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Nidus Idearum. Scilogs, XIV: SuperHyperAlgebra

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scilogs, XIV

florentin smarandache

nidus idearum

SuperHyperAlgebra

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Florentin Smarandache

Nidus idearum.
Scilogs, XIV: SuperHyperAlgebra

Grandview Heights, Ohio, USA, 2024

Exchanging ideas with Mirela Teodorescu, Linfan Mao, Shondiin Silversmith, Mumtaz Ali, Vasantha W.B. Kandasamy, V. Lakshmana Gomathi Nayagam, Bharanidharan R., Michael Voskoglou, Said Broumi, Maissam Jdid, Sagvan Y. Musa, Mohammad Hamidi, Yaser Ahmad Alhasan, Nivetha Martin, Mohammad Khoshnevisan, Deqiang Han, Jean Dezert, Mircea Șelariu, Ștefan Vlăduțescu, Tudor Păroiu (in order of reference in the book).

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Florentin Smarandache

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INVITATION

Welcome into my scientific lab!

My **lab**[oratory] is a virtual facility with non-controlled conditions in which I mostly perform scientific meditation and chats: *a nest of ideas* (**nidus idearum**, in Latin).

I called the jottings herein *scilogs* (truncations of the words *scientific*, and gr. Λόγος (logos) – appealing rather to its original meanings "ground", "opinion", "expectation"), combining the welly of both science and informal (via internet) talks (in English, French, and Romanian).

In this *fourteenth book of scilogs* – one may find topics on examples where neutrosophics works and others don't, law of included infinitely-many-middles, decision making in games and real life through neutrosophic lens, sociology by neutrosophic methods, Smarandache multispace, algebraic structures using natural class of intervals, continuous linguistic set, cyclic neutrosophic graph, graph of neutrosophic triplet group , how to convert the crisp data to neutrosophic data, n-refined neutrosophic set ranking, adjoint of a square neutrosophic matrix, neutrosophic optimization, de-neutrosophication, the n-ary soft set relationship, hypersoft set, extending the hypergroupoid to the superhypergroupoid, alternative ranking, Dezert-Smarandache Theory (DSmT), reconciliation between theoretical and market prices, extension of the MASS model by the incorporation of neutrosophic statistics and the DSmT combination rule, conditional probability of actually detecting a financial fraud, neutrosophic extension using DSmT combination rule, probabilistic information content, absolute and relative DSm conditioning rules, example of PCR5 with Zhang's degree, PCR5 with degree of intersection, the most general form of SuperHyperAlgebra, on Crittenden and Vanden Eynden's conjecture, use of special types of linear algebras and their generalizations, SuperMathematics, 3D-space in physics, neutrosophic physical laws, neutrosophy as a meta-philosophy, principle of interconvertibility matter-energy-information, neutrosophic philosophical interpretation, possible neutrosophic applications to Indian philosophy and religion, philosophical horizons in neutrosophy, clan capitalism, or artificial intelligence – email messages to research colleagues, or replies, notes, comments, remarks about authors, articles, or books, spontaneous ideas, and so on.

Feel free to budge in or just use the scilogs as open source for your own ideas!

Contents

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previously published SCILOGS

Nidus idearum. Scilogs, I: *de neutrosophia*.
Brussels, 2016 http://fs.unm.edu/NidusIdearumDeNeutrosophia.pdf
Nidus idearum. Scilogs, II: *de rerum consectatione*.
Brussels, 2016 http://fs.unm.edu/NidusIdearum2-ed2.pdf
Nidus idearum. Scilogs, III: *Viva la Neutrosophia!*
Brussels, 2015 http://fs.unm.edu/NidusIdearum3.pdf
Nidus idearum. Scilogs, IV: *vinculum vinculorum*.
Brussels, 2019 http://fs.unm.edu/NidusIdearum4.pdf
Nidus idearum. Scilogs, V: *joining the dots*.
Brussels, 2019 http://fs.unm.edu/NidusIdearum5-v3.pdf
Nidus idearum. Scilogs, VI: *annotations on neutrosophy*.
Brussels, 2019 http://fs.unm.edu/NidusIdearum6.pdf
Nidus idearum. Scilogs, VII: *superluminal physics*.
Brussels, 2019 http://fs.unm.edu/NidusIdearum7-ed3.pdf
Nidus idearum. Scilogs, VIII: *painting by numbers*.
Grandview Heights, 2022 http://fs.unm.edu/NidusIdearum8.pdf
Nidus idearum. Scilogs, IX: *neutrosophia perennis*.
Grandview Heights, 2022 http://fs.unm.edu/NidusIdearum9.pdf
Nidus idearum. Scilogs, X: *via neutrosophica*.
Grandview Heights, 2022 http://fs.unm.edu/NidusIdearum10.pdf
Nidus idearum. Scilogs, XI: *in-turns and out-turns*.
Grandview Heights, 2023 http://fs.unm.edu/NidusIdearum11.pdf
Nidus idearum. Scilogs, XII: *seed & heed*.
Grandview Heights, 2023 http://fs.unm.edu/NidusIdearum12.pdf
Nidus idearum. Scilogs, XIII: *Structure / NeutroStructure / AntiStructure*.
Grandview Heights, 2023 http://fs.unm.edu/NidusIdearum13.pdf

TOPICS

Brainstorming Lab

Sifting Neutrosophics

Sets & Systems

Exploring Dezert-Smarandache Theory (DSmT): Discussions, Research, and Applications

Math Thematics

Physics

Philosophy&Stuff

Brainstorming Lab

Law of Included Infinitely-Many-Middles

Florentin Smarandache

The concept of this law[1] originated alongside with analysis issues in classical probability theory. It posits that between the probability of an impossible event (0) and the probability of a certain event (1), *there exist infinitely many events that are partially impossible and partially possible*, with probabilities ranging strictly between 0 and 1.[2]

Informational Action

Florentin Smarandache

Information processing involves computations that include various operations and actions. The subject utilizes computational tools to process cognitive material.

[1] Florentin Smarandache (2014). "Law of Included Multiple-Middle & Principle of Dynamic Neutrosophic Opposition". Columbus: Educational Publisher, 135 p.; available online: https://fs.unm.edu/LawIncludedMultiple-Middle.pdf

[2] Florentin Smarandache (2023). "Law of Included Infinitely-Many-Middles within the frame of Neutrosophy." *Neutrosophic Sets and Systems* 56:1-4; available online: https://fs.unm.edu/NSS/LawIncludedInfinitely1.pdf

The term *informational action* refers to a method of processing information.

There are five key actions: exploring, grouping, *anticipation*, schematization, and structuring. All informational-computational actions are systematically guided practices.

Examples where Neutrosophics works and others don't

Florentin Smarandache

I should provide more clear&simple examples in which Neutrosophic logic can be applied to a specific decision question in which it inherently comes up with a different (and presumably better) decision than any of these:

- classical probability theory;
- classical (2-valued) logic;
- fuzzy logic.

Decision Making in Games and Real Life through Neutrosophic Lens

Florentin Smarandache, Mirela Teodorescu

I co-authored with Mirela Teodorescu an article[3] that delves into the relationship between decision-making

[3] Florentin Smarandache, Mirela Teodorescu (2016). "From Linked Data Fuzzy to Neutrosophic Data Set Decision Making in Games vs. Real Life." In Florentin Smarandache, Surapati Pramanik (editors). "New Trends in Neutrosophic Theory and

processes in games and their reflection in real-life scenarios. Focusing particularly on multiplayer online computer games, we examined their social dynamics, citing EVE Online as a prime example due to its simulation-like qualities. The application of economic concepts, notably Vernon Smith's theories, adds depth to the discussion.

Drawing from philosophical and psychological perspectives, the article explores the essence of games as symbolic activities. It highlights their role in childhood development, citing scholars like Ludwig Wittgenstein, Eric Erikson, and Jean Piaget. Games are portrayed as essential for learning, creativity, and socialization, with cultural and cognitive implications. Moreover, the advent of internet gaming is analyzed, noting its economic and cultural impacts, along with concerns such as addiction and tolerance.

We used Neutrosophic Theory as a framework for analyzing decision-making processes in games. Athar Kharal's work on multicriteria decision making using neutrosophic sets is referenced, emphasizing its utility in evaluating uncertainty.

EVE Online is examined as a case study, focusing on the factors contributing to uncertainty in decision making within the game. Economic principles applied by scholars like Dr. Eyjólfur Guðmundsson enrich the understanding of

Applications," Brussels: Pons, pp. 115-126; available online: https://vixra.org/pdf/1612.0090v1.pdf

EVE Online as a simulated system mirroring real-world complexities. The game serves as a microcosm for exploring human behavior and strategic decision making amidst uncertainty.

Our article concludes by underlining the parallels between decision making in games and real life, emphasizing the value of games as experiential learning platforms.

Neutrosophic Sociology: studying sociology by neutrosophic methods

Florentin Smarandache

Neutrosophic Sociology (or *Neutrosociology*) is the study of sociology using neutrosophic scientific methods.[4]

The huge social data that we face in sociology is full of indeterminacy: it is *vague, incomplete, contradictory, hybrid, biased, ignorant, redundant, superfluous, meaningless, ambiguous, unclear,* etc.

That's why the neutrosophic sciences (which deal with indeterminacy), through the process of neutrosophication, are involved, such as: *neutrosophy* (a new branch of philosophy), *neutrosophic set, neutrosophic logic, neutrosophic probability* and *neutrosophic statistics, neutrosophic analysis, neutrosophic measure,* and so on.

[4] Florentin Smarandache (2019). "Introduction to Neutrosophic Sociology (Neutrosociology)." Brussels: Pons, 78 p.; avalibale online: https://fs.unm.edu/Neutrosociology.pdf

Neutrosophy studies only the triads (<A>, <neutA>, <antiA>), where <A> is an item or a concept, that make sense in the real world.

The process of neutrosophication means:

- converting a crisp concept {i.e. (1, 0, 0)-concept, which means concept that is 100% true, 0% indeterminate, and 0% false} into a neutrosophic concept {i.e. (T, I, F)-concept, which is T% true, I% indeterminate, and F% false – which more accurately reflects our imperfect, non-idealistic reality}, or more general into a refined (T_1, T_2, ...; I_1, I_2, ...; F_1, F_2,...)-concept;
- or the conversion of a crisp (1 or 0), fuzzy (T), or intuitionistic fuzzy (T, F) numbers into a neutrosophic number (T, I, F);
- or the conversion of a crisp (exact) number N into a neutrosophic number of the form $N = a + bI$, where a is the determinate part of number N and bI the indeterminate part of number N.

Smarandache Multispace

Linfan Mao

In any field of knowledge, a *Smarandache multispace*[5] (or *S*-multispace) with its multistructure is *a finite or infinite* (countable or uncountable) *union* of various

[5] More information, and also free books and articles: https://fs.unm.edu/Multispace.htm

spaces with different structures, which may overlap.[6] The concepts of multispace (also spelled multi-space) and multistructure (also spelled multi-structure) were introduced by Smarandache in 1969 under his idea of hybrid science, which aims to combine different fields into a unified field, reflecting the *heterogeneous nature of our real world*.[7]

Today, this idea is widely accepted in the scientific community. A *S*-multispace is a qualitative concept because it is extensive, encompassing both metric and non-metric spaces. It is believed that the Smarandache multispace with its multistructure is the leading candidate for the 21st-century Theory of Everything across various domains, as it unifies many fields of knowledge.

Applications of such a multispace include its use in physics for the Unified Field Theory, which aims to unify gravitational, electromagnetic, weak, and strong interactions. It is also relevant in *parallel quantum computing, the mu-bit theory, multi-entangled states or particles,* and *multi-entangled objects*.

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[6] Linfan Mao (2006). "Smarandache Multi-Space Theory." Partially post-doctoral research for the Chinese Academy of Sciences. Phoenix: Hexis, 263 p.; available online: https://fs.unm.edu/S-Multi-Space.pdf

[7] First International Conference on Smarandache Multi-space and Multistructure was organized by Dr. Linfan Mao, Academy of Mathematics and Systems, Chinese Academy of Sciences, Beijing, People's Republic of China, June 28-30, 2013.

Additionally, this concept applies to algebraic multispaces (such as *multi-groups, multi-rings, multi-vector spaces, multi-operation systems, multi-manifolds, multi-voltage graphs*, and *multi-embedding of a graph in a n-manifold*), geometric multispaces (which combine Euclidean and Non-Euclidean geometries into one space, as in *Smarandache geometries*), and theoretical physics (including *relativity theory, M-theory,* and *cosmology*). It also pertains to multi-space models for *p*-branes and cosmology.

Furthermore, the multispace and multistructure concepts were first utilized in Smarandache geometries (1969), which combine different geometric spaces where at least one geometric axiom behaves differently in each space. These concepts also feature in paradoxism (1980), an avant-garde approach in literature, arts, and science, which finds commonalities between opposing ideas by combining contradictory fields.

In neutrosophy (1995), a generalization of dialectics in philosophy, the consideration extends beyond an entity <A> and its opposite <antiA> to include the neutralities <neutA> in between. Neutrosophy integrates <A>, <antiA>, and <neutA> together, forming a *metaphilosophy*. This approach extends to neutrosophic logic (1995), neutrosophic set theory (1995), and neutrosophic probability (1995), which introduce a third component called indeterminacy, representing a state that is neither true nor false, or both true and false simultaneously — a combination of opposites within indeterminacy.

These ideas are also employed in Smarandache algebraic structures (1998), where certain algebraic structures are incorporated into other algebraic structures.

Towards an "International Extension Innovation Applied Research Center"

Draft Proposal (2014)

by Florentin Smarandache

Party A: International Academy of Extenics

Party B: University of New Mexico at Gallup, USA

Based on consultation, Party A and Party B intend to set up International Extension Innovation Applied Research Center (hereinafter referred to as the Center) in University of New Mexico.

- The *main functions* of the Center:

1. Train the talents to use the extenics-based theory and method for innovation.

2. Develop the basic elements base for the service of new product conception design for companies.

3. Develop the extension strategy generation platform to solve the contradictory problems.

4. Provide the innovation consultation for regional economy, industries and enterprises by using Extentics and Extentics-based methods.

- *Location:* University of New Mexico, USA
- *Financial Resources:*

With joint efforts, Party A and Party B shall raise the capital for center operation by government funding, enterprise sponsors and enterprise capital contribution etc.

- *The responsibilities of Party A*:
- Provide the series files of Extenics-based theory for the consultation of innovation methodology for Party B;
- Develop the basic elements base and the extension strategy generation platform, and provide support on theory and methods;
- Carry out the targeted technology research and development and provide theory support for the consulting projects which Party B undertakes;
- Invite the researchers of Party B in the Center to visit China, and bear the expenses of board and lodging for the staff of Party B.
- Select graduate students and excellent college students to UNM for advanced studies.
- *The responsibilities of Party B:*
- Organize a team to learn and master the Extenics-based theory and extension innovation method;
- Contact and undertake the consulting projects of industries and enterprises, and charge reasonable consulting fees;

- Raise money in USA for the establishment of the Center and its daily operation expenses;
- Invite the researchers of Party A in the Center to visit USA, and bear the expenses of board and lodging for the staff of Party A.
- Select excellent students to China for advanced studies on Extenics.

Algebraic Structures Using Natural Class of Intervals

Interview - "Campus Voice," UNM-G, with the occasion of 2011 NM Book Award[8]

Shondiin Silversmith

Describe your book.[9]

Florentin Smarandache

The book introduces the natural class of intervals and defines algebraic structures and neutrosophic structures on them. The book is about abstract algebra.

Shondiin Silversmith

What inspired you to write this book?

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[8] 2011 New Mexico Book Award Winners, more information online: https://nmbookcoop.com/BookAwards/page/2011-winners/2011-winners.html

[9] Vasantha Kandasamy, Florentin Smarandache (2011). "Algebraic Structures Using Natural Class of Intervals." Columbus: Educational Publisher, 170 p.; available online: https://fs.unm.edu/AlgebraicIntervals.pdf

Florentin Smarandache

The neutrosophic logic inspired us to extend the indeterminate component ("I") from logic to algebra. In Neutrosophic Logic, which is a generalization of the Fuzzy Logic, a proposition has a percentage of truth, a percentage of falsehood, and a percentage of neutral (indeterminacy, i.e. neither truth nor false). Like in the voting procedure: voting FOR, voting CONTRA, or NOT voting.

We have previously defined a neutrosophic number in the form of N = a+bI, where a and b are real (or complex) numbers, and I = indeterminacy. "a" represents the determinate part of number N and "b" the indeterminate part of number N.

"I" is different from the complex unit "i", which is the square root of -1.

Then, we extended these numbers to neutrosophic intervals, and later to neutrosophic structures.

Shondiin Silversmith

When did you start writing this book and when was it published?

Florentin Smarandache

At the beginning of 2011 we started writing the book. It took about two months to finish it. It was published in the pasted Summer.

Shondiin Silversmith

How does it feel to have won the 2011 NM Book Award?

Florentin Smarandache

Very pleasant. It is a symbolic award for our research in algebraic structures that lasted more than a decade.

Shondiin Silversmith

Do you recommend this book for students at UNM-Gallup?

Florentin Smarandache

The book is for graduate students. The book is also for researchers and professors.

Assesing 'Best Movies'

Florentin Smarandache
to Mumtaz Ali

In order to find out what is the 'best movie', according to the information provided by those people, we simply add the numbers on column Quality and on column Sound for each movie.

The largest number will give the 'best movie'.

In order to make it neutrosophic, instead of crisp numbers of the form 4, 5, etc. we can associate triples (t, i, f) for each of them.

Or if we keep crisp numbers, at least for one value we should assign "I" = indeterminacy.

Let's do such paper!

Geometria lingvistică și aplicațiile ei

Florentin Smarandache

Am definit noțiunea de 'geometrie lingvistică' împreună cu W.B. Vasantha Kandasamy și Ilantheral K.[10]

Geometria lingvistică diferă de geometria clasică. Multe concepte și noțiuni de bază sau fundamentale ale geometrie clasice *nu sunt adevărate sau extensibile* în cazul geometriei lingvistice. Prin urmare, pentru o simplă ilustrare, fapte precum două puncte distincte în geometria clasică definesc întotdeauna o linie care trece prin ele; acest lucru nu este adevărat în geometria lingvistică. Să presupunem că avem două puncte lingvistice, e.g. 'înalt' și 'ușor', pe care nu le putem conecta sau, din punct de vedere tehnic, nu există nicio linie între ele.

Totuși, să luăm, de exemplu, două puncte lingvistice, 'înalt' și 'foarte scund', asociate cu înălțimea variablă lingvistică a unei persoane. Avem o linie direcționată care unește de la punctul lingvistic 'foarte scund' la punctul lingvistic 'înalt'.

În acest caz, este important de menționat că direcția este esențială atunci când variabila lingvistică este *înălțimea* unei persoane. Linia inversă, de la 'înalt' la 'foarte scund', nu are sens. Deci, în gemetria lingvistică, în general, s-ar putea să nu avem o singură linie lingvistică;

[10] W.B. Vasantha Kandasamy, Ilantheral K., Florentin Smarandache (2022). "Linguistic Geometry and its Applications." Miami: Global Knowledge.

desigur, avem o linie, dar s-ar putea să nu o avem în ambele direcții: linia poate fi direcționată.

Linia lingvistică direcționată există dacă și numai dacă punctele sunt comparabile.

Prin urmare, însuși conceptul de extindere a liniei la infinit nu există.

La fel, nu putem spune, ca în gemetria clasică, precum că trei puncte necoliniare determină planul în geometria lingvistică. În plus, nu avem noțiunea de zonă lingvistică a unor figuri bine definite precum un triunghi, patrulater sau orice poligon, ca în cazul geometriei clasice.

Cea mai bună parte a geometriei lingvistice este că putem defini noua noțiune de rețele geometrice de informații sociale lingvistice, analog rețelelor de informații sociale.

Aceasta va fi un avantaj pentru cercetătorii non-matematici din științe socio-umane în care limbajele naturale pot înlocui matematica.

Continuous Linguistic Set

Florentin Smarandache

to Vasantha Kandasamy

A discrete linguistic set

{*small, big*}

can be turned into a *continuous linguistic set* as:

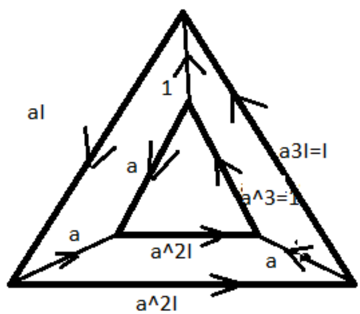
[*small*, *p% small* & *(1-p)% big*, *big*], where $p \in (0,1)$.

Sifting Neutrosophics

Cyclic Neutrosophic Graph

Florentin Smarandache

Graph of $\langle C_3 \cup I \rangle$, where C_3=$\{a: a^3 = 1\}$.



Cyclic Neutrosophic Graph

(This looks like a pyramid trunk)

Graph of Neutrosophic Triplet Group NTG={0, 2, 4, 6, 8}

Florentin Smarandache

Consider $(Z_{10},\times)$. Then $NTG = \{0,2,4,6,8\}$ is a neutrosophic triplet group with respect to multiplication modulo 10.

Ignore the trivial neutrosophic triplet $(0,0,0)$.

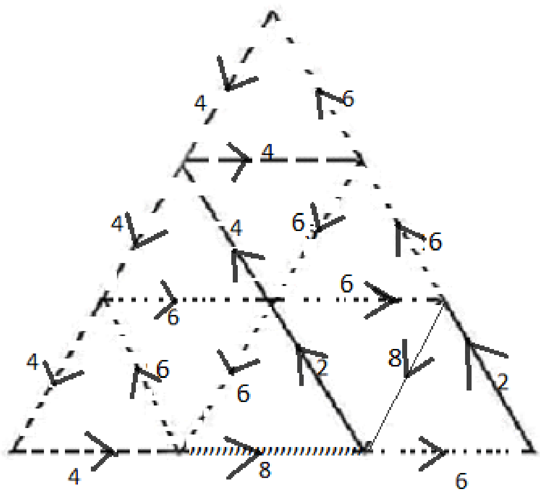
Let 2 be represents by the line by the following line.

4 is denoted by the dashed line

6 is represented by doted line

And 8 is denoted by comma line

Now by the consider that the bianary operation $\times$ and when we combine two elements of NTG, the next elelement will be next side of the triangle. The arrow shows the direction.



For example when $4 \times 4 = 16 (mod\ 10) = 6$. The next element will be 6. In the figure, the arrow shows that when side 4 combine to side 4, the next side will be 6. Similarly when $2 \times 8 (mod\ 10) = 6$. Then next side is 6 and so on.

How to Convert the Crisp Data to Neutrosophic Data

Florentin Smarandache

Numbers that are unknown, but we know that each one belongs to some closed or open interval, for example:

$$a_1 \in [0.1, 0.2],$$

$$a_2 \in (0.4, 0.7],$$

$$a_3 \in (2, 3),$$

$$a_4 \in [4, 6),$$

$$a_5 \in [7, 7.2], \ldots$$

We know that $0.1 \leq a_1 \leq 0.2$, but we do not know its exact value.

Similarly, for $a_2, a_3, a_4, \ldots$.

Numbers that belong to some hesitant sets (i.e. sets that have a finite number of elements), for example:

$$b_1 \in \{0.2, 0.5, 0.6\},$$

$$b_2 \in \{0.1, 0.5\},$$

$$b_3 \in \{4.5, 7.2, 8.3, 9.8\}, \ldots$$

We know that: either $b_1 = 0.2$, or $b_1 = 0.5$, or $b_1 = 0.6$, therefore three possible choices/alternatives to choose from.

Similarly, for $b_2, b_3, b_4, \dots$.

Neutrosophic Numbers (*NN*) of the form

NN = a + bI, where *a, b* are real (or complex) numbers, and *I* = indeterminacy.

The determinate part of *NN* is

determ(NN) = a,

and the indeterminate part of *NN* is

indeterm(NN) = bI.

For example:

Let NN = 3 + 2I, where *I* = [0.1, 0.3], then *determ*(NN) = 3 and *indeterm*(NN) = 2I.

I may be: known, partially known and partially unknown, or unknown.

I may be a general set.

<u>Real Applications</u>:

$\sqrt{3} = 1.7320508075\dots$ is an *irrational number*, which has infinitely many decimals (digits) with no repeated group of digits, in our real world we need to approximate it with some desired accuracy.

We may say that, for example:

$\sqrt{3}$= 1.7 + I, where I is indeterminacy, i.e. I = 0.0000508075... (infinitely many decimals, we are unable to know all of them).

Another approximation is:

$\sqrt{3}$= 1.732 + I, where I = [0.0000, 0.0001]

Also, we may have:

$\sqrt{3} = 1.7 + 3I$, where $I \in [0.01,0.02]$, whence

$\sqrt{3} \in [1.7 + 3 \times 0.01, 1.7 + 3 \times 0.02] = [1.73,1.76]$

Or better accuracy:

$\sqrt{3} = 1.73 + 2I$,

where $I = [0.001,0.002]$, whence:

$$\sqrt{3} = 1.73 + 2I =$$
$$= [1.73 + 2 \times 0.001, 1.73 + 2 \times 0.002] =$$
$$= [1.732,1.734]$$

And so on.

Similarly for the *transcendental numbers*, let's say:

$$\pi = 3.1415926535\ldots$$
$$e = 2.7182818284\ldots$$

In these cases, the approximation may be equivalent to an interval that contains the number, but if we do not know much about the indeterminacy, we just use "*I*".

n-Refined Neutrosophic Set Ranking

Florentin Smarandache

to V. Lakshmana Gomathi Nayagam, Bharanidharan R.

When you transform:

a (p_1, q_1, r_1)-refined neutrosophic set,

where $p_1 + q_1 + r_1 = n_1$,

into a bigger one:

(p_1', q_1', r_1')-refined neutrosophic set,

with $p_1' + q_1' + r_1' = n_1' > n_1$,

it does not mean that if for $N_1 > N_2$ in the (p_1, q_1, r_1) system then $N_1' > N_2'$ in the (p_1', q_1', r_1') system

Even so, you need to prove that:

Theorem

If $(T_1, I_1, F_1) > (T_1', I_1', F_1')$

and $(T_2,I_2,F_2) > (T_2', I_2',F_2')$

then $(T_1, T_2; I_1, I_2; F_1, F_2) > (T_1', T_2'; I_1', I_2'; F_1', F_2')$,

which will result for the general case:

$$(T_1, T_2, \ldots, T_k;\ I_1, I_2, \ldots, I_k;\ F_1, F_2, \ldots; F_k) >$$
$$(T_1', T_2', \ldots, T_k';\ I_1', I_2', \ldots, I_k';\ F_1', F_2', \ldots; F_k').$$

What about if you get:

$(T_1, I_1, F_1) > (T_1', I_1', F_1')$ and $(T_2,I_2,F_2) < (T_2', I_2',F_2')$,

then

$(T_1, T_2; I_1, I_2; F_1, F_2) >$ (or $<$) $(T_1', T_2'; I_1', I_2'; F_1', F_2')$?

Adjoint of a square neutrosophic matrix

Florentin Smarandache

Let A be a square neutrosophic matrix:

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

based on adjoint of a fuzzy matrix.

Then we could compute the adjoint of a square neutrosophic matrix as:

$$B11=\begin{bmatrix} (0.4\,,0.5,0.2) & (0.3,0.2,0.1) \\ (0.4,0.2,0.3) & (0.4,0.5,0.1) \end{bmatrix} =$$

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

B11 =(0.4, 0.2, 0.2)

B12= $\begin{bmatrix} (0.4, 0.5, 0.3) & (0.3, 0.2, 0.1) \\ (0.4, 0.2, 0.1) & (0.4, 0.5, 0.1) \end{bmatrix} =$

= [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)}]

B12 =(0.4, 0.2, 0.1)

B13= $\begin{bmatrix} (0.4, 0.5, 0.3) & (0.4, 0.5, 0.2) \\ (0.4, 0.2, 0.1) & (0.4, 0.2, 0.3) \end{bmatrix} =$

= [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)}]

B13 =(0.4, 0.5, 0.2)

Similarly :

B21= $\begin{bmatrix} (0.3, 0.1, 0.2) & (0.4, 0.1, 0.5) \\ (0.4, 0.2, 0.3) & (0.4, 0.5, 0.1) \end{bmatrix}$=

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

B21 =(0.4, 0.2, 0.2)

B22= $\begin{bmatrix} (0.4, 0.2, 0.3) & (0.4, 0.1, 0.5) \\ (0.4, 0.2, 0.1) & (0.4, 0.5, 0.1) \end{bmatrix} =$

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

B22 =(0.4, 0.2, 0.3)

B23= $\begin{bmatrix} (0.4, 0.2, 0.3) & (0.3, 0.1, 0.2) \\ (0.4, 0.2, 0.1) & (0.4, 0.2, 0.3) \end{bmatrix} =$

= [max {min(0.4, 0.4),min(0.4,0.3)},Min{max(0.2, 0.2) ,max (0.2, 0.1)}, Min{max(0. 3, 0.3), max(0.1, 0.2)}]

B23 =(0.4, 0.2, 0.2)

B31= $\begin{bmatrix} (0.3, 0.1, 0.2) & (0.4, 0.1, 0.5) \\ (0.4, 0.5, 0.2) & (0.3, 0.2, 0.1) \end{bmatrix} =$

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

B31 =(0.4, 0.2, 0.2)

$$B32=\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.1,0.5) \\ (0.4,0.5,0.3) & (0.3,0.2,0.1) \end{bmatrix} =$$

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

B32 =(0.4, 0.2, 0.3)

$$B33=\begin{bmatrix} (0.4\,,0.2,0.3) & (0.3,0.1,0.2) \\ (0.4,0.5,0.3) & (0.4,0.5,0.2) \end{bmatrix} =$$

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

B33 =(0.4, 0.5, 0.3)

Hence the adjoint of the matrix A will become

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

Property :

Adj (A)’ =(adj A)’

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

Adj (A)’ = =

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

Again,

$$(A)'=\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.5,0.3) & (0.4,0.2,0.1) \\ (0.3,0.1,0.12) & (0.4,0.5,0.2) & (0.4,0.2\,,0.3) \\ (0.4,0.1,0.5) & (0.3,0.2,0.1) & (0.4,0.5\,,0.1) \end{bmatrix}$$

C11= $\begin{bmatrix} (0.4\,,0.5,0.2) & (0.4,0.2,0.3) \\ (0.3,0.2,0.1) & (0.4,0.5,0.1) \end{bmatrix} =$

= [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(0.1, 0.3)}]

C11 =(0.4, 0.2, 0.2)

C12= $\begin{bmatrix} (0.3\,,0.1,0.3) & (0.4,0.2,0.3) \\ (0.4,0.1,0.5) & (0.4,0.5,0.1) \end{bmatrix} =$

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

C12 =(0.4, 0.2, 0.2)

C13= $\begin{bmatrix} (0.3\,,0.1,0.2) & (0.4,0.5,0.2) \\ (0.4,0.1,0.5) & (0.3,0.2,0.1) \end{bmatrix} =$

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

C13 =(0.4, 0.2, 0.2)

Similarly :

C21= $\begin{bmatrix} (0.4\,,0.5,0.3) & (0.4,0.2,0.1) \\ (0.3,0.2,0.1) & (0.4,0.5,0.1) \end{bmatrix} =$

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

C21 =(0.4, 0.2, 0.1)

C22= $\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.2,0.1) \\ (0.4,0.1,0.5) & (0.4,0.5,0.1) \end{bmatrix}$

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

C22 =(0.4, 0.2, 0.3)

B23= $\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.5,0.3) \\ (0.4,0.1,0.5) & (0.3,0.2,0.1) \end{bmatrix}$

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

C23 =(0.4, 0.2, 0.3)

$$C31=\begin{bmatrix} (0.4\,,0.5,0.3) & (0.4,0.2,0.1) \\ (0.4,0.5,0.2) & (0.4,0.2,0.3) \end{bmatrix} =$$

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

C31 =(0.4, 0.5, 0.2)

$$C32=\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.2,0.1) \\ (0.3,0.1,0.2) & (0.4,0.2,0.3) \end{bmatrix} =$$

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

C32 =(0.4, 0.2, 0.2)

$$C33=\begin{bmatrix} (0.4\,,0.2,0.3) & (0.4,0.5,0.3) \\ (0.3,0.1,0.2) & (0.4,0.5,0.2) \end{bmatrix} =$$

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

C33 =(0.4, 0.5, 0.3)

Then

Adj (A)' =(adj A)'.

Neutrosophic vs. Fuzzy in Decision Making

Michael Voskoglou & Said Broumi

What are the advantages of applying neutrsophic 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.

Neutrosophic Optimization

Florentin Smarandache

to Maissam Jdid

There is a free website where to graph and calculate, https://www.desmos.com/calculator, but this one does only 2D, so we cannot graph

$$f(x,y) = (x-2)^2 + (y-3)^2.$$

{I use x instead of x_1, and y instead of x_2, as *desmos* allows me to}.

Yet, there is a 3D software, Mathematica (I feel Apple too?), that I had a grant but one year only (it is very expensive).

Do you know some university in your area having such a software?

You would be able to graph in 3D such objective function as above.

*

For *Example 1*:

please fix, $x + 2y \leq [12, 15]$, since ε_1 is in [0, 3].

If you graph in desmos:

$x + 2y = 12$

$x + 2y = 15$

(you get two parallel lines).

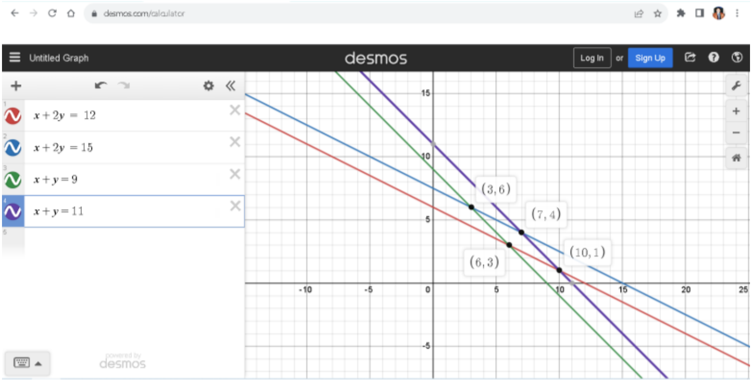
Then:

$x + y = 9$

$x + y = 11$

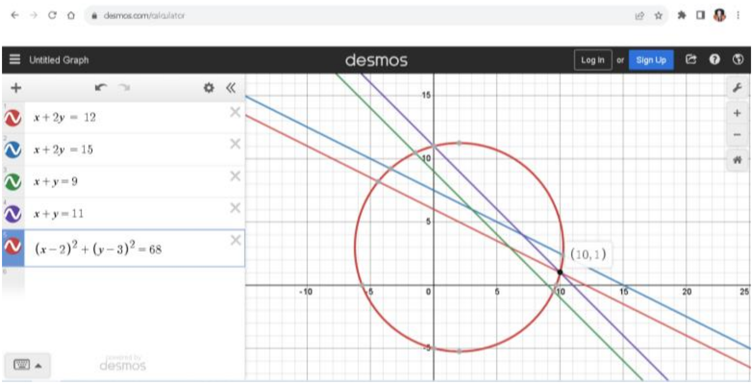
(you get other two parallel lines)

Their intersections form a rhombus which is actually the zone of restrictions:



See where the function f(x,y) = (x-2)^2 + (y-3)^2 = *a* intersects this zone.

We need to find a >= 0, so we play on the graph and replace “a” by a number, then by another:



We may consider *x* + *2y* in [12, 15]

and *x* + *y* in [9, 11}.

Got max f(*x*,*y*) = 68.

De-NeutroSophication

Florentin Smarandache

The authors of this paper[11] combine the three decision making procedures such as TOPSIS, VIKOR, and SAW under the frame of the neutrosophic set.

They use an interesting type of de-neutrosophication by normalizing the neutrosophic components

$$T' = T/(T+I+F),\ I' = I/(T+I+F), \text{ and } F' = F/(T+I+F),$$

and then assigning weights w_1, w_2, w_3 respectively to each of them (T', I', F'), and multiplying and adding them up:

$$w_1T' + w_2I' + w_3F'.$$

I think it would be good if the authors try to use the refined neutrosohic set[12] in decision making, and try a de-neutrosophication again of the n-subcomponents

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

where $p, r, s \geq 0$ are integers, and $p + r + s = n \geq 2$,

And at least one of p, r, s is ≥ 2 to assure that at least one component amongst T, I, F is refined/split in a least two subparts.

---

[11] Amirhossein Nafei, Chien-Yi Huang, Shu-Chuan Chen, Chia-Hsien Chu, Ti-An Chen, Xiao-Chang Liu. "Enhancing Decision-Making under Uncertainty: A Neutrosophic Framework Based on TOPSIS, VIKOR, and SAW Methodologies." Nu gasesc articolul online.

[12] Florentin Smarandache (2013). "n-Valued Refined Neutrosophic Logic and Its Applications to Physics." *Progress in Physics* 4:143-136; available online: http://fs.unm.edu/RefinedNeutrosophicSet.pdf

Sets & Systems

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.[13] 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[14], [15],

---

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

[14] F. 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; available online: http://fs.unm.edu/TSS/NewTypesSoftSets-Improved.pdf

[15] F. Smarandache (2022). "Introduction to the IndetermSoft Set and IndetermHyperSoft Set." *Neutrosophic Sets and*

with IndetermSoft Operators acting on a IndetermSoft Algebra.

The n-ary soft set relationship is just the HyperSoft Set (2018)

Florentin Smarandache
to M. Hamidi

See this paper[16]:

It had to be called HyperSoft Set Relationship.

See also a paper by Kamaci.[17]

Extending the HyperGroupoid to the SuperHyperGroupoid

to M. Hamidi

I think you may extend the HyperGroupoid[18] to the SuperHyperGroupoid.

As we worked on SuperHyperAlgebra.

Systems 50:629-650; available online: https://fs.unm.edu/NSS/IndetermSoftIndetermHyperSoft38.pdf

[16] F. Smarandache (2018). "Extension of Soft Set to Hypersoft Set, and then to Plithogenic Hypersoft Set. *Neutrosophic Sets and Systems*, 22:168-170; DOI: 10.5281/zenodo.2159755; https://fs.unm.edu/NSS/ExtensionOfSoftSetToHypersoftSet.pdf

[17] https://fs.unm.edu/NSS/naryFuzzyHypersoftExpertSets15.pdf

[18] Saeed Mirvakili, Mina Faraji, Mohammad Hamidi, Peyman Ghiasvand, Mohammad Hamidi. "Non-Commutative Hypergroupoid Obtained From Simple Graphs." ResearchGate.net, Aug. 2023.

What do you think?

See the definition of a SuperHyperFunction (Definition 14),[19] where we take instead of

$$f: H \times H \rightarrow P(H)$$

(doesn't matter the * (without, or with the emptyset), we extend to

$$f: P^r(H) \rightarrow P^s(H),$$

where $P^r(H) = P(P(\ldots P(H)\ldots))$, i.e. powerset of powerset of … powerset (*r* times) of H.

AH-Isometry, extended

Florentin Smarandache
to Yaser Ahmad Alhasan

Excellent, shoukran, Prof. AlHasan! Then write a paper for *Neutrosophic Sets and Systems*.

Also, we should ask the opinion of Abobala and Hatip, who introduced the AH-isometry (one-dimension).

See also this paper[20] of AH-isometry (two dimensions: I_1 and I_2 as two types of subindeterminacies).

You can use my method as well, extended to two subindeterminacies:

$$\sqrt{a + bI_1 + cI_2} = x + yI_1 + zI_2$$

Then raise both sides to the second power and, afterwards, identify the coefficients.

[19] https://fs.unm.edu/NSS/SuperHyperFunction37.pdf

[20] https://fs.unm.edu/NSS/AHHomomorphismsInNeutrosophic35.pdf

Where we may take $I_1I_2 = I_2I_1 =$ either I_1 or I_2.

Alternative Ranking

Florentin Smarandache

to Nivetha Martin

Why not consider the min negative and the max positive?

For example:

	min	max
A_4	0.2	0.7

Whence 0.7-0.2 = 0.5.

Instead, you add them: 0.2+0.7 = 0.9.

Why do you add the cost (negative) with the benefit (positive)?

Because if for example:

	min	max
A_5	0.2	0.8

Whence 0.8-0.2 = 0.6.

But, you add them: 0.2+0.8 = 0.10.

You select A_4, since $0.9 < 0.10$.

But it is not correct, we should select A_5, since A_4 and A_5 have the same cost (0.2), but A_5 has a bigger benefit than A_4 ($0.8 > 0.7$).

Exploring Dezert-Smarandache Theory (DSmT): Discussions, Research, and Applications

Reconciliation between theoretical and market prices

Mohammad Khoshnevisan

The neutrosophic probability approach makes a distinction between "relative sure event", event that is true only in certain world(s):

$$NP\ (rse) = 1,$$

and "absolute sure event", event that is true for all possible world(s):

$$NP\ (ase) = 1^{+}.$$

Similar relations can be drawn for "relative impossible event" / "absolute impossible event" and "relative indeterminate event" / "absolute indeterminate event". In case where the *truth*- and *falsity*-components are complementary, i.e. they sum up to unity, and there is no indeterminacy, one is reduced to classical probability.

Florentin Smarandache

Indeed, neutrosophic probability may be viewed as a generalization of classical and imprecise probabilities.

Mohammad Khoshnevisan

When a long-term option priced by the collective action of the market players is observed to be deviating from the theoretical price, three possibilities must be considered:

(1) The theoretical price is obtained by an inadequate pricing model, which means that the market price may well *be* the true price,

(2) An unstable rationalization loop has taken shape that has pushed the market price of the option 'out of sync' with its true price, or

(3) The nature of the deviation is indeterminate and could be due to (a) or (b) or a super-position of both (a) and (b) and/or due to some random white noise.

However, it is to be noted that in none of these three possible cases are we referring to the efficiency or otherwise of the market as a whole. *The market can only be as efficient as the information it gets to process*. Therefore, if the information about the true price of the option is misleading,[21] the market cannot be expected to process it into something useful – after all, the markets can't be expected to pull jack-rabbits out of empty hats!

[21] Perhaps due to an inadequate pricing model.

Florentin Smarandache

Please discuss the following events with *T, I, F* as the neutrosophic components:

- **H = {p: p is the true option price determined by the theoretical pricing model}** and
- **M = {p: p is the true option price determined by the prevailing market price}**

Mohammad Khoshnevisan

There is a t% chance that the event ($H \cap M^c$) is true, or corollarily, the corresponding complimentary event ($H^c \cap M$) is untrue, there is a f% chance that the event ($M^c \cap H$) is untrue, or corollarily, the complimentary event ($M \cap H^c$) is true and there is a i% chance that neither ($H \cap M^c$) nor ($M \cap H^c$) is true/untrue; i.e. the determinant of the true market price is indeterminate. This would fit in nicely with possibility (c) enumerated above – that the nature of the deviation could be due to either (a) or (b) or a superposition of both (a) and (b) and/or due to some random white noise.

Illustratively, a set of AR1 models used to extract the mean reversion parameter driving the volatility process over time have *coefficients of determination* in the range say between 50%-70%, then we can say that t varies in the set T (50% - 70%).

If the subjective probability assessments of well-informed market players about the weight of the current excursions in implied volatility on short-term options lie in the range say between 40%-60%, then f varies in the set F (40% - 60%). Then unexplained variation in the temporal volatility driving process together with the subjective assessment by the market players will make the event indeterminate by either 30% or 40%.

Then the neutrosophic probability of the true price of the option being determined by the theoretical pricing model is:

$$\mathbf{NP\ (H \cap M^c) = [(50 - 70), (40 - 60), \{30, 40\}]}.$$

Florentin Smarandache

Therefore, DSmT can be applied in scenarios such as these to amalgamate conflicting sources of information, leading to an accurate and computable probabilistic evaluation of the true price of the long-term option.

Extension of the MASS model by the incorporation of neutrosophic statistics and the DSmT combination rule

Florentin Smarandache

Please evaluate and explain the extension of the MASS model as a cost-optimal relative allocation of facilities technique by the incorporation of neutrosophic statistics and the DSmT combination rule.

Mohammad Khoshnevisan

The original CRAFT-type models for cost-optimal relative allocation of facilities technique as well as its later extensions are primarily deterministic in nature.

A Modified Assignment (MASS) model[22] follows the same iterative, deterministic logic.

However, some amount of introspection will reveal that the facilities layout problem is basically one of achieving *best interconnectivity by optimal fusion of spatial information*. In that sense, the problem may be better modeled in terms of mathematical information theory whereby *the best layout is obtainable as the one that maximizes relative entropy of the spatial configuration*.

Florentin Smarandache

Let us hypothesize a neutrosophic dimension to the problem.

Mohammad Khoshnevisan

Given a *DSmT* type combination rule, the layout optimization problem may be framed as a *normalized basic probability assignment* for optimally comparing between several alternative interconnectivities. The neutrosophic argument can be justified by considering the very practical possibility of conflicting bodies of evidence

[22] First proposed by Bhattacharya and Khoshnevisan in 2003. See also: Sukanto Bhattacharya, Florentin Smarandache, M. Khoshnevisan (2006). "MASS – Modified Assignment Algorithm in Facilities Layout Planning." Published in: F. Smarandache, M. Khoshnevisan, S. Bhattacharya (Editors), "Computational Modeling in Applied Problems: Collected Papers on Econometrics, Operations Research, Game Theory and Simulation." Phoenix: Hexis, pp. 38-50; available online: https://fs.unm.edu/Stat/MASSModifiedAssignment.pdf

for the structure of the load matrix possibly due to conflicting assessments of two or more design engineers.

If for example we consider two mutually conflicting bodies of evidence Ξ_1 and Ξ_2, characterized respectively by their basic probability assignments μ_1 and μ_2 and their cores k (μ_1) and k (μ_2) then one has to look for the optimal combination rule which maximizes the joint entropy of the two conflicting information sources.

Mathematically, it boils down to the general optimization problem of finding the value of $-\min_{\mu} [-H(\mu)]$ subject to the constraints that the marginal basic probability assignments μ_1 (.) and μ_2 (.) are obtainable by the summation over each column and summation over each row respectively of the relevant information matrix & the sum of all cells of the information matrix is unity.

Conditional Probability of actually detecting a financial fraud

Florentin Smarandache

Please suggest a neutrosophic extension to the application of Benford's first-digit law.

Mohammad Khoshnevisan

In an earlier paper (Kumar and Bhattacharya, 2002), we had proposed a Monte Carlo adaptation of Benford's first-digit law. There has been some research already on the application of Benford's law to financial fraud detection.

However, most of the practical work in this regard has been concentrated in detecting the first digit frequencies from the account balances selected on basis of some known audit sampling method and then directly comparing the result with the expected Benford frequencies.

We have voiced slight reservations about this technique in so far as that the Benford frequencies are necessarily **steady state frequencies** and may not therefore be truly reflected in the sample frequencies. As samples are always of finite sizes, it is therefore perhaps not entirely fair to arrive at any conclusion on the basis of such a direct comparison, as the sample frequencies won't be steady state frequencies.

However, if we draw digits randomly using the **inverse transformation technique** from within random number ranges derived from a cumulative probability distribution function based on the Benford frequencies; then the problem boils down to running a *goodness of fit* kind of test to identify any significant difference between observed and simulated first-digit frequencies. This test may be conducted using a known sampling distribution like for example the **Pearson's χ^2 distributions**.

The random number ranges for the Monte Carlo simulation are to be drawn from a cumulative probability distribution function based on the following Benford probabilities given in Table below.

First Significant Digit	1	2	3	4	5	6	7	8	9
Benford Probability	0.301	0.176	0.125	0.097	0.079	0.067	0.058	0.051	0.046

The first-digit probabilities can be best approximated mathematically by the log-based formula as was derived by Benford:

$$\textbf{P (First significant digit = d) = } \log_{10} [1 + (1/d)].$$

Computational Algorithm

First proposed by Kumar and Bhattacharya (2002)

Define a finite sample size n and draw a sample from the relevant account balances using a suitable audit sampling procedure.

Perform a continuous Monte Carlo run of length $\lambda^* \approx (1/2\varepsilon)^{2/3}$ grouped in epochs of size n using a customized MS-Excel spreadsheet. Derivation of λ^* and other statistical issues have been discussed in detail in Kumar and Bhattacharya, 2002.

Test for significant difference in sample frequencies between the first digits observed in the sample and those generated by the Monte Carlo simulation by using a "goodness of fit" test using the χ^2 distribution. The null and alternative hypotheses are as follows:

- **H_0:** The observed first digit frequencies approximate a Benford distribution
- **H_1:** The observed first digit frequencies do not approximate a Benford distribution

This statistical test will not reveal whether or not a fraud has actually been committed. All it does is establishing at a desired level of confidence that the accounting data may not be naturally occurring (if H_0 can be rejected). However, given that H_1 is accepted and H_0 is rejected, it could possibly imply any of the following events:

I. There is no manipulation - occurrence of a Type I error i.e. H_0 rejected when true.

II. There is manipulation *and* such manipulation *is definitely* fraudulent.

III. There is manipulation *and* such manipulation *may or may not be* fraudulent.

IV. There is manipulation *and* such manipulation *is definitely not* fraudulent.

Neutrosophic extension using *DSmT* combination rule

Florentin Smarandache

Neutrosophic probabilities extend beyond classical and fuzzy probabilities, encompassing events characterized by varying degrees of indeterminacy. They offer a superior method for quantifying uncertainty compared to classical or fuzzy probability theory.

Mohammad Khoshnevisan

Neutrosophic probability theory uses a subset-approximation for truth-value as well as indeterminacy and falsity values. Also, this approach makes a distinction between "relative true event" and "absolute true event" the former being true in only some probability sub-spaces while the latter being true in all probability sub-spaces. Similarly, events that are false in only some probability sub-spaces are classified as "relative false events" while events that are false in all probability sub-spaces are classified as "absolute false events". Again, the events that may be hard to classify as either 'true' or 'false' in some probability sub-spaces are classified as "relative indeterminate events" while events that bear this characteristic over all probability sub-spaces are classified as "absolute indeterminate events".

In classical probability **n_sup ≤ 1** while in neutrosophic probability **n_sup ≤ 3^+**, where we have n_sup as the upper bound of the probability space. In cases where the truth and falsity components are complimentary, i.e. there is no indeterminacy, the components sum to unity and neutrosophic probability is reduced to classical probability as in the tossing of a fair coin or the drawing of a card from a well-shuffled deck. Coming back to our original problem of financial fraud detection, let E be the event whereby a Type I error has occurred and F be the event whereby a fraud is actually detected. Then the *conditional neutrosophic probability* **NP (F | E^c)** is defined over a probability space consisting of a triple of sets (T, I, U). Here, T, I and U are probability sub-spaces wherein event F is t% true, i% indeterminate and u% untrue respectively, given that no Type I error occurred.

The sub-space T within which t varies may be determined by factors such as past records of fraud in the organization, propensity to commit fraud by the employees concerned, and effectiveness of internal control systems. On the other hand, the sub-space U within which u varies may be determined by factors like personal track records of the employees in question, the position enjoyed and the remuneration drawn by those employees. For example, if the magnitude of the embezzled amount is deemed too frivolous with respect to the position and remuneration of the employees involved. The sub-space I within which i varies is most likely to be determined by the mutual inconsistency that might arise between the effects of some of the factors determining T and U.

For example, if an employee is for some reason really irked with the organization, then he or she may be inclined to commit fraud not so much to further his or her own interests as to harm.

The DSmT combination rule can be used in such a circumstance to remove the mutual inconsistency in the factors deciding T and U.

Specificity

Florentin Smarandache
to Deqiang Han

In our 2012 Fusion paper,[23] at Cuzzolin distance, formula (17), shouldn't it be:

"IncT" instead of "IncIncT" ?

Also, isn't it "(m_1-m_2)" instead of "(m_1,m_2)"?

What did we note by "*I-Inc*" in conflict distance? What is "*I*"?

Deqiang Han

First, about Cuzzolin's distance, see eq. (34) in Jousselme's survey[24] We directly cite it from this survey.

Second, (m_1,m_2) should be m_1-m_2, you are right. This is a typo.

Third,
I is an matrix with all elements of 1,
e.g. [1 1 1; 1 1 1; 1 1 1].
This is also a typo. I should be 1 (matrix)
See (43) in Jousselme's paper.

Inclusion Index:

Inc*(A, B)* = 1 if $A \subseteq B$, and 0 otherwise (4)

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[23] Florentin Smarandache, Deqiang Han, Arnaud Martin. Comparative Study of Contradiction Measures in the Theory of Belief Functions. https://vixra.org/abs/1207.0056

[24] Anne-Laure Jousselme, PatrickMaupin (2012). "Distances in evidence theory: Comprehensive survey and generalizations." *International Journal of Approximate Reasoning* 53:118–145; available online: https://core.ac.uk/download/pdf/81153735.pdf

Intersection Index:

Int(A, B) = 1 if $A \cap B$ *different from* $\emptyset$,

and 0 otherwise (5)

Pignistic Index:

Bet(A, B) = $|A \cap B| / |B|$.

La limite de $DSmP_\varepsilon$

Florentin Smarandache
à Jean Dezert

L'on considère 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 ε decroit vers zero, par exemple ε = 0.01, 0,001, etc. Quelle est le minimum ε que ton programme peut utiliser dans notre formule de $DSmP_\varepsilon$?

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

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

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

Jean Dezert

Je pense que $\varepsilon = 1.1^{-9}$ est possible.

When *A* intersects *A* intersects *B*

For A ∧ A ∧ B = empty set, the mass $m_1(A)m_2(A)m_3(B)$ should be distributed to A and B proportionally to $m_1(A)+m_2(A)$ to A and $m_3(B)$ to B.

Therefore,

$$x_A/(m_1(A) + m_2(A) = x_B/m_3(B) =$$

$$= (x_A + x_B)/(m_1(A)+m_2(A) + m_3(B) =$$

$$m_1(A)m_2(A)m_3(B)/(m_1(A)+m_2(A) + m_3(B)).$$

Association Problem

Florentin Smarandache
à Jean Dezert

1) Avez-vous un programme qui calcule votre MOA? Une idée serait d'utiliser votre algorithme de la même manière, mais en remplaçant BetP(.) par DSmP(.), et ensuite de comparer les résultats.

2) Autre chose : l'utilisation dans l'association de la masse de forme

$$m_{X_1}(Y_1) =$$

$$m_{X_1}(\text{non}Y_1) =$$

$$m_{X_1}(\theta) =$$

correspond exactement à la définition de la logique neutrosophique : la probabilité que X_1 soit associé à Y_1, la probabilité que X_1 ne soit pas associé à Y_1, et la probabilité indéterminée.

Ensuite, il est possible d'utiliser les opérateurs neutrosophiques ∧, ∨, ¬, etc.

Probabilistic Information Content

<u>Conjecture</u>: The *Probabilistic Information Content* (PIC) measures the information content that is contained

into the probability distribution after a mass m(.) is transformed into a Bayesian mass: the bigger PIC is, the more information is contained into the probability distribution, and it is more accuracy to take a decision (since it is more evident what event has a greater chance to occur).

For any bba m, and any type of probability transformation P, there is an ε (ε > 0) such that PIC of $DSmP_e(m)$ is greater than PIC of P(m).

Absolute and Relative DSm Conditioning Rules

Florentin Smarandache

One can actually define more DSm Weighted Conditioning Rules, by introducing weights in the previous DSm Conditioning Rules. Yet we should take only the main ones.

Let Θ be a frame of discernment formed by *n* singletons, defined as: (1)

$$\Theta = \{\phi_1, \phi_2, ..., \phi_n\}, n \geq 2$$

and its Super-Power Set (or fusion space): (2)

$$S^{\Theta} = (\Theta, \cup, \cap, C)$$

which means the set Θ is closed under union $\cup$, intersection $\cap$, and respectively complement C.

Let *m(.)* be a mass (3)

$m(.)$: $S^{\Theta} \rightarrow [0, 1]$

and a non-empty set $B \subseteq I_t$, where $I_t = \phi_1 \cup \phi_2 \cup \ldots \cup \phi_n$ is the total ignorance.

Conditioning of *m(.|.)* becomes: (4)

$$m(A \mid B) = \sum_{\substack{X \in S^\Theta \\ X \cap B = A}} m(X) + \delta^{\phi}_{A \cap B} \cdot \frac{m(A)^2 \cdot w_O}{m(A) \cdot w_O + w_B} + \delta^{B}_{A} \cdot \frac{m(A) \cdot w_B}{m(A) \cdot w_O + w_B}$$

where (5)

$$\delta^{\phi}_{A \cap B} = \begin{cases} 1, A \cap B = \phi \\ 0, A \cap B \neq \phi \end{cases}$$

Also (6)

$$\delta^{B}_{A} = \begin{cases} 1, A = B \\ 0, A \neq B \end{cases}$$

and w_O and w_B are the weights for all sets which are completely outside of *B,* and respectively for all sets which are inside or on the frontier of *B*,

with $w_O, w_B \in [0, 1]$ and $w_O + w_B = 1$.

All masses of the elements situated outside of *B* are redistributed, according to formula *(4),* in a prudent/pessimistic way, to *B*.

But, for a more refined/optimistic redistribution, all masses of the elements situated outside of *B* are redistributed, according to the formula *(7)* below, to the elements included in *B* proportionally with respect to their masses. (7)

$$m(A \mid B) = \sum_{\substack{X \in S^\Theta \\ X \cap B = A}} m(X) + \delta^{\phi}_{A \cap B} \cdot \frac{m(A)^2 \cdot w_O}{m(A) \cdot w_O + w_B} + \delta_{A \subseteq B} \cdot \frac{m(A)}{\sum\limits_{\substack{Y \in S^\Theta \\ Y \subseteq B}} m(Y)} \cdot \sum_{\substack{Z \in S^\Theta \\ Z \cap B = \phi}} \frac{m(Z) \cdot w_B}{m(Z) \cdot w_O + w_B}$$

where (8)

$$\delta_{A\subseteq B} = \begin{cases} 1, A\subseteq B \\ 0, A\not\subset B, A\neq B \end{cases}$$

a) If w_O = 0 and w_B =1, we have an **absolute conditioning**, i.e. the truth is for sure in *B*.

b) If 0 < w_O, w_B < 1, we have a **relative conditioning**, i.e. the truth is with the weight w_B in *B* and with the weight w_O in *nonB*=$I_t \setminus B$.

c) If w_O = 1 and w_B = 0, we have an **absolute opposite conditioning**, i.e. the truth is outside of *B*, i.e. the truth is in *nonB* = $I_t \setminus B$.

New Formula

$\forall x \in S^\theta - \{\emptyset\}$, we have:

$$m(x|A) = \sum_{\substack{Y\in S^\theta-\{\emptyset\} \\ Y\cap A=X}} m(Y) + \sum_{\substack{Y\in S^\theta-\{\emptyset\} \\ Y\cap A=\emptyset \\ X=A}} m(Y)\cdot w_B + (1-\delta_X^A)m(x)\cdot w_0$$

where $\delta_X^A = \begin{matrix} 1, \text{if } x \subseteq A \\ 0, \text{if } x \nsubseteq A \end{matrix}$

The redistribution of the mass is done in the following ways (for the case when the conditioning is done with respect to set B);

a) all elements X which are included in or equal to B keep their initial mass m(X);

b) all elements Y which are on the frontier of B {i.e. Y/\B is not empty, and Y/\C(B) is not empty either,

where C(Y) is the complement of Y} have their mass m(Y) absorbed by Y/\B;

c) all elements Z which are outside of B, i.e. Z/\B=empty, transfer their masses to B.

Of course it needs to still be checked on some numerical examples.

See if you can get any engineering concrete examples where we have absolute conditioning and where we have relative conditioning; for the weights of conditioning we need also to come with some justifications: why a conditioning has a weight for example 0.3 and another 0.7.

to Jean Dezert

In many conditioning rules, if it is known that the truth is in a set A, then the conditioning rule considers that as absolute. Dempster's conditioning is also absolute.

But, you're right. We should design a conditional rules where the fact that the truth is in A is not absolute, but has some weight. I can do that too, but what weight to you think we can put on A?

to Jean Dezert

The subject is interesting. We can make a common paper if you want: you do the applications in engineering, and do the formulas - so you tell me exactly what you need.

I mean another conditioning rule that is not absolute (all the other I know are absolute).

to Jean Dezert

I like the idea of conditioning rule, which is not absolute. About the weight of A...that's the point ;-) that's the main justification for this kind of rule. I think it should be a function of reliability of the source used for conditioning and also I think that the difference in processing levels should have something to do.

I also like the idea of writing a common paper.

to Jean Dezert

Okay, I think there should be a weight for A (if somebody has conditioned A) and a smaller weight on nonA (i.e. Total-Ignorance minus A). We need to get the parameters (from applications needing maybe) in order to determine the weights.

Degree of Intersection

Proof that using the *Zhang's degree* in any rule based on conjunctive rule and then on the transfer of the conflicting mass

$$\frac{|x_1 \cap x_2|}{|x_1| \cdot |x_2|}$$

keeps the neutrality of the vacuous believe assignments.

Let $m_1(\cdot)$ be a bba on θ and the vacuous believe assignment $m_v(\theta) = 1$, where θ is the total ignorance. Suppose $|\theta| = n \geq 2$ (cardinal of θ is n).

$\forall x \in G^{\theta}$ we have:

$$m_{1v}(x) = m_1(x) \oplus m_v(\theta) = \frac{|x \cap \theta|}{|x| \cdot |\theta|} m_1(x) m_v(\theta)$$
$$= \frac{|x|}{|x| \cdot |\theta|} m_1(x) m_v(\theta) = \frac{1}{n} m_1(x).$$

So, $m_{1v}(x) = \frac{1}{n} \cdot m_1(x)$ for any $x \in G^\theta$.

Since there is no conflict because the total ignorance intersected with any element x is equal to x, i.e.

$$x \cap \theta = x,$$

there is nothing to transfer. We only need to normalize $m_{1v}(\cdot)$, but this is done by multiplying with n each of the $m_{1v}(\cdot)$. After normalization (N) we get:

$$m_{1v}^{(N)}(x) = m_1(x) \text{ for any } x \in G^\theta.$$

Any fusion rule improved with Zhang's degree, such as PCR5, DSmC, DSmH, Dubois-Prade's, Yager's rule, Smets' rule, Dempster's rule, etc. preserve the neutrality of the vacuous believe assignment.

Improving a fusion rule (based on conjunctive rule and then redistribution of the conflicting mass) with the *Jaccard's degree*, does not in general preserve the neutrality of the vacuous believe assignement.

With the previous data we have:

$$m_{1v}(x) = m_1(x) \oplus m_v(\theta) = \frac{|x \cap \theta|}{|x \cup \theta|} m_1(x) m_v(\theta)$$
$$= \frac{|x|}{|\theta|} m_1(x) m_v(\theta) = \frac{|x|}{n} m_1(x).$$

There is no conflicting mass, therefore nothing to transfer. We need to normalize.

a) The only case when a fusion rule improved with the Jaccard degree preserves the neutrality of $m_v(\cdot)$ is when all focal elements have the same cardinal. Let's say in this case card $(x) = p$ for all focal elements.

Then $m_{1v}(x) = \frac{p}{n} m_1(x)$ for all $x \in G^\theta$.

b) If there exist two focal elements $x_1 \neq x_2$ such that card $x_1 = p_1 \neq p_2 =$ card (x_2), then the neutrality of *v.b.a.* is not preserved, since

$m_{1v}(x_1) = \frac{p_1}{n} \cdot m_1(x_1)$ and $m_{1v}(x_2) = \frac{p_2}{n} \cdot m_1(x_2)$

and then we normalize and multiply each $m_{1v}(\cdot)$ with the same normalizing constant c, so we cannot have both $\frac{p_1 c}{n} = 1$ and $\frac{p_2 c}{n} = 1$.

Hybrid vs. rafinné

Florentin Smarandache
à Jean Dezert

Le modèle que tu as utilisé n'est pas hybride, mais c'est un modèle libre. Cependant, dans le cas d'un modèle hybride, on obtiendra la même chose. Il n'y a pas d'incohérence, mais les approximations sont différentes. Par exemple, on peut estimer la solution d'une équation et dire que sa solution se trouve dans l'intervalle (0.2, 0.5), mais en faisant une autre approximation meilleure, on peut trouver que la solution se trouve dans un intervalle plus restreint (0.25, 0.35).

Ton exemple prouve que le modèle libre (et aussi le modèle hybride) donne un résultat meilleur que le raffinement, car dans la DSmT, on a P(B) dans [0.4, 0.4], donc un résultat plus exact ; tandis que dans le raffinement que la DST doit faire, le résultat est plus vague : P(B) dans [0.4, 1], donc un résultat très imprécis.

Dans ton exemple, on peut prendre m(A∧B)=a dans (0, 1), et l'autre m(A) = 1-a dans (0, 1). Je pense qu'on peut démontrer dans le cas général que les modèles hybrides et libres sont plus précis que celui raffiné.

Travailler avec les modèles tels qu'ils sont, c'est naturel ; tandis que les transformer (raffiner) c'est un peu artificiel. Aussi, comme tu le sais, le raffinement ne marche pas toujours...

Il n'y a pas d'erreur mathématique dans les calculs des Bel et Pl dans la DSmT, ni dans ceux de la DST. Mais dans la DSmT, on utilise les modèles naturels (tels qu'ils sont), tandis que la DST utilise des modèles artificiels (= raffinés) qui ont la chance de se départager de la réalité/pratique. C'est ça la meilleure explication de l'avantage de la DSmT.

Tu passes des probabilités subjectives m(), Bel(), Pl() à une probabilité objective P() dans le calcul de la DST raffinée. Tandis qu'en DSmT, on utilise seulement des probabilités subjectives, donc on est plus consistant dans la DSmT.

Example of PCR5 with Zhang's degree

	A	AUBUC	θ
m_1	0.9	0.1	
m_2	0.9	0.1	
m_{12}^{Zhang}	0.8700	0.003	0 (no conflict)
$m_{12}^{z}(A)$	0.0540	0.0060	
	0.0540	0.0060	
		0.0033	
		0.0033	

	A	AUBUC
$m_{12\ PCR5}^{Zhang\ first\ method}$	0.978	0.022
$m_{12\ PCR5}^{no\ Zhang}$	0.990	0.010

	A	AUBUC
$m_{12\ PCR5}^{Zhang\ second\ method;just\ normalize;no\ transfer}$	$\frac{0.8700}{0.8733} = 0.9962$	$\frac{0.0033}{0.8733} = 0.0038$

$$m_{12}^{z}(A) = \frac{|A \cap A|}{|A| \cdot |A|} m_1(A) m_2(A) + \frac{|A \cap (AUBUC)|}{|A| \cdot |AUBUC|} m_1(A) m_2(AUBUC) + \frac{|A \cap (AUBUC)|}{|A| \cdot |AUBUC|} m_2(A) m_1(AUBUC)$$
$$= 1 \cdot (0.9)(0.9) + \frac{1}{3}(0.9)(0.1)$$
$$= 0.81 + 0.03 + 0.03 = 0.87$$

$$m_{12}^{z}(AUBUC) = \frac{|(AUBUC) \cap (AUBUC)|}{|AUBUC| \cdot |AUBUC|} m_1(AUBUC) m_2(AUBUC)$$
$$= \frac{3}{3 \cdot 3}(0.1)(0.1) = \frac{0.01}{3} \simeq 0.0033$$

$$\frac{x_{1A}}{0.9} = \frac{y_{1AUBUC}}{0.1} = \frac{\left(1 - \frac{1}{3}\right)}{0.9 + 0.1} = \frac{2}{3}(0.009) = 2(0.03) = 0.06$$

$$x_{1A} = 0.9(0.06) = 0.054$$

$$y_{1AUBUC} = 0.1(0.06) = 0.006$$

Similarly:

$$\frac{x_{2A}}{0.9} = \frac{y_{2AUBUC}}{0.1} = \frac{\left(1 - \frac{1}{3}\right)(0.9)(0.1)}{0.9 + 0.1}$$

so $x_{2A} = 0.054$, $y_{2AUBUC} = 0.006$.

Also:

$$\frac{y_{3AUBUC}}{0.1} = \frac{y_{4AUBUC}}{0.1} = \frac{\left(1 - \frac{1}{3}\right)(0.1)(0.1)}{0.1 + 0.1} = \frac{\frac{2}{3}(0.01)}{0.2} = \frac{\frac{0.02}{3}}{0.2}$$
$$= \frac{0.2}{3} \cdot \frac{1}{0.2} = \frac{0.1}{3} \simeq 0.0333$$

$$y_{3AUBUC} = y_{4AUBUC} = 0.1(0.00333) \simeq 0.0033$$

PCR5 with degree of intersection

Jean's Example 3:

	A	AUBUC	θ
m_1	0.9	0.1	
m_2	0.9	0.1	
m_{12}	0.99	0.01	0 (no conflicting mass)

Therefore all rules (Dempster, PCR5, DSmC, DSmH, DP, Smeths, Yager's) give the same result as the conjunctive rule m_{12}. For PCR5, thus:

$$m_{PCR5}(A) = 0.99, m_{PCR5}(AUBUC) = 0.01.$$

$$m_{PCR5}(A) = 0.99, m_{PCR5}(AUBUC) = 0.01.$$

	A	AUB	AUBUC	θ
m'_1	0.9	0	0.1	
m'_2	0	0.9	0.1	
m'_{12}	0.90	0.09	0.01	0 (no conflicting mass)

Again, the conjunctive rule's result (total of m'_{12}) is the same for all rules that transfer the conflicting mass: D5, PCR5, DSmC, DSmH, DP, Smeths, Yager's. For PCR5, thus:

$$m'_{PCR5}(A) = 0.90,$$

$$m'_{PCR5}(AUB) = 0.09,$$

$$m'_{PCR5}(AUBUC) = 0.01.$$

Therefore, *the two results are different*, so PCR5 (and other rules cited above) does respond to changes, even if there is no conflict, or one changes the focal elements.

a) Using *Zhang's degree* $\frac{|x_1 \cap x_2|}{|x_1| \cdot |x_2|}$ in the conjunctive rule, the neutrality of the vacuous belief is preserved. I can prove it in the general case (you did on an example).

b) Using *Jaccard degree* $\frac{|x_1 \cap x_2|}{|x_1 \cup x_2|}$ in the conjunctive rule, the neutrality is *not preserved*. See below:

	A	AUBUC
m_1	0.9	0.1
m_2	0	1

$$m_{12}(A) = \frac{|A \cap (AUBUC)|}{|A \cup (AUBUC)|} m_1(A) m_2(AUBUC) = \frac{1}{3}(0.9)(1) = 0.3$$

$$m_{12}(AUBUC) = \frac{|(AUBUC) \cap (AUBUC)|}{|(AUBUC) \cup (AUBUC)|} m_1(AUBUC) m_2(AUBUC) = \frac{3}{3}(0.1)(1) = 0.1$$

If we normalize, we get:

$$m_{12}^n(A) = \frac{0.3}{0.4} = 0.75$$

$$m_{12}^n(AUBUC) = \frac{0.1}{0.4} = 0.25$$

Therefore, in order for the rules (Dempster's, PCR5, etc.) endowed with a degree of intersection to preserve the neutrality, we need to use *Zhang's degree* instead of *Jaccard degree* (although, upon me, Jaccard degree is more intuitive as degreeof intersection).

So, in my previous proposals of *PCR5 improvement* instead of Jaccard degree we should use Zhang's degree.

Zhang's center rule without normalization constant (transfer of the conflicting mass to the elements involved in conflict upon PCR5's principle).

$$m_{PCR5}(A) = \sum_{\substack{x,y \in G^\theta \\ x \cap y = A}} \frac{|x \cap y|}{|x| \cdot |y|} m_1(x) m_2(y) + \sum_{\substack{x \in G^\theta \setminus \{\phi\} \\ A \cap x = \phi}} \left[\frac{m_1(A)^2 m_2(x)}{m_1(A) + m_2(x)} + \frac{m_2(A)^2 m_1(x)}{m_2(A) + m_1(x)} \right] + \sum_{\substack{x \in G^\theta \setminus \{\phi\} \\ A \cap x \neq \phi}} \left(1 - \frac{|A \cap x|}{|A| \cdot |x|}\right) \cdot \left[\frac{m_1(A)^2 m_2(x)}{m_1(A) + m_2(x)} + \frac{m_2(A)^2 m_1(x)}{m_2(A) + m_1(x)} \right]$$

The third sum represents the nonconflicting mass missing from the conjunctive rule after including a degree of intersection,

$\left(1 - \frac{|x \cap y|}{|x| \cdot |y|}\right) m_1(x) m_2(y)$, when $x \cap y = A$,

is transferred to x and y proportionally with respect to their masses (following the PCR5 principle):

$$\frac{\propto}{m_1(x)} = \frac{\beta}{m_2(y)} = \frac{\left(1 - \frac{|x \cap y|}{|x| \cdot |y|}\right) m_1(x) m_2(y)}{m_1(x) + m_2(y)}$$

whence:

$$\alpha = \frac{\left(1 - \frac{|x \cap y|}{|x| \cdot |y|}\right) m_1(x)^2 m_2(y)}{m_1(x) + m_2(y)}$$

and

$$\beta = \frac{\left(1 - \frac{|x \cap y|}{|x| \cdot |y|}\right) m_1(x) m_2(y)^2}{m_1(x) + m_2(y)}$$

Formula for PCR5 with Zhang's degree and then normalization (not redistribution of the missing mass):

$$m_{PCR5}^{z_1 n}(A) = C_{PCR5} \left\{ \sum_{\substack{x,y \in G^\theta \\ x \cap y = A}} \frac{|x \cap y|}{|x| \cdot |y|} m_1(x) m_2(y) + \sum_{\substack{x \in G^\theta \setminus \{\phi\} \\ A \cap x = \phi}} \left[\frac{m_1(A)^2 m_2(x)}{m_1(A) + m_2(x)} + \frac{m_2(A)^2 m_1(x)}{m_2(A) + m_1(x)} \right] \right\}$$

Math Thematics

SuperHyperAlgebra is an algebra that deals with SuperHyperOperations and SuperHyperAxioms

Florentin Smarandache
to Mohammad Hamidi

I think I already sent you these links that we can continue working in for new papers. Please, also, forward them to your students and research associates:

2022 **SuperHyperAlgebra & Neutrosophic SuperHyperAlgebra**

http://fs.unm.edu/SuperHyperAlgebra.pdf

2022 **SuperHyperGraph, Neutrosophic SuperHyperGraph**

http://fs.unm.edu/NSS/n-SuperHyperGraph.pdf

2022 **SuperHyperFunction, SuperHyperTopology**

http://fs.unm.edu/NSS/SuperHyperFunction37.pdf

(in the last link there are easy definitions 4, 5, 6 of SuperHyperOperations, SuperHyperAxioms, and of SuperHyperAlgebra that is based on SuperHyperOperations and SuperHyperAxioms).

The most general form of SuperHyperAlgebra

Florentin Smarandache

The most general form of SuperHyperAlgebra is

$(P^n(S), \#_{SHO})$

where $\#_{SHO}$ is a SuperHyperOperation, defined as:

$\#_{SHO} : P^n(S) \dashrightarrow P^n(S)$

Of course, we may have many SuperHyperOperations

$\#_{SHO1}, \#_{SHO2}, \ldots, \#_{SHOq} : P^n(S) \rightarrow P^n(S)$

and many SuperHyperAxioms (SHA1, SHA2, ..., SHAr) dealing with these SuperHyperOperations

and working on the $P^n(S)$ space

$(P^n(S); \#_{SHO1}, \#_{SHO2}, \ldots, \#_{SHOq;}$ SHA1, SHA2, ..., SHAr)

forming a more complex SuperHyperAlgebra,

defined herein for the first time:

https://fs.unm.edu/NSS/SuperHyperFunction37.pdf.

The most general form of the SuperHyperFunction, see the Definition 14 of SuperHyperFunction (f_{SHP}) from the this paper:

https://fs.unm.edu/NSS/SuperHyperFunction37.pdf

is

$f_{SHF} : P^r(S) \dashrightarrow P^n(S)$,

then for a SuperHyperAlgebra defined on $P^n(S)$

the operations should be defined on $P^n(S)$,

therefore:

$\#_{SHO} : P^n(S) \dashrightarrow P^n(S)$.

On Crittenden and Vanden Eynden's Conjecture

Florentin Smarandache

It is possible to cover all (positive) integers with n geometrical progressions of integers?

Find a necessary and sufficient condition for a general class of positive integer sequences such that, for a fixed *n*, there are *n* (distinct) sequences of this class which cover all integers.

Comments:

a. No. Let $a_1, \ldots, a_n$ be respectively the first terms of each geometrical progression, and $q_1, \ldots, q_n$ respectively their ratios. Let p be a prime number different from $a_1, \ldots, a_n, q_1, \ldots, q_n$. Then p does not belong to the union of these n geometrical progressions.

b. For example, the class of progressions

$$A_f = \begin{Bmatrix} \{a_n\}_{n\geq 1}: a_n = f(a_{n-1}, \ldots, a_{n-i}) \\ \text{for } n \geq i+1, \text{and } i, a_1, a_2, .. \in N* \end{Bmatrix}$$

with the property

$$\exists y \in N^*, \forall (x_1, \ldots, x_i) \in N*^i: f(x_1, \ldots, x_i) \neq y.$$

Does it cover all integers?

But, if $\forall y \in N^*, \exists (x_1, \ldots, x_i) \in N*^i: f(x_1, \ldots, x_i) = y$?

(Generally no.)

This (solved and unsolved) problem remembers Crittenden and Vanden Eynden's conjecture.

References:

[1] R.B. Crittenden and C. L. Vanden Eynden, Any n arithmetic progressions covering the first 2^n integers covers all integers, Proc. Amer. Math. Soc. 24 (1970) 475-481.

[2] R.B. Crittenden and C. L. Vanden Eynden, *The union of arithmetic progression with differences not less than k*, Amer. Math. Monthly 79 (1972) 630.

[3] R. K. Guy, *Unsolved Problem in Number Theory*, Springer-Verlag, NewYork, Heidelberg, Berlin, 1981, Problem E23, p.136.

Use of special types of linear algebras and their generalizations

in the construction of new classes of codes with applications to cryptography, data storage, web-monitoring and testing

Dr. W. B. Vasantha Kandasamy has carried out innovative research in matrix theory and linear algebra. Her introduction of new classes of matrices like bimatrices, fuzzy interval matrices, super fuzzy matrices and special *n*-matrices (large *n*) which find their applications in coding and communication theory, Markov processes, and Leontief economic models is notable.[25]

She is best known for her work in the field of bialgebraic structures. The new notion of bivector spaces utilizes a bigroup to find applications in coding theory

[25] More information about her books and research can be viewed at her websites: http://www.vasantha.in, http://mat.iitm.ac.in/home/wbv/public_html/index.html.

through bicodes. Bicodes, *n*-codes and their dual n-codes are built using bilinear vector spaces and n-linear vector spaces. Best-approximation is applied for the first time to find the closest correct codeword. This concept was recently generalized to the notion of best bi-approximation and n-approximation for use in bicodes and n-codes and would prove to be highly beneficial to cryptologists because of its secure features that make it almost impenetrable to hackers.

She has also used techniques from basic set theory to build the concept of set-linear algebra, the most generalized form of linear algebra, which can be adopted by coding theorists. This has been generalized to n-set vector spaces and n-set linear algebras. Based on these special types of set linear algebras, semigroup linear algebras, and group linear algebras new classes of codes like set codes, set bicodes, set n-codes, semigroup cyclic codes and set group codes have been built. These codes can be used in web-monitoring and testing because of their capacity to work with n set of states simultaneously.

Recently, Dr. Vasantha was also involved in the construction of a new class of rank distance bicodes and generalizing them using bimatrices and n-matrices respectively. These classes of codes find applications in m-public key m-cryptosystems.

She pioneered the concept of N-algebraic structures that lend itself to applications in relevant fields like finite automatons, colouring problems and coding theory. She also utilized super-matrices to construct a new class of algebraic structures known as super-linear algebras that are used in Fuzzy and Neutrosophic models.

Previously, she has made fundamental and wide-ranging contributions in analyzing social problems by applying new classes of matrices in Fuzzy models to study real-world issues including the sociological analysis of people living with HIV/AIDS, difficulties faced by disabled people and so on.

SuperMatematica

Florentin Smarandache
către Mircea Șelariu

Nu știu dacă s-a dezvoltat ideea generală la SuperMatematica, adică:

- *o curbă oarecare închisă în planul cu două dimensiuni (2D), și un punct interior*

Apoi, în funcție de acestea, să se definească operațiile sinus, cosinus, etc. Vreau să zic definirea generală, în așa fel încât prin particularizarea acestei definiții a curbei și a punctului să se obțină formulele pentru cazurile cunoscute (cerc și punct în centru, cerc și punct ne-în-centru, elipsă și punct în centru, elipsă și punct ne-în-centru, etc.).

Desigur, când curba închisă este cerc iar punctul interior este centrul se obține trigonometria clasică; apoi se pot considera alte feluri de curbe închise (elipsă, etc.), cum s-a făcut.

- *o curbă deschisă, și un punct în afară*

În acest caz, funcțiile ar fi nedefinite pentru situația când se cade în partea deschisă a curbei. Cazul doi (curba neînchisă) pare a fi absurd, dar s-ar putea să aibă aplicații în cazul funcțiilor nedefinite peste tot.

Physics

3D-space in physics

Florentin Smarandache

There are various 3D-space concepts in physics

- 3D space topology - William Thurston;

- space is composed of liquid crystal - Harold Aspden;

- space is deeply related to consciousness – S. Lehar.

Neutrosophic Physical Laws

Florentin Smarandache

In my book:

http://fs.unm.edu/NewRelativisticParadoxes.pdf

I asserted that:

- *not all physical laws are the same in all inertial reference frames*.

We can get the same physical law that behaves differently in one place than in another, or in some conditions than in others…

We can do something on not-exact physical laws…

Philosophy&Stuff

Neutrosophy as a Meta-Philosophy

Florentin Smarandache

Neutrosophy is a meta-philosophy, i.e. a comparative metod for studying philosophy. The neutrosophic framework can open a new field of research in humanistic fields.

In neutrosophy, I included not only the opposites positive/negative, but also positive/zero/negative, not only good/evil, but also good/neutral/evil, not only matter/antimatter, but also matter/non-matter/antimatter, and so on, simply expressed by the triplet: <A>/<neutA>/<antiA>, expanding from the doublet <A>/<antiA>.

Principle of Interconvertibility Matter-Energy-Information

Florentin Smarandache, Ștefan Vlăduțescu

We propose the thesis of interconvertibile relationship between constituent elements of the universe: matter, energy, and information. The approach is a computationally-communicative-neutrosophic one.

We configure a coherent and cohesive ideation line. Matter, energy and information are fundamental elements of the world. Among them, there is an inextricable multiple, elastic and evolutionary connection. The elements are defined by the connections between them.

Our hypothesis is that the relationship between matter, energy and information is a neutral one. This relationship is not required by the evidence. At this level, it does not give up in front of the evidence intelligibility.

Neutral relationship is revealed as a law connection. Firstly, the premise that matter, energy and information never come into contradiction is taken as strong evidence. Their law-like-reciprocal obligations are non-contradictory. Being beyond the contrary, matter, energy and information maintain a neutral relationship.

Therefore, based on such view of functioning of the universe, or of the multi-verse, the neutrality should be stated. Matter, energy and information are primary-founder neutralities. They are neutral because they are perfectly bound to one another.

We clarify that regularity and uniformity are the primary forms of neutrality. Therefore, we study further the relational connections, and highlight the attributes and characteristics of the elements.[26] We have to explain the bilateral relationships matter-energy, information-matter, and energy-information.

[26] *Attributes* are essential features of elements and *characteristics* are their specific features.

The reality is an ongoing and complex process of bilateral and multi-lateral convertibility. Thus, we formulate the *Principle of Interconvertibility Matter-Energy-Information* (PI_{MEI}).

Neutrosophic Philosophical Interpretation

Florentin Smarandache

to W.B. Vasantha Kandasamy

I proposed (together with Chinese philosophers) a *Neutrosophic Interpretation* of two Chinese philosophical schools.

For example, the last book published with Fu Yuhua, that I met at Beijing in last December, and who translated the book into Chinese, interprets Confucius from a neutrosophic point of view, i.e. positively (his ideas), negatively (the opposite of his ideas), and neutrally (neither his ideas, nor the opposite ideas). And we offer examples for each of these three cases.

I think we can similarly do with respect to the rich, abundant, old, very diversified Indian Philosophy, Sociology, Social Science, Psychology, etc. (from ancient to contemporary).

We can neutrosophically interpret a school of thought (or a philosopher, sociologist, social-scientist, psychologist, etc.) from India: positively, negatively, and neutrally, and show by examples that each case is true in specific circumstances.

We can take a school of thought <S>, then the opposite of its ideas <antiS>, then its neutral part (labeled <neutA>, i.e. what is neither <S> nor <antiS>, or what is both <S> and <antiS> simultaneously).

We can show that all, <S>, <antiS>, and <neutS>, are true in same thinking space, false in other space, and indeterminate (i.e. neither true nor false) in another space.

We thus consider the multi-space of thinking.

Possible Neutrosophic Applications to Indian Philosophy and Religion

Florentin Smarandache
to W.B. Vasantha Kandasamy

We put contradictory concepts together and show that they can be true simultaneously or false simultaneously.

What about *Vedic philosophy, anti-Vedic philosophy, and neut-Vedic philosophy* (neither Vedic nor anti-Vedic, or both Vedic and anti-Vedic simultaneously)?

Or *Jainism, anti-Jainism, neut-Jainism*?

Similarly for *Dualism, non-Dualism, neut-Dualism*.

Metaphysics, anti-metaphysics, neut-metaphysics.

Dharma (natural law), *anti-Dharma* (un-natural law), *neut-Dharma* (a combination of Dharma and anti-Dharma law).

Or *modern Vedanta, anti-Vedanta, neut-Vedanta*.

In religion: *Buddhist, anti-Buddhist, neut-Buddhism*.

W.B. Vasantha Kandasamy

We probably should take into consideration Shivaism, the most important philosophy in Tamil.

Shivaism: an overview

Florentin Smarandache

Shaivism[27] reveres Lord Shiva as the Supreme Being. It is one of the oldest forms of Hinduism, with roots tracing back to pre-Vedic times. Temples dedicated to Shiva are spread across India, with notable ones in Varanasi, Rameswaram, and Chidambaram. The depiction of Shiva in dance (Nataraja) and his various forms (such as Ardhanarishvara, the *half-male*, *half-female* form) have significantly influenced Indian art and iconography.

Core Beliefs

Shiva is regarded as the ultimate god who creates, protects, and transforms the universe. He embodies both the ascetic and householder roles, reflecting his complex nature.

Shiva performs five essential activities - creation (Srishti), preservation (Sthiti), destruction (Samhara), concealing grace (Tirobhava), and revealing grace (Anugraha).

[27] Britannica, The Editors of Encyclopaedia. "Shaivism". Encyclopedia Britannica, 11 Jan. 2024, https://www.britannica.com/topic/Shaivism.

The Shiva Linga, an abstract representation of Shiva, symbolizes the cosmic pillar of fire, representing the universe's infinity.

Scriptures and Texts

Shaivism draws from Vedic texts and the Shaiva Agamas, which are a collection of scriptures providing philosophical, ritualistic, and meditative guidance. The Shiva Purana and Linga Purana are central texts that narrate the stories, rituals, and teachings associated with Shiva.

Sects within Shaivism

- *Pashupata Shaivism*: Focusing on ascetic practices and the worship of Pashupati, a form of Shiva.
- *Shaiva Siddhanta*: Emphasizing devotion (*bhakti*) and philosophical teachings on the soul's union with Shiva.
- *Kashmir Shaivism*: Known for its monistic (*Advaita*) philosophy, teaching that everything is a manifestation of Shiva.
- *Veerashaivism/Lingayatism*: Stressing the worship of the Ishtalinga, a personal emblem of Shiva worn by adherents.

Practices and Rituals

- **Puja and Abhishekam**: Regular worship and ritual bathing of the Shiva Linga with water, milk, honey, and other offerings.

- **Festivals**: Maha Shivaratri, the great night of Shiva, is the most significant festival, marked by night-long vigils and fasting.
- **Yoga and Meditation**: Shaivism has a strong tradition of yoga, with practices aimed at realizing oneness with Shiva.

Philosophy

- **Monism and Dualism**: Different sects of Shaivism have varied philosophical approaches. Kashmir Shaivism advocates monism (everything is Shiva), while Shaiva Siddhanta incorporates dualistic elements (distinct but connected souls, and God).
- **Spanda Theory**: In Kashmir Shaivism, this theory describes the dynamic, creative pulsation of the divine as the basis of all reality.

Philosophical Horizons in Neutrosophy

Tudor Păroiu

către Florentin Smarandache

În sistemul pe care îl creez răspunsurile vin de la sine, de aceea referitor la ambiguitate sau dacă ştim dacă este convenţional sau nu, sau cazul de combinare - răspunsul este la fel de simplu: sînt simultane. Adică ambiguitatea sau relativul relaţiei convenţional/neconvenţional este peste tot o realitate pentru că ele sînt simultane ca în cazul cunoaşterii şi necunoaşterii - atîta timp cît va exista necunoaşterea, toată cunoaşterea noastră este relativă. Ca această ambiguitate să dispară, noi creem alte convenţii (limite) pentru echilibru şi stabilitate în matematică - le spunem condiţii iniţiale de existenţă. Nu există în matematică o cifră, un număr sau o formulă care să nu aibe aceste condiţii iniţiale de existenţă (convenţii), în afara lor convenţiile (formulele) nu mai sînt valabile. Din acest motiv, dincolo de limitele finite nu mai putem face matematică.

Acolo este neconvenţionalul. Să nu credem că dacă cifra 1 sau 0 au devenit o banalitate, ele nu au condiţii de existenţă, aceste condiţii pot fi marcate sau subînţelese şi de aceea uneori ni se pare că nu avem condiţii iniţiale de existenţă. Cifra 1 şi 0 trebuie şi sînt în mulţimea numerelor naturale sau poate în binar (dar fac parte şi din celelalte sisteme de numeraţie sau domenii de numere în acelaşi timp) ori aceste menţiuni sînt condiţii de existenţă impuse prin convenţii subînţelese.

Acum intervine neconvenţionalul şi ne spune că cifra 1 este de fapt o mulţime întotdeauna pentru că în realitate unu şi mai mulţi sînt o simultaneitate, aşa cum am arătat în lucrarea pe care o publicăm orice număr este o simultaneitate nelimitată de subdiviziuni şi doar convenţiile noastre îl fac un număr independent.

Deci convenţia ne spune că 1 este unu iar neconvenţionalul ne spune că este doar o parte a adevărului întrucît în acelaşi timp 1 este simultaneitate nelimitată de subdiviziuni şi necunoscută.

Acest neconvenţional al lui unu îi dă relativul sau ambiguitatea cum spuneţi dumneavoastră dar în realitate ele sînt simultane. Orice entitate/univers, orice activitate practică, mersul pe jos au politica sau ştiinţă chiar şi în menegment sau justiţie, etc. toate sînt supuse legilor T* printre care legea simultaneităţii şi pardoxului sau infinitului limitat. Toate sînt simultan cunoaştere şi necunoaştere sau convenţionalne/convenţionale fără limită neutră.

Doar în convenţional există o linie de separaţie între contrarii „neutA” cum spuneţi dumneavoastră. Am să vă dau încă un exemplu care sper să fie edificator omul este o convenţie în realitate el nu este o masă compactă aşa cum apare convenţiei noastre de om el este ca orice entitate/univers de altfel o simultaneitate ca şi în cazul exemplului cu 1 şi 0 (şi 0 este nelimitat ca subdiviziuni doar că noi nu convenţionalizăm acest lucru) Omul este o simultaneitate nu doar materială ci şi nematerială, dar să ne oprim la materia lui.

Aşa cum am spus el nu este o entitate/univers compactă el este alcătuit din atomi şi molecule iar acestea sînt alcătuite din protoni, electronoi, etc. nici ele nu sînt o materie compactă mai mult ultimele cercetări din Elveţia remarcă dincolo de protoni şi electroni în condiţii de Big-Bang o “supă” la care nu se mai poate spune care este materia şi care este energia dar cu siguranţă nu este materie compactă şi nici doar energies au în final şi materie şi energie.

Concluzie: în nici o formă a materiei umane prezentate nu am găsit în realitate simultaneitatea gol/plin ci doar gol sau plin separt care teoretic merg în nelimitat dar practic devin simultane.

Acesta este relativul convenţional/neconvenţional sau gol/plin sau cunoaştere/necunoaştere, acesta este paradoxul oricărei entităţi/univers inclusiv al menegmentului sau al mersului pe jos iar noi sau altcineva nu putem desface simulatneitatea lui. Ca realitate ele sînt şi simultane şi separate în acelaşi timp dar noi nu putem reflecta lucrurile în acest mod pentru că deşi sîntem realitate nu putem reflecta realitatea decît convenţional prin spiritul nostru limitat.

În aceste condiţii ne folosim de ceea ce putem adică de convenţii şi acolo unde nu ajungem stabilim o limită ca şi în cazul planetei Pluto sau a lui neutrino, sau Dumnezeu sau infinit, etc. Teoretic neconvenţionalul meu are răspunsuri pentru orice dar în realitate este o iluzie pentru că el are răspunsuri pentru orice dar răspunsurile sînt limitate de infinit, nelimitat, paradox, etc, care nu mai sînt răspunsuri în convenţional.

Ca şi în matematică, aceasta are teoretic răspunsuri la orice dar multe dintre ele sînt nedefinit, nelimitat, infinit, sau cazuri exceptate iar acestea nu sînt răspunsuri decît dincolo de puterea noastră de înţelegere. Cine ne dă dreptul să stabilim noi nişte limite pentru Pluto sau neutrino? neputinţa noastră. Am fost creaţi ca să ne opunem putinţei Universului în Sine nelimitat noi sîntem neputinţa lui, el este neconvenţionalul noi convenţionalul lui. Fiecare cu sarcinile lui nelimitate sau limitate.

În principiu teoria mea prelungeşte în nelimitat orice limită şi nu desfiinează nici o convenţie.

Ultima concluzie în convenţional, convenţionalul şi neconvenţionalul sau orice contrarii pot fi separate, simultane, limitate şi opuse cu sau fără neutrul lor în raport de convenţii şi cel care face convenţiile, ca realitate ele sînt simultane dar noi şi nimeni nu poate decît să le reflecte în raport de capacitatea noastră sau a celui care reflecă iar în neconvenţional ele sînt identice, simultane, opuse, existente şi inexistente , etc. şi neapărat nelimitate.

Tudor Păroiu

Ca să vă răspund nu fac decît să vă prezint altfel realitatea, adică să privim lucrurile mai în profunzime. Imaginaţi-vă că orice **entitateunivers** este în final alcătuită din atomi şi molecule şi componentele acestora care şi ele la rîndul lor continuă divizarea ca şi în matematică. Pînă unde merge divizarea? Evident ca în în matematică (care este o filozofie matematică a realităţii, o reflectare matematică a ei) în infinit şi mai mult în neconvenţional în nelimitat. Dacă luăm o **entitateunivers** fizică aceasta se divizează şi ea în particule din ce în ce mai mici şi dacă luăm în calcul nelimitatul Universului în Sine şi al materiei ca şi al energiei vom putea crede uşor că particula spre care tinde componenta cea mai mică în nelimitat pentru orice entitateunivers fizică este 0. (mai ales după noile descoperiri care ne arată că nu s-a ajuns încă la limita cea mai mică a materiei chiar în condiţii de Big-bang).

Acel 0 neconvenţional care este o simultaneitate 0+ cu 0-. În aceste condiţii este evident că orice **entitateunivers** fizică este alcătuită din nelimitate **entităţiunivers** 0, ca de altfel orice număr din matematică sau fizică, etc. Prin exemplificarea lui 0+ şi 0- v-am dat un exemplu şi de contrarii identice neconvenţionale care pot fi simultane, identice şi contrarii. Este adevărat că nu pentru noi care nu putem lucra cu aşa ceva dar noi putem lucre cu 0*+ şi 0*- care sînt limitele lui 0 în convenţional şi pot fi cuantificabile indiferent cît de mici le considerăm. 0 nu poate fi cuantificat în convenţionalul nostru iar ca realitate convenţională nici nu există pentru noi (este doar o convenţie) atîta timp cît nu există perfecţiunea reflectării realităţii şi nici a măsurării ei. (realtivul absolut)

În concluzie orice **entitateunivers** respectă legea simultaneităţii care spune că orice **entitateunivers** este sumă **finitinfinită** de **entităţiunivers** în convenţional, infinit de infinit ca realitate şi nelimitată neconvenţional.

Neutrosophic Information - proiect

Florentin Smarandache - Ștefan Vlăduțescu

1) În orice societate există un procent mai mare sau mai mic de manipulare a informaţiei.

2) Democraţie a devenit astăzi un totalitarism global, adică dorinţa şi valorile celui mai puternic impuse prin forţă şi propagandă la nivel mondial.

3) Între multe valori există diferenţe imperceptibile. Dar cei care manipulează mass-media internaţională le lărgesc, le îngroaşă.

4) Umanizare + Dezumanizare.

5) Materializare + Spiritualizare.

6) Determinism + Nondeterminism.

7) Superficializare: astăzi ambalajul contează mai mult decât conţinutul.

8) Socializare + Nesocializare.

9) Relaţionalizare + Nerelaţionalizare.

10) Plăcere + Datorie + Indiferenţă.

11) Preluarea unui model social + Refuzarea unui model social.

12) În general <A> + <antiA> + <neutA>, unde <A> este o noţiune, <antiA> este opusul lui <A>, iar <neutA> este neutralul (adică nici <A> nici <antiA>).

Trebuie să găseşti un sens în tot ce faci. Să găseşti un sens şi la contrarii şi neutral (adică lui <A>, <antiA>, şi <neutA>.

The Fourth Way and Neutrosophy

The Fourth Way, introduced by the mystic and spiritual teacher George Gurdjieff and further developed by his student, P.D. Ouspensky,[28] offers an approach to

[28] Ouspensky's work (Ouspensky, P.D. "In Search of the Miraculous: Fragments of an Unknown Teaching." Harcourt, Brace & World, 1949.) serves as a primary text, detailing his

self-transformation, intertwining psychology, mysticism, and philosophy. Emphasizing the harmonious development of the intellectual, emotional, and physical aspects of an individual, this system challenges conventional notions.

Gurdjieff's emphasis on self-awareness and conscious living aligns with the complexities of human psychology. Because "Man is a machine. All his deeds, actions, words, thoughts, feelings, convictions, opinions, and habits are the results of external influences, external impressions, external circumstances.", Ouspensky's writings delve into the multifaceted nature of consciousness, echoing the idea that reality is not always straightforward.

Therefore, the Fourth Way aims to be an alternative approach to spiritual development that could be integrated into ordinary life, without the need for extreme asceticism, isolation, or renunciation of the world.

The Three Traditional Ways of Spiritual Development

The term implies a more direct and comprehensive method that incorporates elements from the three traditional ways but seeks to achieve spiritual growth within the context of everyday existence, emerged out of three traditional ways of spiritual development: the way of the fakir, the way of the monk, and the way of the yogi.

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experiences with Gurdjieff and the profound teachings of the Fourth Way.

- **The Way of the Fakir**: This path involves physical and bodily practices aimed at achieving spiritual development. Fakirs often engage in extreme physical disciplines and endurance to transcend the limitations of the body.
- **The Way of the Monk**: Monastic traditions involve a life of isolation, ascetic practices, and devotion to religious principles. Monks typically withdraw from worldly affairs to focus on prayer, meditation, and religious contemplation.
- **The Way of the Yogi**: Yogic traditions emphasize mental and meditative practices to attain spiritual enlightenment. Yogis often engage in various forms of meditation, breath control, and mental concentration to reach higher states of consciousness.

Conscious Evolution

The Fourth Way comes with the concept of "conscious evolution," which involves the deliberate and awakened development of one's inner being. It suggests that ordinary life alone does not lead to significant spiritual growth, and intentional specific efforts are required, since: "Self-observation brings man to the realization of the necessity of self-change. And in observing himself a man notices that self-observation itself brings about certain changes in his inner processes. He begins to understand that self-observation is an instrument of self-change, a means of awakening."

Gurdjieff proposed that human beings have three main centers of functioning: *intellectual*, *emotional*, and *physical*. The Fourth Way aims (by increasing consciousness) at the harmonious development and integration of these centers, leading to a balanced state of being: “Consciousness is a function that cannot stand by itself. Consciousness is always the result of conflict. It is conditioned by opposition, by the struggle of opposites.”

Advice for practitioners

Practitioners are encouraged to become more aware of their thoughts, emotions, and physical actions in order to transcend automatic and unconscious behaviors, by various practices and exercises designed to facilitate self-observation, self-remembering, and self-discipline. Gurdjieff often referred to these practices as "Work on Oneself." The aim is to break free from mechanical reactions and develop a higher level of consciousness.

Also, practitioners of the Fourth Way are encouraged to develop an objective understanding of themselves and the world around them. This involves seeing things as they truly are, free from personal biases and illusions.

Moreover, Gurdjieff and Ouspensky emphasized the importance of working within groups as a means of mutual support and learning. Group interactions provide opportunities for individuals to observe themselves in relation to others and receive feedback on their progress.

In essence, the "Fourth Way" signifies a more balanced and holistic approach to spiritual development that is accessible to individuals leading ordinary lives in the modern world. The designation emphasizes the idea that there is a different path, a "fourth" option, for those seeking inner transformation.

The teachings of the Fourth Way are often transmitted orally and experientially. Parables, allegories, and practical exercises are used, serving to convey deeper insights.

Man has no individual 'I', but thousands of 'I'

Ouspenky believed that "Man has no individual 'I'. But there are, instead, hundreds and thousands of separate small 'I's, very often entirely unknown to one another, never coming into contact, or, on the contrary, hostile to each other, mutually exclusive and incompatible."

This view congruents the neutrosophic framework. Like neutrosophy, the forth way is a system that invites individuals to explore the nuances of reality and recognize the limitations of conventional binary thinking.

Clan capitalism

Florentin Smarandache

It is easy to observe that the clan system occurs in all countries.

In capitalism it is more predominant. In socialism and communism it may turn in clan government.

Major enterprises tend to make clan capitalism and monopoly.

In the United Statea, there are anti-trust laws and anti-monopoly laws, but large corporations avoid them, or extend the process that the government tries to break their monopoly.

Each business tries to become clan capitalism, and the regulations try to entangle that.

Always there will be a movement between liberalism and government regulations.

Even a small business tends to operate as small clan capitalism.

Commitment to Diversity

Florentin Smarandache

Diversity refers to the differences that include race, ethnicity, age, religion, language, culture, abilities/disabilities, sexual orientation, gender identity, socioeconomic status, veteran status, thought and opinion, professional aspirations, geographic region, and more. But from diversity arises the variety of personal experiences, values, and worldviews.

It leverages the power of these differences, and broadens and deepens both the educational experience and the scholarly environment.

In academia, diversity should mean to promote a mutual respect, a pluralistic view, different frames of references, to recruiting a heterogeneous faculty, student body, staff, and embedding diversity in the future.

As an educator and researcher, my diversity initiatives and strategies try to attract, develop, and advance the most talented students regardless of their differences, because each student has a personal accountability for success.

Inclusion of various student, staff, and faculty populations inspires innovation and the role each one of us plays in the university's community.

The educator has to increase the awareness and understanding of differences in the work place, and why they really matter. He should work to identify, and promptly address, diversity issues.

As a minority myself, I support the diversity and equal opportunity in education, administration, services, teaching, research and creativity. It is an imperative need to remove the barriers between people and promote truly talented students, faculty and staff from underrepresented populations.

Artificial Intelligence can be trained to distort the truth

Florentin Smarandache

Not only the mainstream media can distort or even inverse the truth, but even the AI (Artificial Intelligence) can be trained to falsify the information.

How? One simple way is by checking/connecting the AI soft/engine only to mainstream information (databases, websites, so on).

In this *fourteenth book of scilogs* – one may find topics on examples where neutrosophics works and others don't, law of included infinitely-many-middles, decision making in games and real life through neutrosophic lens, sociology by neutrosophic methods, Smarandache multispace, algebraic structures using natural class of intervals, continuous linguistic set, cyclic neutrosophic graph, graph of neutrosophic triplet group , how to convert the crisp data to neutrosophic data, n-refined neutrosophic set ranking, adjoint of a square neutrosophic matrix, neutrosophic optimization, de-neutrosophication, the n-ary soft set relationship, hypersoft set, extending the hypergroupoid to the superhypergroupoid, alternative ranking, Dezert-Smarandache Theory (DSmT), reconciliation between theoretical and market prices, extension of the MASS model by the incorporation of neutrosophic statistics and the DSmT combination rule, conditional probability of actually detecting a financial fraud, neutrosophic extension using DSmT combination rule, probabilistic information content, absolute and relative DSm conditioning rules, example of PCR5 with Zhang's degree, PCR5 with degree of intersection, the most general form of SuperHyperAlgebra, on Crittenden and Vanden Eynden's conjecture, use of special types of linear algebras and their generalizations, SuperMathematics, 3D-space in physics, neutrosophic physical laws, neutrosophy as a meta-philosophy, principle of interconvertibility matter-energy-information, neutrosophic philosophical interpretation, possible neutrosophic applications to Indian philosophy and religion, philosophical horizons in neutrosophy, clan capitalism, or artificial intelligence, and so on.

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