the removal of the pressure, the matter will move up again, separate from below, and cease its action finally when it has reached its position above. This "Moving" (動), "Separating" (離) and "Ceasing" (止) are the three kinds of force in the said three steps of time.

In furthering this instance, we may say that gravitating heavy matter is like a lifted axe, which once dropped will free itself from its holder, sink, and enter the wood, and that floating light matter is like a balloon held low by a child, which when once released will move up from its holder, separate from below, and cease finally in its upward motion.

The meaning of the said instance could be applied to one or two of the lines (or YAOS) of a Trigram, and according to the analogous meanings of positive and negative to those of light and not-light (or heavy). The lifted heavy axe which is *freeing* from above at the start, could be taken to illustrate the only broken line (or negative Yao 陰爻) at the top of the Trigram "Tui", that which is *entering* below at the finish, the only broken line at the bottom of the Trigram "Sun", and that which has both of these two actions of *freeing* and *entering* in the order of one after the other to be the two broken lines, say, one at the top and the other at the bottom of the Trigram "Kam" which means also *sinking*, representing a combined middle action of the *freeing* and the *entering*. Likewise, the light balloon held low by a small child and is *moving* below at the start, could be taken to illustrate the only

unbroken line (or positive Yao 陽爻) at the bottom of the Trigram "Chen", that which already *ceased* above in its motion at the finish to be the only unbroken line at the top of the Trigram "Ken" and that which has both of these two actions of *moving* and *ceasing* in the order of one after the other to be the two unbroken lines, say, one at the bottom and another at the top of the Trigram "Li" which means also *separating*, representing a combined middle action of the *moving* and the *ceasing*. While the two Trigrams "Kam" and "Li" each are combinations of the Trigrams "Tui" and "Sun", "Chen" and "Ken" into two sets of two trigrams each, then, in the same way, the Trigrams "Chien" and "Kwun" could also be taken reciprocally to be a combination of those two Trigrams "Kam" and "Li". By a careful examination of the Trigrams, you will notice in the Trigram "Chien" that, besides its two unbroken lines, one at its bottom and the other at its top, which could be taken to represent those possessed by the Trigram "Li", there is yet one unbroken line in its middle which could represent that possessed by the Trigram "Kam", and then by noticing the Trigram "Kwun" in a similar way, it will thus present the idea that they are reciprocally a combination of the two Trigrams "Kam" and "Li". But from the Trigrams "Chien" (乾) and "Kwun" (坤) there is yet a difference which could be interpreted that in former (Chien 乾) it is at first *moving* (動) and *ceasing* (止), and afterwards *freeing* (脫) and *entering* (入) being one having the manner of activeness or that of the

*strengthening* (健) in nature while in "Kwun" (坤), it is at first *freeing* (脫) and *entering* (入), and afterwards *moving* (動) and *ceasing* (止) being one having the manner of passiveness or that of *obeying* (順) in nature. The aforesaid "freeing", "entering", "sinking", "moving", "ceasing", "separating", "strengthening" and "obeying" are the natures of the EIGHT TRIGRAMS, and according to the foregoing interpretations, the order of arrangement of the lines (or YAOS) of the eight Trigrams will thus constitute a certain kind of meaning.

The same could be quoted from The Treatise of Remarks on the Trigrams (說卦傳), Appendix V, Chapter VII, Paragraph 11 which is translated by Legge as follows:—

"Khien is (the symbol of) strength; Khwan, of docility; Kan of stimulus to movement; Sun, of penetration; Khan, of water, is precipitous and perilous; Li, of what is bright and what is catching; Kan, of stoppage or arrest; and Tui, of pleasure and satisfaction,"

and this chapter in his notes is taken as mentioning the attributes, being called also the "virtues" of the different Trigrams, and in the foregoing interpretation called the "natures" (性情). That chapter could be translated as meaning as follows:—

"Chien is (the symbol of the nature of) strengthening; Kwun, of obeying; Chen, of moving; Sun, of entering; Kam, of sinking; Li, of being bright (or separating flame of a fire); Ken, of

ceasing; Tui, of satisfying (an action in mind from unnatural to natural) or freeing.”

For the full exhibit of the natures of two kinds of matter and their mutual relation in respect to time, one can refer to diagrams Nos. 42 and 43 showing a lever with two ends of different weight in place of the heavy axe and the light balloon mentioned above. From these diagrams, one can see that by adding and deducting the extra weight (joining and disjoining the movable extra length of the lever arm) the four natures of one side could be changed into those of the other side (or the four Trigrams of one side are transformed into those of the other side) and that among these eight natures that of “Li” having an upward tendency like the upward rising of flames of fire since the Trigram “Li” is a symbol of fire, and those of “Kam” having the downward tendency like the downward dropping of water, since the Trigram “Kam” is a symbol of water, they are therefore the best that could be understood; while that of “Sun” the meaning of entering is made more explicit by a level above.

Great attention should be paid to these “Natures” for the reason that all the descriptions of those of the Sixty-Four Hexagrams throughout the whole text of the Chinese Logic of Changes, could be reduced to mere combinations of these “Natures” and that they are belonging to all of the characteristics of those eight component parts of the world such as heaven, earth, mountains etc. as mentioned in the second remark of this writing.

### EXHIBIT OF THE NATURES OF REACTIONARY FORCES AND THEIR RELATIONS

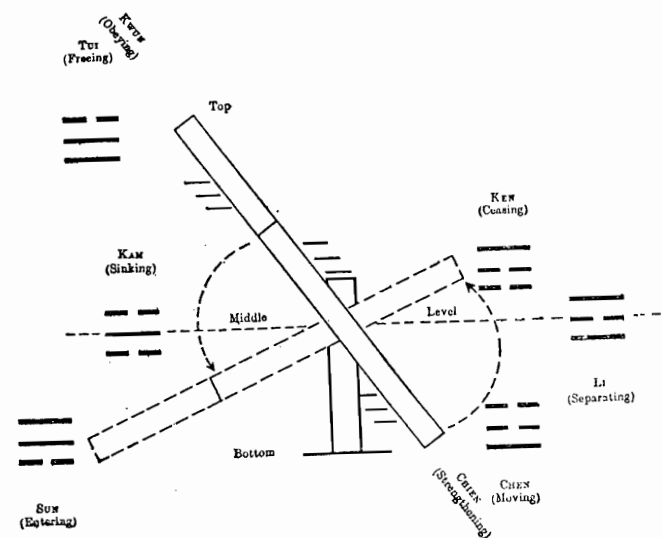


Fig. 42

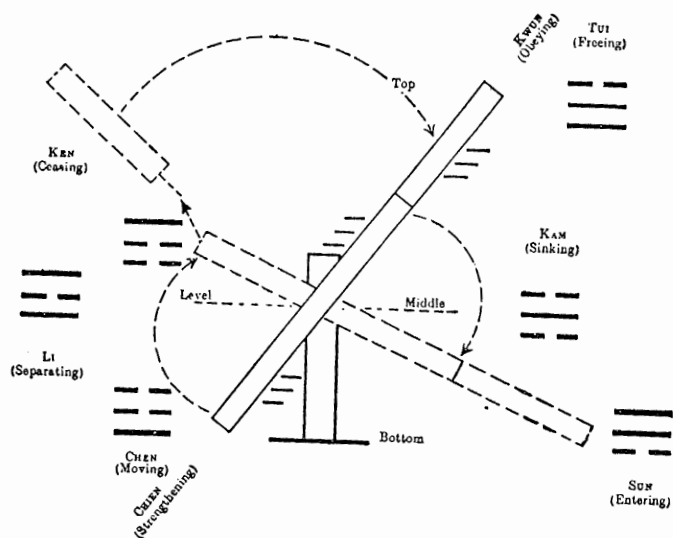


Fig. 43

Example (C) concerning the order of position of the different parts of a body as relative to its quality:—

In chemistry, among the formulæ of various chemicals, there are two graphic formulæ for Naphthylamine, one for a-Naphthylamine and the other for b-Naphthylamine, and when they are compared there is no difference in either their qualitative or quantitative chemical composition; yet because in them there is an Amido ( $\text{NH}_2$ ) group which occupies different positions in their respective graphic formulæ, they possess two different kinds of properties.

## REMARK XII.

### The Suggestion of Using Heat and Light Measuring Formulæ for the Detection of Various Worldly Parts

We noted in the foregoing paragraphs that the volume formulæ of third and sixth power of a binomial, could be used as symbols for the world, and then, that to detect the various component parts of the world, one could thus use the method of evolution,—for instance,—if the products of two unlike Trigrams or Hexagrams (or terms in Algebra) are known, the rest of the products could be deduced by way of proportion. Therefore, in physics in both measuring the quantity of heat (or Calorimetry) and that of light (or Photometry), the calculating operations of evolution and involution could be used. When one speaks of this heat and light, do they not both belong to the influences of a positive and negative side of all kinds of heavenly bodies? In photometry, one may consider the area of the image on the screen as accounting for two of the necessary dimensions for a volume and the distance of the image from the source of light as the third dimension. In this way we may obtain a "volume" of light. In an analogous manner, in calorimetry, we may consider the volume of the absorbing medium to be a measure of the "volume" of heat involved.

## REMARK XIII.

### The Quantitative Explanation of the Symbols

Only with the two Trigrams, "Chien" and "Kwun" (like the first and last terms of the expansion series of a

binomial cube without their rest) one could never form a whole (圖圖) (like a binomial cube) or one transformation. For instance, in the process of distillation, the water to be distilled must be vaporized by heat and the resulting steam must be condensed by cold to form a complete process. If we regard the process of distillation merely in the light of its initial, intermediate and final stages we do not get an adequate picture of the changes occurring in the system to produce these states. In the still, cold water has to be heated, then heat has to be added to change the water into steam, additional heat is required to keep the steam from condensing prematurely, then, in the reverse cycle, this additional heat has to be removed, the steam has to change, by further cooling, to water, and, finally, the hot condensate has to be cooled to bring it to its original state. Thus we see that the complete process consists of the following changes:

Cold water→hot water→water evaporating→steam  
warming→steam at constant temperature→steam  
cooling→steam condensing→hot water→cold water.

From this we can readily see that in considering only the initial, intermediate, and final stages of the process the actual cycle of changes would be lost.

This instance is cited to explain that with only the two Trigrams, "Chien" and "Kwun", "Chien" for both the vaporized steam that to be condensed, and "Kwun" for both the cold water to be distilled and the condensed distilled-water) without the remaining six others (the three steps of the evaporating process, and the three of the condensing process), it would not be possible to form a whole (as a whole process of distillation).

Again by checking over the diagram No. 4, one will find that, since the cube of five is equal to one hundred twenty five, with only the sums of the two terms "Chien" and "Kwun", being in all only thirty five, one could not make up to the number of the cube.

#### REMARK XIV.

##### The Method of the Study of this Logic and the Purpose of its Publication

The Trigrams of Hexagrams of the Chinese Logic of Changes being in similarity to the number-symbol terms of their respective kinds of algebraic formulæ, and the kinds of means of relating their principles to those of the concrete numbers of one's assignment to the symbols, employing them appropriately depends entirely upon the capacity of one's wisdom. With the varieties of the kinds of means resembling those of concrete numbers, therefore, with hundred of kinds of the Chinese Logic of Changes with notes of different writers, one will gather as there are with solutions of calculating problems, that seemingly there are truths in each and every one of those notes. But in studying the said kind of logic by merely going over kind by kind, one could never grasp the real skeleton of its principle, and even with the studying of the Sixty-Four Hexagrams, preceding that of Eight Trigrams, it would be also useless.

Regarding these Hexagrams, the writer would not dare to interpret them nor to even proceed with the publication of this whole chapter of remarks at first, for they were merely rough notes which had never gone



through a final checking of critical processes of thought. However, what the writer emphasizes, are those two exhibits, say, fig. Nos. 3 and 7 showing the agreements of Eight Trigrams and Sixty-Four Hexagrams respectively, with their corresponding terms of expansions of a binomial cube or sixth power, and even with only those two exhibits showing the symbolic reasoning formulæ of the Chinese Logic of Changes and without this whole chapter of remarks, it is something like a manner without any sign of its deductive reasoning.

The writer quite earnestly hopes that any of the readers who have the same wishes, both in this country or abroad, would with interest utilize their modern knowledge in definitely demonstrating this most antique and worthy of study product of the remote times of China, and from various angles which should include not only one of philosophy, but also of Art, to discover its definite functions. It is for this reason, that the writer voluntarily presents all of his thoughts in the foregoing exhibits, and consequent remarks to those interested, and invites comments and criticisms, as may be deemed necessary.

## APPENDIX

## YI SYMBOLS AS IMAGINARY GAUGES

(In various forms and graduations)

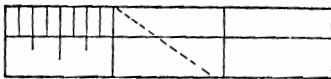
As the form which the writer has taken the initiative in presenting in the principal part of this work is a cubic one, some others that are based on diagrams either originally brought down or made by Chinese philosophers, are also given in the Appendix. Yi symbols, once assigned with a particular form and graduation, as with physical measuring instruments, are better called imaginary gauges as in all probability they were that to the ancient philosophers.

Z. D. SUNG

YI SYMBOLS AS IMAGINARY GAUGES

THE FORM OF A STRAIGHT LINE AND ITS GRADUATIONS

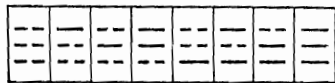
A physical measure of eight eighths of an inch



An imaginary gauge of eight divisions of a unit

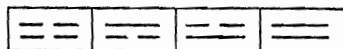


An instance of a physical measure and its graduation principle symbolized in the above diagram of divisions, in three series, is used to explain the following system of corresponding YI SYMBOLS:—



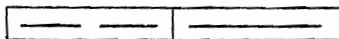
EIGHT TRIGRAMS

As an imaginary linear polynomial of eight terms



FOUR EMBLEMATIC SYMBOLS

As an imaginary linear polynomial of four terms



TWO ELEMENTARY FORMS

As an imaginary linear binomial

Fig. 44

YI SYMBOLS AS IMAGINARY GAUGES

THE FORMS OF LINEAR DEVELOPMENTS AND THEIR GRADUATIONS

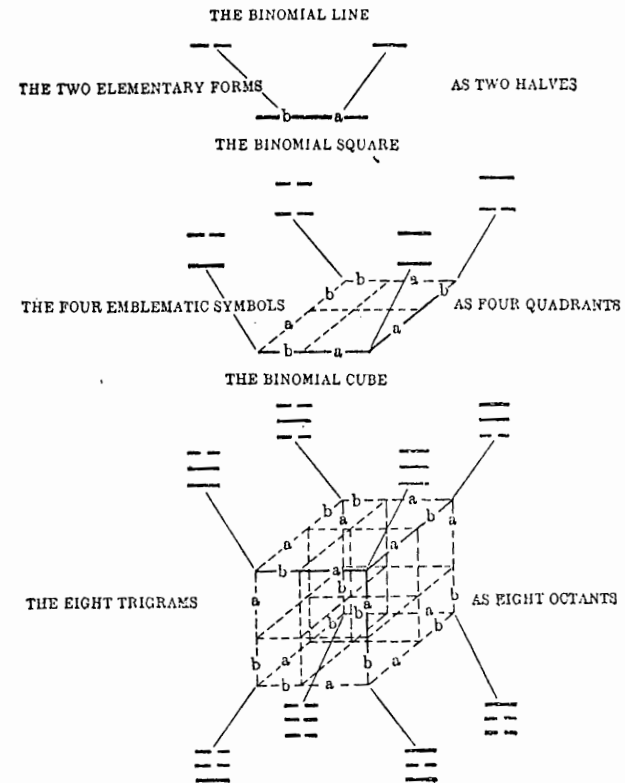
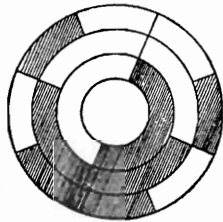


Fig. 45A-C

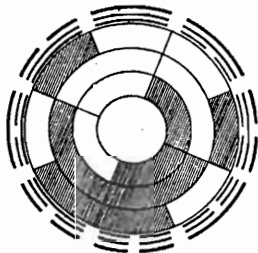
YI SYMBOLS AS IMAGINARY GAUGES

THE FORM OF A CIRCLE AND ITS GRADUATIONS

An Imaginary Gauge of Eight Divisions of a Circle

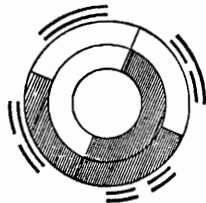


EIGHT TRIGRAMS



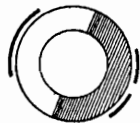
AS EIGHT EIGHTHS

FOUR EMBLEMATIC SYMBOLS



AS FOUR QUARTERS

TWO ELEMENTARY FORMS



AS TWO HALVES

Fig. 46

YI SYMBOLS AS IMAGINARY GAUGES

THE FORMS OF PLANES AND THEIR GRADUATIONS

Four Emblematic Symbols

AS FOUR QUADRANTS OF A SQUARE PLANE



AS FOUR QUADRANTS OF A CIRCULAR PLANE

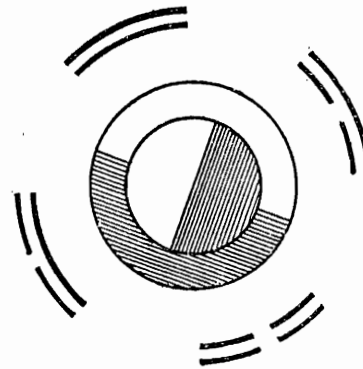


Fig. 47

YI SYMBOLS AS IMAGINARY GAUGES

THE FORM OF THE PLANES OF ROTATION ON THEIR AXES

The Eight Trigrams

AS THE FOUR QUADRANTS OF AN IMAGINARY CIRCULAR-PLANE ON EACH SIDE OF AN AXIS

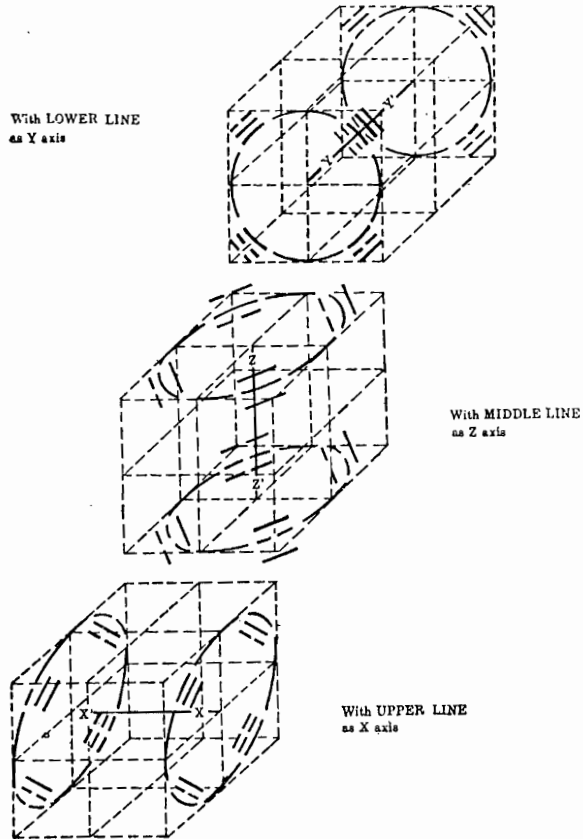
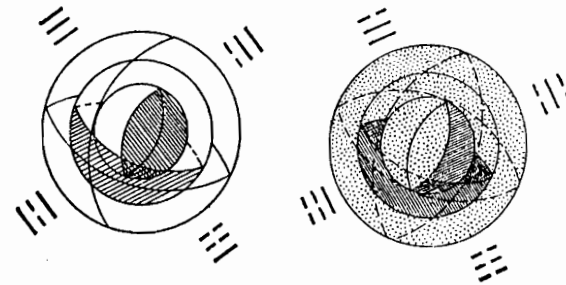


Fig. 48

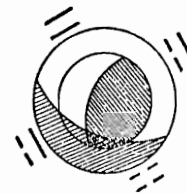
YI SYMBOLS AS IMAGINARY GAUGES

THE FORM OF A SPHERE AND ITS GRADUATIONS

EIGHT TRIGRAMS AS EIGHT EIGHTHS



FOUR EMBLEMATIC SYMBOLS AS FOUR QUARTERS



TWO ELEMENTARY FORMS AS TWO HALVES



Fig. 49

## YI SYMBOLS AS IMAGINARY GAUGES

## THE FORM OF A WAVE LINE AND ITS GRADUATIONS

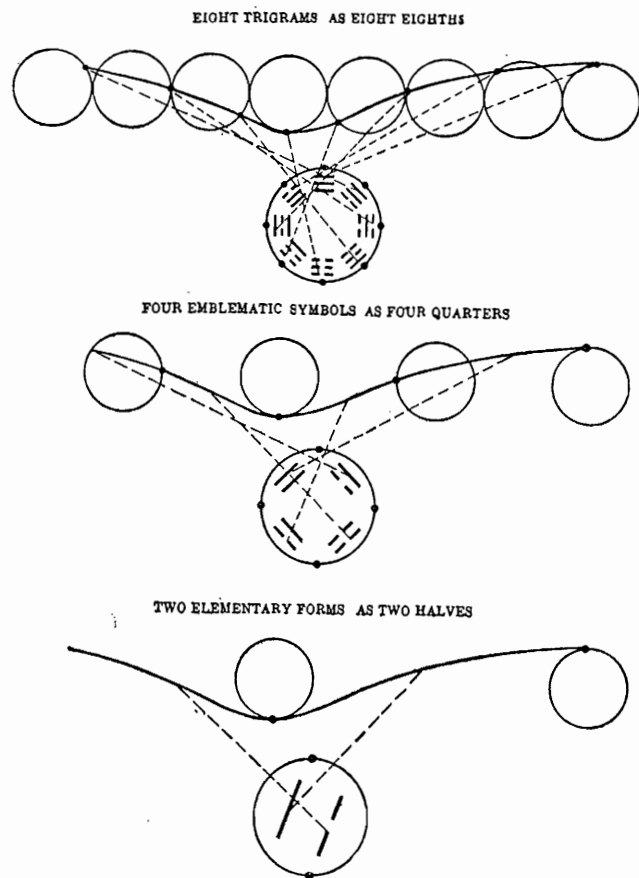


Fig. 50

## Description of the diagrams Nos. 44 to 50

**Diagram No. 44** (In the form of a straight line and its graduations)

This diagram shows how the form and graduations of an inch of British linear measure, in eighths, quarters and halves, could be taken, correspondingly, as Eight Trigrams, Four Emblematic-symbols and Two Elementary-forms. The exhibit of these symbols, in the form of a straight line, is based on the original diagram of the Fu Hsi's Trigrams in linear arrangement (橫圖) while the formation of the gradual dual development (加一倍法) of this system of YI SYMBOLS was made known by the Chinese philosopher, Shao-tzü (邵子).

**Diagrams Nos. 45A to 45C** (In the forms of linear developments and their graduations)

Under this exhibit, diagram No. 45A is based in principle on the preceding one, No. 44, and No. 45B, on the original of Fu Hsi's Hexagrams in square arrangement (方圖) while the third one, No. 45C, in cubic arrangement, as treated in the principal part of the work, is initiated by the writer.

**Diagram No. 46** (In the form of a circle and its graduations)

This entire exhibit is based on the original diagram of Fu Hsi's Trigrams in circular arrangement (小圓圖) while the formation of the gradual dual development of the system of these symbols is borrowed from the one mentioned under No. 44.

**Diagram No. 47** (In the forms of square and circular planes and their graduations)

The whole exhibit is based in principle either on the original of Fu Hsi's Hexagrams in square arrangement (方圖) or Fu Hsi's Trigrams in circular arrangement (小圓圖). The four divisions of either plane are represented by a corresponding number of Emblematic-Symbols, and to the latter were originally assigned by King Wan (文王) four attributes, namely, Yuan (元), Heng (亨), Li (利) and Chen (貞) (meaning 'the great and originating,' 'the penetrating,' 'the advantageous' and 'the correct and firm' respectively) which have been widely used by philosophers for the extension of the analogies of the four periodic changes. The direction and order of arrangement of these four symbols is clockwise like that of the apparent motion of the heavenly bodies as it was originally, but to be in accordance with the actual motions of those bodies, they could be rearranged in counter-clockwise manner. Those attributes were also mentioned by Dr. Chatley, in his work, as four phases which indicate the inception, climax, balance, and anti-climax respectively.

**Diagram No. 48** (In the form of planes of rotation on their axes and their graduations)

This diagram is based on No. 45C, in cubic form, or inferred from No. 47, in the form of a circular plane representing the two lines of a Trigram and by assuming its axis as the remaining one of its lines.

**Diagram No. 49** (In the form of a sphere and its graduations)

This diagram is based on the one made by Jen Ghi-yün (任啓運), a prominent scholar in this particular field of study.

**Diagram No. 50** (In the form of wave line and its graduations)

This diagram is based on No. 46, in a circular form, since in explanation of a wave line, circles are used to show the definite relation of the relative positions of the particles at any given instant. A line drawn through the indicated points on the circumferences will represent the wave form. This wave diagram is also suggested by the Vibration line dividing the Taoistic Diagram (太極圖) into halves of black and white, Ying and Yang respectively, as suggested by Dr. Chatley who also considered VIBRATION as Ying and Yang (陰陽), and is to be greatly admired for his initiation of applying the latter to this modern scientific term (see his work printed on page No. 139). The Taoistic Diagram which was first constructed by Kâu-zze (周子) (A. D. 1017-1073) from the fundamental ideas of the GRAND TERMINUS (太極) expressed in the Confucius Appendixes of the Text of Yi-King and quoted under the Remark VII of Part III, is given by the writer in the following exhibit (see Fig. 51).

THE DIAGRAM OF THE GRAND TERMINUS  
(or TAOISTIC DIAGRAM)

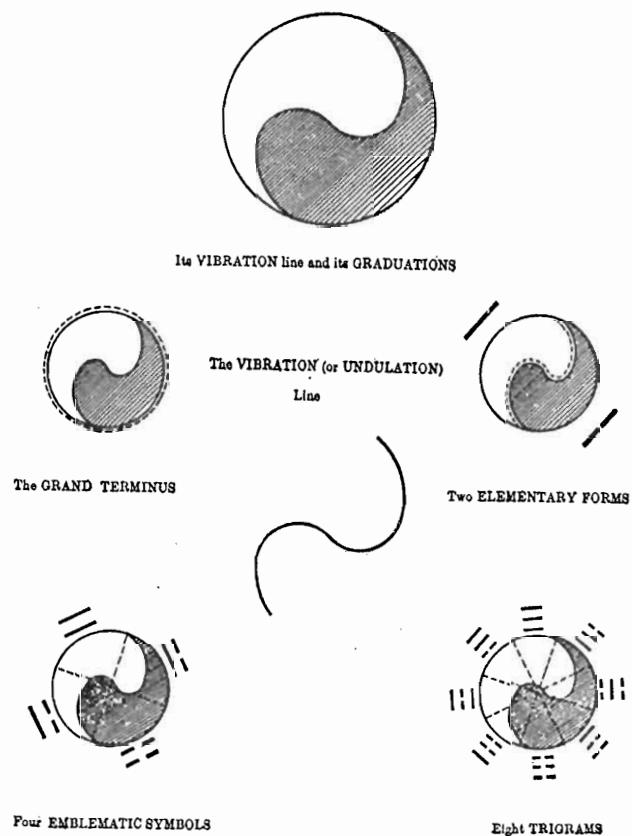


Fig. 51

CHINESE MYSTICAL PHILOSOPHY IN  
MODERN TERMS

BY

HERBERT CHATLEY, D.SC., LOND.

(Extract from "The China Journal of Science &amp; Arts")

The following notes, penned some years ago, are the essential part of an essay endeavouring to present the ideas suggested by the Sung system of philosophy expounded by China's most logical thinker, Chu Hsi, in modern terms. The author is far from supposing that Chu Hsi (or Chu Fu Tzu, as he is more respectfully called) had anticipated modern concepts, based on experiment, to the extent which at first sight might seem implied. Rather does the essay take the form of a meditation such as might (perhaps) be made by a present day Chinese who had absorbed a certain amount of modern science and endeavoured to "rationalize" to himself the mediæval Chinese system.

It need scarcely be said that many erudite Chinese have held that their philosophers have anticipated Western science in all essential respects. The author fears that this is an entirely unwarranted generalization. The most that can fairly be said is that certain of the Chinese ancients were well on the way towards making good guesses as to the inner nature of things, much as in the West Democritus and Lucretius did.

If these remarks induce some to study, in the original or translation, China's foremost philosopher, they will have justified their existence.



## INTRODUCTION

Spencerian philosophy divides the universe into two parts, the knowable and the unknowable, the boundary between them being fixed by the limitation of human sense-perception.\* Philosophers are by no means agreed as to the exact value of these limitations and it is one of the main tenets of all mystic and occult faiths that there is no definite limit to the sense perceptions, or rather that they incline to the view that the senses are not the only means of acquiring knowledge. As a matter of fact it is so difficult to define the exact limits of the power of the senses that it seems quibbling to discriminate between the idea of the extensibility of the sense perceptions and the actual increase of the number of senses unless it can be shown that a new organ performs sense functions. Biology shows that all the sense organs originate from the sensibility of protoplasm. The skin has evolved a peculiar responsiveness to the mechanical contact of solids and fluids, the nasal membrane to the mechanical contact of gases, the palate to chemical reactions, the ear to certain vibrations of gases and the eye to some vibrations of the ether, but it is more or less certain that undifferentiated protoplasm is in some measure sensible of each of these effects. All are special forms of motion in matter (including ether) and there is every reason to suppose that all matter undergoes alteration of some kind as the result of every motion. It is a not uncommon saying among physicists that the fall of a stone on the Earth causes a

\*A question here arises whether *all things* may not have an indirect effect on the senses and be intelligibly cognizable through the senses.

change in the molecules of the Sun. The slightest motion is infinite in its effects, the difficulty of observing them arising from their infinitesimal value at any one place remote from their origin. Protoplasm is peculiarly susceptible to certain motions and it is one of its distinct features that in course of time it can evolve complex forms (neuroplasms) which are extremely susceptible to special varieties of motion, so that an organism provided with several of these elaborate instruments can discriminate to a far greater extent than the simple organism which does not possess such means of distinction.

The human organism apparently possesses a more elaborate set of instruments, considered as a whole, than any other animal, but it nevertheless is only directly sensible to a small number of motions and there can be no doubt whatever that it is not yet even indirectly in conscious touch with the whole gamut of cosmic energy forms. Nevertheless if we acknowledge that the, as yet, unknown forms of energy can produce some effect on living matter and that the latter possesses the power of developing sensitivity of any kind within certain limits, we are driven to the conclusion that whole realms of experience remain to be exposed to our consciousness.

This is as it were the physical aspect of "occultism." There is also the psychical one, arising from the nature of consciousness. The phenomena of consciousness appears to be contemporaneous with motion in living matter, and it seems difficult in view of the continuity of all phenomena to avoid the idea that some analogous change occurs even in what is called inorganic matter. We are only able to distinguish the latter from "living matter" (protoplasm) by the complexity of chemical

reaction and transformation which protoplasm undergoes, almost all the phenomena of sensible life being explicable as developments of such chemical action. It is true that the processes of metabolism, katabolism and anabolism present aspects which are somewhat difficult to reconcile with ordinary chemical change, but when the instability of the biogen molecules and their mechanical arrangement as a cellular emulsion is considered, the difficulty is by no means insuperable, so that most scientists now believe in abiogenesis, although there is no doubt that we have not yet the means of reproducing the conditions under which it occurred. It would not, then, seem presumptuous to assume a simple form of consciousness as a fundamental property of matter of which organic consciousness is a co-ordinated integration.\* If we proceed to suppose that every molecule responds to every motion in every other molecule and every stress in every part of the ether, and that every such response is accompanied by a consciousness, it follows that each molecule is omniscient when its experiences in time are summed, but it needs a mechanism for reproducing those experiences before it can become instantaneously cognisant of more than one sensation. The brain of the higher animals has evolved to this end so that the ability to memorise and co-ordinate sensations has developed to an enormous extent. By reason, however, of the correlation of the brain to the senses during its evolution it is at present only capable of storing impressions made through the most receptive channels of the senses and does not memorise

\*It is the contrary hypothesis of Haeckel that consciousness does not occur until a well developed form of protoplasm (psychoplasm) has evolved, but his reasoning is not rigid.

the effects of those other more numerous but physically less important forms of energy which fill up the gaps in our scientific knowledge.

For example the vibrations which lie between the highest audible note and the lowest perceptible heat vibration must exist in some (perhaps all) forms of matter, but although the effects of some of them (the Hertzian waves) are demonstrably great, we are not cognisant of their action, if any, on ordinary matter. Again, the high speed vibrations beyond the ultra violet spectrum presumably ascend till the periodic time is infinitesimal, but we know nothing of them, except indirectly as Röntgen rays.

The Theosophists in recent years have endeavoured to prove that each of the types of vibrations have definite psychical functions, and that their synchronisms (harmony), interferences (discord) and octaves (frequency-multiples) are analogous, but I cannot see that beyond suggesting the analogy (which is not original) they have furthered matters at all. They claimed however to have received hypernormal information and this then leads us to consider the two fundamental features of metaphysical doctrine, viz., the extension of analogies and psychical inspirations.

#### METHODS OF EXTENDING KNOWLEDGE

The Aristotelian and Baconian separation of knowledge into *a priori* and *a posteriori* concepts has undergone considerable modification since the development of mechanical science. The approved method of extending knowledge is by the comparison of *a posteriori*

experiences. Kant has shown that the very process of comparison involves an *a priori* concept and there is a general tendency to limit *a priori* notions to the ordinary functions of thought. *A priori* experiences as distinguished from methods of thinking are not generally acknowledged and this is where philosophy of the scientific type falls foul of religious and occult thought. As a matter of fact on the basis of universal consciousness it is impossible to distinguish between *a priori* and *a posteriori* conceptions in a rigid manner. The *a priori* principles in categories of experience may have been *a posteriori* to the developing organism, and the only reason we have for imagining that they differ essentially in nature arises from the fact that we are not able in ourselves to observe the development of the categories. The principal category with which we are concerned is that of analogy or association of ideas which leads us to imagine that things which are similarly related in one respect may be so related in more than one respect. The actual analogies arise from the continuous juxtaposition of certain experiences leading to a regular linear arrangement of the memorizing cells (association fibres), and probably when a new memory is placed at one end of a fibre it tends to form its antithesis at the other end by a kind of polarity. Occultism professes to have discovered by means of such analogies the *modus operandi* of numerous obscure forces which act beyond the range of ordinary senses, and affirms that by the regular processes of cell development the faculty of perceiving the effects of such forces may be produced. Furthermore it is claimed that from time to time (or at one particular time in the dogmatic creeds) persons have

appeared who naturally possessed these hyper-normal faculties, and have instructed others in the development of them. This is revelation of the first degree. In addition to this it is frequently claimed that there are external sources of intelligence which, to a person partially possessing these new senses, can enable the said person to greatly develop them. Whether the mere anthropomorphising of the energies underlying uncommon phenomena may or may not account for the belief in the existence of a quasi-human, non-protoplasmic intelligence is doubtful, but we again encounter a *petitio principii* when it is considered that matter as such may possess the two features of intelligence namely, consciousness and response.

In support of the claim of special inspiration at certain times the traditions and literature of the ancients are adduced as examples. It is acknowledged that these have been modified by copyists and it is optimistically agreed that such alterations have always degraded the original sense. It is, however, admissible that there is a certain similarity in the symbolism of the ancient books and also certain agreement with modern thought, so that if there is any such thing as literary inspiration an examination of them may (not necessarily will) prove or disprove its existence.

We may then summarize the weapons of occult analysis as twofold:

- (1) The extension of analogies to explain and exhibit energies as yet unperceived.
- (2) The analysis of reputedly inspired writings and traditions.

These methods can, of course, only lead to hypotheses and the further step is to test the applicability of these hypotheses to psychic experience, *i.e.*, magic.

With regard to the first method one very important class of analogies occurs in connection with ordinary physical phenomena. Physical research has shown that numerous invariable mathematical rules apply to these, and it is conceivable that the general characteristics of these rules may analogically be extended to occult phenomena.

Four important generalizations may be made, and we here strike on one of the most extraordinary coincidences between reputedly inspired literature and the analogy method.

The First generalization we may make is that of reciprocity or mutual order.

The Second generalization is mathematical regularity and relation.

The Third is the continuous feature of change with alternate or opposed phases.

The Fourth is the character of objectivity or outward manifestation of the previous three.

Now these four are precisely the same as the four fundamental principles of the cosmos which occur in Chu Hsi's (朱夫子) expositions of the traditional philosophy of the Yih (易經) called respectively:

Li 理	Su 數	Chi 氣	Hsing 形
order	number	Breath (motion)	Form (matter)

In modern terms, this states that the universe is a Monism, mathematically related, of polar differentiation, manifest as a succession of forms.

The idea of order is also suggested in all schemes of philosophy and religion although it is certainly much more pronounced in ancient Chinese thought and modern science than in the other types. The principle of mathematical relation occurs in the Kabbalah, Babylonian and Egyptian astrology, the Pythagorean cosmogony, and the Christian Trinity. The concept of motion and change as a breath with antithetical states occurs markedly in Indian philosophy and the notion of psychical polarity is dominant in Parseeism, Islam, and Mediaeval Christianity. Finally the concept of form as a mere manifestation of underlying causes is the central feature of Vedantism and all the mystical pantheisms which have developed in the various religions. Modern occidental philosophy recognizes all four ideas clearly. The universe is dominated by "Laws," which are expressible mathematically. It is periodically and locally subject to antithetical conditions, whose forms are evolution and involution, pole and antipole. Forms are but the integral of causes.

In the range of the psychic the same actions apply. The mind follows a definite order (succession of motives) and has its polar states (the emotions) and outwardly expresses itself in form of matter and motion.

#### VIBRATIONS (陰 陽)

The dominant note in all the more orderly systems of occult philosophy is the principle of Breath or pulsatory change. In Indian philosophy the various breaths (Pranas) are regarded as the moulding forces of the universe and the mystic art of Yoga has for its principal object the regulation of the psychic economy to harmonise

with the periodic changes of the Prana. Similarly the universe is regarded as passing through alternate periods of Evolution (Avantara) and Involution (Pralaya) the vitality being dependent on the fullness of the cosmic breath (Purusha acting on Prakriti). In Chinese philosophy the ideas are almost identical. The Chi (氣) has its two alternations Yang and Yin (陽 and 陰) which represent the alternations of Light and Darkness, Development and Degeneration, and, as before, the world is supposed to undergo periods of destruction and construction. (The four phases Yuan, Heng, Li, and Chen, 元, 亨, 利, 貞, of each period 元 Yuan, the Indian Kalpa, indicate the inception, climax, balance, and anti-climax respectively). The complicated Christo-Judaic System with its numerous Egyptian, Babylonian, Persian and Greek sources possibly shows the same idea in its antitheses of Christ to Satan, Ahuramazda to Angramainyus, Ausar to Set, while the doctrine of the Logos or immanent Demiurgic Reason corresponds to the Indian Buddhi and the Chinese 道 Tao which seems identical with the principle of order. The theory of periodic creation is also suggested by the alternation of the First Creation, the Flood, the Noachic world-development, the Day of Judgment, and the New Jerusalem. The difficult idea of the eternal and unvarying character of the Future Life seems comparatively modern and coincident with an epoch of stagnation in the development of the religion.

In modern science the extensive theory of vibrating energy corresponds to the mystic Breath Philosophies and the doctrine of alternate Evolution and Involution is firmly established. It first appears in a curious form in the Catastrophic doctrine of Cuvier (an attempt to

reconcile geological phenomena with the Hebrew traditions) which is almost identical with the Chinese theories (see the works of Ch'u Hsi), and then fully in Spencer's Synthetic Philosophy. The theories of Laplace, and more recently Lockyer and Arrhenius on cosmogony, although they differ in almost all respects yet agree in the main doctrine of successive destruction and reconstruction. Einstein's cosmogonic theories may also be interpreted cyclically.

We have, then, an universal testimony to a periodic character in all phenomena, and it is found almost without exception that the changes which things undergo may be represented by curves which plotted on a time base exhibit the features of recurrence. Whether it be the motion of a star in space or the votes at successive elections there is this peculiarity. We find, however, that there is by no means always an uniform character in these periodic changes. As an example consider the voting for members of the English Parliament between the years 1832-1910. There was no regularity as to period or range apparent within the values recorded, but there was an obvious alternation of growth "the swing of the pendulum" and an approximate periodic time of fourteen or fifteen years in this alternation. This class of phenomena with irregular range of variation and a slightly varying periodicity is a very large one, but passes insensibly into a second class having a regular period including several shorter periods in which the range of variation appears irregular. Sounds, the beat of the pulse, and the current of multiphase alternating current dynamos change in this manner. Here there is a regular periodic time, and each period resembles all others or bears a definite relation to

them, but within the period there are numerous irregularities.

Lastly we have Harmonic variation, in which there is a regular curve. It is found that this type occurs whenever there is a force tending to restore the changing matter to its intermediate position exactly proportionate to its displacement from that position. By a mathematical theorem known as Fourier's Series, it is shown that the curves of the previous type can be reduced to the algebraic sum of a number of curves of this harmonic type having different periodic times and ranges, and so this harmonic or *sine*\* variation is regarded as the standard with which all other pulsations should be compared and a study of its properties makes clear most of the important points underlying the more complex forms.

In this way assisted by mathematical analysis we arrive at the conclusion that periodic change is due to a resistance of some kind continually acting on matter in a state of change so that this change is always retarded and finally reversed. So long as the change exceeds the state of minimum stored energy the resistance pushes the matter back towards that state with the result that it overleaps the point of rest and acquires the reverse (polar) kind of change and is again subject to a resistance which again forces it towards the point of rest. This will go on until the matter has some opportunity for parting with its energy.

Thus a clock pendulum drawn from its central position is thereby given potential energy, and falling back under the force of gravity passes the central position

\*Sinus, a wave.

and mounts the other side. In rising, however, it experiences the resistance of gravity which all the time is urging it to the lowest position.

Sound again consists of vibrations of masses of gas. These are compressed and thereby displaced from their mean positions: their internal kinetic energy causes resistance (repulsion) and the compression is decreased until and beyond the mean position, then becoming expansion which is similarly resisted.

In both these cases the motion continues till friction destroys it or rather converts it into vibrations of the ether.

Heat and light are probably similar changes in the ether, which is alternately compressed and rarified.

To revert to our more elaborate political example: one party gets in but its strength is continually weakened by the resistance of its opponents and external circumstances until finally the latter secure the victory and then again undergo the same fate.

Our known universe, as a whole, during its evolution is continually becoming more and more complex and the stability of its components decreases. The set of laws which makes for its heterogeneous growth is matched against contrary laws which tend to destroy that growth. At last growth ceases and then the contrary laws cause universal destruction, finally, however, leading to a maximum of stability in which the constructive forces may recommence their work under the original conditions.

The emotions similarly follow one phase until exhausted when the contrary feeling sets in and again suffers increase and decrease.

The modern terminology for harmonic change includes the following important definitions:—

Amplitude: the maximum variation from the mean.

Displacement: any one value of the variation from the mean.

Periodic time: the time between two exactly corresponding states.

Epoch: the time from the beginning of a period at which the change commences.

Phase: the time corresponding to any particular displacement.

The periodic time is for convenience subdivided into four parts, which in the case of pure harmonic motion are as follows (Fig. 52, page 145):

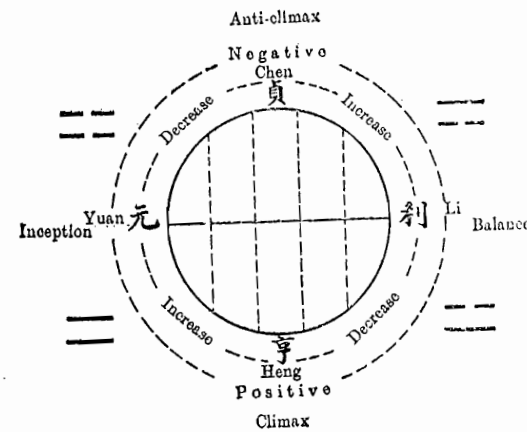
- (1) The Period of Regular Positive Increase (元 to 亨)
- (2) The Period of Regular Positive Decrease (亨 to 利)
- (3) The Period of Regular Negative Increase (利 to 貞)
- (4) The Period of Regular Negative Decrease (貞 to 元)

These notions define the simple vibrations and it remains to allude to some of the effects of combination.

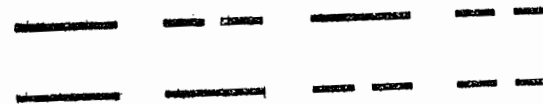
### HARMONY

When two vibrations, whose periodic times bear a simple relation one to another, act simultaneously on matter there is a large increase of amplitude at certain intervals leading to a periodic change of longer period with strong marked climaxes. These are called *Beats* and cause the psychological effect of musical "Harmony" in the case of sound.

### PURE HARMONIC MOTION



Increase	Decrease	Increase	Decrease
POSITIVE		NEGATIVE	



Written by Dr. H. Chatley and  
illustrated by Z. D. Sung

Fig. 52

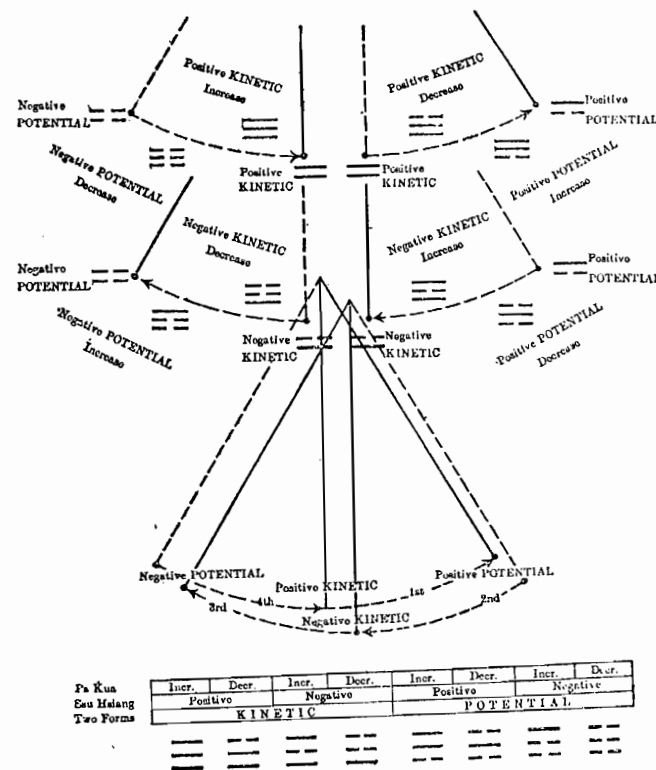
If the two vibrations have the same or almost the same periodic times they either extinguish each other (*interference*) or continue to produce a new vibration of greater amplitude. If one of the vibrations is produced by a source of energy comparatively inexhaustible, the successive increments of amplitude will finally cause enormous vibrations with great energy-effects (*forced vibrations*). The Hertzian and Marconi "wireless" effects are largely produced by this means of increasing the amplitude. There is something perhaps analogous to this in the development of emotion in a well-balanced person by the successive suggestions of other more emotional people.

*Discord* is the psychical effect of repeated "interference" of sound vibrations.

Vibrations (Fig. 53, page 147) express themselves as forms of Ch'i (氣) the vitalising Breath of the Universe when considered in the form of Energy. This "Energy" is precisely equivalent to the Chinese 氣 and can be identified with 神 Shen, Spirit, or God, it being the indestructible infinite source of all change. It has two forms (Potential=陰 Yin, and Kinetic=陽, Yang) and a vibration consists in the interchange of these two. From inception to climax, the Kinetic Energy decreases, being converted to Potential. From climax to reversal the Potential decreases and becomes Kinetic. From reversal to anticlimax Kinetic decreases becoming Negative Potential and from Negative Potential we return to Positive Kinetic energy at the inception of a new vibration. The Ssu Hsiang (四象) picture this change well:—

Positive Kinetic is Yang Major ☰  
 Positive Potential is Yin Minor ☷

VIBRATIONS (OF THE PENDULUM)



Written by Dr. H. Chatley and  
 Illustrated by Z. D. Soug

Fig. 53



Negative Kinetic is Yang Minor  $\equiv \equiv$

Negative Potential is Yin Major  $\equiv \equiv$

Add to this the idea of increase and decrease and we get the PaKua (八卦):—

+ K. Decr. $\equiv \equiv$ ●○○	— K. Decr. $\equiv \equiv$ ●●○○
+ P. Incr. $\equiv \equiv$ ○○○●	— P. Incr. $\equiv \equiv$ ○●●●
— K. Incr. $\equiv \equiv$ ○●○○	+ K. Incr. $\equiv \equiv$ ○○○○
+ P. Decr. $\equiv \equiv$ ●○○●	— P. Decr. $\equiv \equiv$ ●●●●

### ENERGY (氣)

The principle that all phenomena are the outward expressions (形) of transformations (化) of energy (力氣) is now well established. We have eight well defined forms of energy each of which passes insensibly into the others.

Mechanical Energy (Gravity and motion)

Heat

Light

Sound

Chemical Energy

Electro-magnetic Energy

Infra-atomic Energy

Life Energy.

None of these are distinct things. Thus all can be regarded as forms of Kinetic and Potential (mechanical) energy. Heat is indistinguishable from light if its frequency is increased. Electro-magnetic energy is regarded as stress in the "ether" and in oscillating forms becomes identical for certain frequencies with Light and Heat. Sound is motion and potential of

gaseous matter and if its frequency is enormously increased becomes heat. In any case it is finally transformable into Heat. Infra-atomic energy and chemical energy seem to be modifications of electro-magnetic energy and finally Life seems to be the outcome of elaborate chemical energy-forms with mechanical and electrical details. Certainly all are one and the same thing. Energy is generally defined as matter in motion. What matter or motion may be we know not save by their sensations or forms (形). We find, however, by experiment that if the amount of matter (inertia) standardised by comparison with gravity is multiplied by the square of its velocity (motion in space divided by time) the product although it may become latent (Potential) can always be traced into some other form and never varies in amount. Even Potential in the light of the theory of molecular vibration and strain seems only to be another form of Kinetic Energy. A mass possessing velocity strikes a surface, straining it (*i. e.*, putting its molecules into a higher state of vibration). The energy is partly recoverable by elastic restitution and is partly transformed to heat (*i. e.*, ether vibrations.) So with all the forms.

The clearest concept of energy is based on the vague idea of gas in motion. Energy itself is a thing invisible and therefore as a concept can only be mentally visible when associated with matter. Gas is the most intangible vehicle of energy that can be directly perceived and hence it is a universal practise to speak of Energy as a wave or breath, as of air. Hence the confusion of the words "breath," "spirit," "air," "ethereal," etc., which occurs in all languages.

Energy passes, as we have said, through alternate changes and it will be of immediate interest to know how much energy is involved in a simple vibration. In order to do this we must be precise in our methods of measuring energy. Potential energy is to be measured by the product of the mean resistance into the distance through which the resistance is overcome. Kinetic energy is most conveniently measured by the product of half the mass into the square of the velocity. The maximum potential energy equals the maximum resistance multiplied by half the amplitude and since contemporaneously there is no kinetic energy this is the total energy of vibration. By the equation of energy also the maximum kinetic energy is equal to the maximum potential. The mean K. E. = half maximum K. E. and by difference the same applies to the P. E. The change in the K. E. (and by difference . . . in the P. E. also) is also periodic, but differs by a quarter of a period in phase from the periodic change of the motion itself (一陰一陽易).

The principal source of energy (陽氣) to the earth is the sun (日 or 太陽) which on account of the annual and diurnal rotation of the earth varies periodically in its effect. By reason of the storage power of the earth (陰) the annual change is most marked and regarding this as the main periodic change in our field of consciousness we may formulate it for any point in the earth at any time as follows :

The light received on any one day is (disregarding the absorption effect of the atmosphere) proportionate to the semi-diurnal arc of the sun's path, which is a function of the declination of the sun and the latitude of the place.

The declination is again dependent on the time of year. We can approximately say that the declination is a sine function of the epoch of the day considered in the year.

If hour angles are drawn as a function of the declination, the periodic change in 陽 is found. At the arctic circles there is a complete reversal but in all lower latitudes 陽 is never zero.

The daily changes in the light may be approximately stated in a similar way.

In a similar manner the moon's revolution about the earth causes a periodic change in her light which is superimposed on the variation in the sun's light. This causes no appreciable change in the day but is appreciable at night when the sun's light is almost zero.

### LIFE

In the region of physiology and psychology the phenomenon of vibration also occurs. In the series of changes which are called metabolism there is an alternation of activity and rest (fatigue) called rhythm. This can be analysed in periodic changes of different times. There is the life period, the annual period, the monthly period, the daily period, the blood circulation and breathing period, the nervous vibration period and finally the high frequency sound perception periods. The perception of heat and light also seems to involve psychic changes of very high frequency although we may imagine that these act through the medium of chemical change other than psychic, which, however, seems to be an artificial distinction. The development of concepts and emotions seems to follow a rhythmic law also. Anger develops slowly, suddenly becomes violent, ebbs and finally is

succeeded by a period of depression. Thought gradually develops, suddenly co-ordinates to an idea, and then gradually fades from the memory unless reinforced by successive development.

Finally we come to the central subject of occultism, namely: Inter-psychic reaction. Emotions in one individual tend to induce similar or directly opposed emotions in others. Ideas and motives tend to suggest similar ideas and motives in others. This is perhaps on the surface a very vague matter but it is professed by occultists that it can be systematized, developed and used for all purposes. Hypnotism, or, as it is frequently called, Personal Magnetism, is regarded as a partial method to this end and consists in the initial production of a state of fatigue in one person, in which that person's own emotions and ideas are incapable of neutralising suggested ones.

We have already noticed that the phenomenon of life itself seems to be but a specially elaborate combination of the other forms of energy, and some biologists are altogether opposed to the hypothesis of a Vital Energy as distinct from Chemical, etc. This is, however, chiefly a verbal distinction. Chemical energy cannot easily be distinguished from Electrical Energy, and Heat and Light are similarly interconnected so that while it may be true that Life is not a new form of energy it possesses sufficient singularity of properties to be separately classified, the most remarkable feature being, as Haldane has said, its unity or self-preservative co-ordination. As this has its limits and only a cyclic existence and is absolutely dependent on solar energy stored in food, the assumption of a pure *entelechy* or vital principle essentially different from all else is not fully warranted.

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