

Mathematical Model for Prevention and Treatment of Heart Disease Using Traditional Chinese Medicine

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ABSTRACT

This article analyses the energetic Meridians (energetic gates) of the human body from the I Ching perspective by disposing the hexagrams into magic squares through simple arithmetical models. Deciphering these squares is the key balance-element for physical health. After establishing the anomalies from the energetic routes, acupuncture or acupressure can be used together with a strengthening appropriate diet for solving them. By applying these treatments, identified anomalies can be corrected from a physical and from an emotional/mental point of view.

Keywords: *I Ching, magic square, hexagrams, human body, energetic Meridian, heart, acupuncture, acupressure, prevention and treatment model, informatics program.*

1. INTRODUCTION

The teachings date from a time in which men, through his creation, for studying the human body and nature, could only use his own given senses. One of the first teachings of human kind from those times is the I Ching. Its origins date to the Neolithic era, in the mythical times of antique China characterized by royal territorial settlements, a.k.a. the time of the five wise men (4400-2000 b. Ch.). The first wise man that meditated about the human body, nature and about their interaction and dependence was king Fuxi. He established a number of eight figures composed of combinations of three lines called trigrams, combinations of whole lines (Yang) and/or dotted lines (Yin) that can be attributed without a doubt to the binary system.

The successor of the tri-gram philosophy was king Wu who, by associating the trigrams, two by two, created the 64 hexagrams. Each hexagram was given a name and its meaning was shortly described. The hexagrams were positioned into a square named by its inventor, just as King Wu's square is part of the magic square category. By considering that the "Supreme Knowledge" includes the "science of numbers" – by mentioning that numbers are the last abstractions that unite the common traits of things, associated to life's rules, the magic squares soon spread throughout the world. The magic squares are being found as studies in philosophical schools (Pythagoras's school, Plato's school), in writings (Emanoil Mascopol), studied by different savants (Euclid, La Hire, Paracelsus, Gerolamo Cardano, Bachet de Meziriac, Pierre de Fermat, Athanasius Kircher, Joseph Saveur, Leonhard Euler, Albrecht Dürer, Benjamin Franklin, etc.), continuing to be studied until this day.

One can say that by disposing the 64 hexagrams of the I Ching into simple arithmetic models, typical to a magic square, a.k.a. Mercury's square, a new order is being defined. Deciphering these squares is the key balance element for a healthy body.

If a hexagram is the result of the association of two hexagrams, by multiplying 64 by 6 a total of 384 results, the sum represents the acupuncture points.

To put into practice the use of these acupuncture points, we must build an 8^2 magical square with 64 elements, representing the 8 mutation phases of the eight trigrams.

Starting from the fact that in order to build a square with a single house (1^2) we need 4 yang lines, for building a square with 4 houses (2^2) we need 12 yang lines and for building a square with 9 houses (3^2) we need 24 yang lines. Thus we can state that for building any square with n^2 houses we need: $2*n*(n+1)$ yang lines. Thus results that for building a square with 64 houses we need 144 yang lines.

The string theory states that nature manifests itself in a binary base just like an instrument with six strings. We can state that any vibrating line or string from an atom, but also from a hexagram, can exist in two states:

- The inactive state, Yin – represented by a dotted line “-” ;
- The active state, Yang – represented by a straight line “|”.

Science speaks about the two states in the science of breathing mentioned in the Sanskrit language and treated by the Tattva philosophy that says that the vibrations, expressed by the two states: inspiration-expiration without discontinuity, represent life. Vibrations underline the perceptions of the five senses with which we are endowed, and in the process of evolution is known as the process of division by five or the ethers of Pancikarana which by their countless combinations represent therefore all possible manifestations of life.

Trough analogy we can talk about a binary mutation system [0,1], thus:

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- A single string has 2 phases, therefore: $2^1=2$, [0,1], [1, 0];
- Two strings have 4 phases, therefore: $2^2=4$, [0, 1, 2, 3], [0, 1, 2, 3], [1, 0, 1, 0], [1, 0, 1, 0];
- Three strings have 8 phases, therefore: $2^3=8$, [0, 1, 2, 3, 4, 5, 6, 7]; [0, 1, 2, 3, 4, 5, 6, 7]; [1, 0, 1, 0, 1, 0, 1, 0]; [1, 0, 1, 0, 1, 0, 1, 0];
- On the six-string mutation system (hexagram) we find 2^6 or 64 phases. The mutation system deployed simultaneously on six strings holds in its core the octet 2+6, because a magic square with 64 phases is in fact a square with 8 elements on each side, representing the 8 mutation phases of the 2^3 trigrams.

By finding the key of deciphering the magic squares, the laws that govern our life can be explained.

Let's consider a rising ensemble of distinct real numbers, n -even, $n=64$, in which the elements belong to an arithmetic ratio progression $r=1$, $S_n=n(n^2+1)/2$. With the elements of the ensemble A a square matrix B is being generated. Let's assume that B is being generated lexicographic from right to left and from up to down.

$$B = \begin{pmatrix} a_n, \dots, a_2, a_1 \\ a_{n+n}, \dots, a_{n+2}, a_{n+1} \\ \dots \\ a_{n^2}, \dots, a_{n^2-n+2}, a_{n^2-n+1} \end{pmatrix}$$

On the permutation set S_n we consider, $P = (p_1, p_2, \dots, p_n)$.

For generating from the matrix B , the magic square A is considered from the permutation set group S_n , n - permutations: p^1, p^2, \dots, p^n , parallel with the main diagonal of the matrix B .

The elements mentioned by the given permutation will be considered lines or columns in the magic square that is about to be generated.

- i. We generate an even magic square, $A_{ij}; i,j=1..8$; containing 64 elements, lexicographic generated, from right to left as followed:

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

Fig 1

- ii. After we trace the four separating lines so that we have in the four corners a square with 3x3 houses each, we separate by two the elements of the matrix as followed:

8			5	4			1
	15	14			11	10	
32			29	28			25
40			37	36			33
	55	54			51	50	
64			61	60			57

Fig 2a

	7	6			3	2	
16			13	12			9
24	23	22	21	20	19	18	17
	31	30			27	26	
	39	38			35	34	
48	47	46	45	44	43	42	41
56			53	52			49
	63	62			59	58	

Fig 2b

- iii. We change the symmetrical elements from the figure 2b among themselves by using the houses symmetry: $A_{ij} \rightarrow A_{kl}; k=(n+1)-i, l=(n+1)-j$; where: $n=8, i,j=1..8$; thus: $2 \leftrightarrow 63, 3 \leftrightarrow 62, 6 \leftrightarrow 59, 7 \leftrightarrow 58, 13 \leftrightarrow 52, 20 \leftrightarrow 45, 21 \leftrightarrow 44, 19 \leftrightarrow 46$, etc. We will realize at a later point how this complementary has an effect with repercussions between the meridians (e.g.: the houses 62,19 typical to the Heart's Meridian with the houses 3,46 typical to the Stomach's Meridian).

	58	59			62	63	
49			52	53			56
41	23	22	44	45	19	18	48
	34	35			38	39	
	25	27			30	31	
19	47	46	20	21	43	42	24
9			12	13			16
	2	3			6	7	

Fig 3

- iv. We complete the matrix with elements from figure 2a and figure 3:

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

Fig 4

A magic square results, while all typical traits are being respected, meaning:

- The sum of the horizontal houses is equal to the sum of the houses on the vertical: $n(n^2+1)/2=8(8^2+1)/2=4*65=260$.
- The sum of the houses from the main diagonal is equal to the sum of the houses on the secondary diagonal, resulting 260.
- Any combination of 8 summed houses, two by two symmetrical, $(A_{i,j} + A_{k,l})=65$; $k=(n+1)-i$, $l=(n+1)-j$; where: $n=8$, $i,j=1..8$; results that the sum of the four pairs of houses: $65+65+65+65$ must be equal to 260.
- The first fundamental law for the Mercury Square, as well as for all other magic squares, indicates the fact that there is a union and an opposition parallel between two houses from the square explaining the above. This happens when the sum of the two houses is equal to the number of the square's houses plus 1 meaning, $64+1=65$. In the case of Mercury's Square, regarding the symmetry, any two elements $(A_{i,j} + A_{k,l})=65$; $k=(n+1)-i$, $l=(n+1)-j$; where: $n=8$, $i,j=1..8$; summing the elements $(a_{2,3};a_{7,6})$ meaning, $14+51$ or the elements $(a_{4,2};a_{5,7})$ meaning $34+31$ and the procedure can continue, the result must though be equal to 65.

From here, a new concept is being born – the fact that the magic square is a representation of the human body and that the laws that unite the different houses of the magic square explain the profound geometrical laws of the human body. As it is well known, the Mercury's Square can be divided into several areas thus: the four corner squares each containing 3x3 houses correspond to the organic Meridians: "Fire", "Earth", "Air" and "Water", while the extraordinary Meridians form a cross the centre of which is made out of four houses (28, 29, 36, 37) representing the fifth element.

I	Ti	Ig	tae	vg	I	Si	P		
8	58	59	5	4	62	63	1		
49	15	14	52	53	11	10	56		
41	23	22	44	45	19	18	48		
yi k	32	34	35	29	28	38	39	25	ya o
yi o	40	26	27	37	36	30	31	33	ya k
17	47	46	20	21	43	42	24		
9	55	54	12	13	51	50	16		
64	2	3	61	60	6	7	57		
V	Vb	St	vc	tcb	Sp	F	R		

Fig 5a

Earth		Fire
	Center	
Air		Water

Fig 5b

In this context, to each house a number is associated and to each number and I Ching hexagram is associated; the hexagram nr. 1, called "The Creator", is placed in the upper right corner of the square, being symmetrical with the hexagram number 64 called "Prior to realization (perfection)" which is placed in the lower left corner.

As seen, each meridian is made out of three houses, corresponding to the three hexagrams, with the specification that the most upper house corresponds to the upper side of the meridian and the lower corresponds to its lower side.

Thus, we have 12 organic meridians corresponding to the four corners of the square (Lung, Heart lord, Heart, Large intestine, Triple heater or Three burners, Small intestine, Bladder, Gallbladder, Stomach, Spleen, Pancreas, Liver, Kidney), 8 extraordinary meridians corresponding cross-shaped extensions (Tae-mo, Vas government, Yin-Keo, Vessel design, Tchcong-mo, Yin-oe, Yang-oe, Yang-keo) and the 4 houses in the center representing the head.

In conclusion: if to each line from a hexagram corresponds an acupuncture point, than to each meridian corresponds a constant number of 3×6 , thus 18 acupuncture points.

2. CASE STUDY

We analyze the Heart's Meridian from the I Ching and the Magic Square's perspective by establishing the anomalies encountered on the energetic paths by applying acupuncture or acupressure along with an

appropriate diet as treatments for correcting these both from a physical and mental/emotional point of view.

The Heart's Meridian Yin, centrifugal, pair; is preceded by the Spine's – Pancreas Meridian and followed by the Small Intestine's Meridian. The Heart's Meridian, along with the Small Intestine's Meridian creates the energetic box "Fire"; and along with the Kidney Meridian it forms the Shao Yin energetic center. The manifestation period to extreme parameters is between 11:00 and 11:15 o'clock; for a maximum of energy between the first two hours from this time period and for a minimum of energy for the last two hours from this time period, coupled after the rule "midday/midnight" with the Gallbladder's Meridian, and after the rule "husband/wife" with the Lung's Meridian. The Heart's Meridian has three branches that have their origins in the heart.

The first of the three branches of its inner trajectory comes into contact with the arteries and the vanes that approach or leave the heart; it has a descendant trajectory, it crosses the diaphragm ending in the middle of the abdominal cavity.

The second internal branch, leaves the heart as well, has an ascending median trajectory until just under the chin from where it leaves sideways ending at the eyeballs.

The third internal branch starts as well from the same level as the heart heading sideways to the armpit externalizing in the Jiguan Point (1). From here the external trajectory starts following the internal side of the arm, the forearm, the fist and the small finger, ending at the most outer corner of the small finger.

On the external trajectory, the Heart Meridian has 9 main acupuncture points (fig. 6b) that are linked to the heart's balance and for each point we must take into account the mentioned indications, as followed:

- 1st Heart Point (Jiquan) – starts on the shoulder, on the median side of the shoulder artery. Caution: avoid the shoulder artery!

Indications: precordial aches, intercostal neuralgias, head and shoulder ache and also aches in the lower torso.

- 2nd Heart Point (Qingling) – with a flexed elbow, the point is being found at 3 CUN above the medial end of the transversal cubital creases from the medial mortise on the biceps. Indications: brachial neuralgias, intercostal neuralgia, head, shoulder and backaches.
- 3rd Heart Point (Shaohai) – with a flexed elbow, at the medial end of the transversal cubital creases. Indications: elbow aches, precordial aches, parietal lateral torso aches, intercostal neuralgia,

shaking of the hands, numbness of the hands, and asthenic neurosis.

- 4th Heart Point (Lingdao) – with the palms facing upwards, the point is being found at 1,5 CUN above the hand's transversal creases. Indications: precordial aches, psychological disorders (anxiety, fear, insomnia), cubital nerve paralysis, fist and elbow arthralgia, and enuresis.
- 5th Heart Point (Tongli) – with the palms facing upwards, the point is being found at 0,5 CUN underneath the 4th Heart Point. Indications: palpitations, precordial aches, hypotension, arm and fist aches, fear, insomnia, asthenic neurosis and "stage fear".
- 6th Heart Point (Yinxi) - with the palms facing upwards, the point is being found at 1 CUN underneath the 4th Heart Point, on the same line that connects the 3rd Heart Point with the 7th Point. Indications: angina pectoris, heart palpitations (arrhythmia), nocturnal sweating, anxiety, headaches.
- 7th Heart Point (Shenmen) – is found at the wrist, where the transversal creases end at the wrist, in the small bend between the misinform and the ulna bones. Indications: precordial aches, anxiety, fear, insomnia, memory deficiency, and fist pains.
- 8th Heart Point (Shaofu) – while holding a fist, the point is being found between the metacarpal bones 4 and 5. Indications: angina pectoris, arrhythmia, torso pains, odontalgias, pruritus and anxiety.
- 9th Heart Point (Shaochong) – the point is being found at 0,1 CUN from the posterior corner of the fingernail on the radial side of the little finger. Indications: syncope, vertigo, heart palpitations (arrhythmia), elbow, fist and finger pains, psychological depression and asthenia.

Blockages on the Heart's Meridian can lead up to the following symptoms:

- Head and face aches,
- Dry mouth and dizziness,
- Heart arrhythmia and chest aches,
- Back and chest aches,
- Hand aches, tingling and numb sensations of the hands,
- A weak hand knuckle, the Carpien Tunnel Syndrome,
- Swollen ankles and varices.

The heart Meridian shows the most accessible and efficient use in combating over 90% of diseases and delaying degenerative and aging processes.

The Heart's Meridian corresponding hexagrams on the external trajectory from figure 5 are [62,11,19],

corresponding to the fire square and are complementary to the Stomach Meridian and have the following meaning:

- The 62nd hexagram, being positioned on the highest point from the external trajectory of the Heart's Meridian corresponds to the first third; starting from the armpit and ending in the middle of the arm on the inner side. For a good functioning of the heart, at summer time, heat protection measures are required, as well as adapting the body to an appropriate diet.
- The 11th hexagram, represented by the middle house of the external trajectory, corresponds to the middle third of the Heart's Meridian; it continues on the inner side of the arm and ends on the inner side of the forearm. Considering that the blood can be disturbed by anomalies from the area of the head, the abdomen or the legs, it is still the one that holds the balance between the heart and the blood.
- The 19th hexagram, represents the lower house and corresponds to the last third of the Heart's Meridian; it continues on the inner side of the forearm up to the palm and to the root of the small finger's nail. This part of the Meridian governs some aspects of the human growth within the first years of its life and from a psychological point of view it influences the left side of the brain hemisphere – side that corresponds to the mathematical-logical thinking and to musical aptitudes.

The I Ching states:

- "In order to obtain a transformation, 3 or 5 operations are required" which represents the first sense of mutations. This is being explained by the fact that many diseases displace the acupuncture points from their classic spots;
- "Unions or partings of the number can be attained", meaning the mathematical summation, subtraction, multiplication and division of these numbers. Starting from the intensity of the three or five points we have measured, we can obtain by using simple mathematical summation or subtraction calculations a sixth point that represents the quintessence of the five mutations that influence the means of illness' treatment.

By mutation, the hexagrams [62,11,19], pass over into the other hexagrams as followed:

The 62nd hexagram → 55,32,16,15,31,56;
meaning: ☲☲☲ → ☲☲☲, ☲☲☲, ☲☲☲, ☲☲☲, ☲☲☲, ☲☲☲;

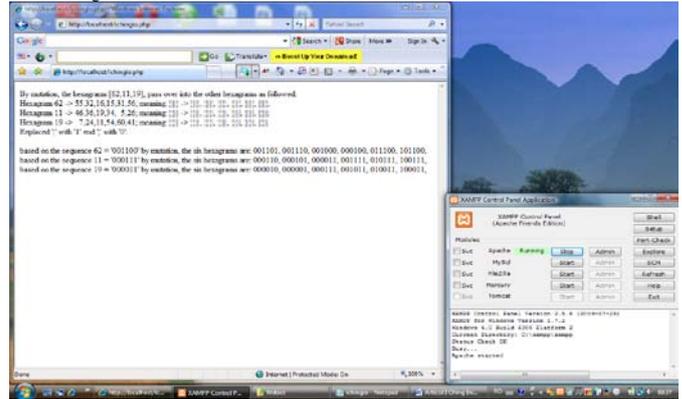
- The 1st line from the 62nd hexagram moves by mutation to the 55th hexagram. Hoarseness and dental pains are omnipresent symptoms for cardiac patients. The 55th hexagram corresponds to the middle third of the Biliary Gallbladder. This hexagram acts upon the released gall,

purifying it, often triggering a crisis. This explains the fact that, amongst cardiac patients, most gallbladder crises are precursory to heart crises. The 55th hexagram acts upon the hips, is important to the eyes and the sight, and represents an overall protection barrier for the immune system. During the hot times of the month August, the heart can show signs of weakness and a adapting to a diet rich in cereals and flour foods is welcomed.

- The 2nd line from the 62nd hexagram becomes by mutation the 32nd hexagram. The 32nd hexagram corresponds to the first third of the Yin Keo Meridian. Its specifics are spasms, which can occur anywhere in the body, starting from spasms of the calf to coronary spasms. Because the urinary control is not always perfect the sphincters characteristic to the urinary tract must be toned energetically at the same time requiring a control of the prostate. . If a medicinal diet is required, we must take into consideration that during the hot summer months, both the stomach and the prostate are swollen and sensitive to drugs.
- The 3rd line from the 62nd hexagram becomes by mutation the 16th hexagram. The 16th hexagram corresponds to the middle third of the Kidney Meridian, situated between the genital organs and the area above the umbilicus, acting upon the pair kidney-heart. This hexagram controls the lower part of the spinal cord, the urinary apparatus and the prostate that can lead through the enhancement of its volume to symptoms of prostatitis. The three hexagrams of the Heart Meridian are complementary to the Stomach Meridian and, thus in consequence any perturbation of the stomach shows repercussions to the heart. The mental state lies at the origin of this situation, regarding the fact that human tend to a cerebral thought life, without regarding the periodic pattern, which allow gastric disturbances to appear with repercussions on the heart.
- The 4th line from the 62nd hexagram becomes by mutation the 15th hexagram. The 15th hexagram corresponds to the middle third of the "Three focuses" situated on the exterior side between the middle of the forearm and the middle of the arm. This area acts especially on the eyes, the ears, the nose, and facial and cutaneous neuralgias. Mentally, the creativity is diminished and physically, the following symptoms can occur: the risk of hurting one's left arm, skin aches and eczemas can appear and nasal and sinus allergies can manifest.

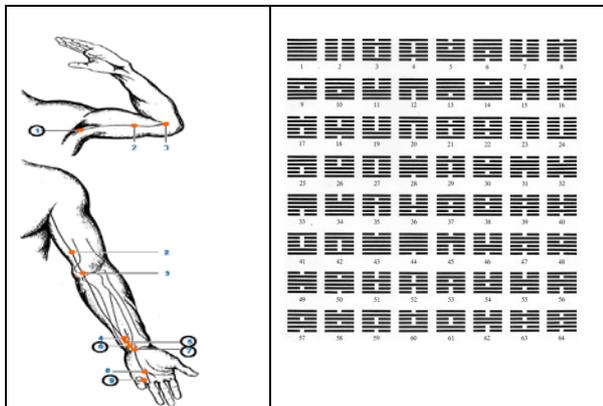
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- The 5th line from the 62nd hexagram becomes by mutation the 31st hexagram. The 31st hexagram represents the middle third of the “Yang keo” Meridian that begins at the knees and goes up to the outer part of the thigh, above the hips. Educating our meditation power must be put into value because the relationship between our conscious and subconscious, the education of the power of concentration must be promoted.
- The 6th line from the 62nd hexagram becomes by transformation the 56th hexagram. The 56th hexagram contains the middle third of the “Lung” Meridian. This hexagram represents the guardian of the immune system and has a fundamental role in defending the body against infectious and inflammatory diseases, regardless of their location. We need to take into consideration both the ailments of the lower part of the spinal cord, the thyroidal complementary point and the nervous system – which is the cause of both low arterial blood pressure and cardiac arrhythmia.



The 11nd hexagram → 46,36,19,34, 5,26; meaning: ☵☱☲☳☴☰
→ ☵☱☲☳☴☰;

The 19nd hexagram → 7,24,11,54,60,41; meaning: ☵☱☲☳☴☰
→ ☵☱☲☳☴☰.



a) The Heart's Meridian b) The I Ching hexagrams

Fig 6

3. CONCLUSIONS

From the I Ching perspective, if to every line from a hexagram an acupuncture point corresponds, then, a constant number of points correspond to each energetic Meridian, 3x6, thus 18 acupuncture points. The informatics program presented in this article is capable of generating by mutation, any three hexagrams of any energetic Meridian.

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