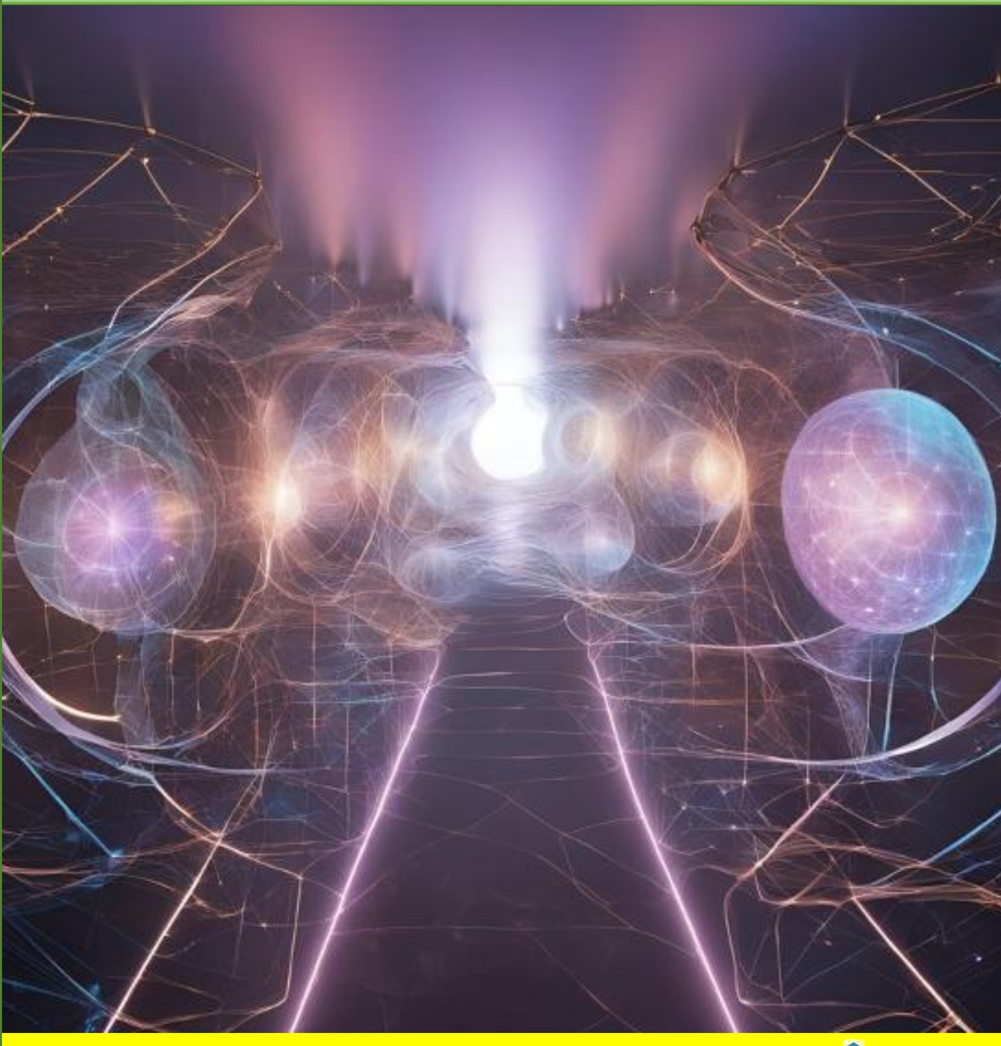
scilogs, XV

florentin smarandache

nidus idearum

NeutroNexus



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Florentin Smarandache

Nidus idearum.
Scilogs, XV: NeutroNexus

Gallup – Guayaquil
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2025

Exchanging ideas with Mayada Abualhomos, R. Alagar, Y. AlHasan, Mai Mousa Mahmoud Alhejoj, Abdallah Al-Husban, Norah Mousa Alrayes, G. Albert Asirvatham, Mahmut Baydaș, Octavian Blaga, Said Broumi, Victor Christianto, Jean Dezert, Dan Florin Lazăr, Feng Liu, Mohammad Hamidi, Ion Marinică, Nivetha Martin, Sagvan Y. Musa, Mutaz Mohamed Abbas Ali, Antonios Paraskevas, Amani Shatarah, Takaaki Fujita, Michael Voskoglou (alphabetically ordered).

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Invitation

Welcome to the fifteenth volume of *Scilogs*, a continuation of my open laboratory of ideas, where scientific inquiry meets spontaneous reflection! This series, rooted in the fusion of rigorous analysis and informal discourse, serves as a platform for exploring theoretical advancements, interdisciplinary connections, and personal meditations on scientific and philosophical matters.

In this volume, I delve into a wide spectrum of topics, spanning mathematics, physics, philosophy, artificial intelligence, and social dynamics. A significant portion of the book is dedicated to neutrosophy and its extensions, including refined and quadripartitioned neutrosophic sets, neutrosophic determinants, and their applications in decision-making, evolutionary biology, and algebraic structures. The plithogenic approach, with its focus on multi-valued, multi-attributed frameworks, is also examined through concepts such as plithogenic derivatives and constants.

Additionally, this volume explores the Dezert-Smarandache Theory (DSmT) and its implications for sensor fusion and probability assessment. The rank preservation, Bayesian masses, and decision fusion rules is considered, shedding light on critical aspects of belief representation and reasoning under uncertainty.

Beyond mathematics and theoretical physics, I reflect on broader philosophical and societal questions: the spectrum of moral and social dynamics, the nature of free will, and the implications of population growth. The philosophical underpinnings of paradoxism, indeterminacy, and the evolving nature of logic are also explored.

Technological advancements, including neutrosophic control in robotics and the impact of digital proliferation on learning and cognition, form another key theme of this volume. As artificial intelligence and automation continue to shape our world, I examine their implications through a neutrosophic and plithogenic lens.

This book is not meant to provide definitive answers but rather to serve as a repository of ideas, questions, and intellectual provocations. I invite you, the reader, to engage, challenge, and expand upon these concepts, using them as a foundation for further inquiry and innovation.

Let the exploration begin!

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TOPICS

Bridging the Abstract and the Real

Extending a Theory and the Neutrosophic Approach to Validation

Octavian Blaga to Florentin Smarandache

1. How does the extension of a scientific or mathematical theory occur, and what is the primary focus of this process?
2. What is the relationship between the original theory (T_1) and the extended theory (T_2), and how are the principles of T_1 treated during extension?
3. How does a neutrosophic approach influence the understanding of theory extension, and how does it differ from a rigid validation-or-invalidation mindset?
4. What is the ultimate goal of extending a theory, and how is the validity of the extended theory determined?

Florentin Smarandache

The process of extending a theory from an initial framework T_1 to a broader theoretical structure T_2 is a fundamental aspect of scientific and mathematical progress. However, this extension does not necessarily involve validating or invalidating the axioms and laws of the initial theory. Instead, it requires analyzing the implications of the new framework and ensuring that the extended theory remains consistent with observable reality.

When expanding a theory, one does not discard the principles of T_1 but rather explores how these principles adapt, evolve, or integrate within T_2.

The primary concern is not whether the original laws remain absolutely true or false but whether the newly emerging theorems, properties, and axioms of T_2 correspond meaningfully to the real world. This perspective aligns with a neutrosophic approach, where truth is not strictly binary but exists in a spectrum of degrees, including indeterminacy.

In scientific exploration, the extension of theories often leads to the discovery of new properties that may initially seem contradictory or paradoxical within the previous framework. A rigid validation-or-invalidation mindset can be limiting, as it forces theories into absolute categories of correctness or incorrectness. Instead, a more flexible, neutrosophic perspective allows for a continuous evolution of knowledge, where theories are assessed based on their coherence, applicability, and alignment with empirical data rather than their strict logical derivation from previous axioms.

Thus, the extension of a theory is not about proving the past wrong but about expanding the boundaries of understanding. The validity of an extended theory lies in its ability to generate meaningful, applicable, and verifiable results while maintaining consistency with observed phenomena. This approach fosters innovation and progress, allowing for a more nuanced and dynamic comprehension.

Neutrosophic vs. Fuzzy in Decision Making

Michael Voskoglou & Said Broumi
to Florentin Smarandache

> What are the advantages of applying neutrosophic logic (theory) in fuzzy decision-making problem?

Florentin Smarandache

It depends on the application.

If the data has indeterminacy, then neutrosophic theory gives more information and a better accurate result.

In general, neutrosophy theory gives a more refined result:

> {degree of positive [take a decision],
>
> degree of neutral (or indeterminate) [pending, or waiting for more information in order to decide],
>
> and degree of negative [reject a decision]}

while fuzzy theory gives only the degree of positive [take a decision] }.

Another example

Suppose after using the fuzzy theory one gets the degree of positive [take a decision] be equal to 0.4, then automatically the degree of negative [reject the decision] is $1-0.4=0.6>0.4$. therefore the expert rejects the decision.

However, it is possible that the degree of positive [take a decision] be 0.4, but using the neutrosophic theory the degree of neutral [or pending] be 0.3, and the degree of negative [reject a decision] be 0.3. As such, it is not correct to reject the decision since the degree of rejection is less that the degree of acceptance, or $0.3 < 0.4$.

Types of Neutrosophic Sets

Said Broumi to Florentin Smarandache

1. What other types of neutrosophic sets exist, and what are their defining characteristics?
2. What does it mean for a neutrosophic set to be a "sub-body" of the neutrosophic cube? Is this a formal mathematical term, and how does it relate to set inclusion?
3. Can a neutrosophic set exist entirely outside the unitary cube, or is it always confined within it?
4. How does the choice of a specific type of neutrosophic set impact the analysis and interpretation of data in a given application?

Florentin Smarandache

Yes, there are various types of neutrosophic sets.

Neutrosophic set is the most general since it is represented by a unitary neutrosophic cube

[0, 1] x [0,1] x [0,1] on the *XYZ* axes,

in the origin (0, 0, 0) of the Cartesian System.

The other particular cases are represented by geometrical corps strictly included into this cube.

As such there are: Fermatean Neutrosophic Set, Cubic Neutrosophic Set, etc.

There are sub-bodies of (or strictly included in) the Neutrosophic Cube.

Certainly, the particular cases of neutrosophic sets may be more specific for certain applications, that's why they are recommendated to be used.

Quadruple Neutrosophic Set

Florentin Smarandache to Takaaki Fujita

Congratulations for your work, you are very prolific and talented!

You cite many times the so-called Turiyam Set/Graph, which is nothing more than a Quadruple Neutrosophic Set (neutrosophic quadruple numbers of the form

a+bT +cI+dF and refined neutrosophic quadruple numbers).[1] Turiyam Set is also named Turiyam Neutrosophic Set, since it is 3/4 neutrosophic (Truth,

[1] See Chapter 7, 186-193, *Neutrosophic Quadruple Numbers*: https://fs.unm.edu/SymbolicNeutrosophicTheory.pdf

Indeterminacy, Falsehood) and only 1/4 Turiyam (Liberal).[2]

The so-called Turiyam Set has 4 components: Truth, Indeterminacy, Falsehood (as in neutrosophics), and another one introduced in between them called "Liberal", from the Indian religion.

It has almost no application, since the "Liberal" degree occurs:

In Indian philosophy, Turiya is the fourth state of consciousness, a pure consciousness that exists between the states of waking, dreaming, and deep sleep.[3]

You can apply it for sleeping/waking people.

But you cannot use it for algebraic structures, graphs, sets etc. Because these things do not sleep or awake!

There also is the Quadruple Neutrosophic Set:

$$(T, I_1, I_2, F),$$

or (Truth, Uncertainty, Contradiction, Falsehood),

that Turiyam copied and replaced *Contradiction* by *Liberal*.

[2] See https://fs.unm.edu/NSS/NeutrosophicQuadrupleNumbers.pdf and also: https://fs.unm.edu/NSS/NeutrosophicQuadruple17.pdf.

[3] Significance of Turiya, Hindu concept of Turiya, https://www.wisdomlib.org/concept/turiya.

The Indeterminacy can be split in many types of sub-indeterminacies.

We also have Quintuple Neutrosophic Set:

T, I_1, I_2, I_3, F, where I_1, I_2, I_3 are three different types of sub-indeterminacies.

The most general form is the Refined Neutrosophic Set,[4] where all T, I, F are refined in sub-components:

$$T_1, T_2, \ldots, T_p;\ I_1, I_2, \ldots, I_r;\ F_1, F_2, \ldots, F_s;$$

The last one will be best for studying and applying.

Refined Neutrosophic Numbers

Victor Gribincea

> Refined Neutrosophic (RN) Numbers are continuous or not?

Florentin Smarandache

$RN = a + b_1 \cdot I_1 + b_2 \cdot I_2 + \ldots + b_n \cdot I_n$ for $n \geq 2$,

where the literal indeterminacy I was split into literal sub-indeterminacies: $I_1, I_2, \ldots, I_n$.

Real Refined Neutrosophic Numbers

$RRN = a + b_1 \cdot I_1 + b_2 \cdot I_2 + \ldots + b_n \cdot I_n \in R + R \cdot I_1 + R \cdot I_2 + \ldots +$

$+ R \cdot I_n$, where R = set of real numbers.

Complex Refined Neutrosophic Numbers

$CRN = a + b_1 \cdot I_1 + b_2 \cdot I_2 + \ldots + b_n \cdot I_n \in C + C \cdot I_1 + C \cdot I_2 + \ldots +$

$+ C \cdot I_n$, where C = set of complex numbers.

[4] See: https://fs.unm.edu/RefinedNeutrosophicSet.pdf.

*

You gave me a continuity of a function, not of a number. So, you need a function of n+1 variables (a, b1, ..., bn) defined from $R^{(n+1)} \rightarrow R \times RI_1 \times ... \times RI_n$

The graph should be a continuous curve.

N-IndetermSoft Set, N-IndetermHyperSoft Set, and N-TreeSoft Set

Florentin Smarandache to Sagvan Y. Musa

Thank you and congratulations, I saved and read your paper.[5] You extended the HyperSoft Set to N-HyperSoft Set by assigning ranking to the alternatives, good idea.

New types of soft sets in the meantime such as: IndetermSoft Set, IndetermHyperSoft Set, TreeSoft Set that you can extend to N-IndetermSoft Set, N-IndetermHyperSoft Set, and N-TreeSoft Set respectively:

http://fs.unm.edu/TSS/NewTypesSoftSets-Improved.pdf

https://fs.unm.edu/NSS/IndetermSoftIndetermHyperSoft38.pdf (with IndetermSoft Operators acting on a IndetermSoft Algebra).

[5] Sagvan Y. Musa, Ramadhan A. Mohammed, and Baravan A. Asaad. "N-Hypersoft Sets: An Innovative Extension of Hypersoft Sets and Their Applications," *Symmetry* 2023, 15, 1795.

The TreeSoft Set is more general than the HyperSoft Set

Florentin Smarandache

HyperSoft Sets

f(Big, Phoenix) = {h_1, h_3},

meaning big houses in Phoenix.

f(Big, Tucson) = {h_5, h_7},

meaning big houses in Tucson.

TreeSoft Set

f(Big, Arizona) = f(Big, {Phoenix, Tucson}) =

= f(Big, Phoenix) ⋁ f(Big, Tucson) = {h_1, h_3, h_5, h_7}

See examples.[6, 7, 8]

[6] Florentin Smarandache (2023). "New Types of Soft Sets "HyperSoft Set, IndetermSoft Set, IndetermHyperSoft Set, and TreeSoft Set": An Improved Version," *Neutrosophic Systems with Applications*, 8:35-41, http://fs.unm.edu/TSS/NewTypesSoftSets-Improved.pdf.

[7] Florentin Smarandache (2023). "Foundation of the SuperHyperSoft Set and the Fuzzy Extension SuperHyperSoft Set: A New Vision," *Neutrosophic Systems with Applications* 11:48-51, http://fs.unm.edu/TSS/SuperHyperSoftSet.pdf.

[8] UNM, Website of New types of soft sets: HyperSoft Set, IndetermSoft Set, IndetermHyperSoft Set, SuperHyperSoft Set, TreeSoft Set, https://fs.unm.edu/TSS/.

Neutrosophic Generalized Half–Linear Second Order Differential Equation

Florentin Smarandache about a paper by Norah Mousa Alrayes, et. al.

A very good paper[9] by Norah Mousa Alrayes et al., since the Generalized Half-Linear Second Order Differential Equation was never used in the neutrosophic field. The authors can indeed extend their research to Refined Neutrosophic Numbers (refined indeter-minacy), of the form: $a_0 + a_1 I_1 + a_2 I_2 + \ldots + a_n I_n$.

Quadripartitioned Neutrosophic Set and Its Application in Species Evolution

Victor Gribincea to Florentin Smarandache

1. What is a Quadripartitioned Neutrosophic Set (QNS), and how does it differ from a standard Neutrosophic Set?
2. How is QNS adapted for the study of species evolution, and what specific categories are used in this context?
3. How can QNS be applied in evolutionary biology to model genetic and phenotypic variations?

[9] Norah Mousa Alrayes, Mayada Abualhomos, Mutaz Mohamed Abbas Ali, Amani Shatarah, Mai Mousa Mahmoud Alhejoj, Abdallah Al-Husban, *Neutrosophic Generalized Half–Linear Second Order Differential Equation.*

4. What are the potential implications of using QNS in evolutionary studies, and what directions could future research take?
5. What is the overall conclusion regarding the use of QNS in evolutionary studies, and what is its key benefit?

Florentin Smarandache

Neutrosophic logic has continuously evolved to better describe uncertainty, contradiction, and indeterminacy in various scientific domains. One of its significant advancements is the *Quadripartitioned Neutrosophic Set* (QNS), which extends the classical *Neutrosophic Set* by further decomposing the indeterminate component.

I will explain for you the application of QNS in species evolution, demonstrating how it provides a refined framework for analyzing genetic trait variations over generations.

Quadripartitioned Neutrosophic Set: A Brief Overview

A standard Neutrosophic Set consists of three components: *Truth* (T), *Indeterminacy* (I), and *Falsehood* (F). However, the Quadripartitioned Neutrosophic Set[10]

[10] See an application: Granados, C. Quadripartitioned Single-Valued Neutrosophic Properties and Their Application to Factors Affecting Energy Prices. *Process Integr Optim Sustain* 7, 575–582 (2023). https://doi.org/10.1007/s41660-023-00310-5

refines the *Indeterminacy* component by splitting it into two distinct subcategories:

- *Contradiction* (C): Represents conflicting information within a system.
- *Uncertainty* (U): Captures the lack of clear evidence or incomplete knowledge.

Thus, QNS is defined as: where each element represents a proportion of truth, contradiction, uncertainty, and falsehood in a given assertion.

Adapting QNS for Species Evolution

In the context of species evolution, traditional Neutrosophic approaches require further refinement to distinguish between different evolutionary states. Instead of *Contradiction* (C), a new category, *Neutrality* (N), is introduced.

This leads to a modified QNS model for species evolution, where:

- T (Truth): The trait exhibits clear evolution in a positive direction.
- N (Neutrality): The trait remains unchanged across generations.
- U (Uncertainty): The trait's evolution or involution remains unclear due to insufficient data.
- F (Falsehood): The trait undergoes regression or loss over time.

Application of QNS in Evolutionary Biology

By employing the QNS framework, researchers can model genetic and phenotypic variations more precisely:

- *Adaptive traits* (T): Traits conferring a survival advantage, increase in frequency over generations.
- *Stable traits* (N): Traits that show neither significant gain nor loss, indicating genetic stability.
- *Ambiguous traits* (U): Traits for which evolutionary direction remains unclear due to genetic drift, environmental noise, or incomplete data.
- *Regressive traits* (F): Traits that decline in frequency, due to selective disadvantages or genetic mutations.

Implications and Future Research

The introduction of QNS in evolutionary studies enhances the precision of genetic modeling by incorporating both deterministic and uncertain elements. Future research could involve:

- *Developing computational models* using QNS to predict evolutionary trends.
- *Expanding empirical studies* to validate QNS-based predictions against real-world genetic data.
- *Integrating QNS with machine learning* to refine phylogenetic analysis.

Conclusion

The Quadripartitioned Neutrosophic Set provides a powerful tool for analyzing uncertainty and contradiction across multiple disciplines. Its application in species evolution presents a way to classify genetic traits, offering —I dare saying— an improved framework for understanding evolutionary dynamics.

For further studies, you should explore additional neutrosophic advancements at:

Neutrosophy Research[11]
Neutrosophic Set Applications[12]

Hypersoft Vague Set

Florentin Smarandache

Let $\mathcal{U}$ be a Universe of Discourse and P($\mathcal{U}$) the power set of $\mathcal{U}$. Let $A = \{a_1, a_2, \dots, a_n\}$, for $n \geq 2$, be a set of attributes. Let A_1 be the set of attribute-values of the attribute a_1. Similarly, $A_2, \dots, A_n$ be the sets of attribute-values of the attributes $a_2, \dots, a_n$, respectively.

$$F: A_1 \times A_2 \times \dots \times A_n \to P(\mathcal{U})$$

is called a Hyper Soft Set.

Let $\mathcal{U}(t, 1 - f_x) = \{x(t_x, 1 - f_x),$

where: $t_x, f_x \in [0, 1], x \in \mathcal{U}\}$, with

[11] See: https://fs.unm.edu/neutrosophy.htm.
[12] See: https://fs.unm.edu/NSS/Articles.htm.

t_x = degree of truth-membership of the element x with respect to the set $\mathcal{U}$,

f_x = degree of false-nonmembership of the element x with respect to the set $\mathcal{U}$.

be a Vague Universe of Discourse. Then:

$$F: A_1 \times A_2 \times \ldots \times A_n \rightarrow P(\mathcal{U}(t, 1-f))$$

is called a Hypersoft Vague Set.

Example

A = {size, color}

A_1 = {big, small}

A_2 = {white, green, yellow}

$\mathcal{U}$ = {h_1, h_2, h_3, h_4} = set of houses.

$\mathcal{U}$(t, 1-f) = {h_1(0.6, 1-0.3), h_2(0.2, 1-0.5), h_3(0.4, 1-0.7), h_4(0.3, 1-0.1)}

F(big, green) = {h_1(0.6, 1-0.3), h_4(0.3, 1-0.1)}

NeutroHypermetricSpace

Mohammad Hamidi

> The foundational concepts of Neutro(Hyper)Algebras, Neutro(Hyper)Structures, and Neutro(Hyper)Topology are opening up new avenues.

Florentin Smarandache

It is gratifying to see researchers like you embracing these concepts.

The partial truth/partial false axioms are incredibly relevant. They resonate with real-world scenarios where laws and principles don't apply uniformly. It's not a black-and-white situation; there's a spectrum of applicability.

That's the core of Neutrosophy. The real world isn't always governed by strict bivalence. There's vagueness, uncertainty, and degrees of truth and falsehood. As you said, some are "above the law," while others are disproportionately affected by it.

Mohammad Hamidi

And this brings me to Kianoosh's work on NeutroHypermetricSpace. I've reviewed his paper on extending the Metric Space to the NeutroHypermetric-Space.[13] I believe it makes a significant contribution to NeutroAnalysis.[14]

Florentin Smarandache

Kianoosh's approach is mathematically sound. Extending metric spaces to NeutroHypermetricSpaces is a natural progression. It allows us to study distances and measures in spaces where the classical metric axioms might not always hold.

---

[13] Kianoosh Polvan, *On Extension of Metric Space to NeutroHypermetricSpace*."

[14] Florentin Smarandache (2020). "NeutroAlgebra is a Generalization of Partial Algebra." *International Journal of Neutrosophic Science* (IJNS), Vol. 2, No. 1, 8-17.

Kianoosh might want to consider exploring applications in areas like image analysis or data science, where dealing with incomplete or conflicting data is common. A NeutroHypermetricSpace could potentially provide a more robust framework for analyzing such data.

Think about complex systems, like social networks or biological systems. The relationships and interactions within these systems are often not easily quantifiable by traditional metrics.

SuperHyperSoft Set

Florentin Smarandache

The SuperHyperSoft Set shows the indeterminacy and the fact that there are many variants of choosing in our real world.

Neutrosophic Determinant

Florentin Smarandache

Ref.: Paper on fuzzy determinant and neutrosophic determinant.

We can generalize these in the following ways:

$$(t_1, i_1, f_1)(t_2, i_2, f_2) = (t_1 \wedge t_2, i_1 \vee i_2, f_1 \wedge f_2)$$

and

$$(t_1, i_1, f_1)(t_2, i_2, f_2) = (t_1 \vee t_2, i_1 \wedge i_2, f_1 \wedge f_2)$$

where "∧" is a T-norm (in fuzzy logic/set), which can be:

$t_1 \wedge t_2 = \min\{t_1, t_2\}$

or $t_1 t_2$

or $(max\{o, t_1^p + t_2^p - 1\})^{\frac{1}{p}}$, with p>0,

and "∨" is a T-conorm (in fuzzy logic/set), which can be:

$t_1 \vee t_2 = \max\{t_1, t_2\}$

or $t_1+t_2-t_1t_2$

or $(min\{1, t_1^p + t_2^p\})^{\frac{1}{p0}}$, with p>0.

For simplicity, we can take $p = 1$ in both equalities above.

These two definitions

$$(t_1, i_1, f_1)(t_2, i_2, f_2) = (t_1 \wedge t_2, i_1 \vee i_2, f_1 \wedge f_2)$$

and

$$(t_1, i_1, f_1)(t_2, i_2, f_2) = (t_1 \vee t_2, i_1 \wedge i_2, f_1 \wedge f_2)$$

are actually complying with the N-norm and respectively N-conorm.

A neutrosophic determinant, let say for the truth *T* components:

$$\begin{vmatrix} t_{11} & t_{12} & t_{13} \\ t_{21} & t_{22} & t_{23} \\ t_{31} & t_{32} & t_{33} \end{vmatrix}$$

can be computed directly as:

max min(t_{j_1}_k1, t_{j_2}_k2, t_{j_3}_k3)

(j_1, j_2, j_3) in P(3)

(k_1, k_2, k_3) in P(3)

where P(3) is the set of permutations of three elements {1, 2, 3}.

Similarly for I and F components.

For a fuzzy determinant:

$$\begin{vmatrix} 0.2 & 0.5 \\ 0.4 & 0.7 \end{vmatrix}$$

where the values represent only the truth,

the determinant is computed as (0.2∧0.7)∨(0.4∧0.5) =max{min(0.2, 0.7), min(0.4, 0.5)} = 0.4. But it should be (0.2∧0.7)∧[complement of (0.4∧0.5)]=(0.2∧0.7)∧ [(complement of 0.4)∨(complement of 0.5)] = (0.2∧0.7)∧[(1-0.4)∨(1-0.5)]=(0.2∧0.7)∧(0.6∨0.5)=0.2∧0.6= 0.2.

This is because in the set of real numbers the determinant:

$$\begin{vmatrix} 0.2 & 0.5 \\ 0.4 & 0.7 \end{vmatrix}$$

is equal to 0.2(0.7)-0.4(0.5)

and not 0.2(0.7)+0.4(0.5).

We should make a distinction between a neutrosophic determinant of the form:

$$\begin{vmatrix} 5 & 1+I \\ 2I & 3 \end{vmatrix}$$

i.e. a determinant that contains as elements the indeterminacy I, where $I^n = I$ for $n > 0$, that I and Dr.

Vasantha used in algebraic structures where we defined the neutrosophic matrix:

$$\begin{vmatrix} 5 & 1+I \\ 2I & -3 \end{vmatrix}$$

in many of our books.

This is computed in the normal way:

$$5(-3) - 2I(1+I) = -15 - 2I - 2I^2 = -15 - 2I - 2I =$$
$$= -15 - 4I.$$

Determinant of Square Neutrosophic Matrix

Florentin Smarandache

Let A be a square neutrosophic matrix:

$$A = \begin{bmatrix} (0.4, 0.2, 0.3) & (0.3, 0.1, 0.2) & (0.3, 0.1, 0.2) \\ (0.4, 0.5, 0.3) & (0.4, 0.5, 0.2) & (0.3, 0.2, 0.2) \\ (0.4, 0.2, 0.1) & (0.4, 0.2, 0.3) & (0.4, 0.5, 0.1) \end{bmatrix}$$

Det A = (0.4, 0.2, 0.3) [max{min(0.4, 0.4), min(0.4,0.3)}, Min{max(0.5, 0.5), max (0.2, 0.2)}, Min{max(0.1, 0.2), max(0.3, 0.1)}]

+ (0.3, 0.1, 0.2) [max{min(0.4, 0.4), min(0.4,0.3)}, Min{max(0.5, 0.5), max (0.2, 0.2)}, Min{max(0.1, 0.3), max(0.1, 0.1)}]

+ (0.4, 0.1, 0.2) [max {min(0.4, 0.4), min(0.4,0.4)}, Min{max(0.2, 0.5), max (0.2, 0.5)}, Min{max(0.3, 0.3), max(0.1, 0.2)}]

DetA = (0.4, 0.2, 0.3)·(0.4, 0.2, 0.2) + (0.3, 0.1, 0.2)·(0.4, 0.2, 0.1) + (0.4, 0.1, 0.2)· (0.4, 0.5, 0.2)

DetA = (0.4, 0.2, 0.3) + (0.3, 0.2, 0.2) + (0.4, 0.5, 0.5)

DetA = (0.4, 0.2, 0.3) + (0.4, 0.5, 0.5)

DetA = (0.4, 0.2, 0.2)

Remark

We use

$(t_1, i_1, f_1) + (t_2, i_2, f_2) = (\max(t_1,t_2), \min(i_1,i_2), \min(f_1,f_2))$

$(t_1, i_1, f_1)\ (t_2, i_2, f_2) = (\min(t_1,t_2), \max(i_1,i_2), \max(f_1,f_2))$

Some Properties of Determinant of Square Neutrosophic Matrix

Florentin Smarandache

Property

The value of the determinant remains unchanged when any two rows or columns are interchanged.

Let us consider the determinant of the matrix below with 1st and 2nd columns interchanged.

$$B = \begin{bmatrix} (0.3\ , 0.1, 0.2) & (0.4, 0.2, 0.3) & (0.4, 0.1, 0.5) \\ (0.4, 0.5, 0.2) & (0.4, 0.5, 0.3) & (0.3, 0.2\ , 0.1) \\ (0.4, 0.2, 0.3) & (0.4, 0.2, 0.1) & (0.4, 0.5\ , 0.1) \end{bmatrix}$$

Det B = (0.3, 0.1, 0.2) [max {min(0.4, 0.4), min(0.4,0.3)}, min{max(0.5, 0.5), max(0.2, 0.2)}, min{max(0.1, 0.3), max(0.1, 0.1)}] + (0.4, 0.2, 0.3) [max{min(0.4, 0.4), min(0.4,0.3)}, min{max(0.5, 0.5), max(0.2, 0.2)}, min{max(0.1, 0.2), max(0.3, 0.1)}] + (0.4, 0.1, 0.5) [max{min(0.4, 0.4), min(0.4,0.4)}, min{max(0.2, 0.5), max(0.2, 0.5)}, min{max(0.1, 0.2), max(0.3, 0.3)}]

Det B = (0.3, 0.1, 0.2) (0.4, 0.2, 0.1)+(0.4, 0.2, 0.3) (0.4, 0.2, 0.2) + (0.4, 0.1, 0.5) (0.4, 0.5, 0.2)

Det B = (0.3, 0.2, 0.2) + (0.4, 0.2, 0.3) + (0.4, 0.5, 0.5)

Det B = (0.4, 0.2, 0.2) + (0.4, 0.5, 0.5)

Det B = (0.4, 0.2, 0.2)

Thus, the values of the determinant remain unchanged if the rows and columns are interchanged.

Strong Neutrosophic Algebraic Structures

Florentin Smarandache

Let ⊔ be the universe of discourse, and let

$A = \{x(t_x, i_x, f_x), x \in \sqcup \; and \; t_x, i_x, f_x \subseteq [0,1]\}$, and

$B = \{y(t_y, i_y, f_y), y \in \sqcup, and \; t_y, i_y, f_y \subseteq [0,1]\}$

be the neutrosophic sets included in ⊔.

We consider a neutrosophic law $*$ defined on A in the following way: for any $x_1, x_2 \in A$ one has $x_1 * x_2 \in A$, i.e. the law $*$ is well defined (as in classical algebraic structures).

Similarly, a neutrosophic law # defined on B for any $y_1, y_2 \in B$ one has $y_1 \# y_2 \in B$.

A <u>strong neutrosophic binary law</u> acting on two elements

$$x_1(t_{x_1}, i_{x_1}, f_{x_1}) * x_2(t_{x_2}, i_{x_2}, f_{x_2}) = x_3(t_{x_3}, i_{x_3}, f_{x_3})$$

acts on both x_1 and x_2, as well on their neutrosophic values $(t_{x_1}, i_{x_1}, f_{x_1})$ and $(t_{x_2}, i_{x_2}, f_{x_2})$, or at least on one of them.

This is the distinction between a classical law in algebraic structures and a neutrosophic law.

A strong neutrosophic morphism is defined as:

$$m : A \to B$$

such that $m(x_1 * x_2) = m(x_1) \# m(x_2)$.

Similarly, the morphism m transforms

$$x(t_x, i_x, f_x) \to y\left(t_y, i_y, f_y\right)$$

so m maps x into y, and (t_x, i_x, f_x) into $\left(t_y, i_y, f_y\right)$.

Example

Let $A = \{x(t, i, f), x \in \mathbb{R}, \text{and } t, i, f \in [0, 1]\}$, where $\mathbb{R}$ is the set of real numbers.

We define the *neutrosophic law* $*$ in the following way:

$$x_1(t_1, i, f_1) * x_2(t_2, i_2, f_2) = x_1 \cdot x_2(min\{t_1, t_2\}, max\{i_1, i_2\}, min\{f_1, f_2\}) \in A.$$

This law is well defined, associative, commutative, and has as neutral element $1(1, 0, 1)$ because:

$$x_1(t_1, i, f_1) * 1(1, 0, 1) = x_1 \cdot 1(min\{t_1, 1\}, max\{i_1, 0\}, min\{f_1, 1\}) = x_1(t_1, i, f_1).$$

But not all elements are inversable.

So, A is a commutative neutrosophic monoid.

Strong Neutrosophic Homorphism

Florentin Smarandache

We define the following strong neutrosophic homorphism:

$$m : A \to A$$

$$m\big(x(t,i,f)\big) = x^2(f,i,t).$$

We prove it verifies the axiom of homorphism:

$$m\big(x_1(t_1,i,f_1) * x_2(t_2,i_2,f_2)\big)$$

$$= m\big(x_1x_2(min\{t_1,t_2\}, max\{i_1,i_2\}, min\{f_1,f_2\})\big)$$

$$= x_1^2x_2^2(min\{t_1,t_2\}, max\{i_1,i_2\}, min\{f_1,f_2\}).$$

Now

$$m\big(x_1(t_1,i,f_1)\big) * m\big(x_2(t_2,i_2,f_2)\big)$$

$$= x_1^2(f_1,i,t_1) * x_2^2(f,i_2,t_2)$$

$$= x_1^2x_2^2(min\{f_1,f_2\}, max\{i_1,i_2\}, min\{t_1,t_2\})$$

therefore m is a strong neutrosophic homorphism.

Of course, many such examples can be constructed.

Twisted Field and Twisted Ring

Definition 1

Let $(T,+,\times)$ be a set with two binary operations $+$ and $\times$.

Then T is called a **twisted field** if the following conditions are satisfied.

1. $(T,+)$ is a commutative classical group with respect to $+$.

2. $(T,\times)$ is a neutrosophic triplet group with respect to $\times$.

3. $a\times(b+c)=(a\times b)+(a\times c)$ for all $a,b,c\in T$.

Example 1

Let $T=\{0,2,4,6,8\}\subset Z_{10}$. Then $(T,+)$ is a commutative classical group under addition modulo 10. Also $(T,\times)$ is a neutrosophic triplet group under multiplication modulo 10. One can easily see that $\times$ is distributive over $+$ in T i.e, for all $a,b,c\in T$, we have $a\times(b+c)=(a\times b)+(a\times c)$. Thus $(T,+,\times)$ is a twisted field.

Theorem 1

Every twisted field T contain $anti(a)$ for all a in T.

Proof

Let $(T,+,\times)$ be a twisted field and let $a\in T$. Then clearly $(T,\times)$ is a neutrosophic triplet group with respect to multiplication. Hence there exist $anti(a)$ in T such that $a\times anti(a)=\text{neut(a)}$

Thus every element a in T has $anti(a)$ in T.

Definition 2

Let $(T,+,\times)$ be a twisted field and let $a\in T$ be aneutrosophic triplet such that $a\times neut(a)=a$ and $a\times anti(a)=neut(a)$. Then $anti(a)$ is called neutrosophic inverse of a.

Example 2

Let $(T,+,\times)$ be a twisted field, where $T=\{0,2,4,6,8\}$. Then clearly

$anti(0)=0, anti(2)=8, anti(4)=4,$

$anti(6)=6, ant(8)=2$

Therefore, $0,2,4,6,8$ are neutrosophic inverses.

Definition

Let $(\mathrm{R},+,\times)$ be a set together with two binary operations $+$ and $\times$. Then R is called **twisted ring** if the following conditions are satisfied.

1. $(\mathrm{R},+)$ is a classical group with respect to $+$.

2. $(\mathrm{R},\times)$ is a neutrosophic triplet monoid with respect to $\times$.

3. $a\times(b+c)=(a\times b)+(a\times c)$ for all $a,b,c\in R$.

Example

Let $R=\{0,2,4,6,8,10,12\}$ be the set of neutrosophic triplets in $(Z_{14},\times)$. Then clearly all the axioms of a twisted ring are satisfied. Hence $(\mathrm{R},+,\times)$ is a twisted ring.

Quadrigeminal Sets

Florentin Smarandache on a paper by
R. Alagar and G. Albert Asirvatham[15]

Their four degrees/components:

- ϒA is called the degree of extreme - belongingness to A
- ΩA is called the very - belongingness to A
- ℧Ais called the degree of moderate - belongingness to A
- ∂A is called the weak - belongingness to A

are actually refinement of the degree of belongingness (truthiness-membership T) into four subcomponents: T_1, T_2, T_3, T_4 (if we use simpler notations).[16, 17]

[15] R. Alagar, & G. Albert Asirvatham. (2024). Fuzzy Quadrigeminal Sets: A New Approach and Application. *Journal of Computational Analysis and Applications* (JoCAAA), 33(05), 268–273. Retrieved from https://eudoxuspress.com/index.php/pub/article/view/498

[16] Somen Debnath (2021). "Quadripartitioned Single Valued Neutrosophic Pythagorean Dombi Aggregate Operators in MCDM Problems," *Neutrosophic Sets and Systems* 46, 180-207. DOI: 10.5281/zenodo.5553508; http://fs.unm.edu/NSS/QuadripartitionedNeutrosophicPythagorean13.pdf

[17] Surapati Pramanik (2022). "Interval quadripartitioned Neutrosophic Sets," *Neutrosophic Sets and Systems* 51, 146-156. DOI: 10.5281/zenodo.7135267;

The author should cite the most general form of refinement, called Refined Neutrosophic Set on n sub-components, for any positive integer:

> In 2013, I proposed the Refined/Split the Neutrosophic Components (T, I, F) into Neutrosophic SubComponents (T_1, T_2, ..., T_p; I_1, I_2, ..., I_r; F_1, F_2, ..., F_s): where $p+r+s = n$, and p, r, s, are positive integers.[18]

Their quadrigeminal set is a particular case of the refined neutrosophic set, when p = 4, r = s = 0. They refined only one component, the truth-membership which they called belongingness.

Plithogenic Constant

Florentin Smarandache

The constant is a *Symbolic Plithogenic Constant* (*SPC*),

$$SPC = a_0 + a_1P_1 + a_2P_2 + \ldots + a_nP_n \in SPS$$

where the *Symbolic Plithogenic Set* (SPS) is defined as:

$$SPS = \{a_0 + a_1P_1 + a_2P_2 + \ldots + a_nP_n; n \geq 1, a_i \in R, 1 \leq i \leq n\},$$

and R is the set of real numbers.

http://fs.unm.edu/NSS/IntervalQuadripartitionedNeutrosophic10.pdf

[18] See my article "n-Valued Refined Neutrosophic Logic and Its Applications to Physics," https://arxiv.org/ftp/arxiv/papers/1407/1407.1041.pdf; https://fs.unm.edu/n-ValuedNeutrosophicLogic-PiP.pdf

Neutrosophic Labels

Florentin Smarandache to Mahmut Baydaş

I'm glad you're interested in neutrosophic labels. As you know, I've explored this in my book, *Symbolic Neutrosophic Theory*.[19] We can move beyond simple T, I, and F labels to represent more nuanced situations.

We may have some relative truths (sub-truths)

$$T = \{T_1, T_2\},$$

and similarly relative indeterminacies (or types of indeterminacies), and relative falsehoods

$$I = \{I_1, I_2\}, F = \{T_1, F_2\} \ldots$$

Their number of sub-truths, sub-indeterminacies, and sub-falsehoods may vary depending on the applications.

For example,

$T = \{T_1, T_2, T_3\}, I = \{I_1, I_2, I_3, I_4\}, F = \{F_1, F_2\}$.

*

Instead of a single T, we can have $T = \{T_1, T_2\}$, representing different aspects or degrees of truth. The same applies to indeterminacy and falsehood.

The number of these sub-elements can vary based on the specific application.

[19] See my book, starting at section 6.9: https://fs.unm.edu/SymbolicNeutrosophicTheory.pdf.

So, for example, in a medical diagnosis, T_1 could represent "high probability of disease A," T_2 could represent "moderate probability of disease A," while I_1 could be "inconclusive test results," and F_1 could be "absence of disease A."

Truth, indeterminacy, and falsehood are not monolithic but rather composed of various shades and nuances. It's not just "true" or "false," but a spectrum of possibilities.

Mahmut Baydaş

I see the connection to neutrosophic probability here. The chance of a disease being present (T) could be further broken down into the chance of "high probability" (T_1) and "moderate probability" (T_2), and so on for indeterminacy and falsehood.

Florentin Smarandache

Absolutely! Neutrosophic probability[20] allows to assign probabilities not just to events, but also to the indeterminate chance of events occurring or not occurring, and to the chance of events not occurring.

[20] See herein the neutrosophic probability (chance that an event occurs, indeterminate-chance that the event occurs or not, and chance that the event does not occur): https://fs.unm.edu/NeutrosophicMeasureIntegralProbability.pdf.

This aligns perfectly with the concept of relative neutrosophic labels.

Imagine using these labels to represent the truth values of linguistic statements, where the meaning of a statement itself might be indeterminate or partially false.

Linguistic neutrosophic logic could be used to model human reasoning with vague and uncertain information. We could assign neutrosophic labels to linguistic variables and use them to evaluate the truth of complex propositions.

Sentiment analysis often deals with nuanced and ambiguous language, making it a perfect candidate for neutrosophic approaches. The relative neutrosophic labels could capture the different shades of sentiment more accurately than traditional methods.

I encourage you to contribute some papers on linguistic neutrosophic logic/probability, Mahmut! I look forward to seeing your contributions.

Plithogenic Derivatives

Florentin Smarandache to Y. AlHasan

Plithogenic Derivatives and of course the Plithogenic Limits are new topics to develop.

Neither A nor antiA

Florentin Smarandache to Victor Christianto

Neither A nor antiA is actually neutA, or, more general, it is: partially A, partially antiA, and partially neutA.

A Triadic Approach to Structural Relations

Dan Florin Lazăr to Florentin Smarandache

What is the role of associativity in algebraic structures?

Florentin Smarandache

In classical algebraic structures, associativity plays a crucial role in defining the behavior of operations. An operation is said to be associative if the order in which operations are performed does not affect the final outcome. However, real-world systems often exhibit complexities that defy strict categorization, leading to the emergence of neutrosophic approaches to structural properties.

Dan Florin Lazăr

How does the neutrosophic framework classify associativity?

Florentin Smarandache

Within a neutrosophic framework, associativity can be generalized into three distinct categories: **Associativity, Neutro-Associativity, and Anti-Associativity**.

These classifications allow for a more flexible representation of algebraic systems where uncertainty, partial truth, and contradiction coexist.

Dan Florin Lazăr

What is the definition of Neutro-Associativity?

Florentin Smarandache

Associativity

A system is associative when its operation satisfies the classical condition: for all elements in the set. This property ensures stability in computational and algebraic structures, forming the foundation for conventional mathematical frameworks.

Neutro-Associativity

Neutro-Associativity represents an intermediate state where some elements in a set adhere to associativity, while others do not.

This hybrid nature allows for partial structure formation and introduces flexibility into mathematical modeling.

Formally, a set exhibits neutro-associativity if there exist elements such that: for certain subsets of elements, whereas for others, the associativity condition holds.

This notion is crucial in scenarios where system components interact variably, such as biological networks, social dynamics, and complex adaptive systems.

Anti-Associativity

A structure is anti-associative if no elements within it satisfy the associative condition. This property is prevalent in chaotic systems, paradoxical structures, and contexts where contradiction is fundamental to the system's operation.

Dan Florin Lazăr

> How does the neutrosophic perspective contribute to the understanding of associativity?

Florentin Smarandache

Conclusion

By incorporating the neutrosophic perspective into associativity, we move beyond rigid mathematical formalism and embrace a more nuanced understanding of structural behaviors.

The distinction between associativity, neutro-associativity, and anti-associativity enables us to analyze complex systems where interactions are uncertain, partially deterministic, or entirely non-deterministic.

This paradigm shift is instrumental in advancing research in fields ranging from quantum mechanics to artificial intelligence, where the interplay between order and disorder shapes emergent phenomena.

IndetermSoft Set and IndetermHyperSoft Set in Applications[21]

Florentin Smarandache

The IndetermSoft Set is a soft set that has some indeterminacy: not clear data in H, P(H), A, or indeterminacy into the function F: A → P(H).

Similarly, the IndetermHyperSoft Set is a HyperSoft Set that has some indeterminacy: not clear data in H, P(H), A, P(A), or indeterminacy into the function F: P(A) → P(H).

General Definition

IndetermSoft Set and IndetermHyperSoft Set are extensions of Soft Set and HyperSoft Set respectively, designed to handle situations with indeterminate data.

IndetermSoft Set

- *Definition*: An IndetermSoft Set is a soft set where the data, the function, or the sets involved have some indeterminacy (uncertainty, conflict, incompleteness, or non-uniqueness).
- *Applications*: IndetermSoft Sets are useful in various fields where information may be incomplete or imprecise. For example, in medical diagnosis, a doctor may not be sure about the exact cause of a patient's symptoms, leading to an indeterminate diagnosis. In decision-making,

[21] See: https://fs.unm.edu/TSS/.

there may be uncertainty about the values of certain parameters, making it difficult to make a definitive decision. IndetermSoft Sets can be used to model such situations and provide a more flexible and accurate representation of the problem.

IndetermHyperSoft Set

- *Definition*: An IndetermHyperSoft Set is a hypersoft set where the data, the functions, or the sets involved have some indeterminacy.
- *Applications*: IndetermHyperSoft Sets are a generalization of IndetermSoft Sets and can be used in even more complex situations where multiple parameters are involved. For example, in product design, there may be uncertainty about the values of various attributes, such as size, color, and material. IndetermHyperSoft Sets can be used to model such situations and provide a more comprehensive representation of the problem.

Key Differences

- *Complexity*: IndetermHyperSoft Sets are more complex than IndetermSoft Sets, as they deal with multiple sets of attributes.
- *Applications*: IndetermHyperSoft Sets are more suitable for complex problems with multiple

parameters, while IndetermSoft Sets are more suitable for simpler problems with fewer parameters.

Conclusion

IndetermSoft Sets and IndetermHyperSoft Sets are powerful tools for dealing with indeterminate data in various applications. They provide a flexible and accurate way to represent complex problems and make informed decisions.

Notes on Dezert-Smarandache Theory (DSmT)

Dezert-Smarandache Theory (DSmT) and Combination Rules

Florentin Smarandache to Dan Florin Lazăr[22]

The **Dezert-Smarandache Theory (DSmT)** is an extension of **Dempster-Shafer (DS) theory**, that I developed with my French friend **Jean Dezert**. It provides a more flexible and general framework for managing uncertainty, imprecision, and paradoxes, particularly when dealing with overlapping or highly conflicting information.

Key Features of DSmT

No Restriction to Exclusivity

- Unlike **DS theory**, which assumes that elements in the frame of discernment (FoD) are mutually exclusive, DSmT allows elements to be **overlapping or non-exclusive**.
- This is useful in **complex problems** where strict exclusivity is unrealistic (e.g., situations where

[22] For the book written by prof. Lazăr: Lazăr, Dan Florin (2024). **A Tapestry of Thought. Smarandache's Contributions to Knowledge and Artistic Expression. An Exploration of Smarandache's World, Where Science Meets Creativity. In honorem Florentini Smarandache, ad completam aetatem septuagenariam**. Grandview Heights, OH, United States of America: Biblio Publishing, 2024, 134 p.; ISBN: 9781599738055

an object could belong to multiple categories simultaneously).

Manages High Conflict More Effectively

- DSmT avoids the problem of **conflict normalization** in **Dempster's rule** by allowing **partial contradictions** and redistributing conflict more meaningfully.

Generalization of DS Theory

- When elements are **mutually exclusive**, DSmT reduces to **Dempster-Shafer theory**.

Combination Rules in DSmT

DSmT introduces several combination rules, with the most well-known being:

Dezert-Smarandache Classical (DSmC) Rule

- This is the basic combination rule in DSmT, extending the **conjunctive rule** but **without normalization**.

Proportional Conflict Redistribution (PCR) Rules

- A series of refined rules (PCR1, PCR2, ..., PCR5) that redistribute conflict **proportionally** to the elements that caused it.
- **PCR5** is the most advanced, ensuring that conflict is assigned **to the most relevant hypotheses** rather than just unions.

Dempster-Shafer vs. DSmT in Sensor Fusion

Imagine two sensors trying to identify an object, where the possibilities are:

- **Car (C)**
- **Truck (T)**
- **Unknown (?)**

However, in reality, **a vehicle might be both a car and a truck (e.g., a pickup truck)**, meaning C and T are **not strictly exclusive**.

Case 1: Using Dempster-Shafer (DS) Theory

- Sensor 1: $m_1(C)=0.6$, $m_1(T)=0.3$, $m_1(?)=0.1$
- Sensor 2: $m_2(C)=0.4$, $m_2(T)=0.5$, $m_2(?)=0.1$

Dempster's rule forces exclusivity and normalizes the conflict, potentially distorting the belief.

Case 2: Using Dezert-Smarandache Theory (DSmT)

- DSmT allows a **Car-Truck hybrid category ($C \cap T$)**.
- Instead of normalizing conflicting information, **it redistributes the belief** to a meaningful mixed hypothesis: $C \cap T$.

Result:

- DSmT provides a **more natural representation of uncertainty**, especially when dealing with **imprecise categories or overlapping evidence**.

Conclusion

DSmT is a powerful extension of **Dempster-Shafer theory**, providing **more flexibility** for handling **complex decision-making problems** with **overlapping, conflicting, or ambiguous evidence**.

A note on computing lower and upper bounds of subjective probability from masses of belief

Jean Dezert, Florentin Smarandache

This short note shows on a very simple example the consistency of free DSm model encountered in Dezert-Smarandache Theory (DSmT)[23] with a refined model for computing lower and upper probability bounds from basic belief assignments (bba).

The belief functions have been introduced in 1976 by Shafer in Dempster-Shafer Theory (DST).[24]

Let's consider the simplest free model for the frame $\Theta=\{A, B\}$ with $A\cap B\neq\emptyset$, and let's consider the following bba defined on the hyper-power set of Θ (its Dedekind's lattice)

[23] Smarandache F., Dezert J. **Advances and applications of DSmT for information fusion**, Volumes 1-5, ARP, 2004–2023; https://fs.unm.edu/DSmT/.

[24] Shafer, G. A *Mathematical Theory of Evidence*. Princeton University Press, Princeton, 1976.

$m(A \cap B) = 0.4,$

$m(A) = 0.6,$

$m(B) = 0,$

$m(A \cup B) = 0$

From the definition of belief and plausibility functions, one has for this example

$Bel(A) = m(A \cap B) + m(A) = 0.4 + 0.6 = 1$

$Pl(A) = m(A \cap B) + m(A) + m(B) + m(A \cup B) = 0.4 + 0.6 + 0 + 0 = 1$

and

$Bel(B) = m(A \cap B) + m(B) = 0.4 + 0 = 0.4$

$Pl(B) = m(A \cap B) + m(B) + m(A) + m(A \cup B) = 0.4 + 0 + 0.6 + 0 = 1$

Note that $m(B)$ (resp. $m(A)$) is included in the computation of $Pl(A)$ (resp. $Pl(B)$) because $A \cap B$ is assumed not empty in the free model. Therefore, one sees that the unknown probabilities $P(A)$ and $P(B)$ are bounded as follows:

$$P(A) \in [Bel(A), Pl(A)] = [1, 1] \qquad (1)$$

$$P(B) \in [Bel(B), Pl(B)] = [0.4, 1] \qquad (2)$$

In fact from the bba $m(.)$ above, one gets finally $P(A) + P(B) \in [1.4, 2]$ (greater than 1) which is perfectly normal because the events A and B are not exclusive elements and so there is no reason to get $P(A) + P(B) = 1$ in such case.

Let's compute the bounds of $P(A)$ and $P(B)$ from another point of view based on the refinement of the frame Θ into the refined frame Θ^t defined as follows:

$\Theta^t \triangleq \{\theta_1 = \bar{B}, \theta_2 = A \cap B, \theta_3 = \bar{A}\}$

where $\bar{B}$ is the complement of B, $\bar{A}$ is the complement of A and where elements θ_1, θ_2 and θ_3 are now three truly exclusive finer elements. Based on such refinement, one has $A = \theta_1 \cup \theta_2$ and $B = \theta_2 \cup \theta_3$. The previous bba $m(.)$ is strictly equivalent to the bba $m^t(.)$ defined on the power-set of Θ^t with

$m^t(\theta_2 = A \cap B) = 0.4$,

$m^t(\theta_1 \cup \theta_2 = A) = 0.6$

and having all other masses $m^t(X) = 0$ for $X \neq \theta_2$, and for $X \neq \theta_1 \cup \theta_2$.

From this bba $m^t(.)$ one can also compute the beliefs and plausibilities of elements of Θ^t as follows:

$Bel(\theta_1) = m^t(\theta_1) = 0$

$Pl(\theta_1) = m^t(\theta_1) + m^t(\theta_1 \cup \theta_2) + m^t(\theta_1 \cup \theta_3) + m^t(\theta_1 \cup \theta_2 \cup \theta_3) = 0 + 0.6 + 0 + 0 = 0.6$

$Bel(\theta_2) = m^t(\theta_2) = 0.4$

$Pl(\theta_2) = m^t(\theta_2) + m^t(\theta_1 \cup \theta_2) + m^t(\theta_2 \cup \theta_3) + m^t(\theta_1 \cup \theta_2 \cup \theta_3) = 0.4 + 0.6 + 0 + 0 = 1$

$Bel(\theta_3) = m^t(\theta_3) = 0$

$Pl(\theta_3) = m^t(\theta_3) + m^t(\theta_1 \cup \theta_3) + m^t(\theta_2 \cup \theta_3) + m^t(\theta_1 \cup \theta_2 \cup \theta_3) = 0 + 0 + 0 + 0 = 0$

Therefore, one sees that the probabilities of θ_1, θ_2 and θ_3 are bounded as follows:

$$P(\theta_1) \in [Bel(\theta_1), Pl(\theta_1)] = [0, 0.6] \quad (3)$$

$$P(\theta_2) \in [Bel(\theta_2), Pl(\theta_2)] = [0.4, 1] \quad (4)$$

$$P(\theta_3) \in [Bel(\theta_3), Pl(\theta_3)] = [0, 0] \quad (5)$$

with the condition $P(\theta_1) + P(\theta_2) + P(\theta_3) = 1$.

Because $P(\theta_3) \in [0, 0]$, then one has $P(\theta_3) = 0$ and therefore one has $P(\theta_1)+P(\theta_2) = 1$. Since $\theta_1 \cap \theta_2 = \emptyset$ (by construction of the refined frame Θ^t), one has also $P(\theta_1 \cap \theta_2 = \emptyset) = 0$ and therefore the probability of $A = \theta_1 \cup \theta_2$ can be computed from probability axioms as follows

$P(A) = P(\theta_1 \cup \theta_2)$

$= P(\theta_1) + P(\theta_2) - P(\theta_1 \cap \theta_2)$

$= P(\theta_1) + P(\theta_2)$

$= 1 = [1, 1]$

One sees that this computation of bounds of $P(A)$ is fully consistent with (1).

Now lets' examine the computation of bounds of $P(B)$ where $B = \theta_2 \cup \theta_3$. From the probability axioms, one can write

$P(B) = P(\theta_2 \cup \theta_3)$

$= P(\theta_2) + P(\theta_3) - P(\theta_2 \cap \theta_3)$

$= P(\theta_2) + P(\theta_3)$

$= P(\theta_2)$

This result comes from the fact that $P(\theta_2 \cap \theta_3) = P(\emptyset) = 0$, and also one has $P(\theta_3) = 0$ here due to (5). So finally, according to (4) we get

$$P(B) = P(\theta_2) \in [Bel(\theta_2), Pl(\theta_2)] = [0.4, 1] \qquad (6)$$

One sees that the bounds for $P(B)$ computed directly using the free model by (2) are fully consistent with the bounds of $P(B)$ given in (6) computed from the refined frame Θ^t. The two approaches provide the same lower and upper bounds of unknown subjective probabilities which is normal.

From this simplest example, one has shown that the computations of the bounds of $P(A)$ and $P(B)$ are mathematically consistent using both approaches. We have to point out that it is very easy to obtain directly when working with the free model of the frame and a bit more complex when working with the refined model of the frame.

Preservation of Rank in Decision Fusion Rules for Bayesian Masses

Florentin Smarandache to Dan Florin Lazăr

In decision fusion and information aggregation, preserving the rank of alternatives is a critical property for ensuring consistency in decision-making. Various combination rules—such as the Conjunctive Rule, Dezert-Smarandache (DSmT), Dempster-Shafer (DST), or Dubois-Prade (DP)—demonstrate this property when applied to Bayesian masses. Additionally, the PCR5 rule may also preserve rank for Bayesian masses, though a complete proof is pending.

Rank Preservation for Bayesian Masses

Bayesian masses refer to probability distributions where all focal elements are singletons, meaning the belief is strictly assigned to individual hypotheses without ambiguity. When fusion rules operate under these conditions, they maintain the relative ranking of alternatives. The Conjunctive Rule, DSmT, DST, and DP are all known to satisfy this rank preservation property because they consistently propagate probabilities without altering the ordering of preferences.

PCR5, which is a more refined proportional conflict redistribution rule, might also satisfy rank preservation under Bayesian conditions.

However, a rigorous demonstration is needed to confirm this property fully. If such a proof holds, it would reinforce PCR5's reliability in decision-making scenarios where rank consistency is required.

Non-Bayesian Masses and Rank Instability

For non-Bayesian masses, where uncertainty and ignorance exist due to mass assignment to composite hypotheses, rank preservation is not necessarily guaranteed. In such cases, decision fusion can introduce ambiguity, leading to inconsistencies in priority rankings. This instability renders the rule inapplicable in certain contexts, particularly when prioritization must remain well-defined.

As previously proposed in the first paper on Analytic Hierarchy Process (AHP), the presence of ignorance in the priority vector suggests that rules lacking rank preservation should be avoided in decision-making frameworks. When fusion introduces uncertainty in ranking, it undermines the fundamental purpose of preference ordering.

Conclusion

Ensuring rank preservation is a fundamental requirement for decision fusion rules, particularly in applications such as multi-criteria decision analysis and expert systems. The Conjunctive Rule, DSmC, DS, and DP satisfy this property when dealing with Bayesian masses, while PCR5 remains a candidate for further verification. For non-Bayesian cases, rank instability challenges the applicability of certain fusion rules, reinforcing the need for careful selection based on decision consistency requirements.

La limite de $DSmP_\varepsilon$

Florentin Smarandache à Jean Dezert

L'on considere la masse suivante: m(A) = 0.3, m(B) = 0.1, et m($A \cup B$) = 0.6.

Calculer $DSmP_\varepsilon$ pour cette masse, quand epsilon decroit vers zero, par exemple $\varepsilon = 0.01$, 0,001, etc. Quelle est le minimum epsilon que ton programme peut utiliser dans notre formule de $DSmP_\varepsilon$?

Est-ce qu'on peut calculer la limite quand epsilon approaches zéro?

$$\lim_{\varepsilon \to 0}(DSmP_\varepsilon(m))$$

ou *m(.)* est la masse d'avant.

Jean Dezert

Je pense que e = 1.1^{-9} est possible.

Thoughts & Doubts

The Tightrope Walk of Being.

Me and antiMe, or How Not to Live

Florentin Smarandache

We are all tightrope walkers…

Existence is a precarious dance between order and chaos, light and shadow. We are born onto this rope, given no instruction manual, only the primal urge to keep moving, to somehow find our footing in the face of the dizzying drop below.

We tell ourselves stories of purpose, of meaning, weaving narratives to make sense of the swaying rope beneath our feet. But these are just stories, comforting illusions in the face of the fundamental disorder of existence. We are slaves to our ideas. We build cages of belief, locking ourselves inside narratives of who we are and how the world works. We crave the illusion of control, the comforting weight of certainty in our grasp. We seek to dominate, to impose our will on the world around us, forgetting that we are ourselves tethered to this precarious existence.

The world, in its brutal honesty, is full of suffering. Pain is not an aberration, but an intrinsic part of the human experience. Yet, even as we stumble, even as the rope cuts into our skin, we find moments of joy, fleeting glimpses of beauty that make the struggle worthwhile.

Let's enjoy it not as a call to reckless abandon, but as an acknowledgment that even in the face of immense pain, life insists on its vibrant, messy unfolding.

Faith, that delicate balance between belief and doubt, becomes another tool in our tightrope walker's kit. We believe, we doubt, we teeter between the two, never fully committing to one side or the other. The "neutrosophic way of life" embraces this uncertainty, acknowledging that truth is rarely absolute. We exist in the gray areas, in the spaces between certainty, forever questioning, forever seeking.

Sanity and insanity become blurred lines on this tightrope. What is "normal" but a collective agreement on how to navigate the rope? There are moments when the rope seems to tilt, when the familiar landmarks disappear, and we find ourselves staring into the abyss. These moments of perceived "insanity" can be terrifying, but they can also be transformative, offering glimpses of reality beyond the confines of conventional thought.

Life is a kaleidoscope of experiences, of enlightenment and withdrawal. We stumble, we fall, we get back up, dust ourselves off, and continue the precarious journey. There is no single path, no right way to walk this rope.

Each of us must find our own rhythm, our own way of balancing the light and the darkness.

For existence is a blend, a tapestry woven from infinite light and infinite darkness. Good and bad, heaven and hell, they are not separate realms, but intertwined aspects of the same reality. We are both eagle and snake, capable of soaring to great heights and slithering in the shadows. We experience moments of sublime joy and crushing despair, caught in an endless cycle of hope and hopelessness, radiance and wretchedness.

And then there is the AntiGod, a force that defies easy categorization. It is not simply the opposite of God, not simply the embodiment of evil. It is something else, something that challenges our fundamental assumptions about the nature of divinity and morality. Perhaps it represents the inherent rebelliousness of the human spirit, the refusal to blindly accept the narratives we are given.

The tightrope walk continues, each step a testament to our resilience, our capacity for both joy and sorrow. We are all tightrope walkers…

A Neutrosophic God-King: *Gilgamesh*

Florentin Smarandache

The Epic of Gilgamesh, one of the oldest surviving works of literature, tells the story of a Sumerian king, a figure of immense power and complex contradictions.

Traditionally, Gilgamesh is seen as two-thirds god and one-third human, a duality that drives much of the narrative. However, considering him through the framework of neutrosophy offers a richer, more nuanced understanding of his divine and human nature.[25]

Gilgamesh is not simply divine or human; he embodies both simultaneously, existing in a state of "both/and" rather than "either/or." This aligns with the core principle of neutrosophy, which acknowledges the existence of neutralities and indeterminacies alongside truth and falsehood.

His godly lineage grants him extraordinary strength and power, setting him apart from ordinary mortals. Yet, his human frailty is evident in his fear of death, his grief over Enkidu's demise, and his impulsive actions. He is neither fully god nor fully human, but rather a complex amalgamation of both, existing in a liminal space that defies simple categorization.

The epic emphasizes Gilgamesh's quest for immortality, a pursuit driven by his human fear of death. This desire is inherently human, a yearning for

[25] Ideas extended in the paper: Smarandache, Florentin (2024), "Neutrosophy Transcends Binary Oppositions in Mythology and Folklore," *Neutrosophic Sets and Systems* 65:57-79.

permanence in a transient world. Yet, the fact that he is part god fuels this ambition, giving him a sense of entitlement and possibility that a fully human king would lack. His journey is marked by both divine intervention and human error, highlighting the inherent tension between his two natures. He is capable of great wisdom and compassion, as shown in his leadership of Uruk. Yet, he is also prone to arrogance and rash decisions, traits that ultimately hinder his quest for immortality.

The discovery of Gilgamesh's tomb suggests a historical basis for the legendary figure. This lends credence to the idea that Gilgamesh was a real king, a historical figure later embellished with divine attributes. From a neutrosophic perspective, this historical reality does not negate his divine status in the epic. Instead, it reinforces the idea that Gilgamesh exists in a state of both/and, simultaneously historical and mythical, human and divine.

A common motif in heroic narratives is killing a beast. Gilgamesh does that too. This act showcases his superhuman strength, a direct manifestation of his godly heritage. Yet, it is also an act of human courage and vulnerability, as he faces danger with the very real possibility of injury or death. The beast can be interpreted as a symbol of the challenges and uncertainties that Gilgamesh faces, both internal and external. His victory over the beast highlights his ability to bridge the gap between his divine potential and his human limitations.

Population Growth

Florentin Smarandache

I read that power countries want to limit the population growth because their population increase at a smaller rate than the third world countries' population.

Let's take a look to the British Empire in India, or Indonesia with respect to the Dutch colonists. During the colonial era, controlling populations in colonized territories was a key strategy for maintaining power and resource control. Concerns about the potential for unrest and rebellion within large, subjugated populations were certainly a factor in colonial policies.

It's important to distinguish between the historical context of colonial population control and the contemporary discussions about global population growth. While there may be echoes of past power dynamics, the current debate is more nuanced and involves a wider range of actors and concerns. Simply equating modern discussions about population with historical colonialism risks oversimplifying a complex issue and ignoring the concerns about resource scarcity. Some voices within developing nations themselves advocate for family planning and sustainable population growth, not as a result of external pressure, but as a means of improving quality of life.

It's true that many developed countries have experienced declining or stagnant birth rates, while some developing nations continue to see rapid population increases. This disparity has led some to speculate that these powerful nations might be motivated by a desire to maintain a global power balance, fearing that a shift in demographics could eventually lead to a shift in economic and political influence.

Attributing this concern solely to a desire for power maintenance oversimplifies however a multifaceted issue.

There are other, arguably more pressing, concerns often cited in discussions about global population growth.

These include the strain on resources like food, water, and energy; the potential for environmental degradation; and the challenges associated with providing adequate education, healthcare, and employment opportunities for a rapidly expanding population.

Saturation Point

Florentin Smarandache

Each neutrosophic dynamic system evolves to a saturation point from where it starts to decay (*fatigue of itself*). Such system may be an empire, a country, a person, a theory, etc.

Fatigue of itself: the decay is not necessarily due to external factors but arises from within the system itself. This could be due to internal contradictions, exhaustion of resources, loss of momentum, or inherent limitations.

Saturation point: a limit or a peak in the lifecycle of a system. Think of it like a sponge that can only absorb so much water – once it's saturated, it can't hold any more.

The *saturation point* might not be a sharp, clearly defined moment, but rather a fuzzy region where the system's characteristics begin to shift towards decline.

After reaching the saturation point, the system begins to decline or decay. This could manifest in various ways depending on the system: loss of power for an empire, economic decline for a country, aging and health issues for a person, or a theory becoming outdated or losing relevance.

Analogies

- *Biological Growth*: Living organisms grow, reach maturity (saturation), and then decline and die.

- Product Lifecycle: Products are introduced, grow in popularity, reach a peak in sales, and then decline as newer products enter the market.
- Economic Cycles: Economies experience periods of growth and prosperity, followed by peaks, and then recessions or depressions.

Conclusions

Systems grow, develop, and reach a peak (*saturation point*) as a part of their inherent nature. Understanding the concept of saturation points is crucial for promoting sustainability. By recognizing the limits of growth and the potential for decay, we can develop strategies to prolong the productive phase of systems and mitigate the negative consequences of decline. Studying why some systems are able to avoid or delay reaching a saturation point can provide insights into building more resilient systems.

A Spectrum of Social and Moral Dynamics

Dan Florin Lazăr
to Florentin Smarandache

- What factors contribute to an individual's moral standing?
- How do social forces influence individual behavior and morality?
- What role do emotions play in our moral compass and social interactions?

- To what extent are our actions determined by free will versus external forces?
- What are the extremes of the spectrum of good and evil, and where do most people fall on this spectrum?
- What are the different ways individuals respond to societal norms and authority?
- What are the different levels of emotional connection we can have with others, and how do they impact our morality?
- How can we foster empathy and compassion in a world often driven by self-interest?
- If our actions are influenced by both control and free will, how can we take responsibility for our choices?

Florentin Smarandache

The human experience is a delicate balance between opposing forces: good and evil, justice and injustice, social cohesion and antisocial rebellion. This eternal struggle is not a binary opposition but a continuum where various shades of morality, behavior, and cognition intertwine. To understand this dynamic, we must explore the spectrum between absolute virtue and complete malevolence, how the brain processes these dichotomies, and the role of individual choice in shaping human destiny.

The Spectrum of Good and Evil

At the extremes, we encounter **100% evil**, a realm of absolute malice, devoid of compassion or remorse. In contrast, **100% angelic** represents untainted goodness, where kindness and selflessness reign supreme. Yet, most individuals exist **somewhere in between**, exhibiting both virtues and flaws in varying degrees. Some may lean towards benevolence, while others oscillate between selfishness and altruism.

This interplay is evident in the **cerebral dichotomy**: the **left cerebellum**, often associated with logic and structured thought, contrasts with the **right cerebellum**, which is believed governs creativity and emotional intuition. The combination of these hemispheres influences the complexity of moral decision-making, determining whether one follows a strict ethical code or engages in moral ambiguity.[26]

Social Dynamics: Conformity and Rebellion

Human behavior is shaped by the forces of socialization and individuality. Some individuals **follow the others**, embracing societal norms and seeking

[26] Of course, the statement is somehow a generalization. In reality, both hemispheres of the cerebellum are involved in a variety of functions, including motor control, cognition, and emotion. The brain is a complex organ, and that different parts of the brain work together in complex ways. See, e.g., Jacobi H, Faber J, Timmann D, Klockgether T. “Update cerebellum and cognition.” *J Neurol.* 2021 Oct; 268(10):3921-3925. doi: 10.1007/s00415-021-10486-w. Epub 2021 Mar 3. PMID: 33656586; PMCID: PMC8463403.

validation through conformity. Others **refuse to follow**, rejecting authority and forging their own paths, often at the cost of alienation. A third category emerges: those who **partially follow and partially refuse**, existing in a liminal space where compromise and selective resistance define their actions.

These choices shape our sense of **justice**: some individuals fight for fairness and righteousness, while others embody **injustice**, engaging in deception and exploitation. Yet, many operate within a **hybrid zone**, where justice and injustice coexist, dictated by personal interests and external pressures.

Sympathy, Empathy, and Antipathy

Our ability to connect with others further defines our moral positioning. **Sympathy** allows us to acknowledge the suffering of others, while **empathy** takes it a step further, enabling us to share in their emotions.

On the other end of the spectrum lies **antipathy**, where individuals feel resentment, indifference, or even pleasure at another's misfortune.

These emotional states are fluid, shifting based on personal experiences and social interactions.

Dan Florin Lazăr

> Are our actions determined by forces beyond our control, or do we possess true agency?

The Intermediary Forces: Control vs. Free Will

Determinism (Control) suggests that our choices are shaped by genetics, upbringing, and societal structures, leaving little room for deviation. Conversely, **indeterminism (Free Will)** posits that humans have the autonomy to shape their destinies, making conscious decisions independent of external influences.

In reality, most individuals experience a combination of both: influenced by circumstances yet possessing the ability to carve their own paths.

The extent to which we embrace one or the other dictates whether we become prisoners of fate or architects of our own morality.

Conclusion

The struggle between good and evil, social conformity and defiance, justice and injustice, is not a simplistic duality but a **complex spectrum** of interactions and choices.

Our neurological composition, social environments, and emotional capacities all play roles in determining where we fall on this continuum. At the heart of it all lies the delicate balance between **control and free will**, guiding us toward either moral absolution or ethical ambiguity. Ultimately, human existence is defined by a perpetual dance between opposites.

Multiple Personality Disorder as a Neutrosophic State of Mind

Florentin Smarandache

Multiple Personality Disorder (MPD)[27] is a psychiatric condition in which an individual exhibits two or more distinct identities or personalities. Each of these personalities may have unique behaviors, thoughts, and emotions, sometimes without the person being aware of the transitions between them. This disorder challenges the concept of a singular, stable self and places the individual in a fragmented psychological state.

A person with MPD does not exist wholly as one identity but instead fluctuates between multiple selves. This can be understood through the lens of neutrosophy. A neutrosophic state of mind is one where elements of clarity and ambiguity coexist, leading to a condition that is neither fully defined nor entirely chaotic.

From a neutrosophic perspective, an individual with MPD is partially one personality while simultaneously being partially another. Their state of mind is neither wholly stable nor completely fragmented, existing in an indeterminate mental space. This results in a psychological condition that is difficult to categorize

[27] Renamed currently as Dissociative Identity Disorder (DID).

within rigid binary frameworks of identity and consciousness.

Neutrosophy applies not only to thought but also to action. A person experiencing MPD may struggle with distinguishing between their identities, much like someone who cannot clearly differentiate between right and wrong in a state of moral or cognitive uncertainty. They operate within an indeterminate mental state; their decisions and behaviors fluctuate unpredictably.

Understanding disorders like MPD through the lens of neutrosophic logic allows for a broader perspective on the fluidity of identity and the indeterminate nature of mental states. Rather than viewing the condition as a rigid pathology, it can be seen as multiple states of being, coexisting within a single individual.

Non-Real Four Dimension

Victor Gribincea

> I've been pondering the nature of reality, particularly the concepts of dimensions, space, and time. But I feel there's more to the story, something beyond the readily perceived. What if there are dimensions beyond what we know? I think about the spaces we create in our minds when we daydream, or the way time seems to stretch or compress depending on our emotional state. These spaces and times, though not physically tangible, are nonetheless real in their impact on our lives. There's also the influence of science fiction.

> Science fiction writers have a remarkable ability to explore the hypothetical, to push the boundaries of what we consider possible. They imagine worlds with different physical laws, different dimensions, and different ways of experiencing time. Where does all this lead?

Florentin Smarandache

Space and time that, in Einstein's theory of relativity, are interwoven into a four-dimension space-time fabric, warped by the presence of mass and energy. There are many types of spaces and times, real or imaginary. Some are science-fiction, others are spiritual, idealistic.

The Multifaceted 3D Space

Victor Gribincea

1. What are some of the different concepts of 3D space in Physics?
2. What was William Thurston's contribution to our understanding of 3D space?
3. What is Harold Aspden's theory about the composition of space?
4. What is the Gestalt Theory of Space?

From Topology to Consciousness

Florentin Smarandache

Our understanding of three-dimensional space has evolved significantly, moving beyond the traditional Euclidean view to encompass more complex and nuanced perspectives. Physics, in particular, offers a rich tapestry of concepts regarding the nature of 3D space, ranging from its topological properties to its potential connection with consciousness.

William Thurston's work on 3D-space topology revolutionized our understanding of the possible shapes and structures of three-dimensional space. He proposed a classification of 3-manifolds, demonstrating that there are far more possibilities than previously imagined. This topological perspective focuses on the connectivity and global properties of space, rather than just its local geometric features. It allows us to consider spaces that are finite yet unbounded, or spaces with complex and non-intuitive geometries. Thurston's work provides a framework for understanding the large-scale structure of the universe.

Beyond topology, alternative theories propose different compositions for space itself. Harold Aspden, for instance, suggested that space is not merely an empty void, but rather a medium composed of a "liquid crystal" like substance. This concept challenges the traditional view of space as passive and unchanging, proposing instead that it possesses inherent properties and may even interact with matter and energy in novel ways. Aspden's theory attempts to explain various physical phenomena, such as inertia and gravity, by attributing them to the interactions between particles and this underlying liquid crystal lattice of space. While still debated, such ideas highlight the ongoing quest to understand the fundamental building blocks of our universe.

Perhaps even more intriguing is the notion that space is deeply intertwined with consciousness, as explored by Steven Lehar. He proposes that our experience of three-dimensional space is not simply a passive reflection of an external reality, but is actively constructed by our consciousness. Lehar's "Gestalt Theory of Space" suggests that the brain processes visual information in a way that creates a coherent and unified representation of space, much like how our perception organizes visual elements into meaningful wholes (Gestalts).

This perspective implies that our understanding of space is not objective but subjective, shaped by our cognitive processes and experiences.

Conclusion

The concept of 3D space in physics is far from settled. From Thurston's topological classifications to Aspden's liquid crystal space and Lehar's consciousness-based model, different theories offer unique insights into the nature of space. While each approach offers its own framework, they collectively contribute to a richer and more complete understanding of the world we inhabit.

Imagination as a Creator of Reality

Octavian Blaga

1. How does imagination function in relation to reality, and what is its role beyond passive thought?
2. What is "mystical judgment," and how does it relate to imagination and understanding reality?
3. What is the connection between imagination and a thought-free state, and how does this state influence creativity?
4. How does imagination contribute to a deeper understanding of the self and the world, and what tools does it employ?
5. What is the relationship between abstraction, imagery, symbolism, and metaphysical understanding, and how does imagination connect to this?
6. What is the ultimate significance of imagination?

Florentin Smarandache

Imagination is not merely a passive function of the mind; rather, it actively shapes reality. The process of envisioning possibilities beyond immediate perception allows individuals to transcend the constraints of time and matter, forming new ways of understanding existence.

One of the essential aspects of imagination is the ability to experience a state devoid of thoughts. This state, which can be achieved through meditation or deep contemplation, grants access to an unfiltered consciousness where creativity flourishes. In such moments, the mind ceases to be cluttered by rational constraints, making way for deeper insights.

Another crucial function of imagination is its capacity to delve into profound levels of our being. Instead of relying solely on rationality, imagination allows us to explore alternative perspectives, embracing emotions, intuition, and abstract thought as primary tools for understanding the world. Through this, imagination becomes a bridge between the conscious and subconscious mind, integrating experiences that are beyond the reach of logic.

Furthermore, imagination enables the transcendence of temporal and material limitations. The human ability to conceptualize ideas beyond the immediate present fosters innovation, art, and philosophy. By stepping beyond the boundaries of reality, individuals engage in a form of judgment that is not bound by conventional constraints, thus accessing new dimensions of knowledge.

Uncertainty is another domain where imagination plays a critical role. When confronted with the unknown, the ability to act without full knowledge of the outcome is a testament to human creativity. Rather than succumbing to fear, imagination encourages adaptability and the exploration of potential paths forward, often leading to groundbreaking discoveries.

Mystical judgment, another key concept, represents an interpretation of reality that is rooted in symbolism and metaphor. This type of judgment relies on imaginative perception rather than strict logical analysis. By embracing symbolic thinking, individuals can access deeper truths that transcend empirical verification, aligning with metaphysical insights.

Ultimately, abstraction, imagery, and symbolism form the foundation of metaphysical understanding. By engaging with these elements, human consciousness surpasses ordinary perception, opening up avenues for philosophical and spiritual exploration. Imagination is not only a tool for creativity but also a fundamental force in shaping personal and collective reality.

Neutrosophic Evolution

Florentin Smarandache to Antonios Paraskevas

Ref.: Evolution/Indeterminacies/Involution with respect to many factors (parameters) at different degrees with each of them

I've been pondering about the limitations of classical evolutionary theory. It often focuses on clear-cut adaptation or extinction, neglecting the fuzzier, less defined aspects of change. This is where I believe Neutrosophic logic can offer a valuable perspective.

Evolution isn't always a straightforward progression. We see instances of stasis, where species remain largely unchanged for long periods, and even atavism, where ancestral traits reappear. These don't fit neatly into the traditional framework.

And what about traits that are neither clearly beneficial nor detrimental? They persist, perhaps due to genetic drift or other factors. This "in-between" state, the indeterminacy, is crucial. Neutrosophic Evolution encompasses Evolution, Indeterminacy, and Involution – all occurring simultaneously, to varying degrees.

I am suggesting that a trait isn't simply evolving or devolving, but can be doing both, or neither, at the same time, in different proportions?

Take the example of human language. Emigrants moving to a new country often experience a neutrosophic evolution with respect to language. They learn the new language – that's evolution. They may gradually lose fluency in their native tongue – involution. And they might end up speaking a hybrid language, like Spanglish – that's indeterminacy. All three processes are happening concurrently.

And this applies to multiple factors, not just language. The emigrant's diet changes – evolution, perhaps with some retention of traditional foods – indeterminacy.

Their social life adapts – evolution, but maybe they maintain connections to their original community – indeterminacy. It's a multi-faceted neutrosophic evolution with respect to numerous parameters. We see similar patterns in biological evolution. A species might develop a new adaptation (evolution) while retaining some ancestral traits (stasis, a form of indeterminacy) and losing other traits that are no longer necessary (involution).

This resonates with the concept of "mosaic evolution" in biology, where different traits evolve at different rates. But Neutrosophic Evolution goes further by explicitly incorporating indeterminacy and involution. It provides a more nuanced way to describe the evolutionary process.

Because it is not just about what changes, but also what *doesn't* change, and what becomes ambiguous or hybrid. The degree of each – evolution, indeterminacy, involution – can be different for each parameter. For instance, the emigrant might fully embrace the new culture's food (strong evolution), maintain a moderate connection to their original social group (moderate indeterminacy), and experience significant language loss (strong involution).

We could potentially use neutrosophic sets to represent these degrees.

For example, a 70% evolution, 20% indeterminacy, and 10% involution for language. This would allow us to model and analyze these complex evolutionary processes more accurately.

This is my hope, Antonios. That Neutrosophic Evolution will provide a more complete and accurate framework for understanding how things change, or don't change, over time.

I wait with interest for new such applications from you, Dr. Paraskevas!

*

I was very impressed with your recent application of neutrosophy to measuring species evolution. It's exactly the kind of work I hoped to see!

Your work highlighted some important points for future applications. As we discussed before, indeterminacy is a key aspect, but it's not always present to the same degree.

In some cases, a trait might show a clear pattern of evolution or involution with very little, if any, indeterminacy. It's still a neutrosophic scenario – (T, 0, F) – but the absence of indeterminacy needs to be accounted for.

And that leads to another important consideration: neutrality.

Some traits simply don't change much over generations. They're stable, neither evolving nor devolving. Stasis, as called it in biology. It's a significant aspect of evolution, and classical theory sometimes struggles to explain it adequately. It's not just a lack of data or an inability to measure change; it's often a real biological phenomenon.

Instead of just (T, I, F), we should consider a quadruple set: (T, I, N, F). Truth/Evolution (T), Falsehood/Involution (F), Indeterminacy (I), and now Neutrality (N). We're essentially splitting the original "I" into two components: pure indeterminacy (I) and neutrality (N).

And this quadruple set can be applied not just to traits, but also to the factors influencing evolution. For example, environmental pressures might be strongly driving evolution for some traits (high T), have little effect on others (high N), and lead to ambiguous changes in still others (high I).

Think of it as a multi-dimensional neutrosophic space, where each dimension represents a factor influencing evolution, and within each dimension, we have the four components – T, I, N, and F – representing the different types of evolutionary change.

We can model not just *what* changes, but *how* it changes, and *why*. And the degrees to which each of these processes occurs. The neutrosophic approach allows for a quantitative analysis of these complex interactions.

I'm confident that it will lead to new insights in evolutionary biology and other fields as well. The key is to embrace the complexity and ambiguity of the real world, and to develop mathematical tools that can capture these nuances.

Duality of Particle-Wave

Florentin Smarandache to Feng Liu

The duality of particle-wave also falls under the extreme neutrosophic case T=1 and F=1.

An object may be a particle (T=1) or may not be a wave, i.e. the opposite of a particle, simultaneously (F=1).

*

As you know, neutrosophy allows for the simultaneous existence of a statement, its opposite, and the neutral state in between. Traditionally, a particle is distinct from a wave. But quantum mechanics tells us that a particle can also behave like a wave, and vice versa. This "both/and" situation seems to fit perfectly within the neutrosophic framework.

The Copenhagen interpretation attempts to address this by saying that the particle or wave nature manifests depending on how we observe it. But that still leaves open the question of what the entity *is* before observation.

And that's where I see the extreme neutrosophic case, where Truth (T) equals 1 and Falsehood (F) equals 1, as particularly relevant. Think of an electron. When we detect it as a particle, T=1; it *is* a particle. But simultaneously, it *is not* a wave in that specific manifestation, so F=1 for the wave aspect at that instant.

Questions about Quantum Systems

Florentin Smarandache

The Copenhagen interpretation of quantum mechanics postulates that reality is not an independent entity but rather emerges from the interaction between the observer and the observed system. This interpretation suggests that the act of measurement collapses the wave function, converting a superposition of states into a single observed reality. In essence, reality, in this framework, is probabilistic and dependent on observation.

This raises questions: <u>what happens when multiple observers examine the same quantum system simultaneously?</u> <u>Does reality remain consistent across different observers, or do separate observers collapse the wave function in distinct ways?</u>

One perspective argues that quantum mechanics necessitates a consensus reality among multiple observers. If two individuals measure the same quantum state, their observations should ultimately align, suggesting a shared collapse of the wave function. However, alternative interpretations, such as the Many-Worlds theory, propose that each measurement spawns a new branch of reality, where all possible outcomes are realized in parallel universes.

This interpretation circumvents the issue of observer dependence but introduces the complexity of infinite branching realities.

Furthermore, the measurement problem underscores the enigmatic nature of quantum observation. The process of measurement itself seems to bring order to an otherwise indeterminate system. In classical mechanics, measurements merely reveal pre-existing states, whereas in quantum mechanics, measurement plays a creative role, determining the outcome rather than merely uncovering it. This has led some theorists to explore the possibility that consciousness itself influences quantum states, a hypothesis that remains speculative but fuels ongoing debates in quantum philosophy and physics.

The practical implications of these ideas extend to quantum computing, quantum cryptography, and experimental tests of entanglement. Quantum systems exhibit non-local correlations, as famously demonstrated in Bell's theorem, suggesting that information about a system may be instantaneously shared across distances in ways incompatible with classical physics.

Conclusion

The question of how multiple observers interact with quantum systems remains an open challenge in both physics and philosophy. Whether reality is fundamentally subjective or whether an underlying objective framework exists is a debate that continues to evolve with advances in quantum experiments.

Macro Quantum Tunneling

Florentin Smarandache

> I'm trying to wrap my head around macro quantum tunneling. We understand quantum tunneling at the atomic level, but how does it scale up? How is macro quantum tunneling explained?

Victor Christianto

Macro Quantum Tunneling, while conceptually linked to its atomic counterpart, manifests in distinctly macroscopic systems. A prime example is the Josephson Junction. It's essentially two superconducting materials separated by a thin insulating barrier. Cooper pairs, the charge carriers in superconductors, can tunnel *through* this barrier, even though classically they shouldn't have enough energy to overcome it. This tunneling current is a macroscopic quantum effect. It's not a single electron tunneling, but a coherent flow of Cooper pairs, a truly macroscopic quantum phenomenon.

Florentin Smarandache

So, it's the collective behavior of the Cooper pairs that allows for this macroscopic tunneling? It's not just a single particle sneaking through.

Victor Christianto

Exactly. The coherence of the superconducting condensate is key. It allows a macroscopic number of particles to act in a unified, quantum mechanical way. Think of it like a single wave function describing the whole ensemble of Cooper pairs. This collective behavior allows the system to tunnel as a whole.

Florentin Smarandache

That makes sense. But how do we go from these lab-scale Josephson junctions, which are still quite small, to truly large-scale macro quantum tunneling? I'm thinking about the kind of scale we might need for, say, quantum computing applications or even more exotic scenarios.

Victor Christianto

Scaling up is the major challenge. The problem is maintaining coherence as the system size increases. Any interaction with the environment, any decoherence, will destroy the delicate quantum superposition that allows tunneling. In larger systems, it becomes incredibly difficult to isolate them sufficiently to prevent decoherence.

Florentin Smarandache

So, environmental control is paramount. We need to shield these larger systems from *everything* – vibrations, temperature fluctuations, electromagnetic fields… the works. It's like trying to keep a quantum state alive in a noisy room. The bigger the system, the harder it is to isolate it from the noise.

So, what are the most promising avenues for scaling up? Are there specific materials or designs that offer better coherence properties?

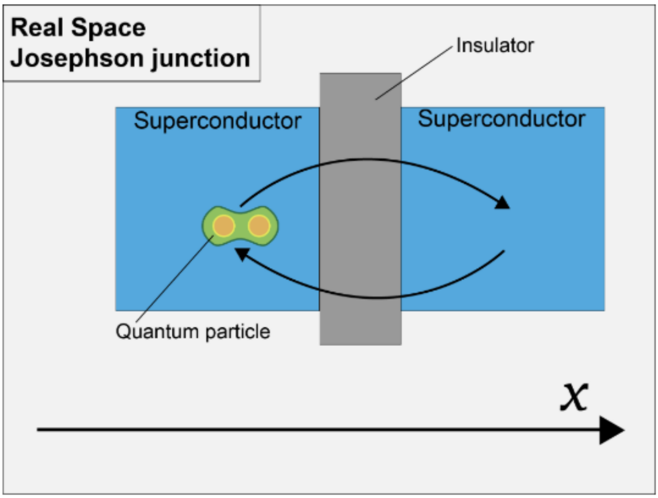
Victor Christianto

That's an active area of research. Topological superconductors are one promising direction. They are theorized to have inherent protection against decoherence. Also, there's work on developing new types of Josephson junctions with improved coherence times. But it's a long road. We're still at the stage of exploring different possibilities and trying to understand the fundamental limitations.

Josephson Junction

Florentin Smarandache

A Josephson Junction is a type of superconducting device made up of two superconductors separated by a thin insulating layer, known as a "weak link". This weak link allows a current to flow between the superconductors, even though they are not directly connected. This phenomenon, known as the Josephson Effect, is a macroscopic quantum effect, meaning it can be observed in relatively large systems.



A real-space Josephson junction[28]

[28] From https://physics.wustl.edu/news/new-routes-josephson-effects-bose-einstein-condensates.

Key features and properties of Josephson junctions[29]

- *Supercurrent*: A direct current can flow through the junction without any voltage applied, known as a supercurrent. This is due to the Cooper pairs (bound pairs of electrons) tunneling through the insulating barrier.
- *AC Josephson Effect*: When a voltage is applied across the junction, an alternating current (AC) flows through it. The frequency of this AC current is directly proportional to the voltage, a relationship known as the Josephson frequency-voltage relation.
- *Critical current*: The maximum supercurrent that can flow through the junction is called the critical current. This value depends on the properties of the superconductors and the weak link.

Applications

Josephson junctions have a wide range of applications, including:

- *SQUIDs (Superconducting Quantum Inter-ference Devices)*: Extremely sensitive magnetometers used in various fields,

[29] R. C. Jaklevic, J. Lambe, J. E. Mercereau, and A. H. Silver (1965). "Macroscopic Quantum Interference in Super-conductors," *Phys. Rev.* 140, A1628 – Published 29 November, 1965; DOI: https://doi.org/10.1103/PhysRev.140.A1628

including medical imaging and geological surveys.

- *Quantum computing*: Josephson junctions are used as qubits, the basic building blocks of quantum computers.
- *High-speed electronics*: Josephson junctions can be used in high-speed digital circuits due to their fast switching speeds.
- *Voltage standards*: The Josephson effect provides a highly accurate way to measure voltage, which is used in national voltage standards.[30]

MultiAction at a Distance in Newton's Law of Universal Gravitation

Florentin Smarandache

Newton's Law of Universal Gravitation states that a particle attracts another particle with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

[30] D. N. Langenberg, W. H. Parker, and B. N. Taylor (1966). “Experimental Test of the Josephson Frequency-Voltage Relation,” *Phys. Rev.* 150, 186 – Published 7 October, 1966, DOI: https://doi.org/10.1103/PhysRev.150.186.

For objects, their masses are considered concentrated at their centers of gravity:

$$F = G \cdot \frac{m_1 \cdot m_2}{r^2}$$

where *F* = the attraction force

G = the gravitational constant

m_1, m_2 = the masses of the two particles (or objects)

r = the distance between the two particles (or objects)

Herein too, we have a MultiAction at a Distance, for example many objects at various altitudes fall on the Earth at the same time. So, the Earth has an action (attraction) at a distance on each object separately.

Newton's Law of Universal Gravitation: A Recap

If you double the mass of one object, the gravitational force between it and another object doubles. If you double the masses of *both* objects, the force quadruples.

If you double the distance between two objects, the gravitational force decreases to one-fourth of its original strength. If you triple the distance, the force decreases to one-ninth, and so on. The "inverse square" relationship means the force weakens rapidly with distance. The law applies to any two objects with mass anywhere in the universe, from apples falling on Earth to planets orbiting stars and galaxies interacting with each other.

The Gravitational Constant (G)

G is a fundamental constant of nature. It was experimentally determined by Henry Cavendish in the late 18th century using a torsion balance.

The value of G is approximately $6.67430(15) \times 10^{-11}$ $N \cdot m^2 \cdot kg^{-2}$. Its small value indicates that gravity is a relatively weak force compared to other fundamental forces like electromagnetism.

MultiAction at a Distance

The Earth exerts a gravitational force on *every* object near it – not just one: many objects at various altitudes falling on the Earth at the same time. Each object, regardless of its altitude, experiences the Earth's gravitational pull.

Importantly, the Earth's gravitational interaction with one object doesn't "block" or interfere with its interaction with another object. Each object experiences the force as if it were the only one present. The Earth doesn't need to be in physical contact with each object; the force acts across space.

Implications and Refinements

Modern physics describes gravity not as an action at a distance, but as a field. Massive objects warp the fabric of spacetime, creating a gravitational field that surrounds them. Other objects moving through this field experience a force. This is the basis of Einstein's theory of General Relativity.

The "MultiAction" concept is related to the principle of superposition, which applies to gravitational fields. The net gravitational force on an object is the vector sum of the individual gravitational forces from all other objects in the universe.

While useful for most everyday situations, Newton's theory of gravity is not the complete picture. It breaks down in very strong gravitational fields or at very high speeds.

Order, NeutroOrder, AntiOrder

Dan Florin Lazăr

> The concept of order, seemingly straightforward, reveals itself to be surprisingly nuanced when viewed through the lens of neutrosophy. Could you comment on the topic?

Florentin Smarandache

We can define three distinct categories of **order**:

a. Total Order on a given space S means that between any two distinct elements, one is bigger than the other.

b. Partial Order is a particular case of Neutro*Order*, i.e. there are at least two distinct elements such that one is bigger than the other; and there are at least two elements that no order is between them.

c. Not Order at All is equivalent to the *AntiOrder*", i.e. for any distinct elements there is no order between them.

Further comments

However, the rigid separation of these categories dissolves when we consider the inherent uncertainties and contradictions that neutrosophy embraces.

In a traditional, bivalent logic, an element is either greater than, less than, or equal to another element. This aligns with the concept of Total Order, where every pair of distinct elements can be definitively compared. Yet, the real world rarely presents such clear-cut scenarios. Ambiguity arises, information is incomplete, and perspectives shift, leading to situations where elements defy simple categorization. This is where the Partial Order, or "Neutro Order," emerges as a bridge.

Partial Order is a state where some elements are comparable while others are not. This "in-betweenness" is precisely where neutrosophy thrives. It acknowledges the existence of both order and non-order within the same system, not as mutually exclusive absolutes, but as coexisting realities.

Consider, for instance, a set of individuals in terms of "intelligence." While we might confidently rank some individuals, others might exhibit different types of intelligence that are harder to compare linearly. We encounter a "neutro" state where order exists for some pairs, while for others, it remains undetermined.

Furthermore, the concept of "No Order" or "Anti-Order," where no two elements are comparable, presents another layer of complexity. From a neutrosophic perspective, even in a seemingly disordered system, pockets of localized order might exist. Conversely, even in a highly ordered system, elements of randomness and incomparability can emerge. It is not about the absolute presence or absence of order, but rather the degree to which it manifests. What appears as "no order" at a macro level might reveal intricate, albeit unconventional, order at a micro level.

Conclusion

Neutrosophy proposes a spectrum where Total Order, Partial Order, and No Order at All are not distinct compartments but interconnected and inter-dependent states.

Indeterminacy in Upside-Down Logics

Florentin Smarandache to Takaaki Fujita

My paper on Upside-Down Logics is online.[31]

The cultural examples you presented are interesting.

[31] See: https://fs.unm.edu/Upside-DownLogics.pdf.

We might consider your 'contextualization' as the "universe of discourse / space" (U) where the "proposition" (P) is announced in.

In Mathematics, "Let U be a universe of discourse, and P a subset of it"...

More things with respect to the neutrosophic logic:

- to transform a proposition that is Indeterminate into a true or false proposition;
- to transform a true proposition into an indeterminate proposition;
- to transform a false proposition into an indeterminate proposition.

Neutrosophic Example

Indeterminate transformed into Truth

$\frac{5}{0}$ is undefined (indeterminate) in algebra,

but $\lim_{x \searrow 0}\left(\frac{5}{x}\right) = +\infty$ is true in calculus.

Paradoxism in all fields

Florentin Smarandache to Victor Christianto

Let do some investigations about paradoxism occurring in many fields, such as: in religion / theology, in culture, in literature, in arts, in politics, in society, etc.

Victor Christianto

Where do we even begin? Paradoxes seem to exist in every field imaginable.

Florentin Smarandache

Exactly! That's the beauty of it. Let's start with religion. Consider the concept of divine omnipotence and human free will. Can God be all-powerful and all-knowing while simultaneously granting humans genuine free will? It seems paradoxical. If God knows everything we will do, are our choices truly free? This paradox has been debated for centuries. And what about the idea of a benevolent God allowing suffering in the world? Another classic paradox.

Then, let's move to culture. Think about the concept of "popular culture." How can something be both popular and, in a sense, imposed or manufactured by cultural forces? Isn't there a paradox there?

Popular culture is often seen as spontaneous and grassroots, yet it's also heavily influenced by media, marketing, and social trends. It's a paradox of authenticity.

And what about art? A painting can be both a realistic representation of the world and an abstract expression of the artist's inner feelings. Isn't that a paradox? A sculpture can be both heavy and light, both static and dynamic.

Literature is full of paradoxes too. Think of irony, where the intended meaning is the opposite of what is literally said.

And what about politics? Politicians often promise change while simultaneously emphasizing stability. They appeal to both individual liberty and the collective good, even though these can sometimes conflict. It's a constant balancing act between opposing forces.

And social life is full of them. We value individuality, yet we also strive to conform to social norms. We want to be unique, but we also want to belong. It's the paradox of identity.

Victor Christianto

Paradoxes are woven into the fabric of human experience. They're not anomalies; they're a fundamental aspect of reality. But how do we study them systematically? That's where Paradoxism comes in, right?

Florentin Smarandache

Paradoxism is not just about identifying paradoxes; it's about understanding their nature, their origins, and their implications. It's about developing tools to analyze and interpret them.

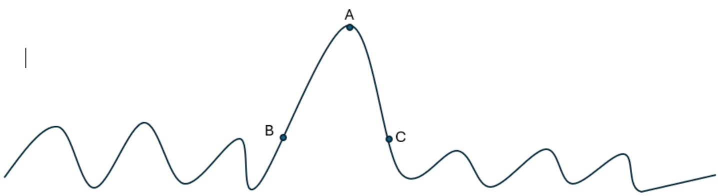
Neutrosophic logic, with its focus on indeterminacy and contradictions, might be a useful tool. But we also need to consider psychological, sociological, and cultural perspectives.

Paradoxism is inherently interdisciplinary.

Paradoxism is a meta-discipline, a way of looking at the world through the lens of paradox. It's about recognizing that reality is not always consistent or coherent, and that these inconsistencies can be a source of creativity and insight.

Principiul Variabilității[32]: *ce este, a fost și va mai fi*

O curbă ca aceasta:



îndeplinește acest principiu, cu excepția punctelor:

(i) A, deoarece nu a fost înainte, și nu va mai fi după.

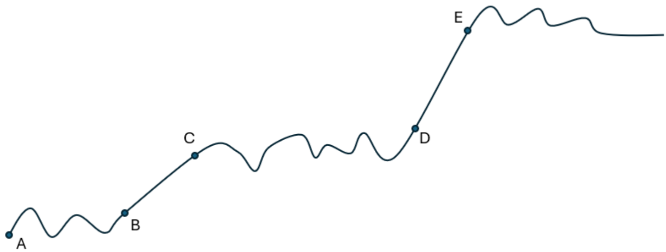
(ii) Toate punctele de pe segmentul de curbă (A, B), deoarece nu au mai fost înainte

(iii) Analog cu punctele de pe segmentul de curbă (A, C), deoarece nu vor mai fi după.

Deci principiul variabilității se aplică doar parțial.

[32] Formulat la început de Ecleziast.

Principiul Schimbării:
ce este nu a fost și nu va mai fi



Punctele de pe segmentele de curbe (A, B), (C, D) reflectă ***principiul variabilității***,

iar punctele de pe segmentele de curbe (B, C), (D, E) reflectă ***principiul schimbării***.

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Variabilitatea vs. Schimbarea

Florentin Smarandache către Ion Marinică

În logicile moderne, este posibil să existe propoziții care sunt parțial adevărate și parțial false (de exemplu, în logica fuzzy, logica intuiționistă fuzzy, logica neutrosofică etc.).

Un paradox, însă, este o propoziție care este simultan 100% adevărată și 100% falsă.

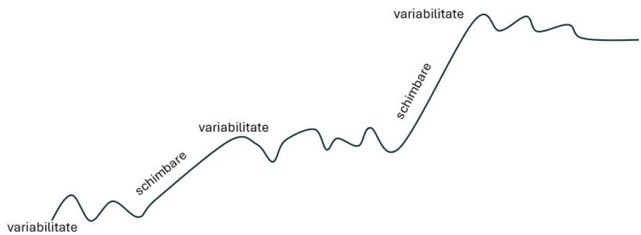
Un exemplu real de adevăr parțial:

Să luăm propoziția **P** = „Vasile s-a dus la piață cu soția."

Aceasta poate fi

- parțial adevărată dacă Vasile s-a dus, într-adevăr, la piață,
- și parțial falsă dacă a fost singur (deci nu împreună cu soția).

Vă atașez o curbă care combină variabilitatea cu schimbarea.



Poate că nu am înțeles prea bine diferența dintre ele?

Menținem legătura pentru eventuale colaborări viitoare.

Sunt, însă, de acord cu tot ceea ce spuneți despre schimbările climatice, scăderea populației, dez-informare, manipulări politice, resetare etc.

Ion Marinică

Curba prezentată de dvs. are aparent intervale de variabilitate între anumite limite, dar în realiate este o curbă care prezintă un proces de schimbare pe ansamblul ei (deoarece rămâne deschisă).

Dacă s-ar închide undeva, ar reprezenta un proces de variabilitate în tot ansamblul ei, indiferent de modul cum ar varia.

Florentin Smarandache

De acord în ceea ce privește curba mea. Dacă aceasta urcă, reprezintă o schimbare.

Totuși, definiția schimbării trebuie actualizată, deoarece nu se aplică tuturor punctelor. Mai exact, pentru punctele aflate într-o zonă de variabilitate, schimbarea nu se manifestă în același mod. Vreau să subliniez că există excepții.

Este nevoie de o formulare mai precisă în loc de „în general”.

În domeniul calculatoarelor, se utilizează logica binară, bazată pe 0 și 1, însă, în ultima perioadă, au început să fie folosite și superpoziții, unde 0 și 1 sunt suprapuse.

Neutrosophic Rhotrix

Nivetha Martin

> With your contributions to linguistic matrix theory, I am trying to develop a Linguistic Rhotrix based on your paper on Linguistic Matrix. Based on your paper, I am extending it and I am trying to conceptualize the following:
> 1. Neutrosophic Linguistic Rhotrix,
> 2. Neutrosophic Hypersoft Linguistic Rhotrix.
> 3.Plithogenic Hypersoft Linguistic Rhotrix
>
> As you have mentioned on other operators, I am using only MAX & MIN Operators since dealing with linguistic representations. Can you suggest some other operators.

Florentin Smarandache to Nivetha Martin

As you know, I've always been eager by connecting neutrosophics with new mathematical entities.

Rhotrix is like a rhombus matrix.

The addition and scalar multiplication look obvious as for matrices.

What about the multiplication and division of two rhotrices?

It is a good idea of yours to connect neutrosophics with new concepts: Rhotrix and hypersoft sets, even more rhotrix and new types of soft sets, SuperHyperSoft Set, IndetermSoft Set, IndetermHyperSoft Set.[33]

[33] See: https://fs.unm.edu/TSS/.

That aligns perfectly with my vision. The inherent uncertainty and indeterminacy within linguistic assessments make neutrosophics a natural fit. Plithogeny adds another layer of sophistication, dealing with the combination of different, possibly conflicting, pieces of information.

You mentioned using MAX and MIN operators for linguistic representations. Have you considered other operators from neutrosophic logic, like the averaging operator or the Lukasiewicz t-norm and t-conorm?

And the neutrosophic aspect comes in when we acknowledge the indeterminacy associated with these linguistic rules. For example, "If the weather is warm (linguistic value), then people might feel happy (linguistic value)." "Might" introduces uncertainty, which neutrosophic logic can handle elegantly. We can assign degrees of truth, indeterminacy, and falsity to these rules.

Uncommon Features in Common Things

Florentin Smarandache to Robert Neil Boyd

- **Observe uncommon features in common things.**

  Pay attention to the small, unique details hidden in everyday objects and experiences. Sometimes, the most ordinary things have extraordinary aspects when viewed from a different perspective.

- **Identify yourself with what you intensely observe.**

Immerse yourself in what you see and experience. Let it resonate with you, allowing it to shape your thoughts and emotions. True understanding comes not just from looking but from deeply connecting with what you observe.

- **Communicate with things and living beings through mental imagery and emotions that will transform into words.**

Perception goes beyond sight—it involves feeling and imagining. When you interact with nature, objects, or people, allow your mind to create vivid images and emotional connections. These impressions will naturally translate into words, enabling a deeper form of expression and storytelling.

Digital Deluge

Reflections on Online Teaching and Learning

Dan Florin Lazăr

1. How has the digital revolution impacted education, and what is the current status of online learning?
2. What are the advantages and challenges of digitizing learning resources?
3. How does the digital divide affect online learning?
4. What are some of the cognitive challenges of online learning, and how can educators address them?
5. How can educators create a sense of community and address test anxiety in online learning environments?
6. How can online learning environments facilitate deeper understanding and integration of knowledge?
7. What role do understanding brain function and concepts like "neutrosophic evolution" play in online instruction?
8. What are the key takeaways regarding online teaching and learning in the digital age?

Florentin Smarandache

The digital revolution has irrevocably transformed the educational landscape, ushering in an era where online learning is no longer a novelty but a core component of the academic experience.

This shift presents both exciting possibilities and significant challenges for educators striving to cultivate meaningful learning in a virtual environment.

One of the most fundamental changes in the online classroom is the digitization of resources.

From e-textbooks to online homework assignments and assessments, the traditional tools of learning have been translated into a digital format.

This offers undeniable advantages in terms of accessibility, convenience, and the potential for interactive learning experiences. However, the mere presence of digital tools does not guarantee effective learning.

Educators must carefully curate and design online content, ensuring that it is engaging, relevant, and aligned with learning objectives. Furthermore, the digital divide remains a significant concern.

Equitable access to technology and reliable internet connectivity are essential for ensuring that all students have the opportunity to succeed in the online learning environment. Bridging this gap requires not only providing hardware and internet access but also offering digital literacy training and ongoing technical support.

Beyond the practicalities of digital resources, effective online teaching must also address the cognitive demands of learning in a virtual space.

While digital tools offer a variety of note-taking options, educators must actively teach and reinforce effective note-taking strategies.

Furthermore, the challenge of maintaining attention in the face of constant digital distractions cannot be overstated. "Split attention" is a pervasive issue in the online world.

Educators must design learning activities that are engaging and interactive, minimizing opportunities for distraction and promoting focused attention. This requires a deep understanding of cognitive principles and the ability to translate them into effective pedagogical practices.

It is a must to desensitize students before tests which highlights the need to address test anxiety and create a sense of psychological safety. Online learning can sometimes feel isolating, so it is crucial for educators to foster a sense of community and connection among students.

Regular opportunities for interaction, collaboration, and feedback are essential for creating a positive and supportive online learning environment.

The Gestalt principle, "the whole is greater than the sum of its parts," reminds us that learning is not simply about acquiring isolated facts but also about integrating them into a coherent understanding.

Online learning environments can be designed to facilitate this process by providing opportunities for students to connect concepts, synthesize information, and apply their knowledge in meaningful ways. Sometimes, breaking down complex topics into smaller, more manageable parts can be a helpful strategy, particularly for students who are new to online learning.

Understanding how the brain learns and adapts is crucial for designing effective online instruction. Furthermore, the concept of "neutrosophic evolution," which deals with uncertainty and interconnectedness, suggests that learning is a dynamic and evolving process.

In the rapidly changing digital landscape, educators must be adaptable, innovative, and willing to embrace new approaches to teaching and learning.

Conclusion

Online learning presents both challenges and opportunities for educators. By carefully considering the cognitive demands of learning in a digital environment, implementing effective pedagogical strategies, and fostering a supportive online community, educators can harness the power of technology to create meaningful and transformative learning experiences for all students. As technology continues to evolve, so too must our understanding of how to effectively teach and learn in the digital age.

Controlul Neutrosofic al Roboților în mecatronică[34]

Florentin Smarandache[35]

În domeniul mecatronicii, controlul roboților reprezintă o provocare complexă, dată fiind necesitatea de a gestiona incertitudinea și variabilitatea mediului în care aceștia operează. Controlul neutrosofic, bazat pe logica neutrosofică, oferă un cadru inovator pentru a aborda această problemă. Această logică permite gestionarea gradelor de control și a incertitudinii, oferind o perspectivă mai nuanțată decât abordările tradiționale.

Fie că avem de a face cu roboți versatili, multilaterali, haptici sau antropomorfici, controlul lor implică

[34] Rezumat al prezentărilor prin zoom de la Sesiunea IMSAR din februarie 2023 privind „Applications of Neutrosophic Logic in Robotics. Vision, trends, strategies for increasing the scientific interest for Robotics in Scientific Research in the country and abroad”, și de la Sesiunea IMSAR din 13 decembrie 2023, privind „Applications of Neutrosophic Logic in Robotics. Challenges for increasing the Neutrosophic interest in Robotics in the country and abroad, the 2nd part”.

[35] Prof. Dr. Florentin Smarandache este Președinte de Onoare al Societății de Robotică din România, Filiala București.

gestionarea coordonatelor carteziene sau ale articulațiilor, reprezentând unghiurile dintre legături. Actuatorul, elementul mecanic responsabil pentru mișcarea și controlul legăturilor robotului, joacă un rol crucial în acest proces.

Însă, controlul perfect al unui robot este adesea imposibil. Vorbim despre grade de control, situându-se, de exemplu între 80-90%, dar și despre grade de incertitudine, de exemplu între 10-20%. Logica neutrosofică, prin capacitatea sa de a gestiona incertitudinea, devine esențială în astfel de scenarii.

O întrebare cheie este cum putem îmbunătăți controlul robotului prin reducerea gradului de incertitudine. Aici intervine logica plitogenică, o logică multi-variată care permite evaluarea unui act, fenomen sau robot din multiple perspective, utilizând diverse surse și parametri. Această abordare multi-valorică ne permite să agregăm informațiile obținute pentru a determina un adevăr concluziv.

Un robot modern este echipat cu numeroși senzori, iar informațiile furnizate de aceștia sunt fuzionate pentru a realiza o acțiune specifică. Această fuziune a datelor provenite de la mai mulți senzori permite robotului să ia decizii mai precise și mai adaptate la mediul înconjurător.

În concluzie, controlul neutrosofic al roboților în mecatronică reprezintă un domeniu de cercetare activ și promițător. Prin combinarea logicii neutrosofice cu logica plitogenică și prin utilizarea senzorilor, putem dezvolta roboți mai inteligenți, capabili să opereze eficient într-un mediu complex și incert.

Metoda Proiecției Virtuale pentru Roboți (VIPRO2)

Florentin Smarandache

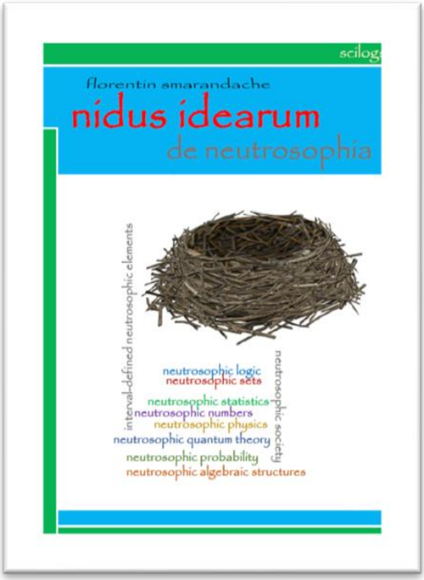
Sistemul are la bază o metodă de proiecție virtuală, cunoscută ca Metoda Vlădăreanu-Munteanu, brevetată de Institutul de Mecanica Solidelor al Academiei Române. Această metodă integrează interfețe inteligente de control în timp real, cum ar fi metoda neutrosofică de control, cunoscută ca Metoda Vlădăreanu-Smarandache.

Sistemul include și Metoda de Control Extensic al Robotului, care are la bază Teoria Extensică, care înseamnă rezolvarea problemelor contradictorii. Aceasta include interfețe inteligente cu rețele neurale.

Scilogs

I: De Neutrosophia (2016)

Florentin Smarandache: **Nidus idearum. Scilogs, I: de neutrosophia**. Brussels, Belgium: Pons, 2016, 109 p.; ISBN: 978-1-59973-890-1



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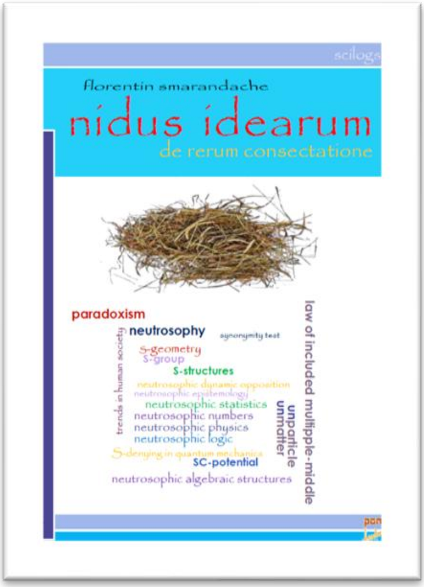

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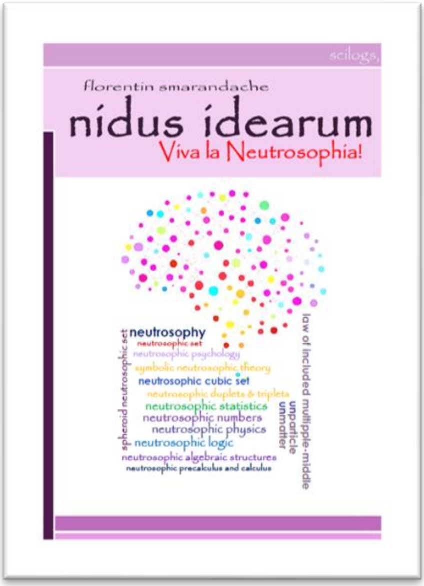

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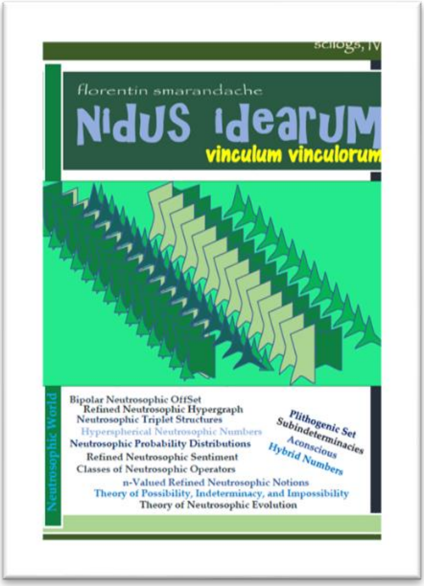

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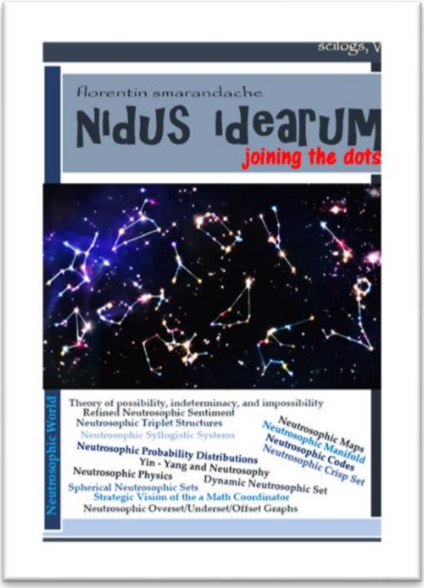

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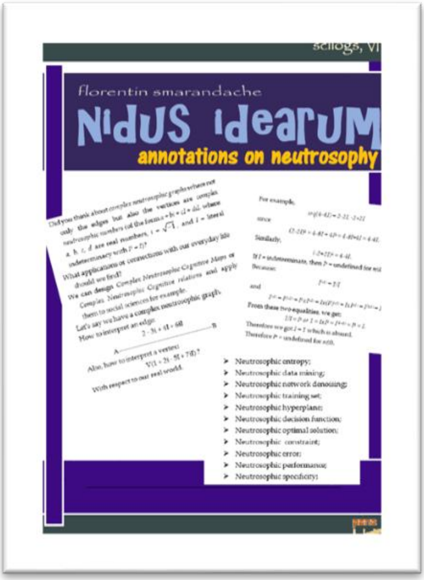

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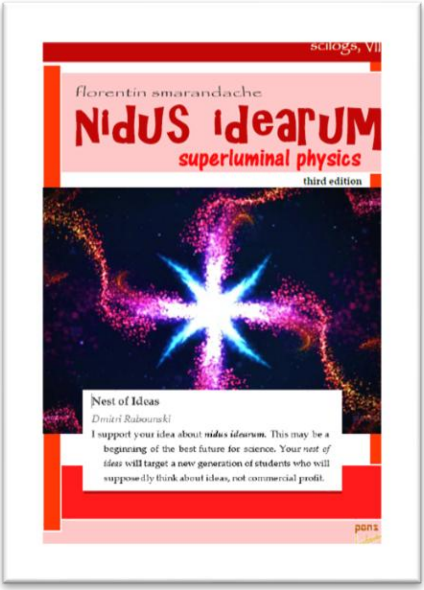

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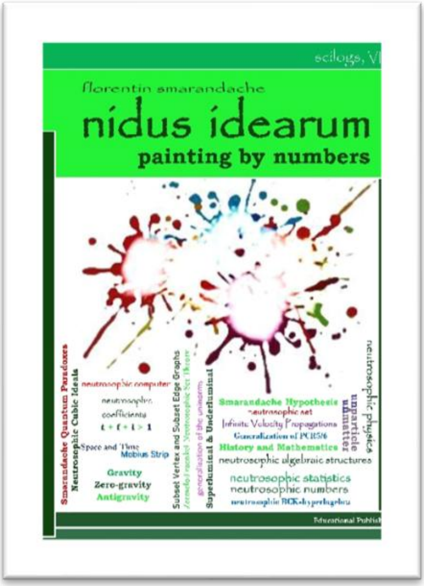

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IX: Neutrosophia Perennis (2022)

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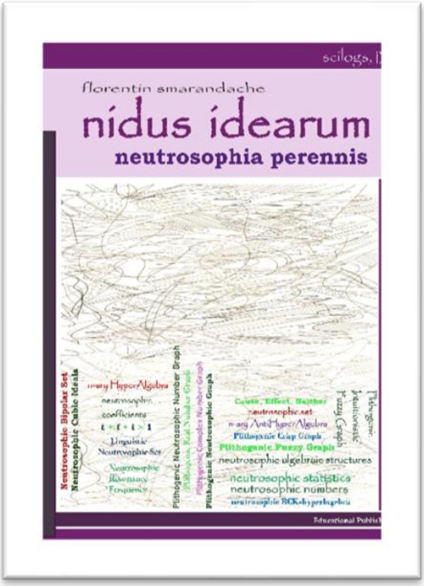

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X: Via Neutrosophica (2022)

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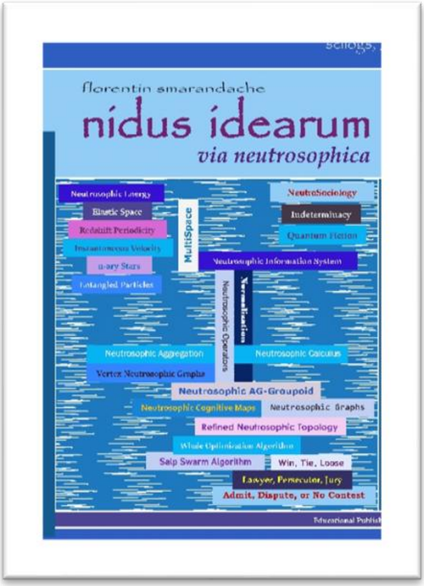

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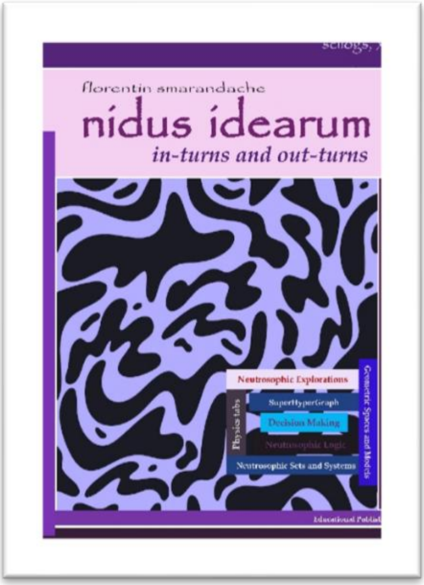

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XII: Seed & Heed (2023)

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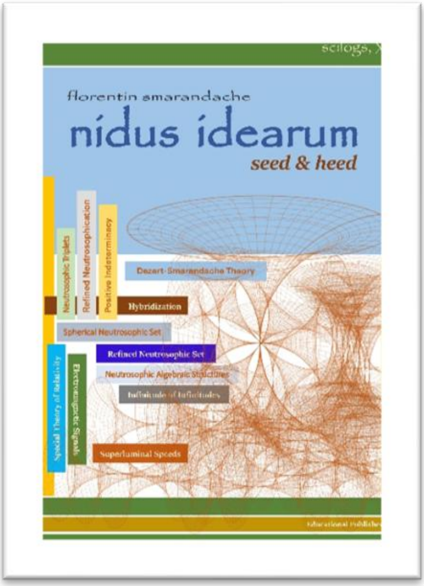

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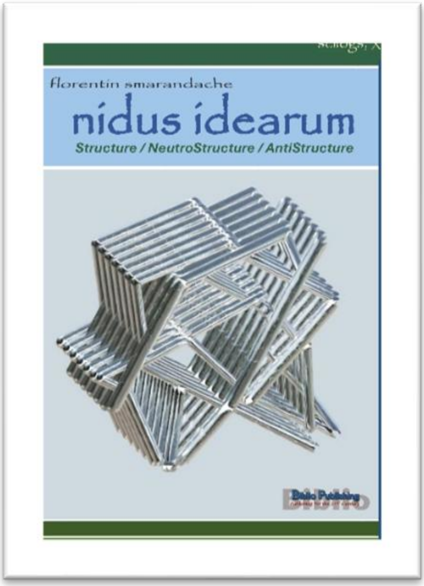

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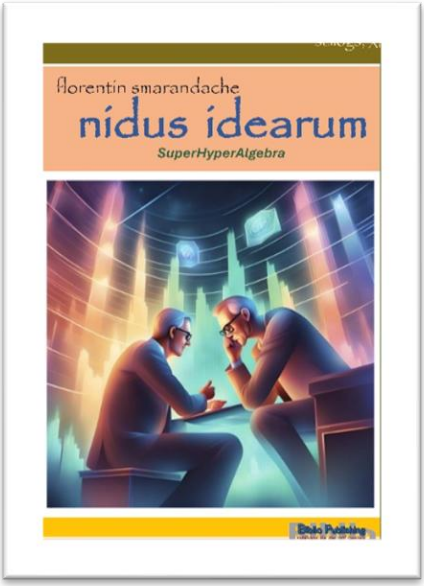

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