

The Orbital Systems Theory

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Abstract

In this paper, a new theory is introduced called orbital systems theory to handle the uncertainty of the natural phenomena, the complicated real-world problems, and the human's decision-making process which naturally creates the inconstancy and uncertainty in each process it involves. The philosophy of the new theory is established based on this hypothesis that every component of the universe is a box that carries the information and each one is constructed by the particular information concepts that move along specific orbits. The orbital system is an integral part of the new theory. As a restricted numeric system, its core is the concept of reality. An orbital system is developed based on five numerical spectra surrounded by four parallel dimensions of reality and certain reality. With considering "time" as an element, each dimension adds entropy to the system, and increases/decreases the level of uncertainty.

Keywords: Orbital systems theory; Orbital numbers; Uncertainty; Reality; Information; Theory

1. Introduction

As Richard Feynman once said: "When a scientist does not know the answer to a problem, he is ignorant. When he has a hunch as to what the result is, he is uncertain. And when he is pretty damn sure of what the result is going to be, he is still in some doubt. We have found it of paramount importance that in order to progress, we must recognize our ignorance and leave room for doubt. Scientific knowledge is a body of statements of varying degrees of certainty, some most unsure, some nearly sure, but none absolutely certain (Feynman & Leighton., 2001)." When people investigate systems, due to both the existence of internal and external disturbances and the limitation of our understanding, the available information tends to contain various sorts of uncertainty(Liu *et al.*, 2012). In fact, uncertainty means that we cannot predict or foresee what will happen when acting or not acting (Aspers., 2018)¹. Collan suggests another definition for the concept of uncertainty. In Accordance with the definition, uncertainty is something that is always present in future-oriented analysis² (Collan *et al.*, 2016).

The definition of the uncertainty has been emerged in the various forms; however, a widely accepted taxonomy compartmentalizes uncertainty in the two terms of the quantitative and the qualitative. The scientific study of uncertainty probably started in 1654 by Pascal and Fermat with the development of probability theory (Masmoudi *et al.*, 2016). Liu has indicated incompleteness and inadequacy in the information as two main characteristics of an unascertained system (Liu *et al.*, 2012). Stated by Bradley and Drechsler, the concept of uncertainty is intersected as the qualitative uncertainty including three different types of ethical uncertainty, option and state-space uncertainty, and on the other hand the quantitative uncertainty which includes the state uncertainty and the empirical uncertainty (using probability theory and the mathematical statistics). Additionally, Bradley and Drechsler have proposed three dimensions to the uncertainty: its nature (the modal uncertainty, empirical uncertainty, and normative uncertainty), object (the factual uncertainty and the counterfactual uncertainty), and severity. Yet, there is another categorization for the uncertainty studied by (Li *et al.*, 2012). On the word of their work, uncertainty is categorized into the Aleatory uncertainty³ and epistemic uncertainty⁴ origins from the nature and the physical world's phenomena, and the human's lack of knowledge of the physical world and lack of the ability of measuring and modeling the physical world respectively.

The uncertainty analysis process consists of finding the set of equivalent model parameters that are those compatible with the prior information and predict the observed data within the same error bounds (Fernández-Muñiz *et al.*, 2019). In order to handle the uncertainty, various theories and methodologies of unascertained systems developed such as information-Gap theory (Hipel & Ben-Haim., 1999) which provides a framework for making decisions under severe uncertainties that cannot be described by probability theory-based methods⁵ due to the lack of enough information (Zhao *et al.*, 2019), and also it has been employed to assess the robustness of value at risk against Knightian uncertainties⁶ in estimating probability distribution function (Soltani *et al.*, 2018; Ben-Haim., 2005); derived uncertainty theory (Liu; 2007⁷, 2010⁸); fuzzy mathematics (see Zimmermann. 2010); grey systems theory, and rough set theory (Pawlak. 1982). The probability theory-based methods (comprising Monte Carlo method⁹, Bayesian method¹⁰, and Dempster-Shafer evidence theory¹¹) embrace Aleatory uncertainty; whilst, other aforementioned methods plus the probabilistic methods are used for dealing with the Epistemic uncertainty.

¹ The author also suggests three forms for reducing the uncertainty including: 1. Decision; 2. Valuation; and 3. Contest.

² See (Maier *et al.*, 2016).

³ Also called as the natural variability, objective uncertainty, external uncertainty, random uncertainty, stochastic uncertainty, inherent uncertainty, irreducible uncertainty, fundamental uncertainty, real world uncertainty, or primary uncertainty (Li *et al.*, 2012).

⁴ Also referred as the knowledge uncertainty, subjective uncertainty, internal uncertainty, incompleteness, functional uncertainty, informative uncertainty, or secondary uncertainty (Li *et al.*, 2012).

⁵ Probabilistic methods

⁶ The non-probabilistic uncertainties (Ben-Gad *et al.*, 2019), introduced by Frank Knight, a distinction between measurable uncertainty, which is called "risk," and "true uncertainty," which cannot "by any method be reduced to an objective, quantitatively determined probability" (Frydman *et al.*, 2019; Knight., 1921).

⁷ Uncertainty theory: An Introduction to its Axiomatic Foundations

⁸ Uncertainty theory: A Branch of Mathematics for Modeling Human Uncertainty

⁹ See (Rey *et al.*, 2019; Gray *et al.*, 2019; Blondeel *et al.*, 2019)

¹⁰ See (Silani *et al.*, 2019)

¹¹ See (Deng *et al.*, 2019; Abellán *et al.*, 2019)

As a practical tool for the uncertain and hesitant situations (Mousavi *et al.*, 2018), fuzzy set theory first developed by Zadeh in 1965. It is one of the most useful and important method for describing vagueness, imprecision, and uncertainty in data (Soleymani *et al.*, 2016). In opposite of the crisp sets, where an element belongs to only one set, in the fuzzy sets theory, the element belongs to a set to a degree (k), where ($0 \leq k \leq 1$). Assume (X) is a random collection of objects, and (A) is a fuzzy set¹², then:

$$A = \left\{ \left(x, \mu_{(A)}(x) \right) : x \in X, \mu_{(A)}(x) : X \rightarrow [0,1] \right\} \quad (1)$$

Where $\mu_{(A)}(x)$ gives the grade of membership of the element to set as is the membership function of (A). The defined operations on fuzzy sets are addressed in the following contents.

$$A' = \left\{ \left(x, 1 - \mu_{(A)}(x) \right) : x \in X \right\} \quad (2)$$

$$\mu_{(A \cup B)}(x) = \max\{\mu_{(A)}(x), \mu_{(B)}(x)\} \quad (3)$$

Where (A) and (B) are the two fuzzy sets.

$$\mu_{(A \cap B)}(x) = \min\{\mu_{(A)}(x), \mu_{(B)}(x)\} \quad (4)$$

With focusing on the incomplete information, and emphasizing on the investigation of such objects that process clear extension and unclear intension, grey systems theory first introduced by Deng in 1982. It typically demonstrates as a numeric interval with the two defined upper and lower bounds which is normally exposed as ($\otimes G = [\underline{G}, \overline{G}]$) where ($\otimes G$) is a grey number, and (\underline{G}) and (\overline{G}) describe the lower and upper bound of a grey number respectively (Zakeri *et al.*, 2019; Lin *et al.*, 2004). Due to the low requirement on the amount of data, the grey system theory has been widely adopted to estimate the behavior of unknown systems (Wang *et al.*, 2019; Ma *et al.*, 2019). Having said that, Sun declared two disadvantages for the grey-based decision models: 1. In grey decision model, it is assumed that all the attributes are mutually independent. However, in real decision problems, the interaction often exists among attributes which leads to the failure of decision model; 2. The possibility degree equation is unreasonable, and the possibility degree matrix is too absolute to meet the reality (Sun *et al.*, 2017).

By replacing a vague concept with the two precise concepts named as the lower approximation and upper approximation, to deal with the rough concepts and rough non-overlapping class and rough concepts, rough sets theory introduced by Zdzislaw Pawlak in 1982¹³. It is employed for quantitatively analysis of the imprecise, inconsistent, incomplete information and knowledge which has been actively employed in intelligent information processing fields such as pattern recognition, knowledge discovery, uncertainty analysis, and so on (Guo *et al.*, 2019). Drawing experience from Pawlak's work, Zhai first proposed rough numbers (Zhai *et al.*, 2008). In general, a rough number consists of the lower limit, upper limit and rough boundary interval and it only depends on the original data (Zhu *et al.*, 2015). The basic idea of the rough set theory can be alienated into two segments: the first segment is to form concepts and rules through the classification of objects, and the latter is to discovery knowledge through the classification of the equivalence relation and classification for the approximation of the target (Loia & Orciuoli; 2019). According to the Zhai's work, the definition of the interval rough number can be found at (Zhu *et al.*, 2015; Zheng *et al.*, 2019). A comparison of fuzzy set theory and rough set theory based methods is provided in the following table (Zheng *et al.*, 2019):

Table 1
Comparison of fuzzy set theory and rough set theory

Main issues	Fuzzy set theory	Rough set theory
Original data	Linguistic item accordingly with certain rating scale	Linguistic item accordingly with certain rating scale
Importance rating method	Fuzzy numbers	Rough number and rough boundary interval
Expression of imprecision	Membership function	Approximation
Determination of final importance ratings	Fuzzy arithmetic and defuzzification	Rough arithmetic
Determination of imprecision	Most subjectively by designers based on experience	Objectively computed by inherent data

¹² See (Nasseri *et al.*, 2016), Page 263-265.

¹³ Also see (Pawlak., 1998)

In accordance with Liu's study, the comparison between three given theories is demonstrated in the (Table 2).

Table 2
Comparison of the fuzzy math, grey systems, and the rough sets (Liu et al., 2012)

Object	Fuzzy math	Grey systems	Rough sets
Research objects	Cognitive uncertainty	Poor information	Indiscernibility
Basic sets	Fuzzy sets	Grey sets	Approximation sets
Methods	mapping	Information coverage	Approximation sets
Procedures	Cut sets	Sequence operator	Lower and upper approximation
Data requirements	Known membership	Any distribution	Equivalent relations
Emphasis	Extension	Intension	Intention
objects	Cognitive expression	Laws of reality	Concept approximation
Characteristics	Experience	Small sample	Information systems (tables)

The abovementioned theories offer a numeric interval with a set of a few numbers which probably are the neighbors in the numeric vector, while we believe every "number" (the crisp number) is affected by every possible number given in a problem. Moreover, the linguistic variables which are mostly using for the problems that human decision-making involved completely affected by the whole offered scales. For instance, for making a choice/decision, when a decision maker faces with a linguistic variables scale such as very low (abbreviated to VL), low (L), medium low (ML), medium (M), medium high (MH), high (H), and very high (VH), or as another regular scale: very poor (VP), poor (P), medium poor (MP), fair (F), medium good (MG), good (G), and very good (VG) to evaluate a specific case, if s/he decides to select "ML", s/he operated not only a process to analyze the case and decided the appropriate scale, but simultaneously, s/he evaluated all scales and selected ML against all other offered/possible options whilst each option made a different impact on her/his decision during the decision-making process indeed; in the other words, as a rule of thumb, when a decision-maker decides to label a case as "VP", s/he unconsciously imagine the case in the "VG" position and other positions unremittingly and compares them immediately. As discussed previously, the above-said methods do not predict any solution to handle the uncertainty made by the other numbers of such problems. They only recommend a tiny interval of the numbers to analyze the uncertainty, or to cover the hesitancy and inconsistency that occurred in the decision-making process; while, as mentioned heretofore, the very complicated and noisy real-world injects different sort of complexity and uncertainty to the problems.

Besides, in both macro and micro scales, every concept which deals with the uncertainty scrimmages with the "time", i.e., time changes the level of uncertainty constantly, and passing of time creates inconstancy. What is the three methods' answer to the matter of time? The answer goes to the "nothing". Same as the previous problem, their philosophies and math-based algorithms are not capable to offer any solution for the problem of time.

Considering the fact that human's decision-making naturally causes uncertainty, another problem emerges when a process involves with it. Characteristically, decision-making problems entail a number of alternatives analyzed through a number of criteria. In the decision-making process, unconsciously, decision maker compares alternatives with a set of abstract alternatives (Zakeri. 2018). It means that there are abstract alternatives which impact the final decision's results and create the uncertainty while they are not reflected in any of the aforementioned theory. Individually, each aforementioned methods recommends their own solution for the human's decision-making process as the unique numerical linguistic variables; however, the question is that "Do they consider the abstract parallel concepts?" And once again, the answer is "no". Well, do the parallel concepts need to be considered? Yes, desperately. They already affect the principle of the universe.

In addition to introducing the orbital systems theory, this paper proposes an integrated system for answering all the above-mentioned questions simultaneously. The core of the new theory is fabricated around the various dimensions of reality. This paper is composed as follows: orbital systems theory has been introduced in the second section, and the third section is devoted to the orbital numbers; the fourth section is named as the Life, death, resurrection; the

prediction of the new theory has been discussed in the fifth section; the sixth section is dedicated to the orbital theory's principles, and as the last section, conclusion is exposed in the seventh section of the paper.

2. Orbital systems theory

Orbital systems theory has been developed respecting to the Pliny the Elder quote:” The only certainty is that nothing is certain”. Based on the new theory’s philosophy, all objects, elements, and concepts of the universe are information¹⁴; they are connected and have interactions. Indeed, all information is the orbitals made by the mentioned interactions. These interactions make entropy, and also make uncertainty subsequently (see Robinson. 2008).The new theory embraces two uncertainty categories of Aleatory uncertainty and Epistemic uncertainty. In fact, it tries to explain the uncertainty produced by the cause and effect relationship.

Grey systems theory categorizes information into three grades (Liu and Lin, 2010) including: 1. White (which shows the complete information); 2. Grey (which indicates the partially known and partially unknown information); and 3. Black (which stands for the unknown information). However, orbital systems theory defines information in a framework of reality which is made by a set of the known and unknown information. The philosophy of this segmentation is based on the fact that there is no available complete package of information for real-world’s phenomena. Whilst, what makes reality as an existing abstract picture is a package of the absolute reality, distorted reality, manipulated reality, rehabilitated reality, imported reality, and defunct reality (Fig 1).

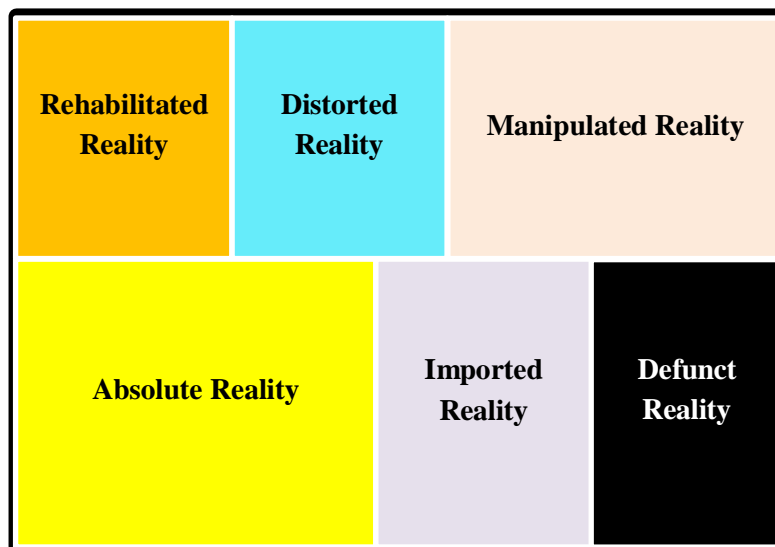


Fig.1. The picture of the reality concept and its composed elements

The four different types of realities are as the following list.

1. *The absolute reality*: This is the accessible complete information of a phenomena. As a part of the whole picture, the absolute reality portrays only part of reality which does not represent the whole picture. If an independent existence considers for the absolute (pure) reality, its schematic portrait can be found in the following figure:

¹⁴ Reading the holographic principle is strongly recommended (Beckstein., 2005; Susskind., 1995).

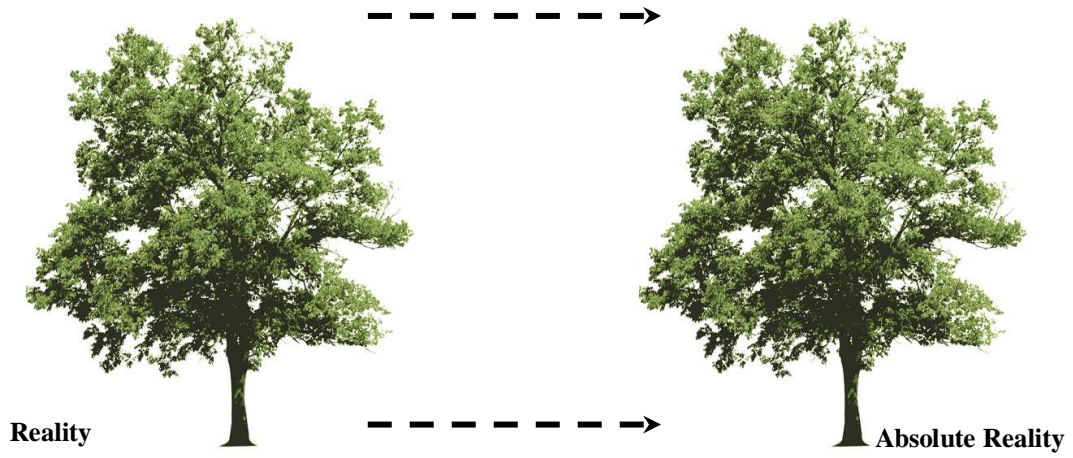


Fig.2. An abstract image of the absolute (pure) reality

2. *The distorted reality*: With an intrinsic origin from the system, this is the product of the process of existing concepts distortion into the “new concepts” that do not exist externally indeed. Yet, the new concepts are built based on the absolute reality’s information (Fig 3).

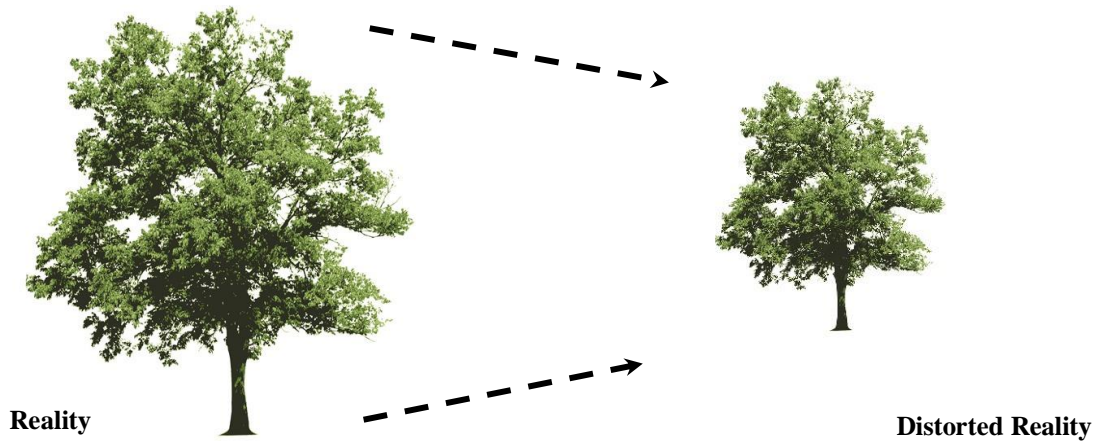
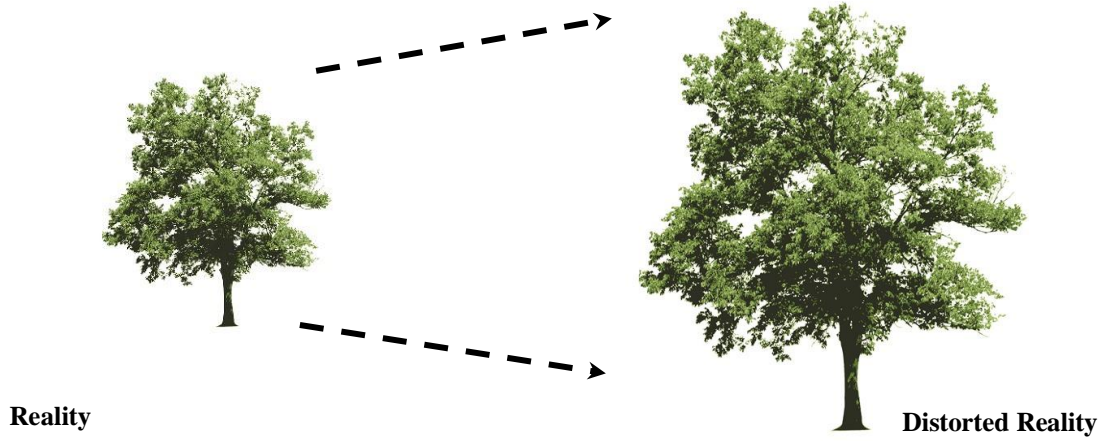


Fig.3. The distorted reality in comparison with the reality

3. *The manipulated reality:* Using the absolute reality's elements, it is product of the process of changing existing concepts to the new concepts by an external origin. Architecturally, this type still conserves the absolute reality's information. An abstract image of the manipulated reality has been displayed in (Fig 4).

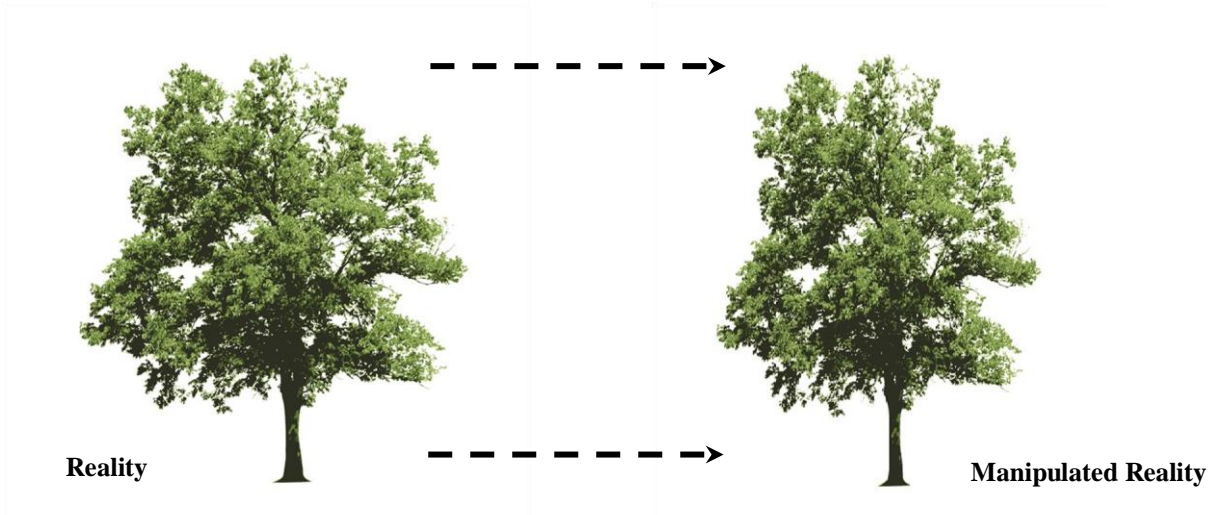


Fig.4. An abstract image of manipulated reality vs the reality

4. *The defunct reality:* This is the part of a system that its information has been transferred to another system, and the observer does not have access to it. The following figure shows the defunct reality compared with a "real image".

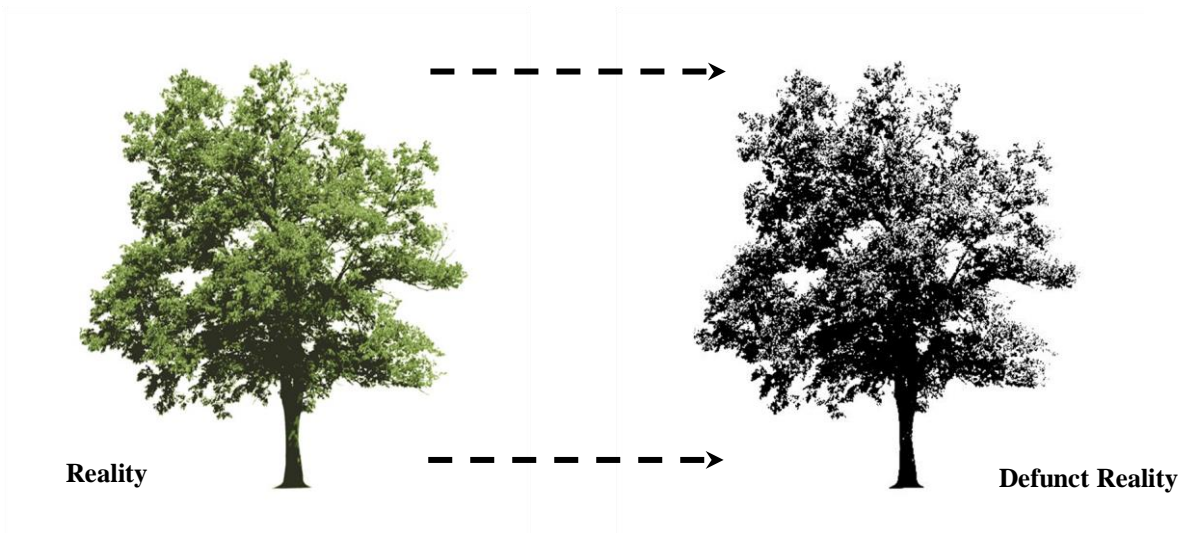


Fig.5. The comparison between the reality and the defunct reality

5. *The rehabilitated reality*: This is a concept built by the external system(s)' information. As a portion of the manipulated reality, the differentiation between them is their composed information. Compared with the reality, the rehabilitated reality has been portrait in (Fig 6).

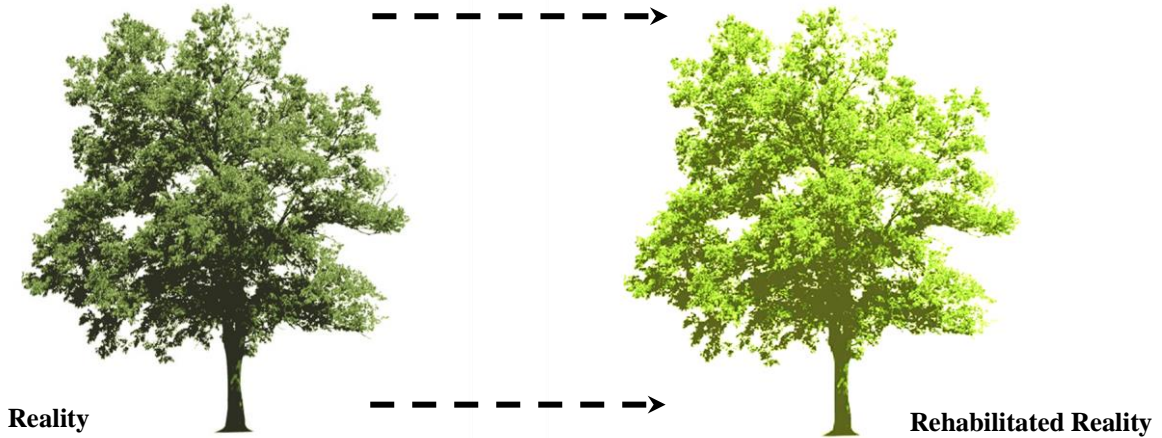


Fig.6. An abstract image of the rehabilitated reality

6. *The imported reality*: This type of reality is erected on the information that does not belong to the system. The imported reality enters the system to cover the defunct reality. Over time, the imported reality changes to "the rehabilitated reality". The comparison of the imported reality's data structure and the reality has been pictured in (Fig 7).

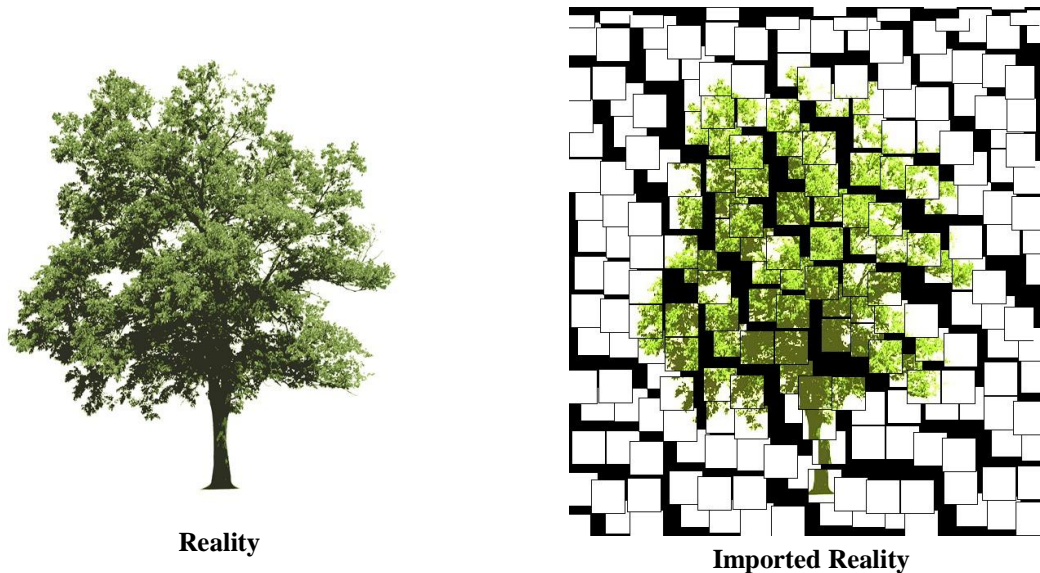


Fig.7. The imported reality's data structure comparing with the reality

In the orbital systems theory, all systems (numeric systems, natural and human-made systems) is bounded between two absolute unattainable concepts, called as "the Singularity" which stands for "0" as the singularity's value which does not denote "nothing" or "empty" concepts while is surrounded by uncertainty and entropy created by other systems' orbitals interactions; "the Crunchity" which stands for "1" in the theory's numeric system, and also two frozen

zones called “the Frozones”, which stand for "0.5" in the system. Another concept in the orbital system is "the event horizon". It is a region located on the closest distance to the Crunchity. In an orbital system, information never reaches the Crunchity but is transfers from a system to another system through the event horizon as a route. The information arrives in the new system through the new system's Singularity and restored in it. The new system is formed by different versions of the realities.

In the new theory, when two orbital systems merge, possibly the Singularity of a system can be the Crunchity of another involved system simultaneously, and vice versa. Two orbital systems collision follows the same order either. The terms of “singularity” and “Crunchity” are adopted from the big bang and the big crunch theory, and “the Frozone” demonstrates the zone where entropy is in minimum mode, while uncertainty is in the maximum level. The fluctuation of entropy’s level in an orbital system is displayed in (Fig 8).

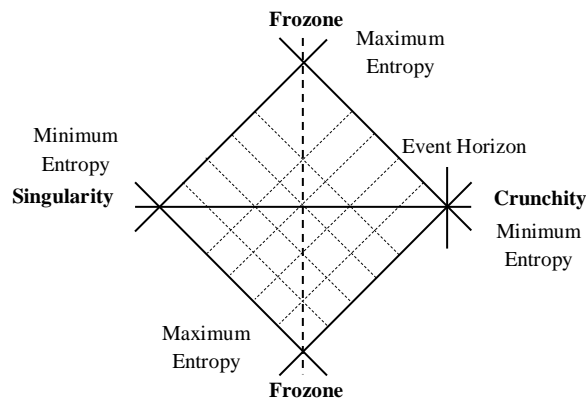


Fig 8. The entropy of an orbital system

As illustrated in (Fig 8), discretely, each orbital system consists of five dimensions: a dimension of the certain reality which merely comprises the crisp numbers, and on the other hand, the other four dimensions which are parallel realities that add uncertainty and entropy to the certain reality. Two parallel dimensions of the reality are related to the information, and the other two have the independent existence than the information. There are three possibilities related to the parallel realities' existence:

1. They have the independent existence as the free reality dimensions, which are not bounded by the external system's reality, or equivalently they are not in a zone where their potential entropy and uncertainty varies.
2. They originate from unknown parallel orbital systems (in an ordered integrated system of the orbital systems, the existence of empty systems is expected). They make interactions with the next orbital systems and make the impact consequently while no numeric system belongs to them. With different contextures, these orbital systems are called the “dark systems”. The dark systems may be the manipulated realities, the realities from the past, or the realities of the future.
3. As the third possibility, they are the certain realities of the other orbital systems. It incidents when the collision of two orbital systems causes the merge.

As discussed earlier, with the five dimensions of reality, an independent orbital system is bounded between two zones of the Singularity and the Crunchity where three dimensions of the realities separately merge at each of them. The orbital system constantly divides itself into the infinite smaller structures. The newborn structures not only construct other orbital systems, but also create other new levels of reality. The first layer of sub-orbital systems (the twenty-five sub-orbital systems) have been portrayed in (Fig 8, 9). Moreover, each orbital system repeatedly connects to other orbital systems of the universe in various levels of interactions. The mentioned engagement adds more uncertainty and entropy to the system. The uncertainties of an orbital system are exposed in (Fig 9), wherein in line with the entropy levels, the uncertainty of the system is highest in the Frozones, and the system faces with the lowest uncertainty in the Singularity and Crunchity zones.

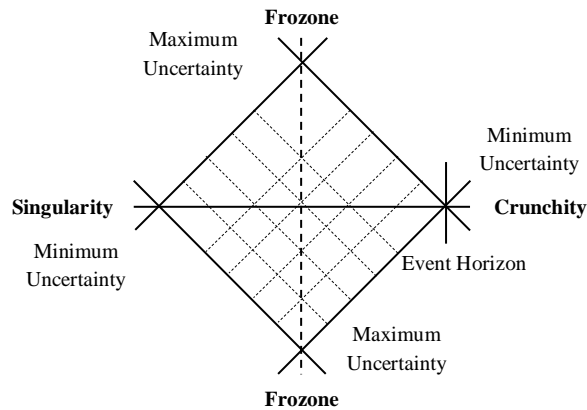


Fig 7. The distribution of uncertainty in an orbital system

Every dimension of the reality changes the entropy level of the system; hereby, they decrease/increase the uncertainty of the system. Specifically, two dimensions add/increase entropy whereas the other two reduce it (see Fig 10 where (-) and (+) show the incremental and decrescent forces respectively).

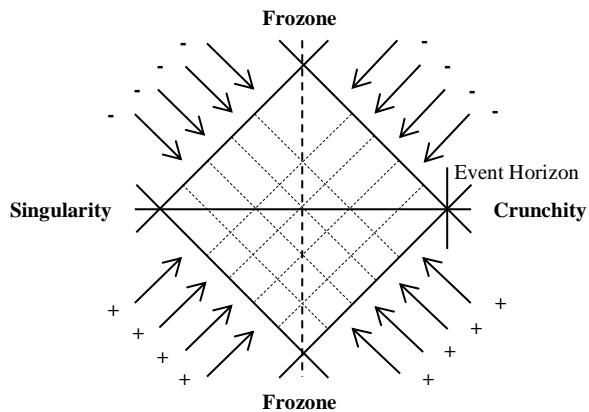


Fig 10. The four dimensions' impact on the entropy of an orbital system

3. Orbital numbers

The "orbital number" of an orbital system is a fundamental part of the orbital systems theory and its numeric system. As mentioned heretofore, the numeric system of an independent orbital system is restricted between "0" and "1" where 0 refers to the Singularity zone, and 1 signifies the Crunchity zone. An orbital number is structured on the platform of the five dimensions of the reality which is demonstrated as (Z.H.R.A), and one certain reality named as (L). Each dimension of the reality is divided into nine parts. The orbital numeric system is illustrated in (Fig 11).

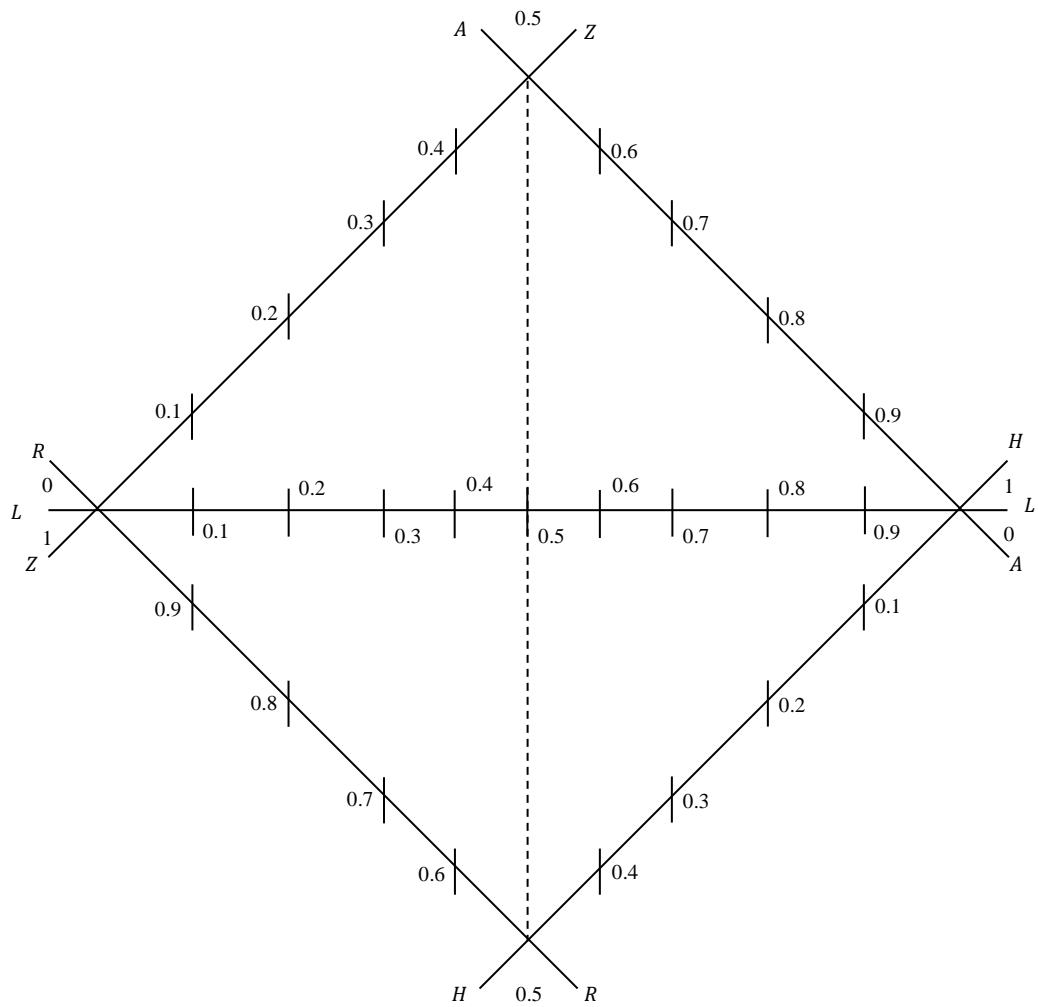


Fig 11. A graphical portrait of a numeric orbital system

Each orbital system comprises five spectrums of numbers where the information is oscillating. In an individual orbital system, the information is located in the certain reality dimension and surrounded by the four reality dimensions. The first spectrum includes (0, 0.1) as the certain reality, and (0.1, 0.9) as the parallel realities which have the direct impact on the entropy and uncertainty of the spectrum. The function of the first spectrum is as (Eq.5):

$$f_{(\theta)} = \{(0.0.1)|(0.1.0.9):-(0.1.0.2.0.3.0.4.0.5).+(0.9.0.8.0.7.0.6.0.5):+(0.5.0.6.0.7.0.8.0.9).-(0.1.0.2.0.3.0.4.0.5):0.1\} \quad (5)$$

The first spectrum is shown in (Fig 12):

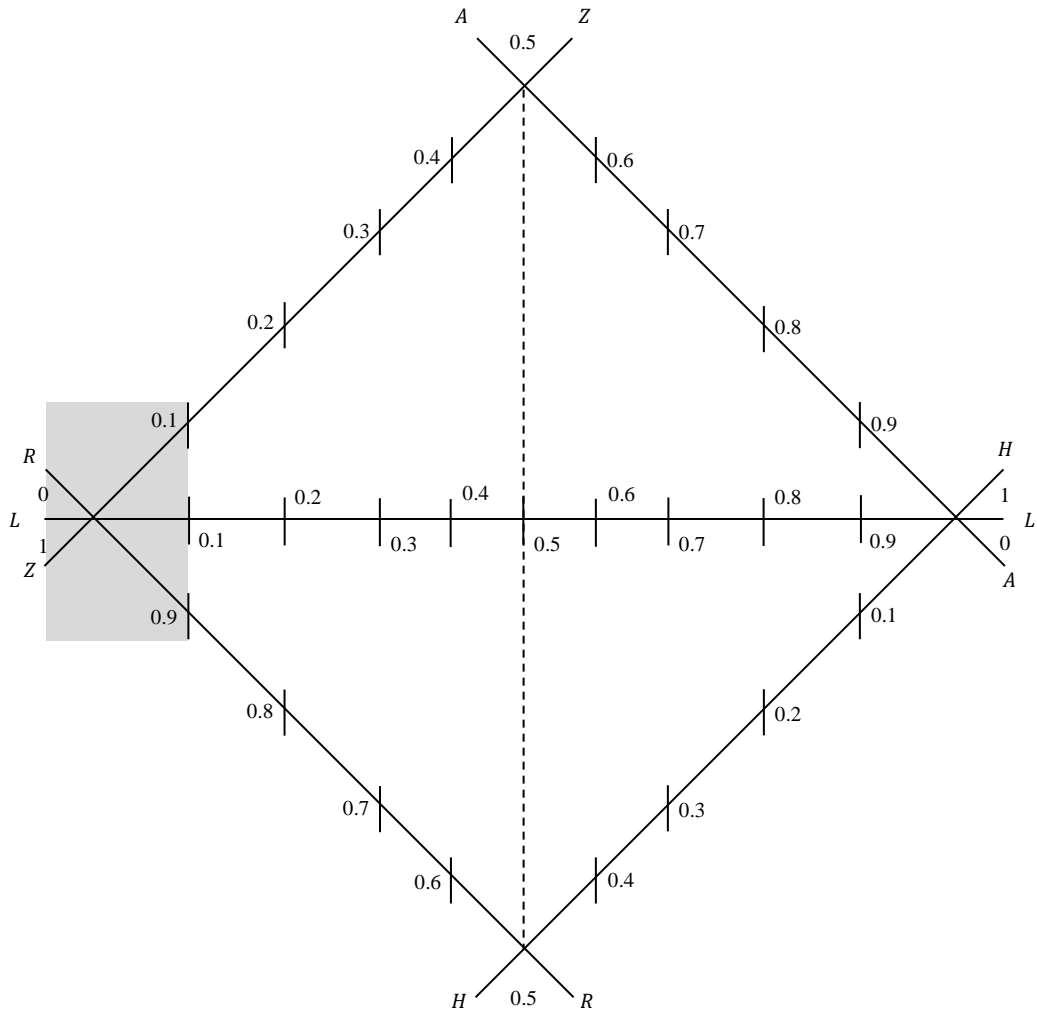


Fig 12. The first spectrum of an individual orbital system

The second spectrum includes (0.1, 0.3) of the certain reality, (0, 0.3) and (0, 0.7) of the parallel realities. Following equation shows the function of the second spectrum:

$$f_{(\eta)} = \{[0.1.0.3]|(0.3.0.7):-(0.3.0.4.0.5).+(0.7.0.6.0.5):- (0.5.0.6.0.7.0.8.0.9).+(0.5.0.4.0.3.0.2.0.1):0.1\} \quad (6)$$

The second spectrum of the orbital system is exposed in (Fig 13). The third, fourth, fifth, sixth and seventh functions are represented in (Eq.7-11) respectively:

$$f_{(\mu)} = \{[0.2.0.5]|(0.2.0.8).(0.5.0.5):- (0.1.0.2).+(1.0.9.0.8):- (0.5.0.6.0.7.0.8.0.9).+(0.5.0.4.0.3.0.2.0.1):0.1\} \quad (7)$$

$$f_{(\pi)} = \{[0.3.0.7]|(0.3.0.7).(0.7.0.3):0.1\} \quad (8)$$

$$f_{(\nu)} = \{[0.5.0.8]|(0.5.0.5).(0.8.0.2):- (0.5.0.6.0.7.0.8.0.9).+(0.5.0.4.0.3.0.2.0.1):- (0.8.0.9).+(0.3.0.2):0.1\} \quad (9)$$

$$f_{(\gamma)} = \{[0.7.1]|(0.7.0.3).(1.0):+(0.1.0.2.0.3.0.4.0.5).-(0.5.0.6.0.7.0.8.0.9):- (0.5.0.6).+(0.5.0.4):0.1\} \quad (10)$$

$$f_{(p)} = \{[0.9.1]|(0.9.1):- (0.8.0.7.0.6.0.5).+(0.2.0.3.0.4.0.5):+(0.5.0.6.0.7.0.8.0.9).-(0.1.0.2.0.3.0.4.0.5):0.1\} \quad (11)$$

The portrait of the second, third, fourth, fifth, sixth and seventh spectrums are shown in (Fig 13-18).

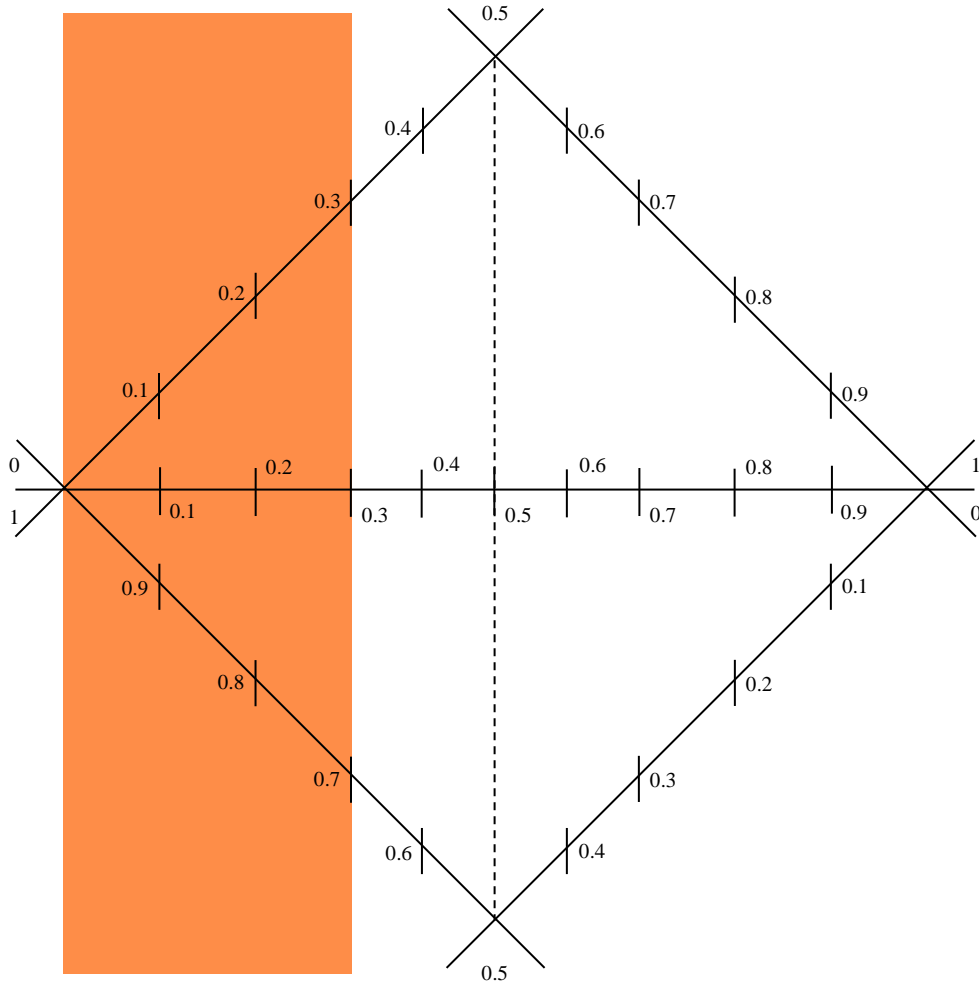


Fig 13. The second spectrum of an orbital system

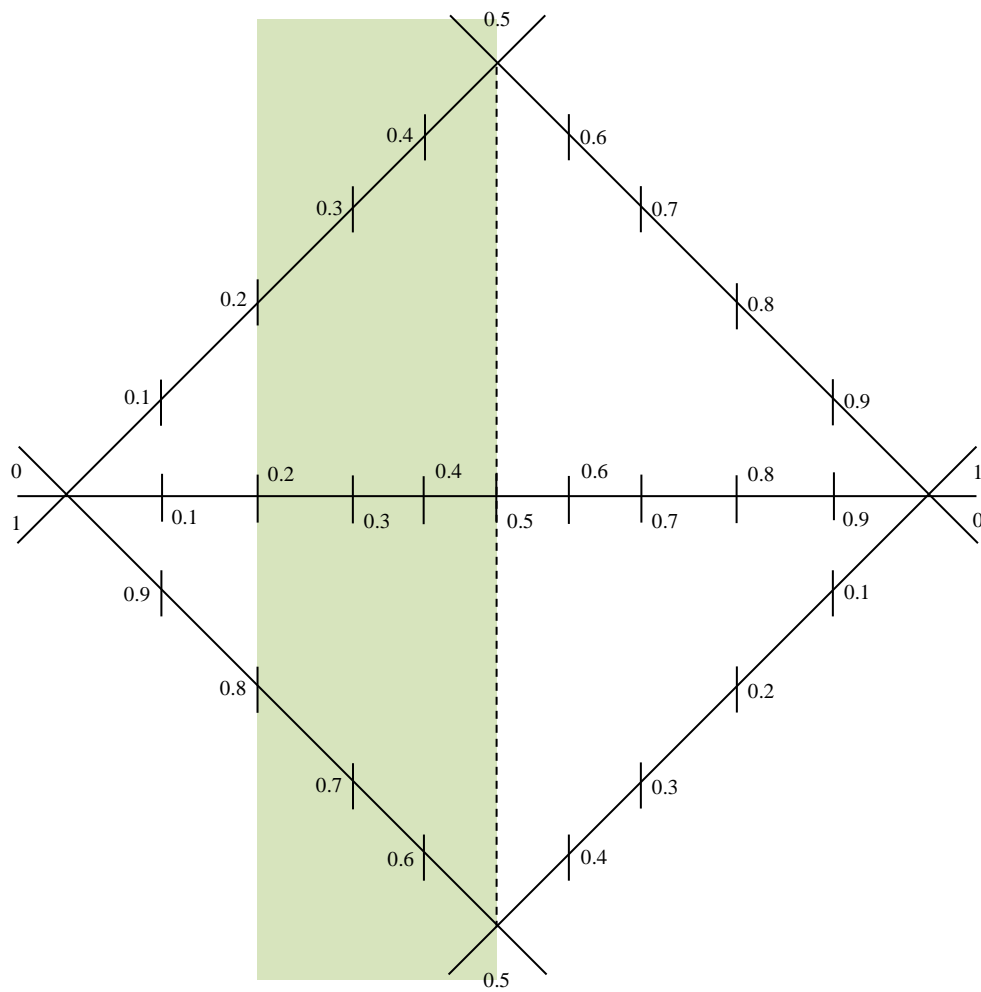


Fig 14. The third spectrum of an orbital system

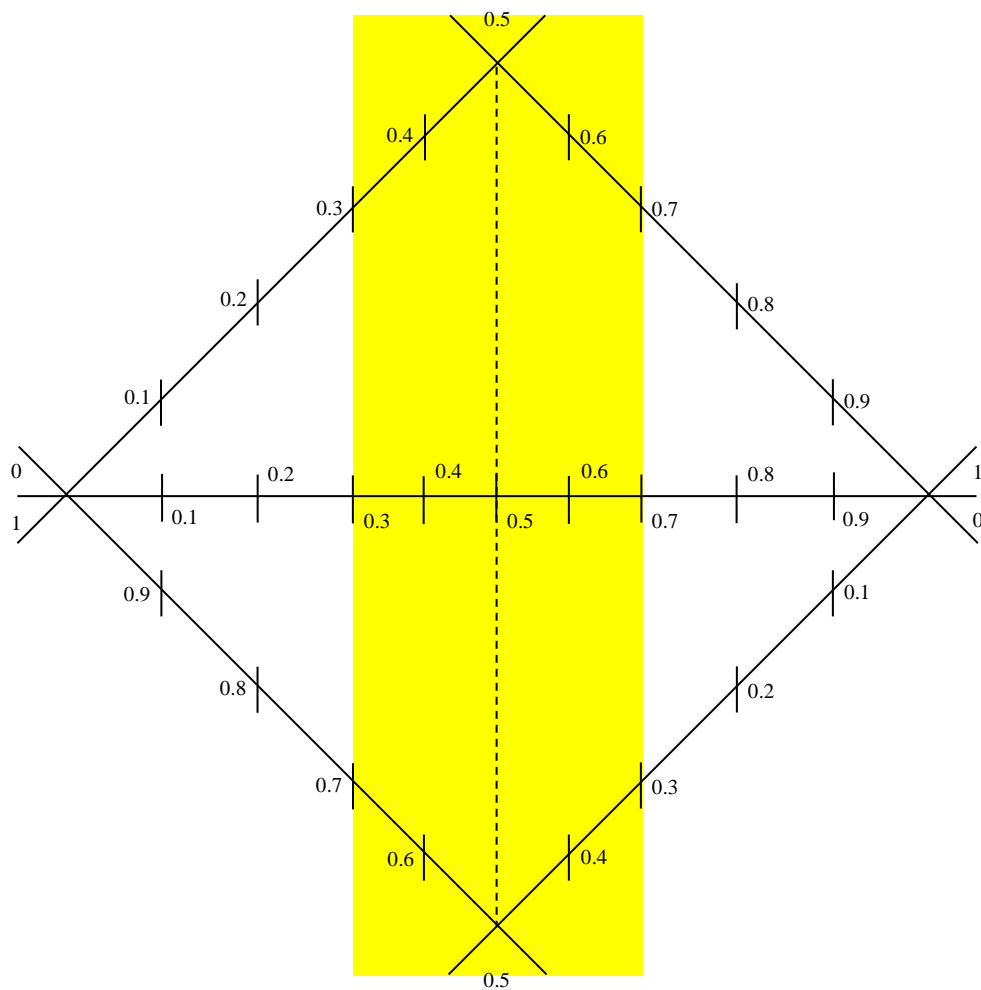


Fig 15. The fourth spectrum of an orbital system

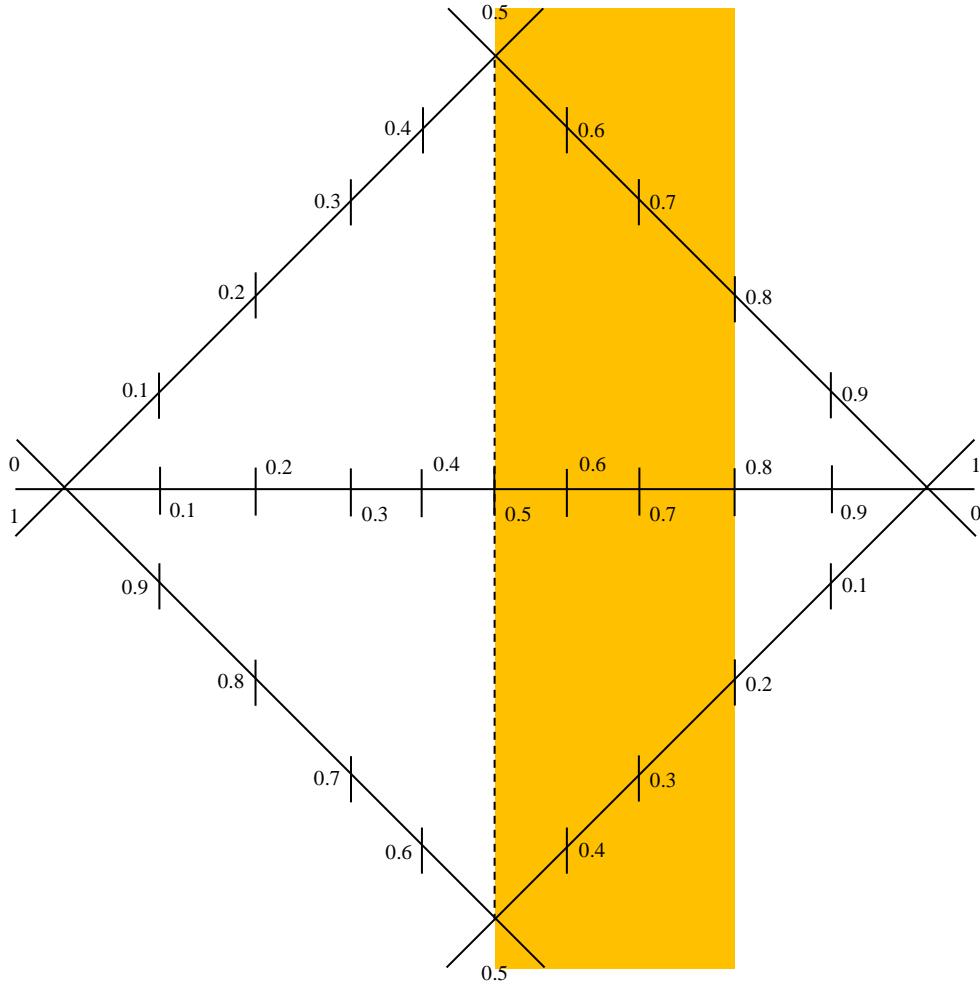


Fig 16. The fifth spectrum of an orbital system

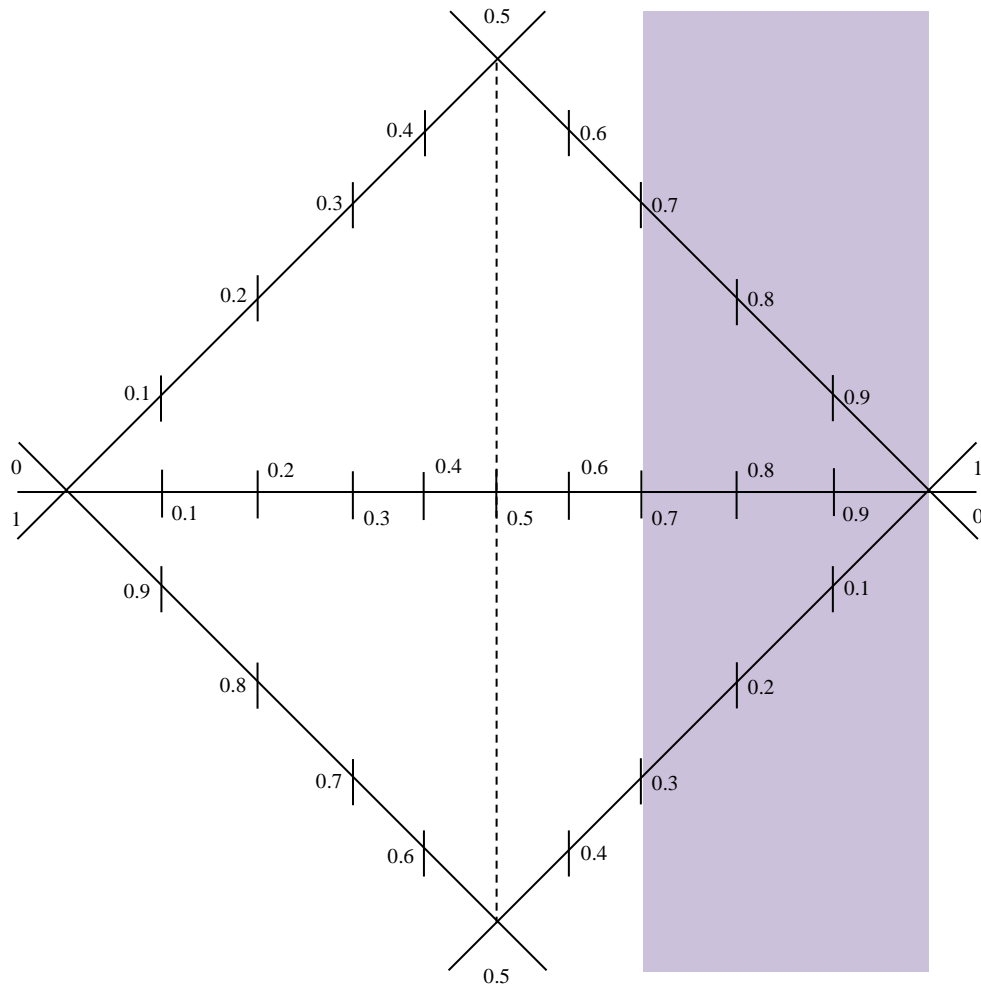


Fig 17. The sixth spectrum of an orbital system

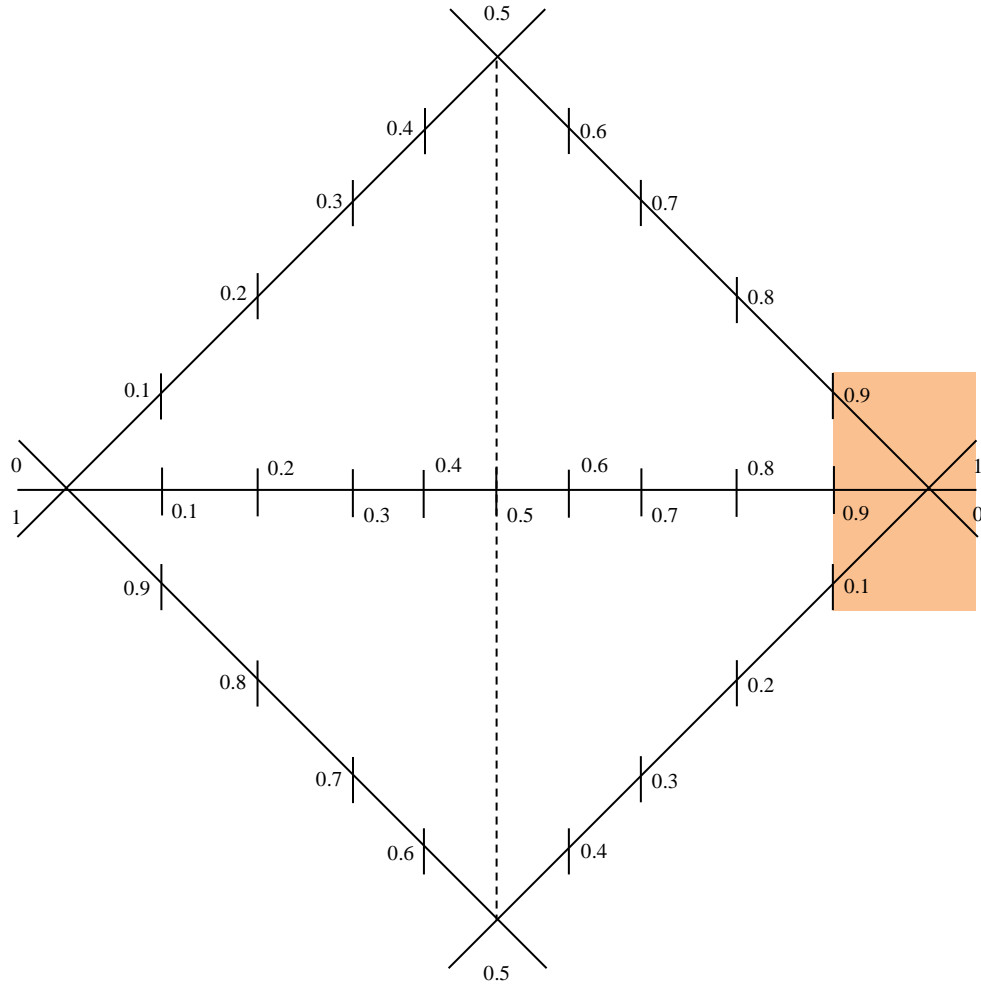


Fig 18. The seventh spectrum of an orbital system

As the integral part of the orbital systems, the math operations of the two orbital systems are based on the orbital numbers. Each orbital number is located on each aforementioned spectrums in (t_0) where (t) stands for the time and (t_0) expresses the first relative time of an orbital number $(S_{\mathbb{S}})$ that it located in the relative $\mathbb{S}th$ spectrum where $\mathbb{S} = \{\theta, \eta, \mu, \pi, \nu, \gamma, P\}$. By the impact of the $(+/-)$ added-entropy made by the realities dimensions, with the changes of (t) , the location of $(S_{\mathbb{S}})$ changes as well. The changes of location forces the information to leave a system, and arrives in the other system called "the mirror system". The mirror system plays as the role of parallel system which is established with a different structure, and different forces than a regular orbital system. After arriving at the mirror system, information moves two times throughout the mirror system, then comes back to an orbital system (which is not the initial system but behaves as the rehabilitated orbital system¹⁵) with a different contexture (see fourth section of the paper). This process is called "metamorphosis". The prediction of a mirror system structure has been portrayed in (Fig 19). Two systems collide in the (\mathbb{D}) point which is the "constancy value" of the collision.

¹⁵ See rehabilitated reality

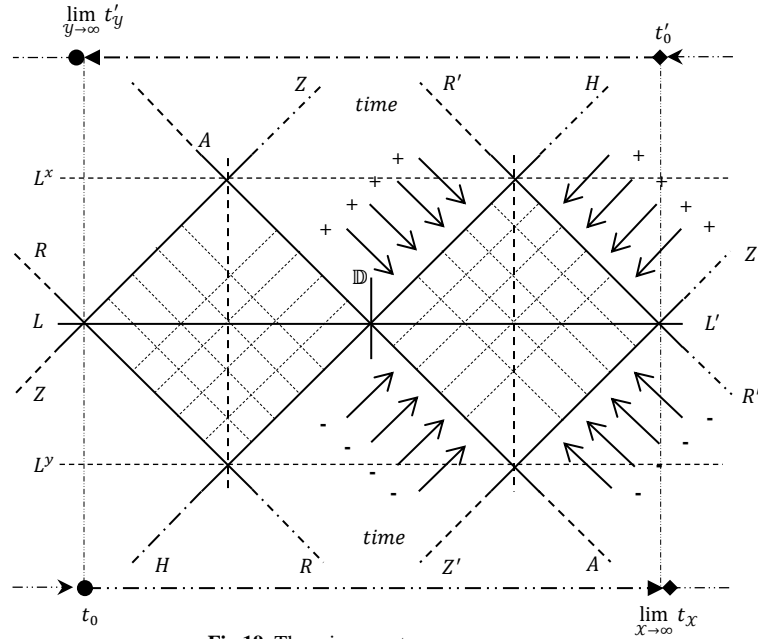


Fig 19. The mirror systems

As revealed in (Fig 19), in different contexture, two dimensions of the reality (in this case, A and H) duplicate themselves to assemble the new parallel system which is called the mirror system. In other words, ceaselessly, each mirror system keeps the similarity of an orbital number with the "new orbital number" (with the different contexture of information). Thus, the new orbital number and its origin are not absolutely different (they are relatively different). As exposed in (Fig 19), equal to the numbers of orbital systems, there are different types of certain realities. Furthermore, each orbital system does not have an independent existence, and it is a mirror system of another orbital system. Except for the certain reality, weaved in the different versions of "time", each dimension of the reality duplicates itself; thus, it remains constant, and its existence conserved throughout the system over time. Hence, the new series of information carries the common characteristics and elements, and also their concepts will not be completely transformed. Indeed, reminiscent of the reality dimensions, information will not be destroyed.

The basic operations of the orbital systems perform in (t_0) . As mentioned in advance, the orbital system is bounded between 0 and 1; consequently, all numbers are valued between 0 and 1. In an orbital system, the value of "0" and "1" belong to the former and later system. Due to this reason, an orbital number never reaches the "Singularity" and "Crunchity" zone, but it crosses through the event horizon and arrives at the mirror system. To transfer a certain (crisp) random number to the orbital system, the following equation is employed, where (N_D) demonstrates the number of digit of each random number, (\aleph) is a random number, and (\tilde{S}_{\aleph}) stands for a raw orbital number.

$$\tilde{S}_{\aleph} = \aleph / 10^{N_D} \quad \tilde{S}_{\aleph} \neq 0.1; \quad (12)$$

For instance, with respect to (Eq.12), the corresponding raw orbital number for a random number of "834.5716" is "0.8345716". Therefore, it is located at the spectrum of (γ) . As conversed beforehand, despite the fact that information moves throughout the system for reaching the mirror system, the basic operations perform in (t_0) where the information fluctuates in a region surrounded by a specific spectrum. This indeed conducts the information to move to the other spectrum until entering another system. Hence, the output of (Eq.12) is only the raw material for the system's operations and (t_0) is the relative value for the time that various numerical values of the same object belong to it. Embedded in the concepts of realities, there are four fundamental forces which make interactions containing:

1. The positive far force as (Θ^+) .
2. The negative far force as (Θ^-) ;
3. The near positive force as (Φ^+) .
4. The near negative force as (Φ^-) .

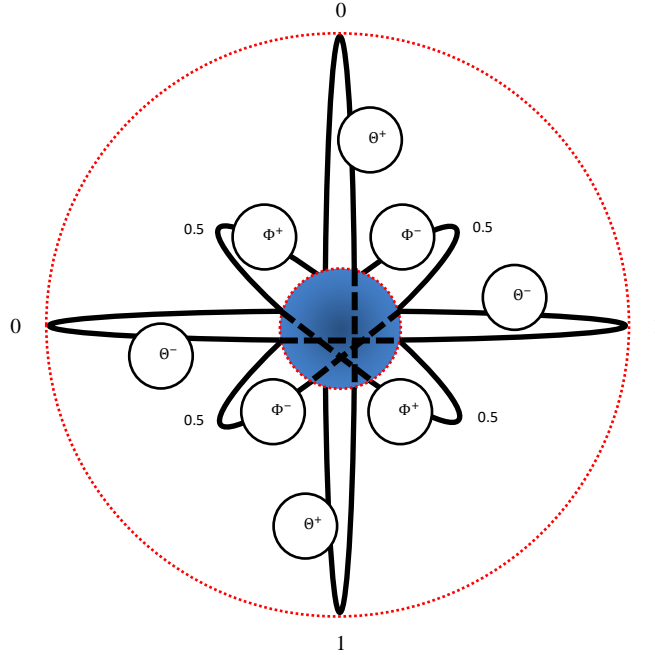


Fig 20. The abstract image of an orbital system and the four fundamental forces located on the orbitals around the core of information (the orbital number) in t_0 . The positive forces increase the entropy, while the negative forces decrease it. The positive and negative forces stem from the parallel realities. These realities and the forces are shown in (Fig 20) where the red lines are the certain reality. As argued heretofore, these interactions change the level of uncertainty and entropy of an orbital system. The proposed following matrix shows the new possible spectrum (orbital value of “ $S_{\mathbb{S}}$ ”) where an orbital number ($S_{\mathbb{S}}$) oscillates there in (t_0). The fundamental orbital matrix-based operations are in accordance with the following hypothesizes.

$$\{\theta^+\} \cup \{\Phi^+\} = (a^+.b^+.c^+.d^+.e^+.f^+.g^+.h^+.l^+.q^+). \quad \{\theta^+\} \cap \{\Phi^+\} = \mathcal{O}_{++} \quad (13)$$

$$\{\theta^-\} \cup \{\Phi^-\} = (a^-.b^-.c^-.d^-.e^-.f^-.g^-.h^-.l^-.q^-). \quad \{\theta^-\} \cap \{\Phi^-\} = \mathcal{O}_{--} \quad (14)$$

where

$$\mathcal{O}_{++} \neq \mathcal{O}_{--} \neq 0 \quad . \quad 0 < \mathcal{O}_{++} \cdot \mathcal{O}_{--} < 0.1 \quad (15)$$

and

$$(a^+.b^+....q^+).(a^-.b^-. q^-) \in \{0.1.0.2.0.3....1\} \quad (16)$$

$$\mathbb{S} \in \{\theta.\eta.\mu.\pi.v.\gamma.P\} \quad (17)$$

The aforesaid equation is based on the entropy injected by the ($Z.H.R.A$) dimensions of the reality. Procedure of the proposed equation for ($\tilde{S}_{\mathbb{Y}} = 0.8345716$) has been exposed in (Eq.18-37), where the relative location of the ($\tilde{S}_{\mathbb{Y}}$) before the (t_0) is displayed in (Fig 21). The term of " before the (t_0)" describes a situation that the element of time does not affect the system.

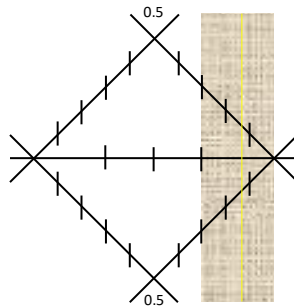


Fig 21. the relative location of ($\tilde{S}_{\mathbb{S}} = 0.8345716$) in an orbital system

As displayed in (Fig 21), ($\tilde{S}_{\mathbb{S}} \in \gamma$), then following equations demonstrates the process of finding location of (S_{γ}) as the corresponding orbital number of (\tilde{S}_{γ}), where:

$$\mathbb{S} \in \{\Theta^+ \cdot \Phi^+\} \wedge (\Theta^+ > \Theta^-) \vee (\Phi^+ > \Phi^-) \therefore d_{ij}^{\mathbb{S}} \in \left\{ \frac{\Theta^- \cdot \Phi^-}{\Theta^+ \cdot \Phi^+} \right\}$$

$$X_{ij} = \begin{matrix} \theta \\ \eta \\ \mu \\ \pi \\ \nu \\ P \\ \mathbf{d}_{ij} \end{matrix} \begin{matrix} \gamma \\ \tilde{S}_{\gamma} \\ \left[\begin{matrix} d_{11} & d_{12} \\ d_{21} & d_{22} \\ d_{31} & d_{32} \\ d_{41} & d_{42} \\ d_{51} & d_{52} \\ d_{61} & d_{62} \end{matrix} \right] \\ \mathbf{d}'_{ij} \end{matrix} \cdot \quad i = 1, \dots, m \quad j = 1, \dots, n; \quad (18)$$

$$d_{11} = \sqrt{(\theta - \gamma)^2} \quad \theta = \{\oplus 1. \ominus 0\}; \quad (19)$$

$$d_{21} = \sqrt{(\eta - \gamma)^2} \quad \eta = \{0.0.1.0.2.0.3\}; \quad (20)$$

$$d_{31} = \sqrt{(\mu - \gamma)^2} \quad \mu = \{0.2.0.3.0.4.0.5\}; \quad (21)$$

$$d_{41} = \sqrt{(\pi - \gamma)^2} \quad \pi = \{0.3.0.4.0.5.0.6.0.7\}; \quad (22)$$

$$d_{61} = \sqrt{(\nu - \gamma)^2} \quad \nu = \{0.5.0.6.0.7.0.8\}; \quad (23)$$

$$d_{71} = \sqrt{(P - \gamma)^2} \quad P = \{\oplus 0. \ominus 1\}; \quad (24)$$

$$d_{11} = \sqrt{(\theta - \tilde{S}_{\gamma})^2} \quad \theta = \{\oplus 1. \ominus 0\}; \quad (25)$$

$$d_{21} = \sqrt{(\eta - \tilde{S}_{\gamma})^2} \quad \eta = \{0.0.1.0.2.0.3\}; \quad (26)$$

$$d_{31} = \sqrt{(\mu - \tilde{S}_{\gamma})^2} \quad \mu = \{0.2.0.3.0.4.0.5\}; \quad (27)$$

$$d_{41} = \sqrt{(\pi - \tilde{S}_{\gamma})^2} \quad \pi = \{0.3.0.4.0.5.0.6.0.7\}; \quad (28)$$

$$d_{61} = \sqrt{(\nu - \tilde{S}_{\gamma})^2} \quad \nu = \{0.5.0.6.0.7.0.8\}; \quad (29)$$

$$d_{71} = \sqrt{(P - \tilde{S}_{\gamma})^2} \quad P = \{\oplus 0. \ominus 1\}; \quad (30)$$

$$E_{\gamma} = -\frac{1}{\log m} \sum_{i=1}^m d_{ij} \log d_{ij} \quad ; \quad \forall_j \quad (31)$$

$$DD_{\gamma}^{\gamma} = 1 - E_{\gamma} \quad ; \quad \forall_j \quad (32)$$

$$E_{\tilde{S}_{\gamma}} = -\frac{1}{\log m} \sum_{i=1}^m d'_{ij} \log d'_{ij} \quad ; \quad \forall_j \quad (33)$$

$$DD_{\tilde{S}_{\gamma}}^{\tilde{S}_{\gamma}} = 1 - E_{\tilde{S}_{\gamma}} \quad ; \quad \forall_j \quad (34)$$

$$UV_{\gamma} = \frac{DD_{\gamma}^{\gamma}}{\left(10 \times \frac{m}{N_{\gamma}}\right) (DD_{\gamma}^{\gamma} + DD_{\tilde{S}_{\gamma}}^{\tilde{S}_{\gamma}})} \quad ; \quad (35)$$

$$UV_{S_{\bar{y}}} = \frac{DD_j^{\bar{S}_{\bar{y}}}}{\left(10 \times \frac{m}{N_{\bar{y}}}\right) (DD_j^{\gamma} + DD_j^{\bar{S}_{\bar{y}}})} ; \quad (36)$$

$$S_{\bar{y}} \in \{(\gamma + UV_{\bar{y}}) \cdot (\bar{S}_{\bar{y}} + UV_{S_{\bar{y}}})\} ; \quad (37)$$

where

$$m = \sum N_{\bar{S}} . \quad \bar{S} = \{\theta, \eta, \mu, \pi, \nu, \gamma, P\}; \quad (38)$$

and

$$S_{\bar{y}} = f_{S_{\bar{y}}} \quad (39)$$

In the above equations, correspondingly, (DD) , (UV) , and $(N_{\bar{S}})$ stand for the "degree of diversification", "uncertainty value", and "Sth spectrum's elements (members) numbers". The entropy formula is adapted from Shannon's entropy (Shannon; 2001). Over time, information moves from the relative location (the location where is the output of Eq.18-38) in (t_0) till leaves the system, and arrive in the mirror system. The timeline of the information movement from (t_0) to $(\lim_{\chi \rightarrow \infty} t_{\chi})$ is portrayed in (Fig 22), where the coordinate grid does not indicate that information' movement is linear and the straight line.

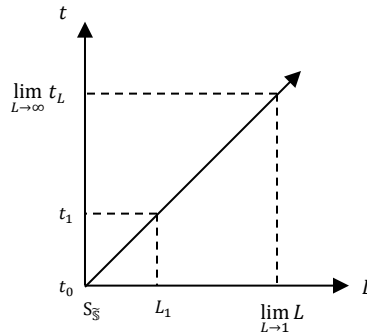


Fig 22. The coordinate grid of information' movement in an orbital system

In addition, the proposed orbital linguistic variables are based on the seven spectrums of the orbital system. The orbital linguistic variables are demonstrated in (Table 3).

Table 3

The orbital linguistic variable

Linguistic variable	VP	P	MP	F	MH	H	VH
\bar{S}	θ	η	μ	π	ν	γ	P
Orbital number	{0}	{0.0.1.0.2.0.3}	{0.2.0.3.0.4.0.5}	{0.3.0.4.0.5.0.6.0.7}	{0.5.0.6.0.7.0.8}	{0.7.0.8.0.9.1}	{1}
Orbital function	$f(\theta)$	$f(\eta)$	$f(\mu)$	$f(\pi)$	$f(\nu)$	$f(\gamma)$	$f(P)$

By executing orbital functions, the orbital linguistic variables and the orbital scales consider impact of all possible number of the system on the decision maker's decision, and also covers the impact of parallel element and alternatives on the decision making process via four parallel dimensions of reality.

4. Life, Death, and Resurrection

Except for four parallel dimensions of reality, each orbital system comprises a certain reality that is demonstrated with the (L) sign where stands for the concept of "Life". As a certain reality, each information enters into the system from an external system and begins its life in an orbital system. In addition to the concept of life, (L) characterizes the timeline of an information until the moment that leaves the system and enters the mirror system. This process is called metamorphosis (see Fig 23), where (d) expresses the distance, and $(d = 0)$ describes that information moves tangentially through the certain reality with touching " ∞ " number of points on the certain reality. In fact, the certain reality is not a continuous line; whereas, as a discrete line, it is built on the (∞) number of points. As another fact that is revealed in (Fig 23), once the information arrives at the mirror system, it moves via another version of the certain reality which is along the initial certain reality. The new version of the certain reality is shown as (L') in the following figure.

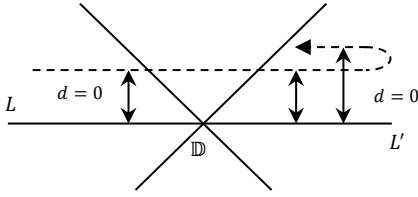


Fig 22. The metamorphosis

For arrival in a mirror system, information needs to pass through (\mathbb{D}) region (not a point), which stands for the concept of "Death". Due to the different forces of the mirror system and also the different entropies, the contexture of information will be changed while still keeps the core elements (metamorphosis), then comes back to the system (which is not the initial system) as the resurrection process.

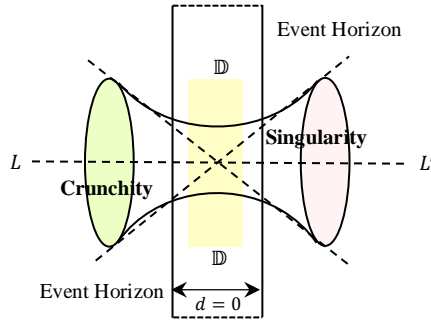


Fig 24. The graphical demonstration of (\mathbb{D}) region

As exhibited in (Fig 24), the distance between two event horizons are ($d = 0$), i.e., the two event horizon are located on a one-dimensional space. To have a better understanding of the (\mathbb{D}) region, the two event horizons, and the trajectory of information from a system to another system, see (Fig 25), which is supplementary for (Fig 24).

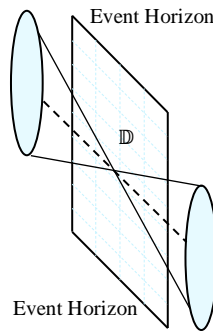


Fig 25. The one-dimensional event horizon plate

in spite that information enters from another system¹⁶, and on the other hand, two dimensions of reality have the independent existence¹⁷, an orbital system, and its elements and dimensions do not have an independent existence¹⁸; while, it will be created with the information creation simultaneously; therefore, the birth of a system initiates with the beginning of the information's journey through the certain reality, while the aforementioned "dimension of certain reality" is descended into the system with the start of the information journey (see Fig 24), then the dimensions mold themselves around the information to put information in a relative spectrum of the system.

¹⁶ An external orbital system

¹⁷ Independent from the orbital system existence

¹⁸ They are duplicated dimensions

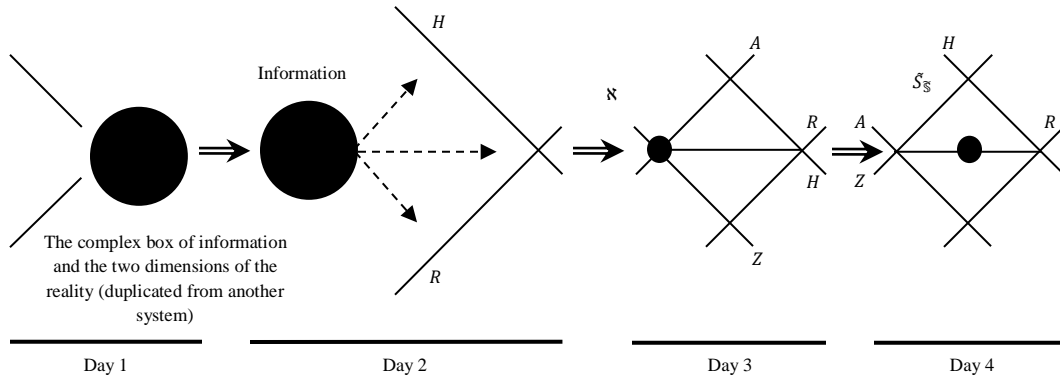


Fig 26. The creation of an orbital number before (t_0)

As exposed in (Fig 26), the creation of an orbital number before (t_0) includes four distinct steps. The term of "day" refers to the world creation story in the Book of Genesis¹⁹. As mentioned, the four steps are before the time arrivals to the system. Thus, the order of the steps does not embrace the time.

As discussed in advance, after arriving in a mirror system, with a different contexture, information comes back for leaving the mirror system through the (\mathbb{D}) region for arriving in another system which is constructed on the different contextures than the first two systems. Perpetually, the cycle continues and information moves in a system then leaves it in order to arrive in another system (see Fig 27).

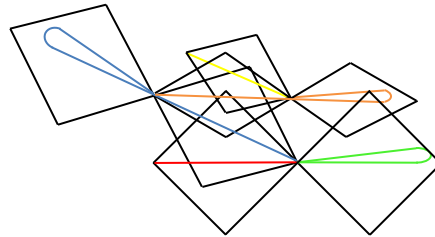


Fig 27. The information transaction between orbital systems

5. Predictions

As mentioned before, there are three possibilities related to the existence of the two independent dimensions of reality:

1. They have the independent existence as the free reality dimensions.
2. They are from unknown parallel orbital systems (dark systems).
3. They are the certain realities of the other orbital systems.

As discussed earlier, the "dark systems" have been predicted in an integrated system of orbital systems (Fig 28). With different contextures, the darks systems are referred to "the empty systems" that have no numeric systems while they make interaction with the next orbital systems and inject entropy and uncertainty to the systems. The term of "empty" refers to the unknown contexture of these systems while they are apparently the empty parallel systems where information arrived in and left there (see Fig 27). Other possibilities are:

1. They are the manipulated realities.
2. They are the realities of the past or the realities of the future.

¹⁹ "Pre-creation: Genesis 1:1–2, and six days of Creation: Genesis 1:3–2:3"

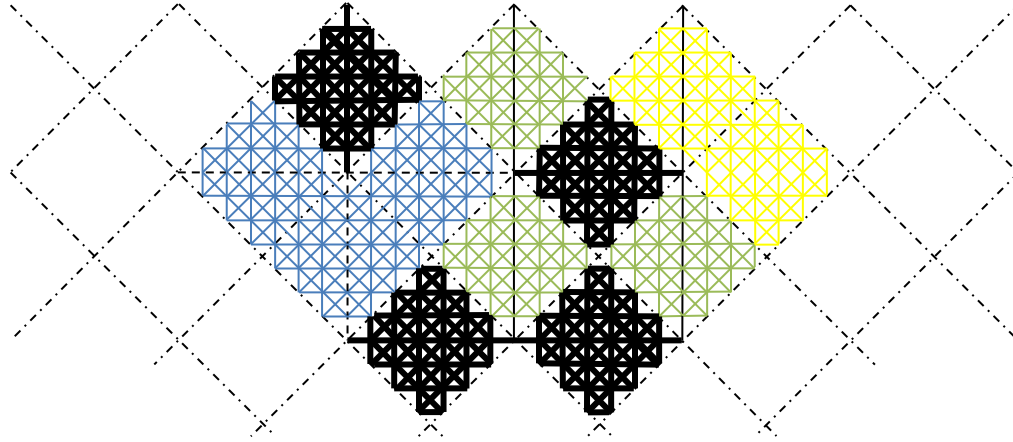


Fig 28. The abstract prediction of an integrated system of orbital systems

Each presented color in (Fig 28) demonstrates a distinctive operation which is an element of the integrated system. The black-colored systems exhibit the dark systems which affect each operation in the non-black systems and create/add entropy and uncertainty.

6. Principles

The five laws of orbital systems theory are as follows:

1. All concepts, phenomena, and objects of the universe have been made by the information (they are the box which carries the specific information).
2. All concepts, phenomena, and objects are connected and have interactions regardless of the time and distance.
3. Information tends to leave the system to enter the mirror system.
4. Information has been not created and will not be destroyed but it arrives and leaves the systems.
5. Each information conserves the core elements; however, through leaving and arriving in the systems, its contexture changes.
6. Once information arrives in a system, time creates consequently.
7. Like information, the time has a contexture and its contexture changes in every system.

7. Conclusion

The orbital systems theory has been introduced to deal with the uncertainty of the complicated and noisy real-world phenomena and concepts. The main core of the new theory's philosophy is that all concepts, phenomena, and objects of the universe are made by information which is surrounded by the five dimensions of reality. These dimensions not only add/create entropy and uncertainty but also formulate bridges that enable systems to have interaction with all the systems of the universe. These dimensions perform as the orbitals that circuit around the information. By adding entropy to the system, the reality dimensions make information to leave a system and enter in a new system. The operated computations in the numeric orbital systems are based on the entropy and the orbital numbers. Currently, we are developing orbital mathematics that includes orbital sets, orbital probabilities, and orbital languages.

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