Mensionization Complementation

The Mathematics of Hermetic Alchemy

Section 5-A

The Binary Number System.

The following explication on *binary* math is an introduction to the *Binary Number* system in terms of the *I Ching's lineal figures*. In the beginning text, do not let the *mathematical* terms intimidate you; we will mostly be using simple arithmetic in the following discussion.

Lateral 6

The Mathematical and Philosophical Exponential 2^n

To understand binary numbers a person *must* be familiar with the *mathematical* and *philosophical* 2^n *exponential* and its expansion. The *philosophical* 2^n differs from the *mathematical* 2^n in contrasting but equivalent ways. The number *two* (2) in 2^n is the *base* of the *binary system* whose *two* values only contain a *zero* (0) and a *one* (1). The numerical number two (2) in 2^n is very significant in all philosophies because it represents the "*duality* of *Nature*," the *Volatile* (1) and *Fixed* (0) of *oppositions* in *Hermetic Alchemy*, the *Yin* (0) and *Yang* (1) of the *I Ching*, and *Chokmah* (1) and *Binah* (0) of the *Kabbalah*. It is also known universally as the two genders *Masculine* (1) and *Feminine* (0). *Hermetic Alchemy's* principles are based on the order of the 2^n expansion.

The *mathematical* 2^n differs in a *cultural* way; the *I-Ching* is considered an *Eastern* culture system and *Hermetic Alchemy* and the *Kabbalah* are considered a *Western* culture system; as one would expect, there are at times *confusing* differences in the *two* (2) systems that must be recognized and taken into account. It is important to understand, individually, the ancient *I Ching* system is a "*Reverse*" of the *Western* system. In this topic we will discuss the *reverse* relationship and how it affects both cultures' use of the lineal figures. We first begin with the *Western* system and their *mathematically* defined ways of order and positioning.

The term 2^n in mathematics is called an "*exponential*" because it contains an *exponent*. There are two *positions* in the exponential 2^n; the numerical value "2" is termed the *base* and the "*n*" is termed the *exponent*. For our use, the exponent *"n"* will only contain *integer* values; the *"n"* value's range is $0,\ 1,\ 2,\ 3,\ \cdots \rightarrow n$. The *hexagram's "n"* values will range from $0 \rightarrow 5$, $(2^0 \rightarrow 2^5)$; the *trigram's "n"* values range is from $0 \rightarrow 2$, $(2^0 \rightarrow 2^2)$; and the *bigram's "n"* values will only be 0 or 1. A table of exponent *"n"* values for a 2^n expansion is shown below which results in the *Binary-decimal values* for each exponential.

$$2^n$$
$$2^0 = 1$$
$$2^1 = 2$$
$$2^2 = 2 \times 2 = 4$$
$$2^3 = 2 \times 2 \times 2 = 8$$
$$2^4 = 2 \times 2 \times 2 \times 2 = 16$$
$$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$$

You can readily observe that an *exponential expansion sequence* of 2^n is simply a *successive multiplication* of the *base* of the *exponential "n"* times.

A *linear increasing* value mathematical expansion of 2^n is shown below by the following summation polynomials. An *increasing decimal* value equivalent of 2^n is also shown.

$$2^n = \sum_{n=0}^{\infty} 2^n = 2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + \ldots + \rightarrow \infty$$

$$2^n = \sum_{n=0}^{\infty} 2^n = 1 + 2 + 4 + 8 + 16 + 32 + \ldots + \rightarrow \infty$$

Binary, of course means two (2); its interactions use only the two (2) arithmetic numbers *one* (1) and *zero* (0). *Decimal* means *ten* (10), the use of the ten (10) numbers (0) through (9) which is commonly used in most societies today.

The lineal figures of the Eastern *I Ching* will be used as examples to show how to interchange between *binary* & *decimal* numbers. As was mentioned earlier, the two (2) different individual culture systems in their interactions are *reverse* systems, so be discerning as to how they are used and compared. It can become confusing at times.

In *decimal* math, suppose a Texas *Rancher* told you, "along with many other animals he has *sixty* (60) Sheep and *five* (*5*) Border Collie dogs on his ranch to gather the animals." Using the *Western binary* system the same sentence would become, "among other animals he has [111-100] Sheep and [101] Border Collies on his property." *Note* when using binary numbers to represent decimal values we only use *permutations* of the numbers *zero* (0) and *one* (1*)* to represent decimal numbers*;* which means each *individual* position in the string of *zeros* and *ones* of the binary numbers must be equal to a specific *decimal* value*.*

Comparing the sentence above with the *six* (6) line hexagram, *order* is very important. There needs to be a *minimum* of *six* (6) binary number *positions*; composed of either *zeros* (0) or *ones* (1) to express the *decimal* value (60) in *binary*, which is equivalent to a *hexagram* in the *I Ching*. Also, there needs to be a *minimum* of *three* (3) binary number *positions* to express the *decimal* value five (5); which is equivalent to a *trigram* in the *I Ching*.

Binary can be defined mathematically as *a positional addition sequence* of the exponential expansion of "2^n". The definition means *position value* is very important in the addition sequence that *results* from the expansion of the 2^n. Therefore to represent the *hexagram* we will need to use six (6) positions; one position for each line of the hexagram. A *position* can hold either a *zero* (0) or a *one* (1) where the 0 is a broken line (▬ ▬) and a 1 is a solid line (▬▬). Note in the expansion below, we are beginning with a *zero* exponential (2^0), so the *exponent's* numerical *value* will be one *integer* unit *less* than the *position* number. Also, note the *Western culture* has a *right* to *left* ($\leftarrow$) *increasing* order of the *exponents* of 2^n in the beginning exponential expansion shown below.

(6) (5) (4) (3) (2) (1) ***Hexagram Line Position Number***

$$2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$ ***Right to left Exponential Expansion***

The 2^n sequence's *decimal* values range is from 1 to 32 calculated from *right* to left ($\leftarrow$).

$$2^5 = 32 \; + \; 2^4 = 16 \; + \; 2^3 = 8 \; + \; 2^2 = 4 \; + \; 2^1 = 2 \; + \; 2^0 = 1$$

Expanded Decimal (2^n) *Exponential*

If we were to change the beginning 2^n sequence into to its actual *decimal* values (*expanded version above*), we would then obtain a numerical *decimal* sequence for each value of 2^n. Placing one sequence below the other will simplify the calculations.

$$\leftarrow 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 \quad (2^n) \text{ Exponential Value Sequence}$$

$$\leftarrow 32 + 16 + 8 + 4 + 2 + 1 \quad (2^n) \text{ Decimal Value Sequence}$$

In the process of converting the *decimal* value sixty (60) to a *binary* value; note we now have a row containing 2^n exponential values and a row below it containing the *decimal* equivalent value of each exponential number 2^n above it. The exponent increases by one *integer* unit throughout the sequence and correspondingly the *decimal* values *double* each time. This is an example of how 2^n *exponentiation* alters the *decimal* numbers. If you increase the *exponent* by one *integer* unit, you *double* the previous numbers' *decimal* value.

The next part can be confusing to some because *Addition* and *Multiplication* will be used to change the *decimal* value *sixty* (60) into a *binary* number. *First*, in the *decimal* value row, choose all the values from that row when *summed* or added together will equal to *sixty* (60). We find the numbers 4 + 8 + 16 + 32 = 60. Having these values tell us *four* (4) out of the six (6) *decimal* number's *positions* will be used in the conversion. Now comes the *multiplication* part. To convert the number sixty (60) to binary we do *not* need to add the *decimal* numbers *one* (1) and *two* (2) on the *decimal* row. So, the way we eliminate them is to *multiply* them by zero (0). Observe the table below again and see we have added a new multiplication row to it.

2^5 +	2^4 +	2^3 +	2^2 +	2^1 +	2^0	(***Exponential Row***)
32 +	16 +	8 +	4 +	2 +	1	(***Decimal Row***)
1	**1**	**1**	**1**	**0**	**0**	(***Multiplication Row***)

The *decimal* numbers we don't need, (1 & 2), multiply those numbers by zero (0). The decimal numbers that add to sixty (60), we need to use so we multiply those numbers by one (1). The multiplication row now contains only *zeros* and *ones*; this multiplication row of *zeros* and *ones* is the *binary* number for (60). It is also what I term as a "*Set*" of *Boolean* binary numbers when we put brackets around it, [111-100]. A dash separation bar was included in the binary number; the dash separation bar is used only in *hexagrams* to easily visualize its *two* (2) *trigrams*; it is *not* counted as a position number. The 2^n exponentiation row is an important aid to include when converting *decimal* to *binary*, it helps to remember *positioning*.

In comparison, computer manufacturers standardized their position length years ago to the "*Byte*" which contains an addition sequence of eight (8) values of 2^n plus the "*Hexadecimal*" system *doubled* the "byte" to contain 16 positions of 2^n, the beginning standards have increased as computers have evolved to higher capacity machines, however, using the *Bigram*, *Trigram*, and *Hexagram* of the *I Ching*; we will only use *two* (2), *three* (3), and *six* (6) *position* values, or *sets* of 2^n.

To convert *binary* to *decimal* we just reverse the above process. Consider the *decimal* number *forty*-*two* (42). Its *Western* Boolean-*set* equivalent is [101-010]. We begin with its *binary* or Boolean set value [101-010] and for ease of viewing, expand the length of the binary graphic a little to give extra room to work with; remember, the process is in terms of the *I Ching* and the dash (-) in the middle separates the hexagram into two (2) *trigrams*, so do not let the dash confuse you; it does *not* count as a position in the conversions.

[1 0 1 – 0 1 0]

When converting *binary* to *decimal* in the graphic above, we are *only* interested in the (1)'s values and their *positions* within the brackets.

	2^5	2^4	2^3		2^2	2^1	2^0	
[	1	0	1	–	0	1	0	]
	32	16	8		4	2	1	

Anytime you see a *zero* (0) in a binary number it means its exponential or *decimal* value had previously been multiplied by *zero* (0) as was shown above. It is the reason we are only interested in the *one's* (1) value and its position. As you can see above; going from *right* to *left*, ($\leftarrow$) a one (1) occurs in the *second* position which has a *decimal* numerical value *two* (2)

($2^1 = 2$); another *one* (1) occurs in the *fourth* position and has a *decimal* value of *eight* (8)

($2^3 = 8$), and the last *one* (1) occurs in the *sixth* position which has a *decimal* value of 32

($2^5 = 32$). Sum the results 2 + 8 + 32 = 42 to get the *decimal* number we are looking for. Sum the purple values in the green rectangles above and you will have converted the *binary* set [101-010] to *decimal* 42.

The binary operations above have been presented so one could become familiar with the 2^n expansion and to show the math process of converting *back* and *forth* between the *Western binary* and *decimal* numbers. Rather than go through the above complex process each time you need to convert a *binary* or *decimal* number to the other; the graphics below will allow you to easily convert between *binary* and *decimal* numbers for *Hexagrams*, *Trigrams*, and *Bigrams*.

Hexagram

2^5	2^4	2^3	2^2	2^1	2^0
32	*16*	*8*	*4*	*2*	*1*

Trigram

2^2	2^1	2^0
4	*2*	*1*

Bigram

2^1	2^0
2	*1*

To convert a *binary* hexagram to *decimal,* place the *six* (6) binary *ones* (1) and *zeros* (0), [101-010] in their respective 2^n positions beneath the dark brown line.

Hexagram

2^5	2^4	2^3	2^2	2^1	2^0
32	*16*	*8*	*4*	*2*	*1*
1	**0**	**1**	**0**	**1**	**0**

Binary Number for 42

The leftmost beginning (1) in the linear [101-010] will go beneath the *leftmost* 2^5 position. Convert each *one* (1) value to its respective *decimal purple* value and sum the numbers.

To convert from *decimal* to *binary*; circle the purple numbers that sum to the value you need to convert, then put a *one* (1) below the circled positions and those without circles insert a *zero* (0). The *ones* (1) and *zeros* (0) will be the *Western decimal* value's *binary* equivalent.

Hexagram

2^5	2^4	2^3	2^2	2^1	2^0
32	*16*	*8*	*4*	*2*	*1*
1	0	1	0	1	0

Binary Number for 42

Calculating Binary Numbers by *Successive Division*

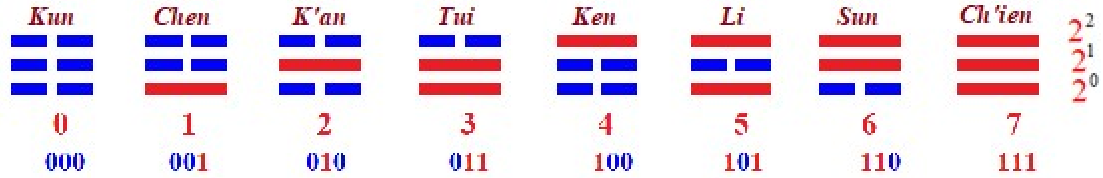
There is a more effective method to convert the I *Ching's lineal* figure's *decimal* numbers to *binary* by using the *remainder theorem* in arithmetic *division*. It works for any Base (*n*) type system *binary*, *octal*, and *hexadecimal*, etc.

If you *successively* divide a lineal figure's *decimal* number by another system's *base*, the result will be a conversion of the *decimal* number into the other system's numerical *base* format. It will be used when converting a Base 10 *decimal* value to a Base 2 *binary* value. The determining point is the *remainder* of the *successive divisions*. Remember this is simple division where your end result is an Integer *remainder* and not a decimal point value like (0.5).

$$2\overline{)7} = 3,\quad 7-6 = 1 \qquad = \quad 7 \div 2 = 3 \text{ R}1$$

The *integer* decimal system has *two* (2) "*types*" of numbers, *Even* numbers and *Odd* numbers. Since we need the *output* to be in a *binary* or Base 2 format, the *successive divisions* will all have a *divisor* of *two* (2), the number of its *base*. Any *even* decimal number divided by *two* (2) will have a remainder of *zero* (0) while an *odd* decimal number will have a remainder of *one* (1) as shown in the simple division above. The resulting remainder will be one of the two *binary* numbers (0,1). Each individual *successive division* will output its own *binary* remainder *zero* (0) or *one* (1), thus resulting in the lineal figure's representation of a symbolic broken line (0 - ▬ ▬) or bold line (1-▬▬).

In the *trigram* map shown below, the *red* numbers below the *trigrams* are the *decimal* numbers that will be converted to their (0, 1) *binary* equivalents by use of *successive division*.



Each trigram graphic is shown by vertical bold lines ( ) (1) and/or divided lines ( ) (0). The bottom *set* of zeros (0) and ones (1) is the binary equivalent of the *red decimal* numbers shown above them. Their 2^n positions are also shown on the right.

Trigram (6), *Sun,* will be used as a beginning example in the *conversions*; the same process and divisions can be used in the other *trigrams'* math.

$6 \div 2 = 3$ R(0) MSL
$3 \div 2 = 1$ R(1)
$1 \div 2 = 0$ R(1) MSP

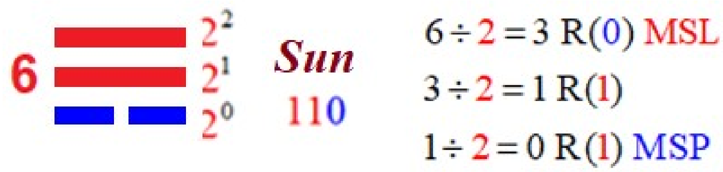
The *trigram Sun's decimal* number value (6) will *first* be divided by two (2) which is the *base* of the binary system. It *evenly* divides into (6) and has a remainder of *zero* (0) shown by the above expression R(0). In the *second* division, *three* (3) is the *integer* result of the first division and is an *odd* number so its division will have a remainder value *one* (1). There are now two *binary* remainder R values of R(0) and R(1) in that specific order.

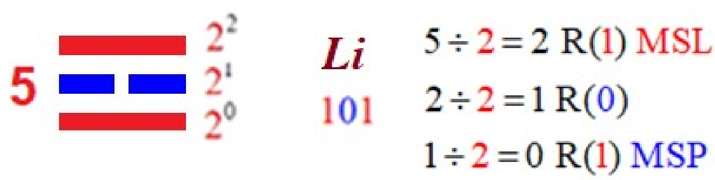
Once again divide the integer (1) result of the *second* division by *two* (2) and the result will be a remainder value of one (1). This remainder will be the third binary remainder which is R(1) again.

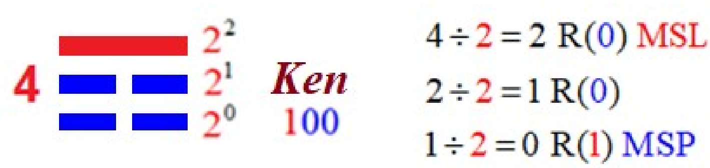
The *successive division* math above shows this particular *binary* remainder is labeled with an (*MSP*) or *Most Significant Position*. The *MSP* is the *last* whole number *division* performed and the beginning of the "*filler bits*" commonly called "*leading zeros*" when they occur.

The *first* and *most important* division is labeled with an *MSL* (*Most Significant Line*). This line of the trigram has *two* main functions, *first* it is always the *top-most* line in any of the *I Ching's* lineal figures. Remember a line can have either a *zero* (0) or a *one* (1). When written *linearly* as in *Boolean* notation, it is the *leftmost* beginning value (it is the beginning (1) in the *Boolean set* [100-010]). *Second*, and *very* important to remember, the *MSL* determines the *correct* order of the *three* (3) binary remainders. In trigram *six* (6) above, it *reverses* the three division's order of (011) to its *inverse* (110). When written *linearly* the *MSL* is the largest 2^n *position* in the lineal figure, which is the 2^2 position in a *trigram* and the 2^5 position in a *hexagram*. Do not forget the *MSL inversion* or your result will be an *incorrect binary* value. Note the remainder's *inversion* which is the correct binary arrangement is shown under the trigram's name *in each* division graphic.

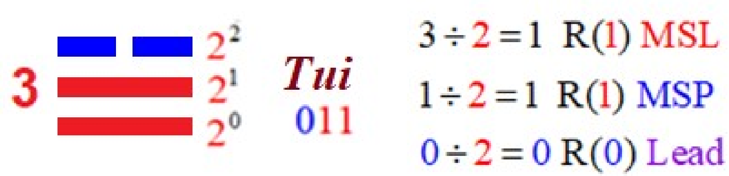
Although we have used trigram number six (6) in the example above, each of the eight (8) *trigram's* divisions are shown graphically below.



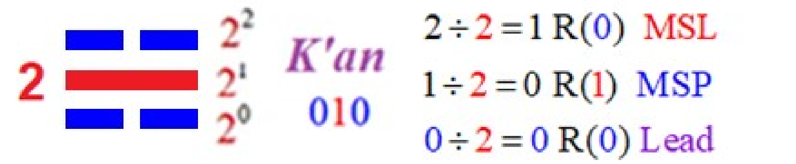


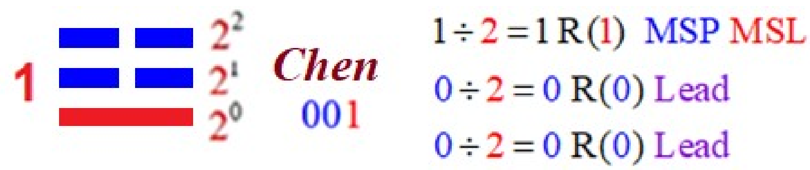


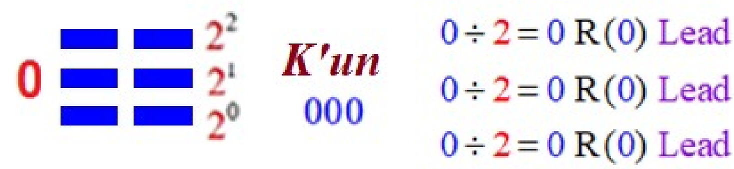
Note in *Trigram* 3 below, the *MSP* produces its first "*filler bit*" or *Leading Zero* noted by the term *"Lead"*.



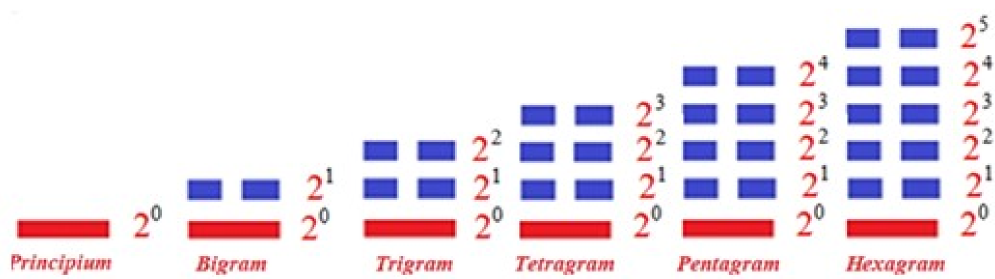
The *MSP* retains its beginning position and the *Lead is a division into zero* (0), ($0 \div 2$).



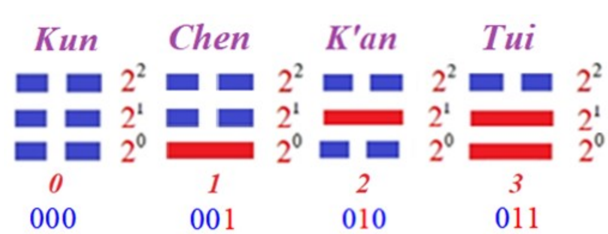




Trigram *K'un* above has the same zero R(0)-*Lead* value divided three (3) times. This *triple* zero (0) division produces "*Filler Bits*" that adds *leading zero* (0) bits to the trigram *structure*. *Zero* (0) divided by two (2) has both a *division* value of *zero* (0) and a *remainder* of *zero* (0). It is the perfect "*Filler*" for a *position* in *binary* math. There is no numerical value being *added*, *subtracted*, *multiplied*, or *divided*; it just fills a needed *position* with a zero (0) bit. The next graphic shows the lineage of increasing bits found in the different lineal figures from the *Principium* through the *Hexagram*.



Each of the *six* (6) lineal figures above has a *decimal* value of *one* (1) and the blue(▬ ▬) *zero* bits are just filler bits to increase the *Principium's* size range to match *Bigrams*, *Trigrams*, and *Hexagrams*, etc. They are known as "*leading zeros*" which has *no* effect on the value of the number.



In the trigrams above, each of top *zero* bits ( ) are *leading* zeros or "*filler bits*" to fill a *trigrams'* three (3) number value positions.Each *binary* trigram *must* have *three* (3) positions. Identifying the *Leading Zero's* is the function of the *MSP*.

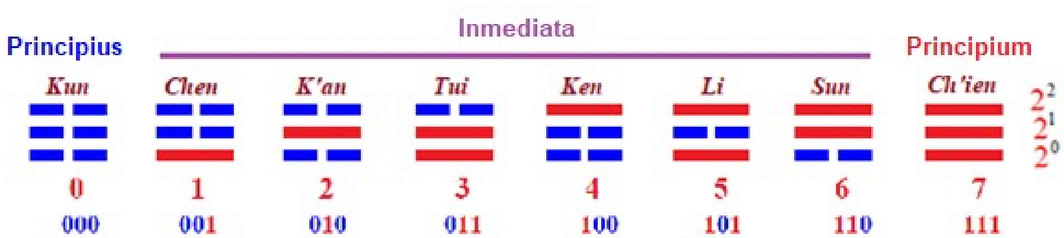
At this point you should have a beginning understanding of *binary*, *decimal*, *position values*, and 2^n along with how to *interchange* between each one. The conversions between *binary* and *decimal* are only *one* (1) of the manifold laterals contained within a 2^n expansion. In the next topic we will show another 2^n *lateral* of Basic *Line* and *position Symmetry* within the *binary* number system.

Lateral 7

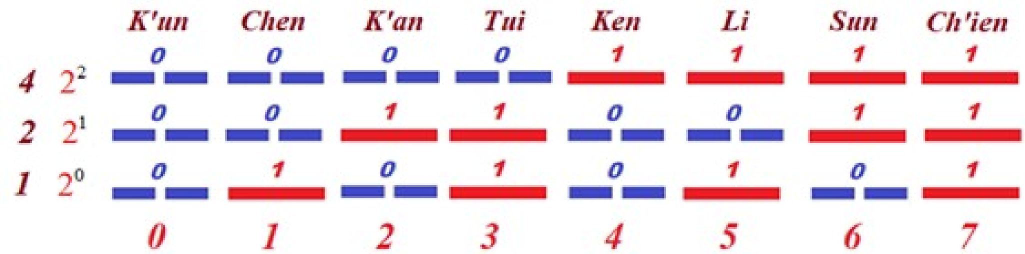
Basic Line and Position Symmetry

Basic binary *line* and *position symmetry* contains much more than the standard *hexagram*, *trigram*, and *bigram*. It includes all of the "*n-grams*". The next examples will *again* make use of the *trigrams*. The 3-dimensional trigram state has three (3) vertical line *positions* that can hold a bold line ( ) or a broken line ( ). Because the trigrams have binary positions, their binary lines will have *symmetrical* arrangements.

The *trigrams* are structured beginning with the *bottom* line to the *top* line showing the 2^n Line Symmetry. We begin by showing an *increasing* value *Western binary* arrangement of the *eight* (8) *trigrams*.



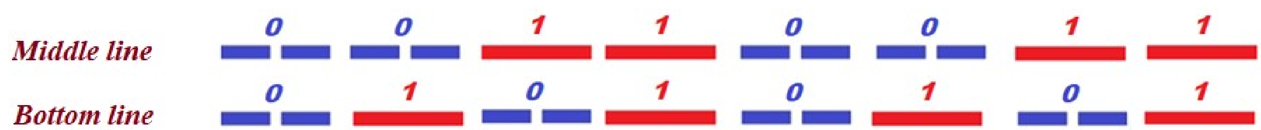
The bottom line 2^0 above is *line one* (1) in any lineal figure in both the *Western* & *Eastern System* of, *bigrams*, *trigrams*, and *hexagrams*. An expanded version is shown in the *Western system's* graphic below along with their *zeros* (0) and *ones* (1).



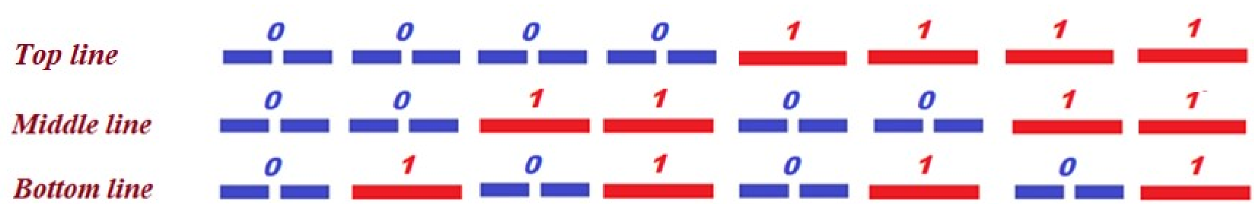
Line Symmetry of the trigrams follows a *structural* 2^n expansion of (2^0), (2^1), and (2^2) shown on the left side of the graphic. Each bottom line of the trigram's *eight* (8) elements has (2^0) *Line Symmetry*. It is best described by showing the *eight* (8) positions of the bottom line.

The ($2^0 = 1$) symmetry means each bottom line changes into its opposite one right after another or after each *one*-line ($2^0 = 1$) it changes to its' opposite.

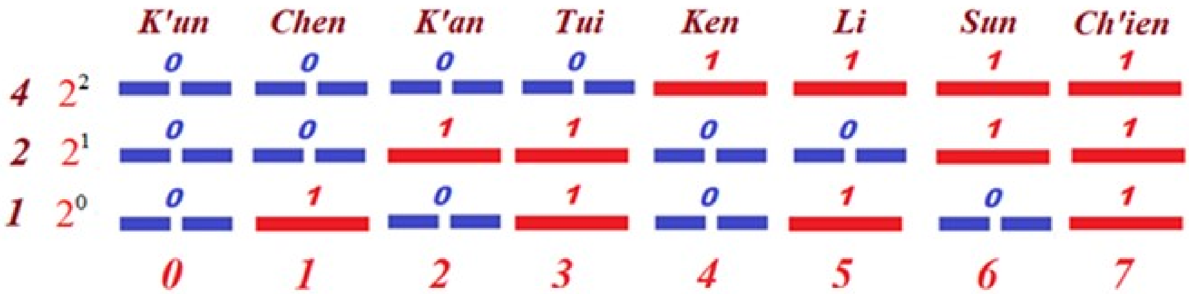
The middle line of the trigrams has ($2^1 = 2$) Line symmetry. Its' line changes to its' opposite after every two (2) lines or positions.



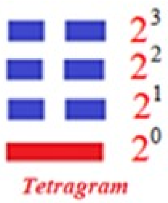
The *third* or top line of the trigram has ($2^2 = 4$) line symmetry. Its' lines change to its opposite after every *four* (4) lines or positions.



The graphic *above* and *below* show a mathematically *correct decimal* sequence for the *binary* values of the eight (8) trigrams *formed* from only 2^n *Line Symmetry.*

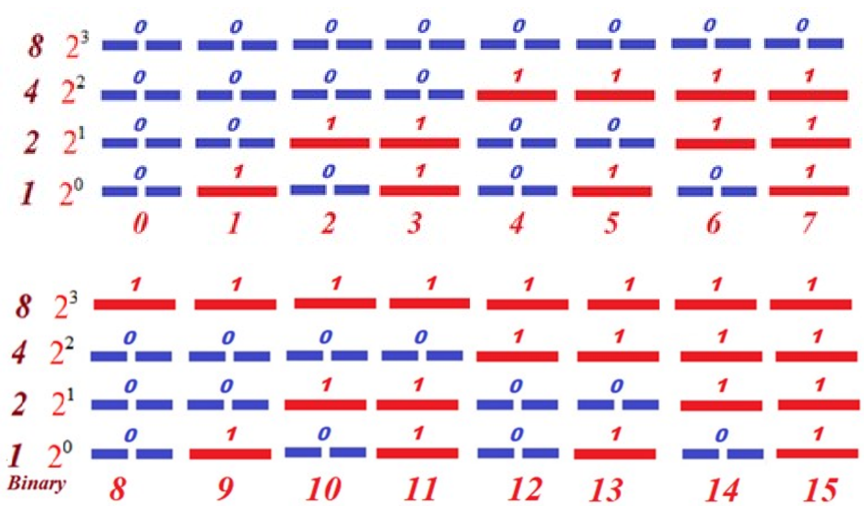


The ($2^0 = 1$), ($2^1 = 2$), and ($2^2 = 4$) line symmetry has formed a *correct* increasing *decimal* value sequence for the Western *System's eight* (8) trigrams shown by the bottom row of *red decimal* increasing values. The *red* numbers are actually the *decimal* equivalent of the binary values; although they are sometimes referenced as the trigram's *binary number* value.



As each new line is added to a lineal figure, the exponent of 2^n is raised by one *integer* unit. An example of the rule is shown when we increase the 3-dimensional *trigram* to a 4th Dimensional "*tetragram*." By increasing the number of lines to *four* (4), it becomes a 4th dimensional *tetragram* which will increase the line symmetry progression to ($2^0 = 1$), ($2^1 = 2$), ($2^2 = 4$), and ($2^3 = 8$).

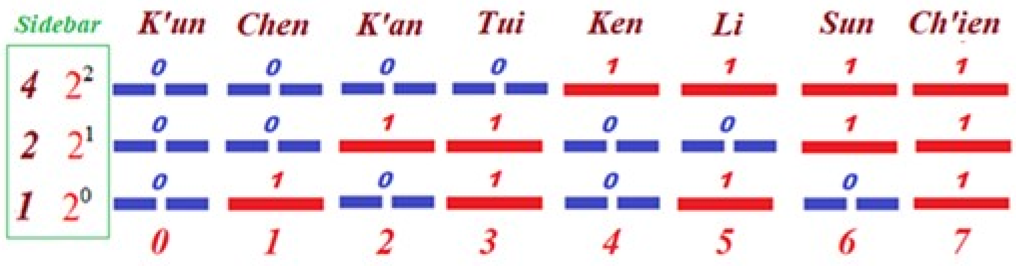
A ($2^3 = 8$) *line symmetry* means the added top line will change to its opposite after the *eighth* bit or position as shown below. We now have *tetragrams* consisting of *four* (4) vertical lines; it will have *sixteen* (16) elements or positions, ($2^4 = 16$), the *sixteen* (16) *decimal* values range from 0 to 15.



2^n *line symmetry* can be continued *infinitely* and result in an *ordered binary* sequence of "*n*-

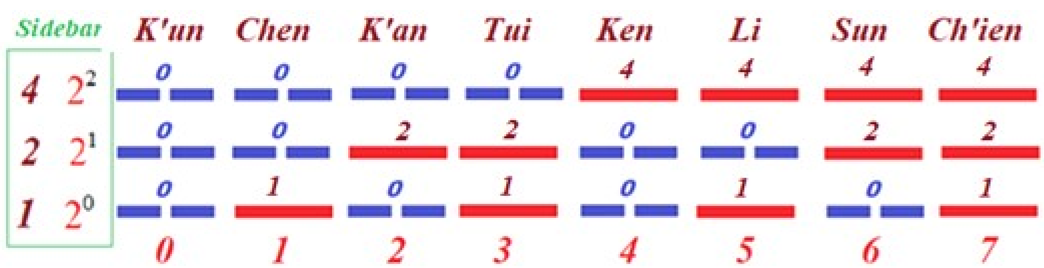
grams". By the use of 2^n Line Symmetry, we obtain two (2) important relationships in determining the *binary* or *decimal* values of any and all types of lineal figures ("*n*-grams").

First we have the 2^n *line symmetry* which forms a *correct* mathematical sequence of increasing *decimal* numbers. *Second*, the 2^n *sidebar* will allow us to determine the *decimal* value of any *single* lineal figure. As an example we will again use the binary value *trigram* arrangement.



The *sidebar*, along with showing the line symmetry, is used to determine the decimal value of any *single vertical* arrangement of *zero's* ( ) and *one's* ( ); it is just a temporary aid and can be discarded once a person becomes more familiar with binary numbering.

Each *bottom*, *middle*, and *top* line of the trigrams has a "*positional decimal value*" determined by the numerical values within the sidebar. It can best be explained by the following graphic, note the different *decimal positional* values on the solid red lines and the numbers on the sidebar.



In the graphic above the *red* solid lines have been changed to their positional values, the *blue* broken lines retain their original value of *zero* (0). The positional values are determined by the 2^n expansion values in the sidebar. To determine each trigram's *decimal* value sum the three (3) vertical numbers in each trigram above.

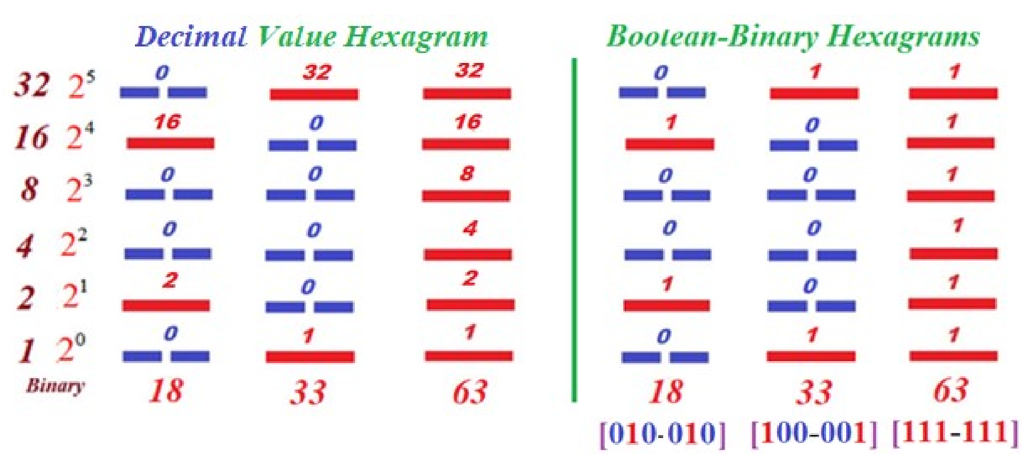
Trigram *K'un* has *three* (3) *zeros* which sum to zero (0), therefore *K'un's* Value is *zero*. Trigram

Chen has *two zeros* (0) and a *one* (1) which sums to the Value 1. Now observe Trigram *Tui*, it has a 0, 2, and 1 which sums to Value 3. Notice the value two (2) is shown on the sidebar by a reddish brown 2 value. The value 2 is the *line position* number. Also note the top line has a line position value of (4). Temporarily change each solid line from its original beginning value to its *line position* value then add the three numbers and you will have a complete set of *decimal* values for the trigrams from 2^n *Line Symmetry* and 2^n *Line Position Symmetry*. This explication does not show the positional values in the beginning graphics because its' three (3) values of *zeros* (0) and *ones* (1) are its Boolean value *sets*.

The next graphic contains vertical *six* (6) line *hexagrams* with the above feature added; it allows us to instantly observe a hexagrams' Boolean-*Binary* value set along with its capability to form a hexagram's *decimal* value.

The left side of the graphic below outputs a *decimal*-value hexagram when the *line position* values are summed.

The right side of the graphic contains the original *zeros* (0) and *ones* (1) and just by beginning with the *top line's* value and listing them *linearly left* to *right* in a horizontal order will output the hexagram's Boolean-binary value *set* shown at the bottom of the graphic. Remember the *MSL* (*Most Significant Line*) *reversed* the direction in which the lines are *linearly* written.

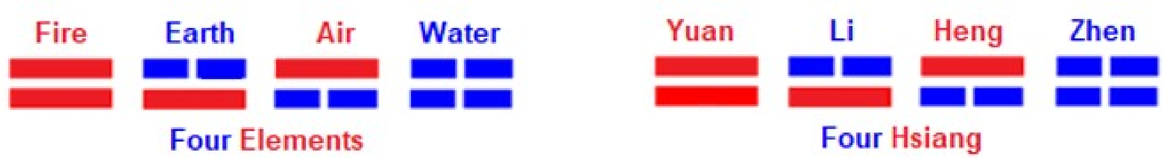


At this point we have covered some of the *Western* System's binary structure and methods. There also exists a *structure* that is termed the "*inverse*" of the *lineal figure*. The next topic will show the math involved in forming the *inverse* of a lineal figure. Remember the *King Wen* arrangement of the *hexagrams* is by *opposite* and/or *inverse hexagrams*.

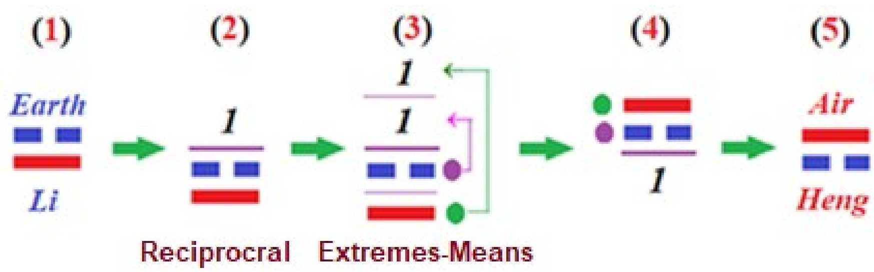
Lateral 8

Calculating the Inverse of a Lineal Figure

Calculating the *inverse* of any of the *I Ching's* lineal figures is a fairly simple process using the *Extremes–Means* rule from *proportionality* and *complex fractions*. In the beginning graphic below, the *Hermetic Alchemy bigram Earth* element which is also the *syncretic I Ching Li Hsiang* element will be used.

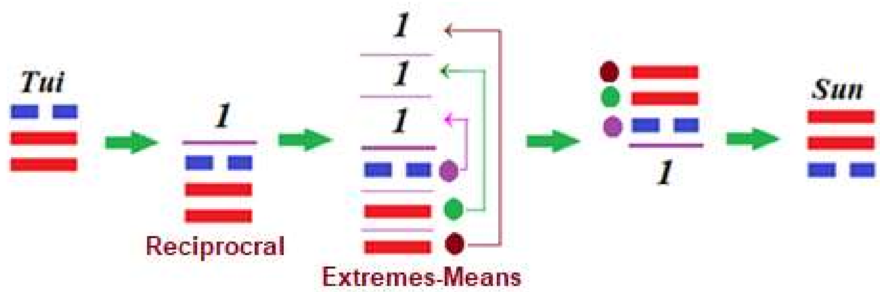


First convert the element to a normal fraction by changing it into its mathematical *reciprocal* (shown by the *second* step below). *Next*, convert it into a complex fraction (*third* step).

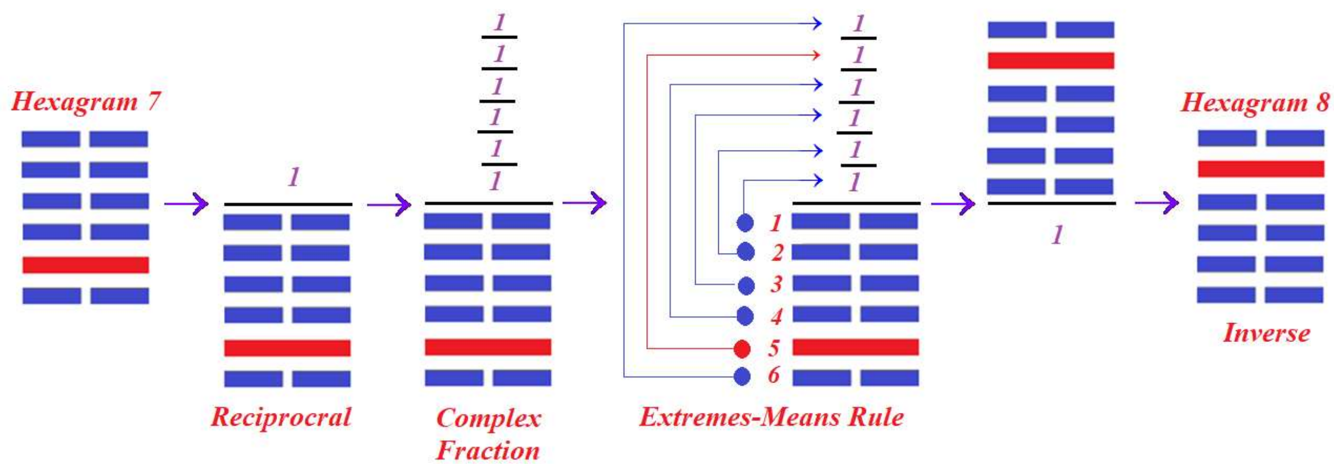


In the *third* or middle step, the *green* arrow (⟵) and *green* dot becomes the upper and lower "*Extremes*" and the purple arrow (⟵) and dot becomes the "*Means* or the innermost properties of the complex fraction." Next multiply the *Extremes times Extremes* and then multiply the *Means times Means*, all the while changing their relative positions. Remember "*anything*" multiplied or divided by *one* (1) is itself (*even objects*). The process *inverts* the graphic, outputting the lineal figure's *inverse*.

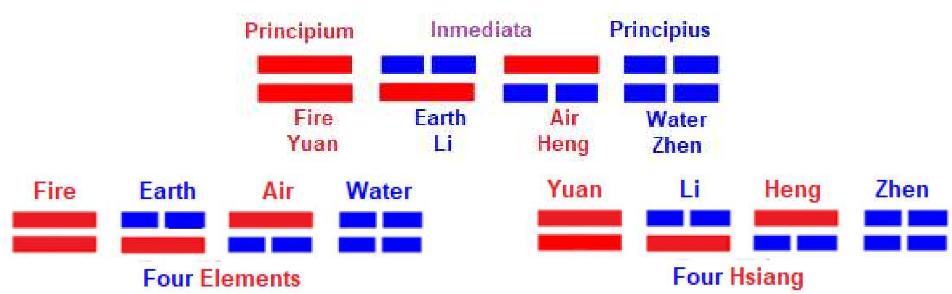
Follow these same steps for the *trigram* (shown below) and the result will be the *inverse* of the trigram graphic *Tui*. The graphic below has one (1) set of Extremes and two (2) sets of *Means*. This transformation will essentially just "*flip*" the *trigram* mathematically upside-down, (its *center*-line will remain unchanged).



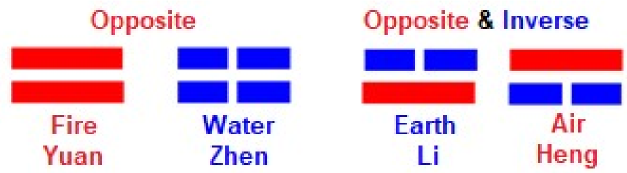
A *hexagram* can be converted into its *inverse* by the same procedure. In the *hexagram*, there is one (1) set of *Extremes* and five (5) sets of *Means*. The top and bottom positions are always considered the *Extremes*.



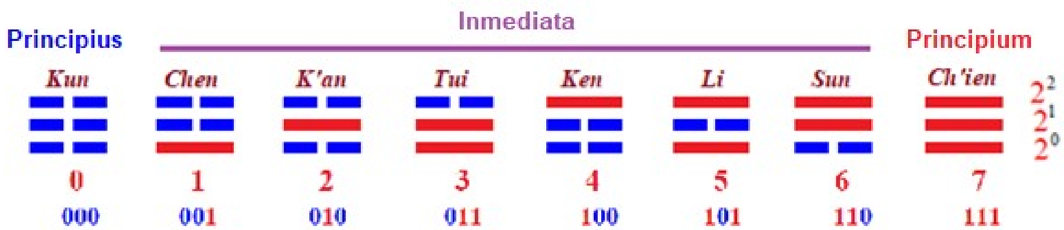
Now that you have learned how to construct a *mathematical inverse* of the lineal figures, let's define the *inverse* of each of the *I Ching* and *Hermetic* Alchemy's four *bigrams*. Let's *first* observe the *Alchemical Principium*, *Principius,* and *inmediata* elements.



In *Hermetic Alchemy* the *Four Elements* are separated into a *Principium*, *Inmediata*, and *Principius;* plus the *I Ching's bigrams* are considered syncretic *analogs* of the *Hermetic Alchemy Four Elements*. If we do a *math inverse* operation on the *Principium and Principius bigrams* it will return the *original bigrams*; these two bigrams will *not* have an *inverse,* they are considered as "*opposites only*." The same *math* process on the *Inmediata* bigrams shows they *are opposite* & *inverse*. However, they are an *opposite* & *inverse* of each other.



In the *math* process of the *trigrams*; the graphic listed below shows the *Principium*, *Principius*, and *Inmediata* of the trigrams.



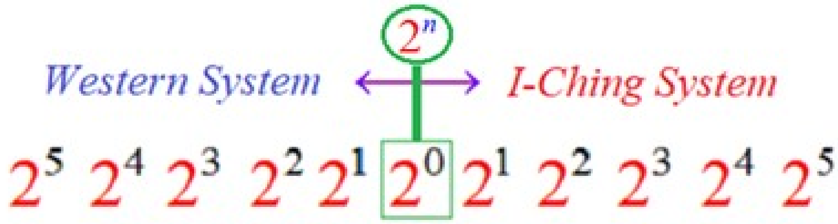
Trigrams *Ch'ien* & *K'un* are *opposites* only, as are trigrams *Li* & *K'an*. Trigrams *Chên* & *Kên* and *Tui* & *Sun* are *inverse* trigrams.

This topic has been a *generalization* on how to form a *mathematical inverse*; however, for a more comprehensive explanation read "The *King Wen Hexagram* Arrangement" in *Section* 6-A of the main manuscript. It will define the complete set of hexagrams.

Lateral 9

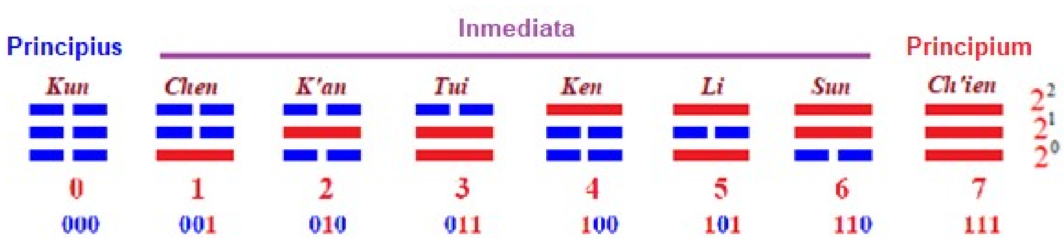
The Reverse Western & I Ching Binary Systems

In this topic be sure you *understand* what is happening within a *reverse* system.



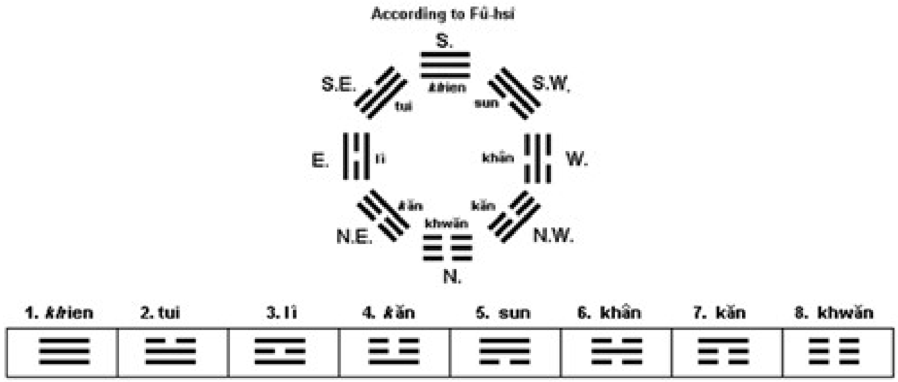
Both the *Western* system and the *I Ching* system can be defined as *Reverse* systems of the 2^n exponential expansion. The *Western* system begins with the 2^0 position and expands in a *right* to *left* direction $(\leftarrow)$ while the *I Ching* system also begins with the 2^0 position but expands in a *left* to *right* direction $(\rightarrow)$. Both systems mathematically produce a *correct* output. The mathematics defines both systems as *Exponentials* acting in *opposite* directions and are called *balanced exponentials*. Balanced exponentials will not change a *binary* outcome. When you compare equal exponentials acting in opposite directions, the net individual *binary* value change is zero. However the end results produce some confusing *inverse* structural graphics.

We will begin with the *Western* system's *trigram* arrangement again with some designations and show the properties of the *reverse* systems.



A few notes to recall in the graphic above. The *Principium* is trigram *Ch'ien* and the *Principius* is *Kun*. The *Inmediata* is the *six* interior trigrams. The things to recall are *Line Symmetry* and the 2^n direction plus *decimal* values. Also note the arrangement of the *solid* and *broken* lines in *Tui*-*Sun* and *Chen*- *Ken*. These two sets of interior trigrams are structurally *inverse.*

Beginning with the basics to understand the process; the graphics below are copies of *two* (2) graphic plates from *James Legge's* book on the *I Ching* which was contained in his translations of "*The Sacred Books of the East*" published in the 1880's. From the two graphic plates below we can determine the *line symmetry* and 2^n expansion direction of the *I Ching System;* however, we will change the names to match *Richard Wilhelm's* names in which I'm more familiar.

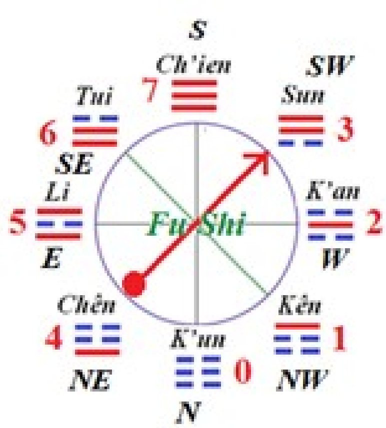


Legge's Graphic Plates

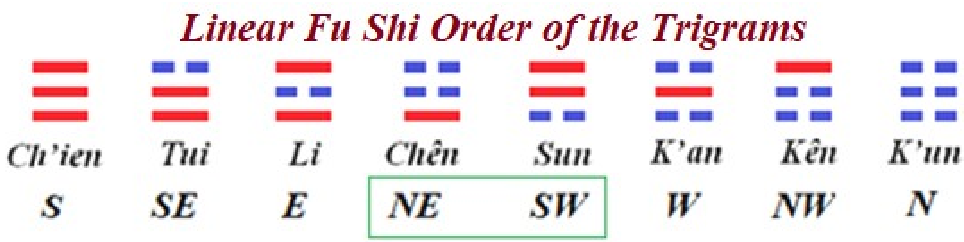
Both the *Western* and the I *Ching methodology* have a *binary* system based on the 2^n exponential, and both systems will be temporarily changed to *linear decreasing binary* value sequences as shown in *Legge's linear* graphic plate above. However, *first* the *circular* graphic.

Transition Point in Circular Diagrams

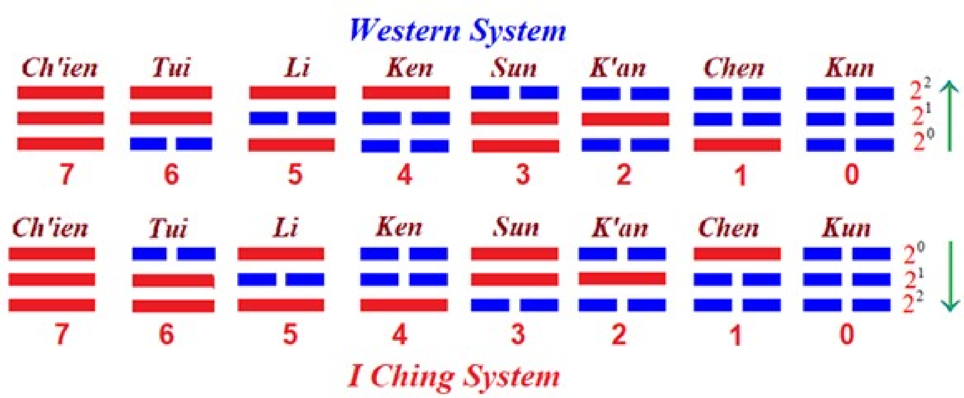
Since the very first known lineal figures are assumed to be the *Fu Hsi* trigrams and the first arrangement was thought to be a *circular* arrangement, the question becomes; "How do we convert a *circular* diagram to a *linear* diagram, and at which trigram do we start, plus, which direction do we go, *clockwise* or *counter clockwise*? I do not recall seeing a standard definition, but I have noticed over the years one way has consistently emerged. The following graphics show the *accepted* method to transpose the *circular* trigrams into a *linear* arrangement. The transition point from *circular* to *linear* is between trigrams *Chên* (NE) and *Sun (SW)* (*Red Arrow*) below.



In the beginning *circular* diagram above, begin with *Ch'ien* at the top *south* (S) position and proceed *counter clockwise* to *Chên* at the *northeast* (NE) position; return to the top and begin with *Sun* in the *southwest* (SW) and continue *clockwise* to *K'un*. This path is the accepted method for converting the *circular* trigrams into a *linear* arrangement. Once we have the *circular* diagrams in *linear* form, it becomes easier to find 2^n relationships. The *red* arrow in the *circular* graphic is called the *transition* point from *circular* to *linear*.



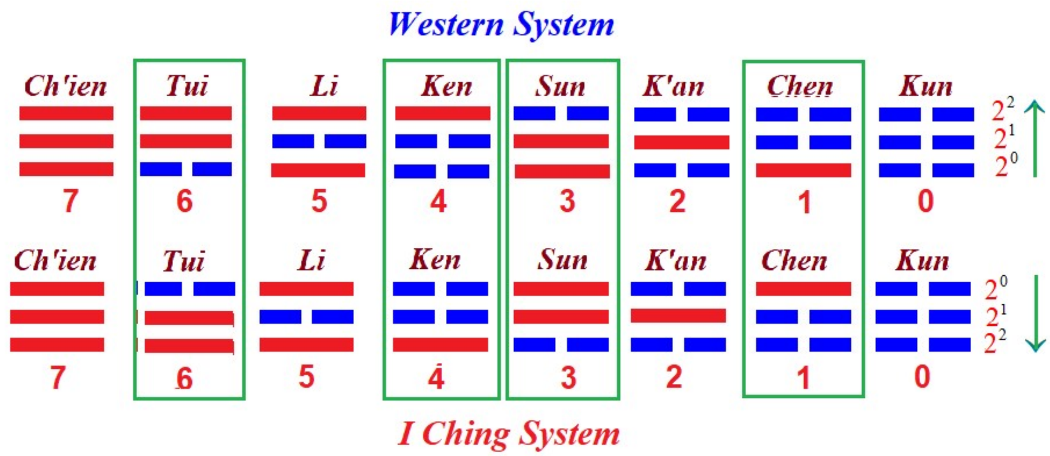
Now that we have the linear arrangements from *Legge's* verified graphic plates, the 2^n *Line Symmetry* can be shown. The *I Ching* system's graphics below are versions of the beginning circular arrangements from James Legge's graphic plates. The *Western* system's graphics were calculated by the *binary* math *successive division* method. There are *inverse* graphic symbols in each set (*Tui* - *Sun* & *Ken* - *Chên*) which will be addressed shortly, for now we will just show some similarities.



Note each system has respective 2^n *line symmetry.* Each system's set of trigrams has $(2^0 = 1)$ $(2^1 = 2)$ $(2^2 = 4)$ *Line symmetry;* however they are in *opposite* directions. Recall in $(2^0 = 1)$ symmetry after each one (1) line, the line changes to its opposite. In $(2^1 = 2)$ symmetry the line changes to its opposite after every two (2) lines and in $(2^2 = 4)$ symmetry, it changes to its opposite after every four (4) lines. Also remember that 2^0 is line 1 in both the

Western and *I Ching* systems. This symmetry can be observed in both Legge's circular and linear graphics.

In the graphic below, both the *Western* and the *I Ching's* set of trigrams has a binary system based on the 2^n exponential shown on the *right* side of the graphic along with the purple *decimal* value of each line shown on the *left*-most side. The red numbers on the bottom are the *decimal* equivalent of each *binary* graphic. Each trigram graphic is formed from its *cultural Western* or *I Ching methodology*. Note both binary systems are *balanced exponentials* which produces no change in the *binary* values. Also notice *cultural methodology inverts* the four graphics *Tui* - *Sun* & *Chên* - *Ken*.



In the above graphic, *cultural methodology* and *balanced exponentials* produces the exact *decimal values* for each trigram in each particular system. You can more easily observe the upside-down structures that result from the opposite directions of their 2^n values.

Western **I Ching**

$$2^2 \; 2^1 \; 2^0 \leftrightarrow 2^0 \; 2^1 \; 2^2$$

In the green rectangular graphic above, the green colored rectangles are the *four* trigrams that have *inverted* graphics; however their 2^n values are equivalent in their respective system. On first glance this becomes rather confusing until you match their 2^n values.

In the trigram graphic below, the bold and broken lines have been changed to *zeros* and *ones*; we can graphically see the *I Ching's* trigram system is just an upside-down version of the *Western* System. Notice each upside-down pair graphic has the same 2^n value.

Western

0	0	0	0	1	1	1	1	2^2
0	0	1	1	0	0	1	1	2^1
0	1	0	1	0	1	0	1	2^0
0	1	0	1	0	1	0	1	2^0
0	0	1	1	0	0	1	1	2^1
0	0	0	0	1	1	1	1	2^2

I Ching

What conclusions can be determined from the *upside down* trigram relationship? Each system has mathematically *correct* operations; the holistic result is they are *equivalent* systems due to the fact that *exponentials* acting in *opposite* directions are *balanced exponentials*. Balanced exponentials will not change a *binary* outcome. The *upside down* structure of four graphics above is because of the opposite directions of the exponentials and *only* occurs within the graphics that are *inverses* of each other. The *upside down* graphics create a paradox in which if you use the *Western* system then the *Eastern* system is wrong, or if you use the *Eastern* system, the Western system is wrong, however the solution is to *invert* a set of graphics. If you *invert* the *Eastern trigram* graphics, it will return the *Western* graphics and if you invert the *Western* graphics it will become the *Eastern* graphics, so *cultural methodology* requires you to adhere to the old adage "when in *Rome* do as the *Romans* do."

Many *I Ching* enthusiasts are not familiar with the *binary* system and use a standard *I Ching* "*hexagram locator"* when searching for a hexagram's *I Ching number*. The left graphic below is a standard *I Ching hexagram Locator* in *decreasing* trigram binary values using dark brown interior numbers and the right graphic with its *red* interior numbers is a *binary*/*decimal* value hexagram locator using the *Western* binary system, for example the *I-Ching* hexagram No. 7 becomes *binary* hexagram No. 2. At the very least you can determine the *binary* value of each hexagram without having to calculate it. I'll close this section with the hexagram locators below, remember the *binary* values do not change in balanced systems.

Standard

T/B	7	6	5	4	3	2	1	0
7	1	9	14	26	43	5	34	11
6	44	57	50	18	28	48	32	46
5	13	37	30	22	49	63	55	36
4	33	53	56	52	31	39	62	15
3	10	61	38	41	58	60	54	19
2	6	59	64	4	47	29	40	7
1	25	42	21	27	17	3	51	24
0	12	20	35	23	45	8	16	2

Binary

T/B	7	6	5	4	3	2	1	0
7	63	55	47	39	31	23	15	7
6	62	54	46	38	30	22	14	6
5	61	53	45	37	29	21	13	5
4	60	52	44	36	28	20	12	4
3	59	51	43	35	27	19	11	3
2	58	50	42	34	26	18	10	2
1	57	49	41	33	25	17	9	1
0	56	48	40	32	24	16	8	0

The Philosophical Model Section 6