The Binary Pattern of Cell Growth and Division

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Abstract

The cell is the fundamental structural and functional unit within living bodies, while the life of these bodies is the result of every cell's activity. The main condition for human existence, represented by the expression of active force, with the property to expand, is generated by knowledge, externalized through curiosity, research and discovery. This process of studying and understanding by means of theory and law elaboration lays the basics of science evolution. This article is intended to present the cell division pattern build on procedural logical structures based on mathematical and scientific methods, corroborated with the I Ching matrix.

KEYWORDS: cell model, I Ching, information, generator torsional movement, vortex-tor.

INTRODUCTION

The spermatozoon, on its way to the ovum, undergoes a few stages from the moment of insemination until its enzymes achieve their ability to penetrate the pellucida zone and the egg cytoplasm. Therefore, from a biological perspective, this process is intended to form the original cell (the zygote). The human embryonic evolution starts after the fertilization, that is the moment the union of the reproductive cells take place. Most cells contain a complete set of genes that retain instructions intended to control the growth and function of the body and are responsible for most of our features.

Genes are located on thread-like structures called chromosomes. The human race has two sets of 23 chromosomes, i.e. 46 chromosomes in most cells, therefore 23 “pairs”. We inherit chromosomes from both parents: 23 from the mother and 23 from the father. Since chromosomes are made up of genes, we inherit two copies of most genes, therefore one copy from each parent. The human body consists of about 100 trillion cells. Throughout our lives, the cells are renewed by a so called controlled software “programmed cell death”, with an essential role in the operation, development and support of the human body in good condition. Therefore, the human fertilized ovule (or the human egg) will contain genetic material from both parents. Nowadays, pregnancies can be confirmed within 24 hours from insemination by detecting a hormone found in the mother's blood called “early pregnancy factor”. This is the moment when, throughout the migration of the embryo until it is stabilized on the wall of the uterus, the process of the cell segmentation and division starts. This process is also called division by 2. So in the 5th day after fertilization, the cell division process reaches 32 cells, i.e.: $2^0,2^1,2^2,2^3,2^4,2^5=32$.

The cell segmentation has three properties: it is total, non-equal and
asynchronous. The first division plan is vertical, resulting in two cells called blastomeres. Blastomeres are not equal, some of them are small and they are called microM and some are called called MacroM. The small ones are placed at the periphery of the egg to form a membrane called the trophoblast that secures the egg endometrium and embryo and provides nutrition; the large ones are placed inside the trophoblast, the embryoblast or bud forming embryonic trophoblast that will arise in the future body.

**MATHEMATICAL MODEL OFF CELL DIVISION**

The first wise man who contemplated the interaction, nature and dependence of the human body was the Chinese King Fu Xi. He established a number of eight mathematical symbols, consisting of combinations of three lines each, called trigrams, signifying combinations of entire lines (yang) and/or broken lines (Yin), which can be attributed, there is no doubt about this, to a ternary or binary system, describing the human body interactions.

One of the followers of the trigrams philosophy was king Wu, who associated trigrams two by two, giving the 64 hexagrams a new meaning.

If a hexagram is the result of a combination of two trigrams, multiplying 64 by 6 results in the 384 acupuncture points.

The String Theory states that nature is manifested in the binary basis as a tool with six strings, that is 2⁶ = 64 phases. We can affirm that any line or vibratory string in an atom or in a Hexagram line can exist in two states, as follows:

- The Inactive status, Yin – represented by a broken line “--- --- “;
- The Active status, Yang - represented by a continuous line “____ “.

The two states are also treated by the science of breath, comprised in Sanskrit and treated in the philosophy of the Tattvas, which says that: the vibrations expressed through the two phases, inspiration-breathing without discontinuity represents life. The vibrations are the basis of the perception of the five senses we are endowed with in the process of our evolution. This is known as the process of the five senses or the assignment of the Pancikarana's ethers that, with their numerous combinations are, therefore, all possible manifestations of life.

A name was attributed to each of the 64 hexagrams and a short summary of their significance has been made. The hexagrams were placed in the boxes of a Square named after King Wu and belong to the magical squares category. These later formed the Basis of Oriental Wisdom, written in the most grandiose classical book of wisdom, “I Ching” or “the Book of Changes”, considered being the Fundamentals of Universal Principles.

Considering that the “supreme science” consists of the “science of numbers”, with the specification that numbers are the last abstractions that unify the properties of things, associated with the laws of life, the philosophy of these elements composing these magic squares can be found as study in philosophy schools (Pythagorean School, Platonic School), in writing (E. Mascopol), studied by the wise men of the time (Euclid, Le Hire, Paracelsus, Gerolamo Cardano, Bachet de Meziriac, Pierre de Fermat, Athanasius Kircher, Joseph Saveur, Leonhard Euler, Albrecht Dürer, Benjamin Franklin, Leibnitz G. Wilhelm, Blaise Pascal), and have been studied to this day.
The I Ching Matrix can also be called the Sciences Matrix, because it contains all elements necessary to the whole understanding in its structure. The I Ching matrix structure comprises the Human Cell Division, DNA/RNA, Pascal's Triangle and structures like Newton's Binome, the Fibonacci String, the Golden Number, can be recognized, as well as Sierpinski's Triangle that forms the basics of Fractals Theory, as well as the Quantum Physics Discoveries of W. Russell and J. Wheeler.

One can say that, by disposing the 64 hexagrams of I Ching into simple arithmetic patterns, typical of a magic square, a new order can be defined. Deciphering these squares is also the key balance element of the body's health.

![Fig. 1](image_url)

The Yin/Yang symbolizes the eternal dichotomy between the two primary aspects of the passive and active forces. Yin is the expression of the stable matter, with the ability to shrink and condense. Yang is the expression of the active force, having the quality of expansion. This symbol represents the action and reaction. At first, reaction appears as a point, being a potential action or condition that evolves in time. This model is a continuous generator representing the law of nature or the perpetual change. It must follow the 7 laws of the universe: 1) The UNITY LAW; 2) The CORRESPONDENCE LAW; 3) The VIBRATION LAW; 4) The POLARITY LAW; 5) The LAW OF CAUSE AND EFFECT; 6) The LAW of the GENRE; 7) The ATTRACTION LAW.

MATHEMATICAL MODEL

The human cell is such a generator.

The evolution mechanism is sustained by the cell division. In order for this mechanism to work in normal parameters, it must fulfill two tasks: the survival and the perpetuation tasks. Optimum environmental and nurturing conditions must be met in order that the survival task function at normal parameters. This task lies at the basics of the creation and development of the digestive system.

The attraction system needs to work for the task of perpetuation to be carried through. The system generates, in return, patterns capable to retain and store information, thus leading to the so-called “matter consciousness.” The need for information storage and processing is the basics of creation and development of the nervous system and, eventually, of the brain. Thanks to the quality of synchronicity, which is part of a non-linear scale, fields of attraction of consciousness may influence multiple events.

Referring to I Ching, we will create a mathematical model capable to show, step by step, the development mechanism of Cell Division and of the embryonic nucleus in the first six days of pregnancy.

In order to do this, we will state the following definitions:

**Definition 1.** The alphabet is the nonempty union $\Sigma$ the elements of which we call
symbols or letters.

**Definition 2.** The nonempty word (the string) over \( \Sigma \) is a \( w \) application: \( N_k := \{1,...,k\} \rightarrow \Sigma \) with nonzero natural number \( k \), called the length of the word \( w \) and noted as \( l(w) \) or \( |w| \). Suppose \( \Sigma \) is the non-empty words set.

We note \( w = w(1)w(2)...w(k) \).

For technical reasons, the empty word is considered to be given by the empty function \( \rightarrow \Sigma \) and noted \( \varepsilon \), where \( l(\varepsilon) = 0 \).

The set of all words (string) over \( \Sigma \) we call \( \Sigma^* \). So \( \Sigma^* = \Sigma^+ \cup \{\varepsilon\} \).

Suppose \( \Sigma^k \) the words of length \( k \); so \( \Sigma^0 = \{\varepsilon\} \) and \( \Sigma^1 = \Sigma \).

We have \( \Sigma^* = \bigcup_{k \geq 0} \Sigma^k \). We call \( k \)-words the elements of \( \Sigma^k \).

Examples:

i) given an \( a, a \in \Sigma \), we define \( a^k \) through \( a^0 = \varepsilon \) respectively \( a^k = a...a \) where \( a \) in the member \( a...a \) is \( k \) times. So, \( a^k \in \Sigma^k \).

ii) For the binary alphabet we have: \( \Sigma^1 = \{0, 1\}, \Sigma^2 = \{00, 01, 10, 11\}, \Sigma^3 = \{000, 001, 010, 011, 100, 101, 110, 111\} \).

iii) For the two-letter alphabet, we have: \( \Sigma^1 = \{a, b\}, \Sigma^2 = \{aa, ab, ba, bb\}, \Sigma^3 = \{aaa, aab, aba, abb, baa, bab, bba, bbb\} \).

iv) For the two-character alphabet, we have: \( \Sigma^1 = \{-\ , \ \}, \Sigma^2 = \{==, ===, \ \ \} \).

The cell division mechanism functioning is determined by the cell's ability to retain information. For easiness in understanding the Mechanism of Cellular Division, we propose the same meaning towards the “0” and “-" characters, and towards “1” and “=".

The pattern of cell division is:

![Pattern of cell division](image)

The information generation mechanism is:

- Starting from the premise that information in the mother cell is (0/1), at the first cell division one of the cells will receive the information “0” and the other information “1”, leading forth in memory the information of the mother cell. The “Center Point” or “The Generator” has to be in the center, thus the information flow can be in balance.
• Two cells will be consecutively added to the right of each cell information for the division process to take place, as follows: by adding information “1” to the old cell information, an ascending movement is given to the cell by the created torsion; then, by adding information “0” to the old cell information, a descending movement is given to the cell by the created torsion. Therefore, the construction of this process in five steps will result in an information system able to discover at every turn both the information generated until that moment and the information about to be generated. In other words, both past and future are known every moment. Abstractly, within the sphere, the cells to which, by the division process, “0” is added as information, are given a levorotation (-) movement by torsion, while the cells to which, by the division process, “1” is added as information, are given a dextrorotation (-) movement by torsion.

• Abstractly, we consider that, at the end of the six-step process, the “mother cell” has the shape of a seven-level sphere. The cellular construction is maintained throughout the process in perfectly symmetrical order and the newly created cells line up according to the six unit information storage general pattern. The set of all words (strings) generated from $\Sigma^1$ to $\Sigma^6$, for the two-character alphabet (---, ----) over $\Sigma$, represents the informational field of “what has been”, “what is” and “what will be”. Therefore, according to the six unit information storage general pattern, the cells containing only “0”-type information, that is that six zeros (“000000”), remain all the time at the lowest level – level zero; information cells are made up of a single “1” and five zeros in any combination settled on level one, according to the division pattern; the cells containing two “1”s and four zeros in any combination settled on level two, and so on, until the information consists of six “1”s, that is “111111” and is situated at the top level.

THE MICROPATTERN OF CELL DIVISION

The micro pattern of cell division or the division by 2 is made up of the following algorithm:

Let us suppose that, after fertilization, from the two information containing characteristics of both the mother and the father (information “0” for the mother and information “1” for the father), a cell results with a common piece of information (0/1), called “Mother Cell” or “Reference Cell”. These common information remains define everything throughout the cell division process and represent the “Generator” or the “Science of Non-science”.

The information in the “Mother Cell” being in the Center, projects its perception by a torsion motion at a distance towards the four cardinal points, namely up and down at the same distance and to the left and to the right, thus creating a static knowledge field. These conditions having been fulfilled, create the possibility for the cells to move along the three axes, being able to switch from a static field to a dynamic one. A knowledge sphere, perfectly harmonic, is formed: a new cell. By knowledge expansion and using the torsion movements, the information moved to the edge of the sphere, where it started to project another sphere using the Reference Cell as a model, and the cell division process continues like this on and on.

The Cell Division occurs thanks to the mechanism of information transmission; with the specification that each cell resulted upon division will contain the same amount of Genetic Information (the same number of chromosomes and the
same amount of DNA) as the divided cell, following the laws of universal creation.

This 6-bit information memory system resembles SRAM (Static Random Access Memory) that, unlike DRAM memory (Dynamic Random Access Memory), is a semiconductor memory where a refreshing periodic cycle is no longer necessary. This bit-memorizing system uses “combinational logic circuits”, is asynchronous, with a very short access time and data security lodged in memory is secure and stable. This pattern system can be found in computer science, as well as in the Cell Division Process.

During the first Cell Division, the information size is one bit and grows by one unit with each subsequent cell division, so that, during the sixth Cell Division, the size of a cell is six units, which is the necessary and sufficient size to store information.

Abstractly, the Mother Cell is represented as follows:

- in plan, it is represented by a point on the circle. Fig. 3 (a);
- a cell arrangement in the binary system. Fig. 3 (b).

If we replace 0 → a and 1 → b, the zero degree Newton's Binomial theorem can be written as: \((a+b)^0=1\).

The graphic representations are:

![Fig. 3](image)

**THE FIRST CELL DIVISION**

Through Cell Division mechanism, two cells with distinct information (0, 1) result from the Mother Cell. The capacity of memorizing the information existent in the two resulted cells is one unit for each cell. If we replace: 0 → a and 1 → b, the first degree Newton's Binomial can be written as: \((a+b)^1 = a+b\); where, upon coefficients addition: 1+1=2, we obtain the number of cells after the first division. It is worthy to be mentioned that the first cell division is vertical.

Abstractly, the first cell division is represented like this:

- the first cell division is graphically represented by two points on a circle, disposed at equal distances, dividing the circle in two equal parts if joined by three straight lines, Fig. 3 (a),
- binary development, Fig. 3 (b),
- arrangement of the newly created cells: binary system Fig. 3 (c), I Ching Fig. 3 (d),
- information transmission model by torsion Fig. 4 (e).

The graphic representations of the first cell division are:

![Fig. 4](image)
THE SECOND CELL DIVISION

Based on the information in the two cells resulted after the first cell division: (0, 1), the following four cells carrying distinct information will result by cell division: (00, (01, 10), 11).

The information transmission is possible thanks to a torsion motion, according to the Information Generating Mechanism, following the Cell Division Pattern, Fig. 2.

According to the torsion motion thus created, the cells will line up according to the following principle, through the cell division pattern:

- The cell with the inherited information “0” is taken:
  1) Information “0” is added at the right of the inherited information, thus the cell information becoming “00”. Adding information “0” to the cell determines a descending trail of the cell by means of the newly created torsion motion. Since the information is composed exclusively by “0”, the cell settles at the zero level.
  2) Information “1” is added at the right of the inherited information, thus the cell information becoming “01”. Adding information “1” to the cell determines an ascending trail of the cell by means of the newly created torsion motion. Since the information contains a single “1”, the cell settles at the middle level – level one;

- The cell with the inherited information “1” is taken:
  1) Information “0” is added at the right of the inherited information, thus the cell information becoming “10”. Adding information “0” to the cell determines a descending trail of the cell by means of the newly created torsion motion. Since the information contains a single “1”, the cell settles at the middle level – level one;
  2) Information “1” is added at the right of the inherited information, thus the cell information becoming “11”. Adding information “1” to the cell determines an ascending trail of the cell by means of the newly created torsion motion. Since the information is composed by “11”, the cell settles at the highest level – level two.

If we replace: 0 → a and 1 → b, the second degree Newton's Binomial can be written: \((a+b)^2=aa+ab+ba+bb=a^2+2ab+b^2\); where, by addition of the coefficients: 1+2+1=4, the number of cells created after the second division is obtained.

Abstractly, the second cell division is represented like this:

- in plan, it is represented by three points on the circle, disposed at equal distances, that result in a triangle if joined by a straight line, Fig. 4 (a);
- binary development and realignment on the Three Levels, Fig. 4 (b);
- re-arrangement of the newly created cells: binary system Fig. 4 (c), I Ching Fig. 4 (d);
- the cell-arrangement is the result of a torsion movement generated by the information transmission mechanism through the information accumulating process, in the sphere: Fig. 4 (e).
THE THIRD CELL DIVISION

Starting from the four inherited cells information: (00, (01, 10), 11), eight cells will be created by cell division, carrying the following distinct information: (000, (001,010,100), (011,101,110), 111).

The transmission of information is possible by a Torsion Motion, according to the Information Generating Mechanism, following the Pattern of Cell Division, Fig. 2.

Through the division pattern, the newly created cells line up by torsion according to the following principle:

• The cell with the inherited information “00” is taken, and then the two steps are performed:
  1) Information “0” is added at the right of the inherited information, thus the cell information becoming “000”. Adding information “0” to the cell determines a descending trail of the cell by means of torsion. Since the information is composed exclusively by zeros, the cell settles at level zero;
  2) Information “1” is added at the right of the inherited information, thus the cell information becoming “001”. Adding information “1” to the cell determines an ascending trail of the cell by means of torsion. Since the information is composed by a single “1”, the cell settles at level one;

• The cell with the inherited information “01” is taken, and then the two steps are performed:
  1) Information “0” is added at the right of the inherited information, thus the cell information becoming “010”. Adding information “0” to the cell determines a descending trail of the cell by means of the newly created torsion motion. Since there is a single one within the cell information, the cell settles at level one;
  2) Information “1” is added at the right of the inherited information, thus the cell information becoming “011”. Adding information “1” to the cell determines an ascending trail of the cell by means of the newly created torsion. Since there are two “1” within the cell information, the cell settles at level two;

• The cell with the inherited information “10” is taken, and then the two steps are performed:
  1) Information “0” is added at the right of the inherited information, thus the cell information becoming “100”. Adding information “0” to the cell
determines a descending trail of the cell by means of the newly created torsion motion. Since there is a single “1” within the cell information, the cell settles at level one;

2) Information “1” is added at the right of the inherited information, thus the cell information becoming “101”. Adding information “1” to the cell determines an ascending trail of the cell by means of the newly created torsion motion. Since there are two “1” within the cell information, the cell settles at level two;

• The cell with the inherited information “11” is taken, and then the two steps are performed:

1) Information “0” is added at the right of the inherited information, thus the cell information becoming “110”. Adding information “0” to the cell determines a descending trail of the cell by means of the newly created torsion motion. Since there are two “1” within the cell information, the cell settles at level two;

2) Information “1” is added at the right of the inherited information, thus the cell information becoming “111”. Adding information “1” to the cell determines an ascending trail of the cell by means of the newly created torsion motion. Since there are three “1” within the cell information, the cell settles at a higher level: level three;

In the third Cell Division, the Transmission of Information is done by the same characteristic torsion movement mechanism of generating of information presented in the cell division patterns, examples one and two. For the third Cellular Division, if we replace: 0 → a and 1 → b, the third degree Newton’s Binomial can be written: \((a+b)^3=a^3+3a^2b+3ab^2+b^3=aaa+aab+aba+bba+bba+bab+abb+bba\); where, by addition of the coefficients: 1+3+3+1=8, the number of cells created after the third division is obtained.

Abstractly, the third cell division is represented as follows:

• in plan, the third Cell Division is represented by four equally displaced points on the circle, that result in a square divided in four equal triangles, if joined by six straight segments, Fig. 5 (a);
• the binary development, Fig. 5 (b) and the realignment on all Four Levels, Fig. 5 (c);
• rearrangement of the newly created cells: binary system: Fig. 5 (d), I Ching Fig. 5 (e);
• the cell-arrangement is the result of a torsion movement generated by the information transmission mechanism through the information accumulating process, in the sphere: Fig. 5 (f).

With every new Cell Division, the Cellular Division construction is in perfect symmetry and order.
The graphic representations are:

![Graphic representations](image)

**THE FOURTH CELL DIVISION**

Starting from the information inherited from the eight cell: (000, (001,010,100), (011,101,110), 111), through Cell Division process, sixteen cells will be created by cell division, carrying the following distinct information: (0000, (0001,0010,0100,1000), (0110,0101,0110,1001,1010,1100), (1011,1011,1101,1110,1111);

In the fourth cell division, the Transmission of Information is made by the same characteristic torsion movement mechanism of generating the information presented in the cell division patterns, examples two and three.

For the fourth Cellular Division, if we replace: 0 → a and 1 → b, the fourth degree Newton’s binomial can be written:

\[(a+b)^4=a^4+4a^3b+6a^2b^2+4ab^3+b^4=aaaa+aaab+aaba+abaa+bbaa+aabb+abab+abba+baba+bbaa+abbb+babb+bbab+bbba+bbbb;\]

where, by addition of the coefficients: 1+4+6+4+1=16, the number of cells created after the fourth division is obtained.

Abstractly, the fourth cell division is graphically represented like this:

- in plan, the fourth Cell Division is represented by five equally displaced points on the circle, that result in ten triangles, five rectangles and a pentagon, if joined by ten straight segments, Fig. 6 (a);
- in the plan, the fourth cell division is represented by five points on a circle, arranged at equal distances, joined by ten right-wing segments, that will give ten rectangles, five triangles and a pentagon;
- binary development, Fig. 6 (b) and realignment on the Five Levels, Figure 6 (c);
- rearrangement of the newly created cells: binary system: Fig. 6 (d), I Ching Fig. 6 (e);
- the cell-arrangement is the result of a torsion movement generated by the information transmission mechanism through the information accumulating process, Fig. 6 (f); in the sphere: Fig. 6 (g).

With every new Cell Division, the Cellular Division construction is in perfect symmetry and order.
The graphic representations are:

![Graphic Representations](image_url)

**THE FIFTH CELL DIVISION**

Based on the information resulted from the previous Division:

\[(0000, (0001, 0010, 0100, 1000), (0111, 0101, 0110, 1010, 1100), (0111, 1101, 1110, 1111))\],

thirty-two cells will be created by cell division, carrying the following distinct information:

\[(00000, (00001, 00010, 00100, 01000, 10000), (00011, 00101, 00110, 01001, 01010, 01100, 10010, 10100, 11000), (11100, 11010, 11011, 10110, 10111, 01110, 01011, 00111), (11110, 11101, 11110, 11111))\]

In the fifth cell division, the Transmission of Information is made by the same characteristic torsion movement mechanism of generating the information presented in the cell division patterns above.

For the fifth Cell Division, if we replace 0 → a and 1 → b, we have:

\[(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5\]

\[aaaaa + aaabb + aabba + abaaa + baaaa + aaabb + aabab + abbba + bbaaa + bbaab + baaab + ababb + babbb + bbbba + bbabb + bbbba + bbbbb;\]

where, after addition of the coefficients: 1+5+10+10+5+1=32, the number of cells created after the fifth division is obtained.

Abstractly, the fifth cell division is represented like this:

- in plan, the fifth Cell Division is represented by six equally displaced points on
the circle, that result in 20 triangles, 15 rectangles and 6 pentagons, if joined by 15 straight segments, Fig. 7 (a),
- binary development, Figure 7 (b) and realignment on the Five Levels, Fig. 7 (c),
- rearrangement of the newly created cells: binary system Fig.: 7 (d), I Ching Fig. 7 (e),
- the cell-arrangement is the result of a torsion movement generated by the information transmission mechanism through the information accumulating process, in the sphere: Fig. 7 (f).

With every new Cell Division, the Cellular Division construction is in perfect symmetry and order.

The graphic representations are:

![Graphic Representations](image-url)
With every new Cell Division, the Cellular Division construction is in perfect symmetry and order.

A sixth cell division follows the same principles.

Abstractly, the sixth cell division is represented like this:

- Arranging new cells created after the sixth division in binary: Fig. 8 (a);
- Generation of the steps, the first cell division to cell sixth division: the I Ching matrix: Fig. 8 (b).

The graphic representations are:

![Graphic representations](image)

**Conclusion**

Following the pattern of Cell Division, the transmission of information is possible by means of a torsion motion according to information generating mechanism. The torsion motion represents the energy stored and is “the unique signature” of every single individual. We can say that, after the fifth cell division, the information contained in any of the 32 newly created cells of the human body is capable to ensure the five functions: growth, multiplication, differentiation, tissue regeneration and, finally, life continuity. In other words, the cell is purely memory encapsulated in matter and it is the largest information bearer and the largest information library. Based on the I Ching Matrix and following backwards the Cell Division Pattern, the trail of any organ in the human body can be built. In conclusion, this five-step process will result in an information system capable to unveil, at any moment, the past and the future.
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