

# A Unifying Field in Logics. Book Review

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## ABSTRACT

Paradoxism is an avant-garde movement in literature, art, philosophy, science, based on excessive use of antitheses, antinomies, contradictions, parables, odds, paradoxes in creations. It was set up and led by the writer Florentin Smarandache since 1980's, who said: "The goal is to enlargement of the artistic sphere through non-artistic elements. But especially the counter-time, counter-sense creation. Also, to experiment." Paradoxism = paradox + ism, means the theory and school of using paradoxes in literary, artistic, philosophical, scientific creations. "Paradoxism started as an anti-totalitarian protest against a closed society, Romania of 1980's, where the whole culture was manipulated by a small group. Only their ideas and their publications counted. We couldn't publish almost anything. Later, I based it on contradictions. Why? Because we lived in that society a double life: an official one - propagated by the political system, and another one real. In mass-media it was promulgated that 'our life is wonderful', but in reality 'our life was miserable'. The paradox flourishing!" (Florentin Smarandache). The new theory generalizes the fuzzy logic and introduces also two new concepts: "neutrosophy", the study of neutralities as an extension of dialectics and its derivative "neutrosophic", such as "neutrosophic logic", neutrosophic set", "neutrosophic probability", and "neutrosophic statistics" opening in this manner ways of research in four fields: philosophy, logics, set theory and probability/statistics. According to this new theory is also available Albers Einstein's statement: "*Not everything that can be controled counts and not everything that counts can be counted*".

**Keywords:** true; false; indeterminate; neutrosophy; uncertainty

## 1. INTRODUCTION

In this paper, Florentin Smarandache, reputed professor at University of New Mexico, presents a new branch of philosophy, called *neutrosophy*, which studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra. Florin Smarandache is not only a high level scientist, he is also a propensity and complete artist who wanted to express and to share his cognition, thoughts, ideas in a moment and in a place when and where, was not possible, it was necessary to find the way to communicate somehow: so, it was born "the paradoxism". Everybody felt this theory, everywhere was needed it, it was blown in the air, but nobody gave it a mathematic support, an explanation by axioms and theorems. It was Professor Florentin Smarandache who introduced neutrosophy in the right moment motivated in conditions of Logic started in Ancient with Classical Logic of Aristotle,

developed and covered by Three Valued Logic of Lukasiewicz, next ring being Fuzzy Logic of Zadeh, and finally the comprehensive Neutrosophic Logic of Smarandache.

Neutrosophic emergences are the unexpected occurrences of some major neutrosophic effects from the interaction of some minor qualitative elements. Emergence would be seen as a major phenomenon occurrence, important and significant from the reaction of two or more minor unimportant, insignificant elements. Neutrosophy appears as the incidence as the application of a law, of an axiom, of an idea, of a conceptual accredited construction on an unclear, indeterminate phenomenon, contradictory to the purpose of making it intelligible. "The incidence is the intelligibilization procedure using the concept: basically apply a previous theoretically validated concept is practically applied. If the emergence is a variant of the cognitive bottom – up processing, the incidence is a variant of the top – down cognitive processing" (Smarandache&Vladutescu, 2013). It can be said that the emergence and incidence are specific neutrosophic concepts: the appearance-occurrence and the imposing-application apply, above all, to Neutrosophy itself. Like a good doctor, neutrosophy applies its most toxic treatments to itself. It is well-known that, in their way, the best medicines are poisons with no remedy, too: medicines are some toxins without counter medicines. There are not drugs against drugs.

So, Neutrosophy makes the emergence and the incidence visible as neutrosophic events and it also holds itself in the universe of emergences and incidences.

Neutrosophy handles all neutralities. In the neutrosophic taxonometry, a class of neutralities is represented by the neutralities that, without turning into contradiction, generate qualitative leaps. The emergence is the cognitive phenomenon in which, from two or more connected neutralities, without contradiction, a change of quality or a qualitative leap result. Thinking in Hegelian terms, it has an axiom the idea that the qualitative change, qualitative emergences may arise from related neutral items.

Any manifestation of life is a component of communication, it is crossed by a communication passage. People irrepressibly generate meanings. As structuring domain of meanings, communication is a place where meanings burst out volcanically. Manifestations of life are surrounded by a halo of communicational meanings. Human material and ideatic existence include a great potential of communication in continuous extension. The human being crosses the path of or is at the intersection of different communicational thoroughfares. The life of human beings is a place of communication. Consequently, any cognitive or cogitative manifestation presents a route of communication. People consume their lives relating by communicational. Some communicational relationships are contradictory, others are neutral, since within the manifestations of life there are found conflicting meanings and/or neutral meanings. Communicational relations always comprise a set of neutral, neutrosophic meanings. Communication in general is a human manifestation of life with recognizable profile. Particularly, we talk about scientific communication, literary communication, pictorial communication, sculptural communication, esthetic communication and so on, as specific manifestations of life. All of these include coherent, cohesive and structural series of existential meanings which are contradictory and/or neutral, neutrosophic. It can be asserted that in any communication there are routes of access and neutrosophic routes. Any communication is traversed by neutrosophic routes of communication

The Fundamental Thesis of Neutrosophy: any idea  $\langle A \rangle$  is  $T\%$  true,  $I\%$  indeterminate, and  $F\%$  false, where  $T, I, F$  are standard or non-standard subsets included in  $[-0, 1+]$ .

The Fundamental Theory of Neutrosophy: every idea  $\langle A \rangle$  tends to be neutralized, diminished, balanced by  $\langle \text{Non-}A \rangle$  ideas (not only  $\langle \text{Anti-}A \rangle$ , as Hegel asserted) - as a state of equilibrium.

Neutrosophy is the base of *neutrosophic logic*, a multiple value logic that generalizes the fuzzy logic, of *neutrosophic set* that generalizes the fuzzy set, and of *neutrosophic probability* and *neutrosophic statistics*, which generalize the classical and imprecise probability and statistics respectively.

The paper is structured in five chapters, one for each domain that covers neutrosophy, neutrosophic logic, neutrosophic set, neutrosophic probability, neutrosophic statistics and a special one for definitions derived from neutrosophics.

## 2. NEUTROSOPHY, A BRANCH OF PHILOSOPHY

To understand Neutrosophy, it is important to understand where it is coming from, why does it appear, who and what concern it, when can be applied and how is functioning. Neutrosophy is a socio-human science generosity supported by extraordinary mathematics contribution of professor Smarandache.

Etymology: Neutro-sophy [French *neutre* < Latin *neuter*, neutral, and Greek *sophia*, skill/wisdom] means knowledge of neutral thought.

Definition: Neutrosophy is a new branch of philosophy, which studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra.

Characteristics of neutrosophy mode of thinking: proposes new philosophical theses, principles, laws, methods, formulas, movements; reveals that world is full of indeterminacy; interprets the uninterpretable; regards, from many different angles, old concepts, systems: showing that an idea, which is true in a given referential system, may be false in another one, and vice versa; attempts to make peace in the war of ideas, and to make war in the peaceful ideas; measures the stability of unstable systems, and instability of stable systems.

Methods of Neutrosophic Study: mathematization (neutrosophic logic, neutrosophic probability and statistics, duality), generalization, complementarity, contradiction, paradox, tautology, analogy, reinterpretation, combination, interference, aphoristic, linguistic, transdisciplinarity.

Reading the F. Smarandache's mottos: "All is possible, the impossible too!" and "Nothing is perfect, not even the perfect!", certainty we are confused but reading the argumentations and demonstrations of the author, step by step everything is clear and logical. Neutrosophy is sustained by some laws of sciences, such as:

- a) *Law of Equilibrium*: Everything x Nothing = universal constant;
- b) *Law of Anti-Reflexivity*: <A> of <A> may transform into a distorted <A>.
- c) *Law of Complementarity*: <A> feels like completing with <Non-A> in order to form a whole.
- d) *Law of Inverse Effect*: The more you ask someone to do something, the less he would.
- e) *Law of Reverse Identification*: <Non-A> is a better <A> than <A>. Poetry is more philosophical than philosophy.
- f) *Law of Joined Disjointedness*: There is little distinction between "good" and "bad".

Rational and irrational work together unseparately. Consciousness and unconsciousness similarly. "Come, my soul said, let's write poems for my body, for we are One" (Walt Whitman). Finite is infinite [see the microinfinity].

- g) *Law of Identities' Disjointedness*: The permanent fight between <A> and <A'> (different shades of <A>). The permanent fight between absolute truth and relative truth.
- h) *Law of Compensation*: If <A> now, then <Non-A> later. [meaning later it will be better, because you learned from the loss]. There is no success without failure [patience guys!].

- i) *Law of Prescribed Condition*: One cannot jump out of own limits. (One spins inside own circle.)
- j) *Law of Particular Ideational Gravitation*: Every idea <A> attracts and rejects other idea <B> with a force directly proportional with the product of their neutrosophic measures and the exponential of their distance.
- k) *Law of Universal Ideational Gravitation*: <A> tends towards <Non-A> (not <Anti-A> as Hegel said), and reciprocally. There are forces which act on <A>, directing it towards <Non-A>, until a critical point is attained, and then <A> turns back. Perfection leads to imperfection.

Ignorance is pleased.

Professor Smarandache has chosen to argue the *neutrosophic epistemology* by many and various classic well known examples from philosophy, literature, arts and sciences in a structure such as Wittgenstein's tractatus: short (from 1-2 lines to maximum 10-15 lines) independent philosophical reflections, metaphysical and metaphorical comments – which are separated by blank rows. It is an *analytical study*, and it is related to multiple-valued logic because in almost each small paragraph one “shows that a statement <A> was proved true by a philosopher X whereas latter another philosopher Y proved the opposite statement <Anti-A> was true. Therefore, both <A> and <Anti-A> were true” (Smarandache, 2005). The author explains that Neutrosophy means/encompasses/involves: philosophy seen by a mathematician and poet; study of History of Philosophy; controversial themes of philosophy (to explore the offensiveness and inoffensiveness); evolution of an idea from <A> to <Non-A> and then to <Anti-A>; how to get patterns where they do not look to be, i.e. to find common characteristics at "+", "-", and "0" attributes; how an idea appears from different viewpoints, from all viewpoints; to find the vanishing point of all philosophical ideas- statements that are argued by mathematical logic and filtered by our cognition.

Neutrosophy as a new science must introduce something new as investigation approach, it can also be seen and interpreted as: new approach to philosophy; philosophy of philosophies; non-philosophy; super-philosophy; neophilosophy; God and Devil of the philosophy; meta-philosophy, macro-philosophy; New World Order in philosophy; paradox of philosophy and philosophy of the paradox; thought of thought; showing the philosophy's perfection and imperfection simultaneously; paradox within/from paradox: there are infinitely many; world's enigma; nature's essence; enigma of the world; any substance ultimately has a neutrosophic attribute; life without paradox would be monotonous and boring, linear; paradoxist intuition is a high level of awareness; postmodernist; an algebraic, physical and chemical philosophy; consistent with its inconsistency- everything that belongs to social existence.

Hermeneutists agree that there is an irrepressible tendency to project modern meanings of words on the texts that represent a neutrosophic approach. Any reading is contextual, situational, circumstantial. Trying to abandon the cogitative and language perspective of the present moment is convicted to failure. The hermeneutist cannot entirely escape from the condition of present time being. A cogitative and language horizon allows every reading. Heidegger believes that the text must be interpreted within the hermeneutical horizon of the moment of its production. The interpreter's limit is the author quality. Once written, the work refuses whoever produced it, and it isolates and wrongs him. The author will never provide the best interpretation of his own work, if such an interpretation is there somehow. The author does not have a right of interpretation derived from the right he has previously had to write. When ending the work, he loses his power over the product. As interpretation, the work

exceeds the authorial jurisdiction. The work is for the author, as for any other hermeneutist, a closed shop. Leaving the room, the producer of the speech loses, without ever having it, the key to interpretation. "A work dies not when it is not read for a while in order to find the best foundation. A work dies only when the internal interpretability, as a message reserve, is finished. The work dies when it no longer speaks to us. Dead works are cold stars" (Smarandache&Vladutescu, 2014).

Very consistent are the statement related to life and death, no place to any other comment: "*The Ultimate Paradox*: Living is the process of dying. Reciprocally: Death of one is the process of somebody else's life [an animal eating another one]" (Smarandache, 2005). Pertinent and palpable entities and constituted of doubtful, invisible, uncertain items, and however real. "Our visible world is composed of a totality of invisible particles. Things with mass result from atoms with quasi-null mass. Infinity is formed of finite part(icle)s" (Smarandache, 2005).

This paradox is explained by author come from the fourth century, nowadays in current style of cognition it can be explained: a) An invisible particle does not form a visible object, nor do two invisible particles, three invisible particles, etc.

However, at some point, the collection of invisible particles becomes large enough to form a visible object, but there is apparently no definite point where this occurs. b) A similar paradox is developed in an opposite direction. It is always possible to remove an atom from an object in such a way that what is left is still a visible object. However, repeating and repeating this process, at some point, the visible object is decomposed so that the left part becomes invisible, but there is no definite point where this occurs. "Between <A> and <Non-A> there is no clear distinction, no exact frontier. Where does <A> really end and <Non-A> begin? We extend Zadeh's fuzzy set term to fuzzy concept. A mathematization of philosophical (and not only) cognition is demanded" (Smarandache, 2005).

Solomon Marcus, a reputed mathematician perceived the frequent presence of paradoxes, "The paradox invaded all activity's fields, all scientific and artistic disciplines. It is not a marginal phenomenon anymore, but in the heart of the act and the human thought" (Smarandache, 2005; apud Marcus, 1984). S. Marcus felt the necessity of a science to govern all these paradoxes, "Outside the paradox we are not able to understand the world. We have to learn to identify the paradox in its stages of an extraordinary diversity, to discover its functional mechanisms for incarcerating and controlling it, and possibly manipulating it in order not to be ourselves manipulated by this" (Smarandache, 2005; apud Marcus, 1984). The paradox had a quickly evolution in our existence, "If not long ago the paradox was considered a symptom of a pathological state, in the last decades it is more frequent an opposite facet of paradox: that of a healthy, normal state" (Smarandache, 2005; apud Marcus, 1984).

In a universe there are more (concentric or not) universes governed according topologies: in a space: more spaces; in a time: more times; in a move: more moves; Our existence is performed, is deployed according these entities, laws of functioning and operating. In a system are met, as such, within a system other systems; and so on...subuniverse, subspace, subtime, submove, subsystem. And these concentrations pass upward and downward away to the macro- and micro- infinite levels, more and more.

Even from Ancient, "Neutrality is the measure unit of all things, paraphrasing Protagoras's famous adage (Human is all things' measure)" (Smarandache, 2005). Why? Because the contradiction and neutrality are the nature's essence. Smarandache professor's book contains a lot of examples, and they may be found anywhere.

There are many examples that enforce Smarandache's theory. For example: "I know that I don't know" (Socrates). Philosophy doesn't need philosophers, but thinkers. The thinkers

don't need philosophy. Therefore, philosophy doesn't need philosophy! Further: Is this an anarchy?

Philosophy is neutrosophic, or is not at all. While Platon, by his dialogues, understands that he doesn't solve anything, Kant believes he solves everything. Conclusion is: None of them is correct.

The author's conclusion is that: "To most of the questions: there is no exact right answer; there is no exact wrong answer, or every answer is right; every answer is wrong, because it is an interpolation of them" (Smarandache, 2005). Also, can be asserted "A formal system, interesting enough to formulate its own consistency, can prove its own consistency if and only if the system is inconsistent (Godel's Second Incompleteness Theorem)" (Smarandache, 2005).

### 3. NEUTROSOPHIC LOGIC

Neutrosophic Logic represents an alternative to the existing logics as a mathematical model of uncertainty, vagueness, ambiguity, imprecision, undefined, unknown, incompleteness, inconsistency, redundancy, contradiction. It is a non-classical logic. Eksioglu (1999) explains some of them: "Imprecision of the human systems is due to the imperfection of knowledge that human receives (observation) from the external world". Also, concerning imperfection, Eksioglu asserts that it leads to a doubt about the value of a variable, a decision has to be taken or a conclusion to be drawn for the actual system. "The sources of uncertainty can be stochasticity (the case of intrinsic imperfection where a typical and single value does not exist), incomplete knowledge (ignorance of the totality, limited view on a system because of its complexity) or the acquisition errors (intrinsically imperfect observations, the quantitative errors in measures)" (Eksioglu, 1999) defines the stochasticity process.

Probability (called sometimes the objective probability) process uncertainty of random type (stochastic) is introduced by the chance, it is the measure of the likeness of event occurrence. In stochastic process or sometimes random process is a collection of random variables that represent the evolution of some random system values in time. "Uncertainty of the chance is clarified by the time or by events' occurrence. The probability is thus connected to the frequency of the events' occurrence" (Smarandache, 2005).

The vagueness is counted as another form of uncertainty being the character of those with contours or limits lacking precision, clearness. Indeterminacy means degrees of uncertainty, vagueness, imprecision, undefined, unknown, inconsistency, redundancy. In this context, is necessarily to get an axiomatic system for the neutrosophic logic. Intuition is the base for any formalization, because the postulates and axioms derive from intuition.

From here results a definition, a logic in which each proposition is estimated to have the percentage of truth in a subset T, the percentage of indeterminacy in a subset I, and the percentage of falsity in a subset F, where T, I, F are defined above, is called *Neutrosophic Logic*.

In Enlightenment period, the attribute "classical" (traditional) was changed to the attribute "modern" (in literature, arts, and philosophy today one says today "postmodern") that invalidates many theorems, even Voltaire (1694-1778), a French writer and philosopher, asserted that "the laws in arts are made in order to encroach upon them". Therefore, in neutrosophic logic most of the classical logic laws and its properties are not preserved. In this conditions, at first look neutrosophic logic appears counter-intuitive, maybe abnormal,

because the neutrosophic-truth values of a proposition  $A$ ,  $NL(A)$ , may even be (1,1,1), i.e. a proposition can completely be true and false and indeterminate at the same time, studying the paradoxes can be observed that it is intuitive. The idea of tripartition (truth, falsehood, indeterminacy) was seized upon J. H. Lambert in 1764 when investigated the credibility of one witness concerned by the contrary testimony of another witness. Further, he generalized Hooper's rule of combination of evidence (1680s), which was a Non-Bayesian approach to find a probabilistic model. In 1940s, Koopman introduced the notions of lower and upper probability, followed by Good, and Dempster (1967) who gave a rule of combining two arguments. In 1976 Shafer extended it to the Dempster-Shafer Theory of Belief Functions by defining the Belief and Plausibility functions and using the rule of inference of Dempster for combining two evidences proceeding from two different sources. Belief function is a connection between fuzzy reasoning and probability.

This theory is a generalization of the Bayesian Probability (Bayes 1760s, Laplace 1780s); that uses the mathematical probability in a more general way, and is based on probabilistic combination of evidence in artificial intelligence. To understand the neutrosophic theory it is obvious necessary to assume that between being and nothingness, existence and nonexistence, geniality and mediocrity, certainty and uncertainty, value and no value, and generally speaking  $\langle A \rangle$  and  $\langle \text{Non-}A \rangle$  there are infinitely many transcendental states. And not even 'between', but even beyond them. An infinitude of infinitudes. These are degrees of neutralities  $\langle \text{Neat-}A \rangle$  combined with  $\langle A \rangle$  and  $\langle \text{Non-}A \rangle$ . In fact there also are steps between being and being, existence and existence, geniality and geniality, possible and possible, certainty and certainty, value and value, and generally speaking between  $\langle A \rangle$  and  $\langle A \rangle$ , this is one of neutrosophy mechanism. "The notions, in a pure form, last in themselves only (intrinsicness), but outside they have an interfusion form", asserts Smarandache professor.

Checking the result (conclusion)  $p$  is made by a comparison approach studying the opposite of this. From here can be arisen the question: what would happen if a non- $p$  conclusion occurred? It is possible that the inconsistency of information shows up in the result, if not eliminate it from the beginning.

The data bases should be stratified. There are methods to construct preferable coherent sub-bases within incoherent bases. The Multi-Criteria Decision theory mechanism explains that one exploits the complementarity of different criteria and the complementarity of various sources. Smarandache explained that the Possibility Theory (Zadeh 1978, Dubois, Prade) gives a better approach than the Fuzzy Set Theory (Yager) due to self-improving connectives also the Possibility Theory is proximal to the Fuzzy Set Theory, the difference between these two theories is the way the fusion operators are defined. But, "What is the logic of the logic? We study the apparently illogic of the logic, as well as the logic of the illogic" (Smarandache, 2005).

The conclusion is: There are two main types of truth: the true truth and the false truth, besides the intermediate shades of truth. And similarly for the falsity: the true falsity and the false falsity, beside the intermediate shades of falsity. "The neutrosophic logic unifies many logics; it is like Felix Klein's program in geometry, or Einstein's unified field in physics" (Smarandache, 2005).

#### 4. NEUTROSOPHIC SET

In this chapter, the author generalizes fuzzy, paraconsistent, and intuitionistic sets to neutrosophic set arguing his theory through many examples.

In physics is an immortal example of the Schrodinger's Cat Theory that says that the quantum state of a photon can basically be in more than one place in the same time, which translated to "the neutrosophic set means that an element (quantum state) belongs and does not belong to a set (one place) in the same time; or an element (quantum state) belongs to two different sets (two different places) in the same time. It is a question of "alternative worlds" theory very well represented by the neutrosophic set theory" (Smarandache, 2005). So, Schroedinger's Equation has to define two different states for the same moment, i.e. "a function whose values are not unique for each argument from the domain of definition (the vertical line test fails, intersecting the graph in more points)" (Smarandache,2005).

## 5. NEUTROSOPHIC PROBABILITY

In this chapter, the author generalizes the classical and imprecise probability to neutrosophic probability, and similarly for neutrosophic statistics. Compared with all other types of classical probabilities, the specificity of the neutrosophic probability is that this "introduces a percentage of "indeterminacy" - due to unexpected parameters hidden in some probability spaces, and let each component  $t$ ,  $i$ ,  $f$  be even boiling *over 1* (overflooded) or freezing *under 0* (underdried)" (Smarandache,2005). For example: an element in some tautological probability space may have  $t > 1$ , called "overprobable". Similarly, an element in some paradoxist probability space may be "overindeterminate" (for  $i > 1$ ), or "overunprobable" (for  $f > 1$ , in some unconditionally false appurtenances); or "underprobable" (for  $t < 0$ , in some unconditionally false appurtenances), "underindeterminate" (for  $i < 0$ , in some unconditionally true or false appurtenances), "underunprobable" (for  $f < 0$ , in some unconditionally true appurtenances). The Smarandache's neutrosophy conclusion is "this is because we should make a distinction between unconditionally true ( $t > 1$ , and  $f < 0$  or  $i < 0$ ) and conditionally true appurtenances ( $t \leq 1$ , and  $f \leq 1$  or  $i \leq 1$ )" (Smarandache,2005).

## 6. CONCLUSIONS

Rationing according "Neutrosophy" arises the statement: Did humanity really reach its insensitivity limit where the only reason, where sensible permanently lost his existential value? If so, that means Albert Camus is right: the only logical solution is suicide. To escape the darkness of death, the nightmares that we set ourselves in her name we have several solutions including apparent suicide, or why not the life performing optimism. Suicide is <anti-A>; to genuine optimism represented by neutrosophic <A>. If we accept the suicide or its equivalent or <anti-A> is such as if we should accept to cut off one's nose to spite one's face. So says also Brancusi, he doesn't create the beauty, he just removes unnecessary material to be easier for us to discover new beauty next to him. Similarly we define (is removed) <anti-A> for beauty and for its sense, to be visible the beauty of our existence in front of nonexistence. Of nonexistence fears any existence, even the Universe itself, maybe nonexistence in itself is not afraid of itself, or people who in their existence forget or do not know that they exist there. Similarly we define (we remove) <anti A> for the beauty and its sense, to be visible the beauty of our existence in front of the nonexistence (Smarandache, 2005).

“*EVERYTHING IS POSSIBLE, THEREFORE: THE IMPOSSIBLE TOO!* Hence don't wonder about this anti-book! If you don't understand it, that means you understand all. That is the goal of the manifesto” is Smarandache’s opinion and also because creation in any domain is art work, he also concludes, “Because Art is not for the mind, but for feelings. Because Art is also for the mind. Try to interpret the uninterpretable! Your imagination may flourish as a cactus in a desert.”

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