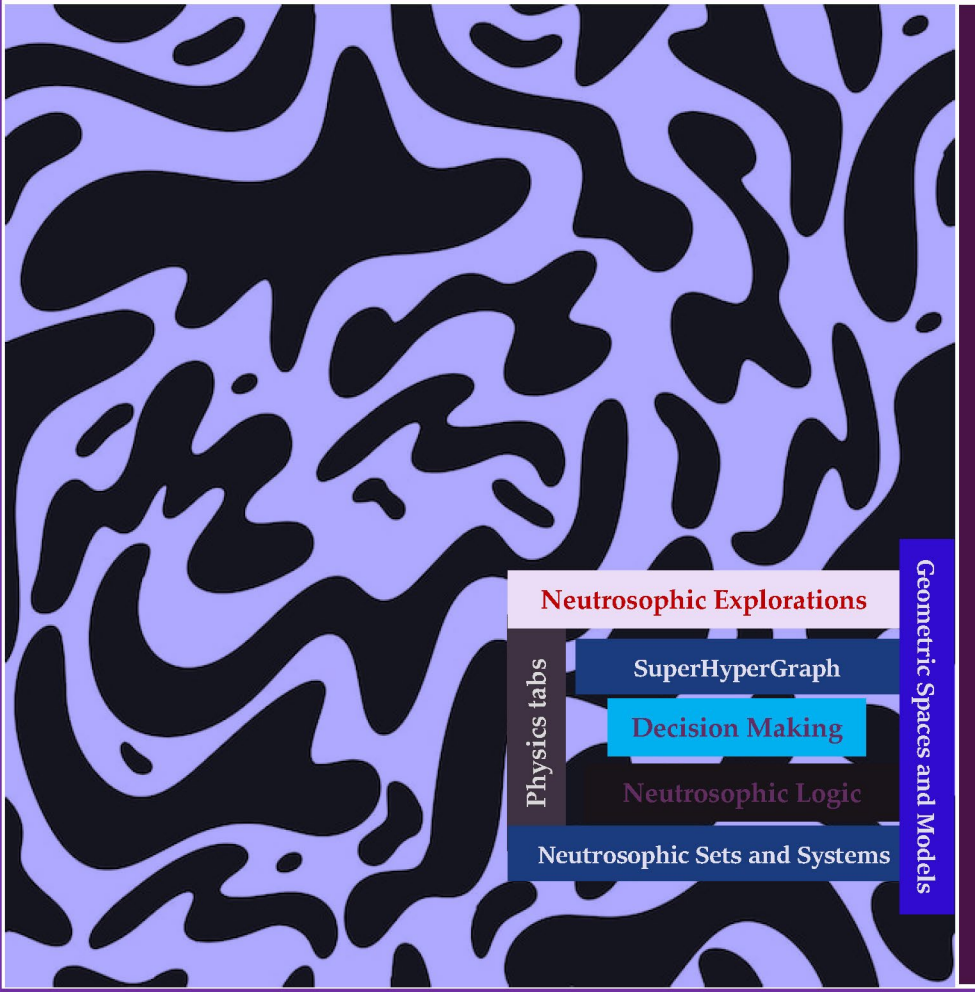
scilogs, XI

florentin smarandache

# nidus idearum

## *in-turns and out-turns*

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**Florentin Smarandache**

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## Nidus idearum.
## Scilogs, XI: in-turns and out-turns

Grandview Heights, Ohio, USA, 2023

Exchanging ideas with Prem Kumar Singh, Feng Liu, Nicolae Bălașa, Jimmy Quellet, Minodora Ruşchiţa, Frank Gelli, A. R. Vătuiu, Victor Christianto, Vladimir I. Rogozhin, Robert Neil Boyd, Akira Kanda, Stefan Spaarmann, Oliver Consa, Yabin Shao, Junle Zhuo, Nivetha Martin, Said Broumi, Jean Dezert, Erick González, Tomasz Witczak, B. De Baets, I. Couso, D. Dubois, L. Good, Mihaela Colhon, Atiqe Ur Rahman, Muhammad Saeed, Muhammad Ihsan, Edeline Nancy, Shawkat Alkhazaleh, Shazia Rana, Vasantha Kandasamy, Santanu Acharjee, Mohamed Al-Shmrani, Parimala Manie, Mehmet Unver, Murat Olgun, Adel Aleidhri, Akira Kanda, Ilanthenral Kandasamy, Mircea Zărnescu, R. Tayebi Khorami, Arsham Borumand Saeid, Maisam Jdid, M. Abobala, Riad Hamido, Rafael Rojas, Esmaeil Zarei, Faisal Khan, Rouzbeh Abbassi, Adel Al-Odhari, Henry Garrett, Ackbar Rezaei, Saeid Jafari, Karthika Muthusamy, Harish Garg, Huda E. Khalid, Gonca D. Güngör, Muslim A. Noah Zainal, Fakhry Asad Agusfrianto, Madeleine Al-Tahan, Mariam Hariri, Yudi Mahatma, Masoud Ghods, Marco Brigliadori, Luis Enrique Aponte Pérez, Amr Mohammed, M. Aslam (in order of reference in the book).

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**Florentin Smarandache**

# Nidus idearum

## Scilogs, XI:
## in-turns and out-turns

*Peer-Reviewers:*

# 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 *eleventh book of scilogs* – called *in-turns and out-turns* –, one may find new and old questions and solutions, referring mostly to topics on Neutrosophy, but also Multispace, with miscellaneous addition of topics on Physics, Mathematics, or Sociology – email messages to research colleagues, or replies, notes 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!

Already 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

# CONTENTS

## NEUTROSOPHY

Neutrosophy [1998], as a new branch of philosophy and a generalization of dialectics, is based on the dynamics of opposites and the neutralities between them, and it has been extended to Refined Neutrosophy, and consequently the Neutrosophication was extended to Refined Neutrosophication. Whence, Regret Theory, Grey System Theory, and Three-Ways Decision are particular cases of Neutrosophication and of Neutrosophic Probability. We have further extended the Three-Ways Decision to n-Ways Decision, the last one is a particular case of Refined Neutrosophy.

Neutrosophy is also an extension of the international movement called Paradoxism (based only on contradictions in science and literature) [1980].

Neutrosophic Set, defined on three components {membership (T), indeterminacy (I), and nonmembership (F)}, is a generalization of Crisp Set, Fuzzy Set, Intuitionistic Fuzzy Set, Inconsistent Intuitionistic Fuzzy Set (Picture Fuzzy Set, Ternary Fuzzy Set), Pythagorean Fuzzy Set, q-Rung Orthopair Fuzzy Set, Spherical Fuzzy Set, Fermatean, and n-HyperSpherical Fuzzy Set. Neutrosophic Set has been further extended to Refined Neutrosophic Set. Further on, as extension and alternative there was defined the Plithogenic Set [2017] based on MultiVariate Analysis.

TOPICS

# Nidus idearum
# Scilogs, XI:
# in-turns and out-turns

# NEUTROSOPHIC EXPLORATIONS

## Neutrosophication, Antisophication

[Florentin Smarandache]

***Neutro**-sophication* of an item *C* (that may be a concept, a space, an idea, an operation, an axiom, a theorem, a theory, etc.) means to split *C* into three parts (two parts opposite to each other, and another part which is the neutral/indeterminacy between the opposites), as pertinent to neutrosophy {(<*A*>, <*neutA*>, <*antiA*>), or with other notation (*T, I, F*)}, meaning cases where *C* is partially true (*T*), partially false (*F*), and partially indeterminate (*I*). And ***Anti**-sophication* of *C* means to totally deny *C* (meaning that *C* is false on its whole domain).

## Social — Asocial — Antisocial

[Florentin Smarandache]

A fight between good and evil.

— 100% evil;
— 100% angel;
— and in between them: partially evil & partially angel.

— Left cerebella
— right cerebella,
— plus their combination.

— Follow the others,
— Refuse to follow;
— and Partially follow & partially refuse to follow.

— Justice,
— Hybrid (partially justice & partially injustice),
— and Injustice.

— Sympathy,
— Empathy,
— Antipathy.

In between the opposites:

— Determinism (Control),
— Indeterminism (Free Will).

## Pure Democracy

[Prem Kumar Singh]

> In democratic countries like India the laws differ from person to person, gender to gender, and politician to politician.
>
> The Law applies fully for the person who opposes the government i.e. Law (1, 0, 0), the law is not applied with the person who supports the given political party i.e. Anti-Law (0, 0, 1) and for some people it is undefined i.e. NeutroLaw *(t, i, f)*. It applies in job, recruitment and promotions also where people get job easily in case he/she supports the given government, given caste, or given regions. In this case they use or bring many laws or incorporate any things to give the job to particular person i.e. Concept (1, 0, 0).
>
> The given person does not support the government, does not belongs to same case or region they try to manipulate the system for not recruiting the particular person i.e. Anti-Concept (0, 0, 1). The third case is undefined when they do not know anything about the given person or might happen that due to political mileage they can give job to anyone. These types of case is undefined can be considered as Neutro-Concept *(t, i, f)*.

[Florentin Smarandache]

If the law does not apply equally to all citizens, then the country is not a democracy. It is also true that some countries have a higher degree of democracy than other countries. But it is a utopia to have the law apply to the same degree to all citizens, therefore a pure democracy does not exist.

## Paradox — as Single Consciousness

[Feng Liu]

> <A> and <antiA> can be both true in the same time if you assign the values: $T = 1$, and $F = 1$. Can you find a single case in a single consciousness instead of multiple consciousness?

[Florentin Smarandache]

Yes, of course, the easiest example is the PARADOX.

A paradox is a proposition that is true and false at the same time, therefore $T = 1$ and $F = 1$.

Another example:

In *Quantum Physics*, when a particle may be in two distinct places at the same time,

— therefore the degree of appurtenance/membership of a particle with respect to a given place may be $T$(particle) = 1, while the degree of non-appurtenance/non-membership of a particle with respect to that given place may be $F$(particle) = 1.

Also, for the *Entangle Particles*.

http://fs.unm.edu/Neutro-NeutrosofiaNouaRamura.pdf

## Neutrosofia și aplicațiile ei practice

[Florentin Smarandache to Nicolae Bălașa]

Nu știu dacă v-am zis ca am publicat un eseu filozofic despre neutrosofie, ca extindere a dialecticii și a filozofiei antice chineze Yin-Yan. Am fost în China și am prezentat-o.

Idea este simplă: se bazează pe conectarea nu doar a contrariilor, dar și a neutralelor dintre ele...

Când doi se bat, alții de pe margine intervin de o parte sau alta (la fel și la război, ca acum).

Neutrosofia a generat discipline precum logica neutrosofică, probabilitatea neutrosofică etc., care au multe aplicații practice.

Forma englezească s-a publicat într-o revistă recunoscută din Marea Britanie (*Multiple-Valued Logic* = Logica Multivalentă), de nivel internațional.

Este vorba de conectarea ideilor filozofice contrare, cum s-ar zice în proverb: *adevărul este la mijloc* (sau parțial adevărat într-o parte, și parțial adevărat și în cealaltă parte).

## Ultimate Truth in Buddhism

[Florentin Smarandache to Feng Liu]

Ultimate Truth in Buddhism is the Absolute Truth (truth in all possible worlds – therefore the Ultimate Truth in Buddhism is included) in neutrosophic logic, i.e. degree of truth whose value is $1^+$ (in non-standard analysis, where $1^+ = 1 + \varepsilon$, with $\varepsilon$ being a positive infinitesimal), is different from Relative Truth (truth in at least one world) whose degree of truth is just 1. Since $1^+ > 1$.

Good luck in your religious study!

Please do not mess up science with religious dogma.

## On Paradoxism, Neutrosophy, and MultiVariate-Truth

[Florentin Smarandache to Jimmy Quellet]

I have my web of paradoxism in science, literature, arts since tens of years ago: http://fs.unm.edu/a/paradoxism.htm. Also, you can see a collection of paradoxist creations in literature, many international anthologies on paradoxism, etc. on the above website.

The Paradoxism, as dynamics of opposites <A> and <antiA>, I have extended to Neutrosophy, as philosophy of dynamics of opposites and their neutrals <A>, <neutA>, <antiA>: since that's what happens in our everyday life, i.e. if a fight/dispute erupts between two opposite parts, some neutral parts intervene on one side, other neutrals maybe on another side, and the third group of neutrals

may still remain neutral, see: http://fs.unm.edu/neutrosophy.htm, and my article: http://fs.unm.edu/Neutrosophy-A-New-Branch-of-Philosophy.pdf , published in 2002 by *Multiple-Valued Logic / An International Journal*).

In neutrosophic logic, you have three components: Truth (*T*), Falsehood (*F*), and Indeterminacy (*I*). But Indeterminacy may be partially true and partially false: http://fs.unm.edu/Indeterminacy.pdf

$I$ = ($p$%)true & (1-$p$%)false, where $0 < p < 1$.

In neutrosophy, if one takes <A> = Existence, and its opposite <antiA> = NonExistence as said in [2], "Existence co-exists with NonExistence", then the Indeterminacy may be partially Existence and Partially NonExistence.

Further one, when talking about Single-Truth and Bi-Truth (*Dialethia*, or twice truth – in Greek), as in your case [1], there is the general the MultiVariate-Truth, see the Plithogenic Logic as generalization of Neutrosophic Logic, when one event (proposition, concept, etc.) is evaluated by many sources from various points of views (various angles):

http://fs.unm.edu/NSS/IntroductionPlithogenicLogic1.pdf .

*References:*

[1] Jimmy Quellet, *The Philosophy of Paradoxism*, https://www.paradoxism.org/, Canada (accessed on 09 Feb. 2023).

[2] James Sirois, *Co-existence Theory*, mss., Greece, 2020.

## Neutrosophy as MetaPhilosophy

[Florentin Smarandache]

One can combine an Asian philosophical idea (or school) $I_1$ with another Asian philosophical idea (or school) $I_2$ that is opposite to $I_1$, (or to get something in between, may be or a mixture of $I_1$ and $I_2$).

As already did for ***intuilytics*** = *intuition* + *analytics* (unification of opposite ideas).

## Neutrosofia, comparare a ideilor opuse, dar și neutre

[Florentin Smarandache to Minodora Ruşchiţa]

Eu am definit Neutrosofia [1, 2] ca o ramură a filozofiei care se ocupă de compararea ideilor opuse, dar și neutre (le-am notat eu: <A>, <antiA>, și respectiv <neutA>) și am publicat pentru prima oară definiția într-o revistă internațională din Anglia [3].

Din ea au rezultat logica neutrosofică, mulțimea neutrosofică, probabilitatea neutrosofică etc., recunoscute la nivel internațional, care au multe aplicații în știință.

*References:*

1. Florentin Smarandache, "A Unifying Field in Logics: Neutrosophic Logic. Neutrosophy, Neutrosophic Set, Neutrosophic Probability and Statistics", mss., 1995.

2. Florentin Smarandache, "Neutrosofia, o nouă ramură a filosofiei", revista *Constelaţii Diamantine*, Craiova, Romania, Anul III, Nr. 7 (23), pp. 39-42, 27 iulie 2012. This is a translation, by the author, from English to Romanian, of the paper:

3. Florentin Smarandache, "Neutrosophy, A New Branch of Philosophy", England - USA, ISSN 1023-6627, Vol. 8, No. 3, pp. 297-384, 2002.

## Consciousness and Personality of The Matter

[Florentin Smarandache to Robert Neil Boyd]

To better understand: what are the definitions of consciousness and personality of the matter (non-beings)?

For example:

— personality of a star = ?
— consciousness of a star = ?

Or, — personality of an object = ?
— consciousness of an object = ?
[Do such things exist?].

## Pro — Contra — Neutral

[Florentin Smarandache to Frank Gelli]

I read many of your philosophical-political-religious-social-historical essays. What I like about them is that you always present all sides of the story: pro, contra, and neutral (in between the opposites) - as in our real life.

Unlike most of the media that only present a side of the story (either pro, or contra).

## Neutrosophy in between stable/unstable

[Florentin Smarandache]

To include the neutrosophy as in between stable/ unstable and in between predictable/unpredictable.

## Saturation of a Neutrosophic Dynamic System

[Florentin Smarandache]

Any system grows and grows until the system riches a point of terminus, or saturation of itself...

Where from it starts to decay...

## Spiral Neutrosophic Evolution

[Florentin Smarandache & A. R. Vătuiu]

The future can only be the *Spiral Neutrosophic Evolution*:

— from inferior (<A>) to superior (<antiA>) [*evolution*],

— and back [*involution*] to an inferior and superior melange (<neutA>),

— and over time we encounter stagnation (no evolution, no involution) or uncertainty (if it is evolution or involution) [*indetermination*] ... ,

and so on, in a spiral.

Therefore:

— evolution / involution / indetermination at a level;

followed by another similar cycle:

— evolution / involution / indetermination

but to another level, superior ...

and so on, spirally, to infinity.

## God = Universe

[Florentin Smarandache to Victor Christianto]

I think Spinoza said that God = Nature.

I'd go further and extend it to God = Universe.

The Universe with all its laws that apply at different degrees in different spaces. The spaces that may be galaxies, solar systems, planets, moons, physical spaces, mental spaces, psychic spaces, spiritual spaces. If I am right, then we all people are part of God - with our flesh and mind and psychic.

## Neologisme

[Florentin Smarandache]

Am introdus câteva neologisme:

— "neutrosophy" (în engleză) și tradus în română prin "neutrosofie", iar în spaniolă prin "neutrosofia";

— plus adjectivul sau "neutrosophic" (în engleză), tradus prin "neutrosofic" (în română) și "neutrosofico" (în spaniolă).

Altul: — "plithogenic" (în engleză numai).

Există:

— logica neutrosofică,

— multimea neutrosofică,

— probabilitatea neutrosofică,

— statistica neutrosofică etc.

Alte neologisme (în engleză numai, deocamdată):

— SuperHyperAlgebra, SuperHyperGraph, SuperHyperFunction, SuperHyperTopology, HyperSoft Set, IndetermSoft Set, IndetermHyperSoft Set, TreeSoft Set, NeutroAlgebra, NeutroGeometry, NeutroTopology, AntiTopology, etc.

Sunt câteva mii de articole și cărți publicate prin zeci de țări prin diverse reviste în lume:

http://fs.unm.edu/neutrosophy.htm

http://fs.unm.edu/NSS/Articles.htm.

## Dinamica limbii și a polisemanticii

[Florentin Smarandache]

Un cuvânt $C$ are sensurile $C_1$, $C_2$, ..., $C_n$ știute/existente până la un anumit timp.

Dar noi sensuri i se pot acorda în viitor, iar altele vechi or dispărea, așadar avem o parte indeterminată/necunoscută (sau potențială) a sensurilor cuvintelor la un anumit timp: $I_1$, $I_2$, ... .

## Classical Math vs. Neutrosophic Math

[Florentin Smarandache to Vladimir I. Rogozhin]

I read the philosophical papers [1,2,3] on science and the stories of infinity and infinitesimals. I agree that mathematics (actually the pure mathematics) is a scientific game, not necessarily reflecting the reality. When I was a student at the University of Craiova, Romania, and studying the mathematical analysis, I asked our assistant where do we need all these theoretical and perfect spaces (Hilbert, Banach,

etc.) in our everyday life - which is full of uncertainty and indeterminacy? She answered for me: they develop our way of thinking. Then I said, good but why don't we learn usable things needed in our world and develop our way of thinking that way?

I had objections about the classical algebraic structures that they are too perfect, too uniform, where all operations and axioms behave the same for all elements - which is different from our world where the laws apply in various degrees to the people. That's why I developed the NeutroAlgebra & AntiAlgebra, where the operations and axioms are not 100% true, but only partially true (as in our life), and even 100% false.

Take a look at this: http://fs.unm.edu/NA/NeutroAlgebra.htm

Similarly for geometry, and extending Lobachevsky and Bolyai's geometries to NeutroGeometry & AntiGeometry where the geometrical axioms are only partially true (as in our reality): http://fs.unm.edu/NSS/NeutroGeometryAntiGeometry31.pdf

Now, let me ask you something else: why don't you analyze the theoretical physics of today? They are so abstract and imaginary and outside of the real world, and more mathematical than realistic, than many scientists wonder about, except you, a philosopher of science.

Physics pretends to represent our reality - but not anymore - while mathematics only tries to module it, but many times escapes outside it.

Yes, the SuperHyperStructure was designed to better module the real world.

Because, the *n*-th-Powerset of a Set, that it is built upon, that I introduced better reflects our complex reality, since a set *H* (that may represent a group, a society, a country, a continent, etc.) of elements (such as: people, objects, and in general any items) is organized onto

subsets P($H$), and these subsets are again organized onto subsets of subsets P(P($H$)), and so on. That's our world.

At the heart of my philosophy is not dialectics (dynamics of opposites), but neutrosophy (dynamics of opposites and their neutrals) because neutrosophy better reflects the reality (i.e. some neutrals play a role in one side or the other of the opposites).

*References:*

[1] A. Zenkin. "Scientific Counter-Revolution in Mathematics" http://www.ccas.ru/alexzen/papers/ng-02/contr_rev.htm

[2] D. Bukin "Crisis of The Foundations of Mathematics as A Crisis of Ontology" http://www.unn.ru/pages/e-library/vestnik_soc/99990201_West_soc_2011_4(24)/15.pdf

[3] Morris Kline. "Mathematics: Loss of Certainty"

## Relation between Mathematics and Physical Realities

[Victor Christianto]

> What do you think of relation between mathematics and physical realities? Do you prefer mathematical constructivist view, or Pythagorean mathematical view?

[Florentin Smarandache]

I have defined the NeutroAlgebra, where the laws and axioms are only partially true, not 100% true as in classical algebra,

just inspired from our real life, where the law applies in different degree to different people.

Please read just the this website (it is easy to understand): http://fs.unm.edu/NA/NeutroAlgebra.htm.

Therefore, I said that mathematics is too abstract and too idealistic and too perfect with respect to our real world. We do not live in an egalitarian world where everybody enjoys the same rights.

# PHYSICS TABS

## Quantum Paradox

[Robert Neil Boyd]

Thanks to you [Florentin Smarandache] and Victor [Christianto] for accepting the invitation to do an article expanding the discussions related to the Smarandache Paradoxes. I have a couple of ideas about where this can go, the first being a discussion of *quantum coherence* (as opposed to *quantum de-coherence*), which is an important understanding.

You told me that my exploration of high-low-high and low-high-low measurement results of multitudinous observations over time, in physical systems, could be put into *neutrosophic terms*.

The above suggested function is analogous to the positive-going and negative-going portions of a sine wave, a triangle wave, and many additional wave-forms.

This means that neutrosophy can be used to examine wave systems, ecology, electromagnetic propagations, and many quantum and astrophysical considerations, in ways that have never been done before and which may be advantageous when applied to the given topic.

[Florentin Smarandache]

Coherence quantum & decoherence quantum put together in quantum field, and other opposites in physics, or opposites and their neutrals put together - to form a neutrosophic approach.

## Finding New Laws in Science

[to Akira Kanda, Victor Christianto, Stefan Spaarmann, Robert Neil Boyd, Oliver Consa]

I read a paper that talks about finding new laws in physics (they do it in psychology - they are Japanese) called AI-Feynman...

What do you think?

How do people find new laws in any field?

## Real Physics vs. today's Imaginary Physics

[Florentin Smarandache to Robert Neil Boyd and Victor Christianto]

I watched on YouTube about the newest telescope sent in orbit, and curiously the Japanese-American physicist Michio Kaku that is well-known, whose status is that of a mainstream scientist, dared to expose anti-mainstream ideas, such as:

— the big bang did not exist,

— the speed of light is overpassed,

— the black-holes do not exist...

Is physics coming back to reality?

## Faster-than-light

Jean-Pierre Petit, *Theory about faster-than-light (FTL) interstellar travels*, YouTube, https://www.youtube.com/watch?v=LoZFg87LZi8 (accessed on 2nd April 2022).

## Gravitation

[Florentin Smarandache to Robert Neil Boyd]

I believe, as you said, that the shape and orientation of an object may influence the way gravity works, the object may fall faster or slower.

Then I think other parameters may influence the gravity, for example what about the electromagnetic fields of the two objects (one that attracts the other)?

Then the medium [ether ?] an object passes through...

## Noise Diodes

[Robert Neil Boyd]

I've been looking at a physical use for neutrosophy in electromagnetic transmission and reception.

Some systems use "noise diodes", to produce a form of uncertainty, to improve reception and/or transmission. Since "noise" is a form of uncertainty, perhaps such systems could be be improved using neutrosophic logic.

As an example, see:

https://www.science.org/doi/10.1126/sciadv.abb0451 .

## Physics Projects to be Investigated and Applied

[Florentin Smarandache]

From my physics side: http://fs.unm.edu/physics.htm, there are links to various ideas to be developed further, and investigate new things [and make new projects] such as:

1. *Unmatter* (having degrees of matter and antimatter), and the first paper was accepted by CERN: http://cdsweb.cern.ch/record/798551

2. *Unmatter Plasma*: http://fs.unm.edu/UnmatterPlasma-book.pdf

3. *Absolute Theory of Relativity* (against STR), http://fs.unm.edu/ParameterizedSTR.pdf; not sure if it coincides with Newton's or others (?)

4. *Relativistic Paradoxes*: http://fs.unm.edu/NewRelativisticParadoxes.pdf

5. *Superluminal Physics*: How the physics laws behave at superluminal speeds? And what are the connections/distinctions between a Law at speed $< c$ and the same Law at speed $> c$?

6. *Instantaneous Physics*: How the physics laws behave at infinite speeds? And what are the connections/distinctions between a Law at

speed < *c* (speed of light), the same Law at speed > *c*, and the same Law at infinite speed?

7. *NeutroPhysics space*, i.e. a physics space where a physics Law is partially true [true for some elements in the space], and partially false (false for other elements in the space). To find some practical examples.

8. *Grand Unification* is done in a *Physics MultiSpace with MultiStructures*, which is a union (or blending?) of multiple different spaces with different structures.

## Physics Spaces with Physics NeutroLaws

[Florentin Smarandache]

Physical spaces with physical NeutroLaws { partially true ($T < 1$), partially indeterminate ($I$), and partially false ($F$) }, or AntiLaws { totally false ($T = I = 0, F = 1$) }

Examples

- the gravity has different values on different points of the globe [the gravity value is not the same (homogeneous) all over the world]; also, various planets and moons have various gravity values;
- speed of light has different speed values when traveling through various medium (such as: air, liquid, high magnet field, law magnetic field, etc.)

So, we can apply the NeutroAlgebra to physics.

*NeutroPhysics* is this: in the same physical space, at least one physical law behaves differently with respect to some elements than with others. Or, the physical law does not apply in the same degree to all space elements.

Neil Boyd may have more examples from the Praha conference on physical laws that are only partially true within some specific physical spaces.

## Physics have become full of abstraction

"not even wrong", by Prof. Peter Woit, from Perimeter Institute, Canada -- he refutes the string theories/superstring advocated by Edward Witten et al.

"lost in math", by Dr, Sabine Hossenfelder, from Germany -- she argues that heavy abstract mathematics have ruined the entire theoretical physics from any productive progress.

I think both books echo a similar thing that physics have become full of abstraction and sophisticated mathematics and has become devoid of substantial progress in the last four decades.

But, I am afraid you are not allowed to do so...

## Introduction to NeutroPhysics

[to Victor Christianto]

The Neutrosophic Dynamic System:

http://fs.unm.edu/SymbolicNeutrosophicTheory.pdf,

which is a system with indeterminacy with respect to the space, or its elements, or the relations between elements or between the elements and the space.

Every system is a neutrosophic system, since a perfect with zero indeterminacy (uncertainty) system exists only in an idealistic (theoretical) world. This system has always a degree of openness.

There are real physical systems where the Law of Conservation of Energy only partially conserve the energy, others that do not conserve it at all.

The Faraday's Law of Induction does not conserve the mechanical angular momentum in relation to electric and magnetic systems.

See how to start doing NeutroPhysics, i.e. physical spaces (or systems) where at least a physical law is not totally (100%) true.

More practical examples we do for a paper on NeutroPhysics.

[Florentin Smarandache]

Examples in real physics where some physical laws are only partially true (or even totally false if this last case do exist)

[Florentin Smarandache]

Non-conservation law... in the paper:

Mario J. Pinheiro, *On Newton's Third Law and its Symmetry-Breaking Effects*, arXiv, 26 April 2011, http://arxiv.org/abs/1104.5011v1

[Robert Neil Boyd]

Non-conservation is what I brought out in my Prague presentation regarding topological Pfaff dimension 4.

The Pfaff Dimension 4 differential volume element is expanding or contracting in the direction of the process current. Such processes are irreversible and dissipative and can gain or lose energy and/or mass. Kiehn expressed this in differential forms notation. (See my Prague presentation.)

It's just an extension of the Vlasov equations of plasma physics. Prof. Kiehn found this stuff and published it about 2009.

[Florentin Smarandache]

We are waiting for Neil. I am sure he may have more examples from the Praha conference of physical laws that are only partially true in some specific physical spaces.

[Robert Neil Boyd]

An example of this is the creation and/or destruction of mass and/or energy in a topological Pfaff dimension 4 space, as included in my presentation in Prague.

You have got my investigative urges up, which is hard to do these days. So now I will go look for some more examples along the lines of your suggestions. (Something to do.)

I do not have much confidence because of the effects of microwaves which reduce the immune system and amplify the reproductive and parasitic behaviors of fungi. Actually, there are 5 ways to communicate wirelessly without using microwaves.

[Victor Christianto]

Regarding your advice on Neutrosophic Science, here is what I can come up for the next week articles:

- an article on Neutrosophic way of learning (mixed method of brain-based, model-based and experience-based learning, particularly for high school and undergrad students)
- an article on conflict resolution at work... see enclosed an intro from Ken Cloke's book... and then we can introduce some practical insights inspired by Neutrosophic thinking
- revise and rewrite for a review article of fusion energy research, to be submitted to ITQM (Prof. Filip), as you suggested
- and one more article, if you like, "on pan-biogenesis metaphysics as an alternative to pan-spermic hypothesis of Francis Crick/Watson, a new interpretation of Namaste greeting" --> for a philosophy conference to be held in India. enclosed is the conference flyer.

"Standard" "physics" is externally forcibly determined and defined by *control-oriented monopoly entities*. Such entities look for any manner of real progress in real physics and then try to cover up the facts and destroy the results and try to prevent those would make them available to the general public from being able to do so.

Status quo dogmas, fictions, form the basis of the sciences these days, preventing multitudes of benefits from being made available to the general public and destroying the natural world in the process.

Thermodynamics and cosmology are two examples where vested interests have controlled the public narrative for decades, so they can make profits and maintain power, at the expense of all Life.

Probably we can look into any topic area in the physics and find dogmas intended to keep the narrative exactly where and how it is.

We've talked some about this before. Maybe we will start doing more towards repairing physics and all the other so-called sciences.

We need to directly express the corrected forms of quantum mechanics, for example, since it has been proved by several experiments that Planck's "constant" is not right. Quantum Mechanics (QM) without Planck's constant falls apart. The QM narrative with all its confusions, irrationalities, and paradoxes needs to be cleaned up in such a way that it actually works without exceptions or paradoxes.

Thermodynamics is another great example, as is cosmology. There is so much to be done, it could take a long time to reach something that resembles completion. Probably we should take it a step at a time, and do what we can as we find it needs to be done.

Mathematics is an abstraction. It is not the fact of anything. Facts are reproducibly experienceable and can be instrumented. What is the math of that tree or that rock or that cloud, for example?

The standard physics was destroyed beginning around the time of Newton's Principia when efforts started to turn every observable fact into an abstraction and then control the narrative about the given fact, acting to turn the facts into sets of lies and fantasies. About that time, the controllers removed all human experiences and direct observations of the activities of Nature and Divinity, from all the sciences.

The so-called sciences are being converted into a series of hoaxes and fictional fantasies, covid-19 being an example of how this

functions and how such public beliefs physically destroy all those who believe the given Mother Goose fantasy-of-the-day.

Reproducible directly observable facts are what the sciences are supposed to be made out of. Not fictional "PCR tests" and "Higgs bosons".

[Victor Christianto]

Concerning, for example, Earth gravity field variation, could it be caused by:

- varying mass density of Earth from place to place
- varying G constant
- the entire Newton gravitation law is an approximation

I would like to find out if Newton third law can be derived from gravitational Magnus force (which is known in superfluidity dynamics).

What is more interesting, if we can derive Bohr type of quantization of hydrogen or helium from Magnus force, or perhaps Ermakov equation..

Hence we can do away with the probabilistic meaning of wave function that is really flawed..

Second, concerning thermodynamics, where should we start?

Either Boltzmann equations are flawed?

Or shall we start with non-equilibrium / topological thermodynamics, as argued by Prof. R.M. Kiehn?

Then, how can we connect such a non-equilibrium thermodynamics to Pfaffian number 4 etc?

Sorry if i ask questions more than answers.

Thank you for bringing up this deep mess in physics sciences

[Robert Neil Boyd]

> Thermodynamics is another great example, as is cosmology. There is so much to be done, I agree with you.. Concerning, for example, Earth gravity field variation...

Get the idea that *the force due to gravitation* is, as N.A. Kozyrev pointed out, as changeable as the speed and direction of the force of the wind, in the air, which is experienced locally but caused non-locally.

> I would like to find out if Newton third law can be derived from gravitational Magnus force (which is known in superfluidity dynamics)...
> ... we can do away with the probabilistic meaning of wave function that is really flawed..

Take probability out of all the sciences as completely as possible. In order of degrees of annoyance, there are lies, damned lies, and then there are statistics. Remove the "wave function". It is fictional.

> Can you express the "Magus force" in terms of Aether activities?
> Second, concerning thermodynamics, where should we start?
> Either Boltzmann equations are flawed?

Boltzmann publicly apologized because he knew his "constant" is only valid for small volumes, and for small amounts of time. Over vast volumes, and vast amounts of time, it completely fails to correspond to the measurable observable facts of the given thermodynamic system.

That is because gravitation, and various other kinds of aether fluxes, are unshieldable unless special technologies and large expenses are used to shield the given type of aether flux, preventing it from entering the volume of interest.

Aether fluxes of all kinds change all the instrumentable observable parameters of the given thermodynamic volume, especially given large spans of time and volumes larger than a parsec.

That means there is no such thing as a "closed" thermodynamic system.

> Or shall we start with non-equilibrium / topological thermodynamics, as argued by Prof. R.M. Kiehn?

Then, how can we connect such a non-equilibrium thermodynamics to Pfaffian number 4 etc?

Kiehn did that. You have to read up on Kiehn's work if you want to know more. The Pfaff dimensions are based on the grades of the Grassmann algebras. The graded Grassmann algebras do not need to know which way is up and do not use nor require any manner of "metric".

The "metric" is a mathematical fiction used to obscure the observable facts of Real Reality. The idea of a "metric" arrived along with the various "scientific" narratives associated with E's version of relativity.

[Florentin Smarandache]

We may make a paper of ideas, from these emails, and invite Stefan Spaarmann as well to join the paper. Danke schoen, Stefan!

[to Robert Neil Boyd]

Neil, with respect to NeutroPhysics, here it is the point:

1) we have the Physics (as defined by the mainstream, where they pretend that the physical laws are 100% true in their physical spaces);

2) but many specialists found by observations or experiments that some laws are only partially true, so they are violated in some physical spaces (these are NeutroPhysics)'

3) yet, I read that some physical laws do not work at all (100% false), this may be called AntiPhysics.

Each physical space with its physical laws falls in one of these three categories.

Of course, the mainstream will attack and maybe insult us, but the real truth (not the imaginary truth from the mainstream) will eventually prevail.

[Florentin Smarandache]

In general, one has three categories:

***Structure, NeutroStructure, AntiStructure***

1) A classical Structure is a structure whose all elements are characterized by the same given Relationships and Attributes and Laws.

2) A NeutroStructure is a structure that has at least one NeutroRelation or one NeutroAttribute or one NeutroLaw (law that is only partially characterized), and no AntiRelation and no AntiAttribute and no AntiLaw.

3) An AntiStructure is a structure that has at least one AntiRelation or one AntiAttribute or one AntiLaw (law that is totally non-characterized).

## Can Electricity Destroy Gravitation?

[Robert Neil Boyd]

Is it possible to nullify, and further to even reverse, the effect of gravity by electricity? This scientific conundrum seems about to be solved, at least to a certain extent. To begin with, everybody is familiar with that law of physics which states that "all particles of matter attract each other with a force which is greater the nearer the particles are together" [=toate particulele de materie se atrag între ele cu o forță care este cu atat mai mare cu cât particulele sunt mai aproape între ele], and to be still more definite, Newton's law says that bodies behave as if every particle of matter attracted every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance

between them. It is the gravitational attraction between the earth and the bodies upon it which causes the latter to have weight.

This fact is often lost sight of and should be well understood by every student. To make the matter more clear let us imagine that a man's body is (as by flying, jumping, diving from a high point, etc.) for the moment separated from the surface of the earth. As soon as the mass of the body is separated from the earth, gravitational attraction is set up between the two masses. The earth pulls the man's body, and also his body pulls the earth, but as the mass of the earth is infinitely greater, its movement cannot be detected.

The scientists of today believe that in some mysterious way the minute electrical charges existing on the particles making up molecules and atoms are definitely linked up and concerned with such basic phenomena as gravitation. Since all bodies are made up of atoms it would seem to logically follow that the forces of gravity must depend in some way upon attractions which atoms exert upon each other, and due to the fact that the atoms are separated, at least in solids and liquids, by extremely small distances, we might expect these inter-atomic forces to be relatively more powerful than are those of ordinary gravitation.

Until recently, however, the mystery linking this inter-atomic activity with the force of gravitation baffled all attempts at solution, although many scientists had tackled it.

But at last experimental proof has been forthcoming through the untiring labors of Professor Francis E. Nipher, of the St. Louis Academy of Science. In a pamphlet issued November 8, 1917, Prof. Nipher supplies experimental evidence that gravitational attraction can not only be suspended or nullified by the electrical current, but it actually can be transformed into "gravitational repulsion"!

All during the summer of 1917, Prof. Nipher had his apparatus in almost continuous operation, and the experiments have been repeated time and again, always with the same result.

Prof. Nipher's mechanical apparatus resembled that used in the "Cavendish experiment", by which it was first experimentally proved that Newton's law of universal gravitational attraction applied to small bodies in their action upon each other at short distances, just as well as it did to small terrestrial bodies under the influence of the earth. This apparatus consists of a delicate torsion suspension fiber, a light, rigid arm at the lower end of the fiber suspension, and at either end of this bar two small lead spheres of known mass. Two equal large balls of solid lead are placed close to the small suspended spheres in the manner shown. Now, remembering our law of physics stated above -- that every body in space attracts every other body proportionally to their respective masses and inversely as the distance between them -- then it is evident that when this apparatus is set up, that the small suspended spheres will be slightly attracted by the larger, stationary balls.

Before connecting any form of electric current to the modified Cavendish apparatus, Prof. Nipher took special precaution to carefully screen the moving element from any electrostatic or electromagnetic effects. His apparatus briefly consists of two large lead spheres ten inches in diameter, resting upon heavy sheets of hard rubber. Two small lead balls, each one inch in diameter, were now suspended from two silk threads, stationed at the sides of the two large lead spheres, from which they were separated by a little distance. Moreover, the suspended balls were insulated elaborately from the large spheres by enclosing them first airtight in a long wooden box, which was also covered with tinned iron sheets as well as cardboard sheets. There was, furthermore, a metal shield between the box and the large metal

spheres. The large metal lead spheres now exerted a certain gravitational pull upon the suspended small lead balls, and the small lead balls were slightly pulled over towards the large spheres.

In his first experiments Prof. Nipher applied a high tension current from a static machine to the large lead balls. No difference was noted whether the positive or negative terminals were applied. In one of these experiments the masses were "repelled" (normal gravitational attraction had been nullified and changed to repulsion) by a force nearly twice as great as the initial gravitational repulsion.

In further experiments Prof. Nipher decided to check his results. To do this he replaced the large solid lead spheres with two metal boxes, each filled with loose cotton batting. These hollow boxes (having practically no mass) rested upon insulators. They were separated from the protective screen by sheets of glass and were grounded to it by heavy copper wires. The metal boxes were then charged in every way that the solid lead spheres had been, but not the slightest change in the position of the lead balls could be detected. This would seem to prove conclusively that the "repulsion" and "gravitational nullification" effects that he had produced when the solid balls were electrically charged were genuine and based undoubtedly on a true inter-atomic electrical reaction, and not upon any form of electrostatic or electromagnetic effects between the large and small masses. If they had been, the metal boxes, with no mass, would have served as well as the solid balls.

Another interesting experiment was conducted with low frequency alternating current applied to the large lead spheres. Spring contact brushes were fastened to the wooden blocks supporting the large spheres as shown in Figure 4, one brush on either side of the ball. This permitted sending current through the ball from one side to the other. First, a direct current of 20 amperes as sent through the two

large masses, but no effect on the suspended masses could be detected. Next, an alternating current of 20 amperes was sent through the two masses, with the result that the gravitational attraction was quickly reduced to zero, and not only that but in 15 to 20 minutes the small lead spheres had moved over one-half as much to the opposite direction as the distance they had been attracted originally towards the large masses. Thus gravitation had not only been completely nullified, but it was actually reversed.

## Non-Real Infinitesimal

[Florentin Smarandache to Robert Neil Boyd and Victor Christianto]

I always appreciated Neil and Vic and tried to improve my knowledge from their ideas.

Let's make a clarification. I have taught lower and upper calculus at UNM and Pima for many years. It is true that even some manuals and instructors and students call 'epsilon' and 'delta' as infinitesimals, but they mean 'very tiny REAL numbers close to zero' just as Neil mentioned. We may call them 'real infinitesimals', and they are physical.

But, I had some polemics with somebody from NonStandard Analysis (NSA) about my NonStandard Neutrosophic Logic, because of me converting from hyperreals (extension of real numbers) to reals, and he said they are not equivalent. I agreed, but I replied that I must approximate these non-real (hyperreals) numbers to some close real numbers to use them to practical applications.

The positive infinitesimal from NSA is defined like this: a number strictly greater than zero, but infinitely close to zero.

Clearly, such a number does not exist in the real world. It is non-physical. Let's call it 'non-real infinitesimal'.

Neil's microscope of $10e^{-95}$ cm.

The number $10e^{-95}$ is a real tiny number, I mean a 'real infinitesimal' if we want to use the word 'infinitesimal' (somebody from NSA will criticize us).

All infinitesimals, you talked about here, were actually 'real infinitesimals' which are physical (i.e. very small numbers, microscopical, or ultramicroscopic numbers).

Another denomination may be: ‘physical infinitesimal’ and ‘non-physical infinitesimal’.

# DECISION MAKING
# AND
# CONTINGENT ISSUES

## Combination of the Score, Accuracy and Certainty Functions into a Single Function

[Florentin Smarandache to Yabin Shao and Junle Zhuo]

We DO HAVE a total order on the set of triplets (*T,I,F*), see this paper: http://fs.unm.edu/NSS/TheScoreAccuracyAndCertainty1.pdf, by using three functions: *Score Function, Accuracy Function,* and *Certainty Function.*

I am not sure if it is possible to combine all three functions into a single one in order to do a direct and fast comparison of two neutrosophic triplets ($T_1$, $I_1$, $F_1$) and ($T_2$, $I_2$, $F_2$), which one is bigger.

## Reliability of Experts

[Florentin Smarandache to Nivetha Martin]

In plithogenic set the contradiction degree is among the attribute values only, in order to better design the neutrosophic operators ∧ and ∨ for a more accurate calculation.

If you talk about experts' contradiction degrees, then one can do a weighted average:

The values are the degree of appurtenance. It is not the expert's opinion.

The contradiction degrees are given for the experts.

If first expert says for an element say $x_1$ as ($x_1$,0.3), second expert gives ($x_1$,0.5), third expert gives ($x_1$,0.8) and the experts' contradiction degrees are:

*Contradiction Degrees between the Experts*

| E1 | E2 | E3 |
|---|---|---|
| 0 | 1/3 | 2/3 |

$$[\ 0.3 \times (1 - 0) + 0.5 \times (1 - \tfrac{1}{3}) + 0.8 \times (1 - \tfrac{2}{3})\ ] / (\ 1 + \tfrac{2}{3} + \tfrac{1}{3}\ ) = 0.45$$

So, the membership of $x_1$, with respect to all experts combined together, is 0.45.

You may also consider the Reliability (instead of contradiction) of Experts, represented by the function

$r$: $\{E1, E2, ..., En\} \rightarrow [0, 1]$, for integer $n \geq 1$,

where $\{E1, E2, ..., En\}$ is the set of experts.

In the above example:

— $E1 = 1 = 100\%$ reliable,

— $E2 = 1 - 1/3 \cong 66.67\%$ reliable,

— $E3 = 1 - 2/3 \cong 33\%$ reliable.

## Score / Accuracy / Certainty Functions for Types of Single-Valued Neutrosophic Sets

[Florentin Smarandache]

One can use the same Score / Accuracy / Certainty Functions defined on this article and others:

http://fs.unm.edu/NSS/TheScoreAccuracyAndCertainty1.pdf,

for all types of single-valued neutrosophic sets with three components $(T,I,F)$, such as Pythagorean, Fermatean, etc. (except the Refined Neutrosophic Set, that has four or more components) since they all need to compare triplets:

i.e. to find out if $(T_1, I_1, F_1)$ is bigger, equal, or smaller than $(T_2, I_2, F_2)$.

## Score, Accuracy, and Certainty Functions for the Interval-Valued Neutrosophic Triplets ([*TL, TU*], [*IL, IU*], [*FL, FU*])

The below formulas follow in the steps of the single-valued neutrosophic set score, accuracy, and certainty functions [1].

— *TL* and *TU* are of positive quality;

— yet *IL* and *IU* are of negative quality, but 1 - *IL* and 1 - *IU* are of positive quality;

– similarly *FL* and *FU* are of negative quality, but 1 - *FL* and 1 - *FU* are of positive quality.

Let us make the average of all positive qualities:

Score Function

$$S( [TL, TU], [IL, IU], [FL, FU] ) = [ TL + TU + (1 - IL) + (1 - IU) + (1 - FL) + (1 - FU) ] / 6 = (1/6)[ 4 + TL + TU - IL - IU - FL - FU ]$$

Accuracy Function

$$A( [TL, TU], [IL, IU], [FL, FU] ) = (1/4)[ TL + TU - FL - FU ]$$

Certainty Function

$$C( [TL, TU], [IL, IU], [FL, FU] ) = (1/2)[ TL + TU]$$

*Reference:*

[1] F. Smarandache, "The Score, Accuracy, and Certainty Functions determine a Total Order on the Set of Neutrosophic Triplets (T, I, F)", *Neutrosophic Sets and Systems*, vol. 38, 2020, pp. 1-14. DOI: 10.5281/zenodo.4300354;
http://fs.unm.edu/NSS/TheScoreAccuracyAndCertainty1.pdf .

## Decision Making on 5 Neutrosophic Components

[Florentin Smarandache to Said Broumi]

You take a paper on neutrosophic decision making:

http://fs.unm.edu/NSS/NeutrosophicLocationSelection11.pdf,

and instead of 3 components (*T, I, F*) for each element, you use more components (*T*, *U*=uncertainty, *V*=vague, *C*=contradiction, *F*).

Design a triangular function for each of the 5 components.

Use *intersection*:

$(T1, U1, V1, C1, F1) \wedge ((T2, U2, V2, C2, F2) =$

$= ( \min(T1,T2), \min(U1,U1), \min(V1,V2), \max(C1,C2), \max(F1,F2) )$

and *union*:

$(T1, U1, V1, C1, F1) \wedge ((T2, U2, V2, C2, F2) =$

$= (\max(T1,T2), \min(U1,U1), \max(V1,V2), \min(C1,C2), \min(F1,F2))$

Etc.

You can define the complement of the quintuple neutrosophic triplet (*T, U, V, C, F*) in several ways, depending on the application.

For example:

Complement of (*T*1, *U*1, *V*1, *C*1, *F*1) may be (*F*1, 1-*U*1, 1-*V*1, 1-*C*1, *T*1).

See, from the complement of (*T, I, F*) that is (*F*, 1-*I*, *T*).

But, if needed, you may adjust it for the needed application the middle components *U, V, C*.

All these operators (in fuzzy, intuitionistic fuzzy, neutrosophic, and other fuzzy extensions) are APPROXIMATIONS, therefore not exact operators because we work with indeterminate data, that's why we can approximate more accurate or less accurate.

It depends on the applications.

## Dominant Value in the Plithogenic Set

[Florentin Smarandache to Nivetha Martin]

The dominant value is the one that all others can be compared against.

It is determined by the expert (in this case YOU).

Because in some problems you are looking for *the lowest price* (when buying something) whence the *dominant value = lowest price*, or *the highest price* (when you sell something) hence the *dominant value = highest price*.

## Plithogenic Operators

[Florentin Smarandache to Nivetha Martin]

Please see the definition of plithogenic set:

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

The degrees of appurtenances do not have contradiction degrees among themselves, only the attribute values have degrees of contradictions among themselves.

The degrees of contradictions were introduced in order to better design the plithogenic operators (union and intersection) as a linear combination of fuzzy intersection ($\wedge_F$) and fuzzy union ($\vee_F$).

Maybe instead of the "dominant value" it is better to say "reference value" because the expert can choose whichever he/she decides.

You may take the recessive value, of course, as reference value.

Maybe new plithogenic operators can be invented in the future, in order to avoid a linear combination of fuzzy intersection and fuzzy union as plithogenic operators.

## Linguistic Plane

[Florentin Smarandache]

The attribute "height" for a man may also decrease when the man gets very old.

What about having two types of attributes, say color and height, they may form a linguistic plane (dimension two): white, red, green, small, big.

## Degré d'intersection et *Incomplete Frame of Discernment*

[Florentin Smarandache to Jean Dezert]

Deux choses nous devons les considérer:

— de calculer le degre d'intersection A∧B des elements dans notre *Frame of Discernment* (FoD), (mais, alors, comment les utiliser dans la fusion des masses?);

— le cas quand la FoD est incomplète, et je pense que nous l'avons discuté un peu, il y a long temps.

L'on a dit de completer le FoD avec un élément manquant *x*, mais ensuite que dire sur l'intersection entre *x* est les autres elements?

Et comment utiliser la masse de *x* dans les règles de fusion?

FoD = {$a_1$, $a_2$, ..., $a_n$, *x*},

— ça veut dire que nous ne connaissons pas tous les elements possibles de FoD,

— donc *x* = événement inconnu (où l'on pouvait avoir plusieurs événements inconnus).

Comment résoudre ce cas?

[Jean Dezert]

Oui, la technique simple et correcte est de fermer le FoD par un elément de fermeture/cloture *x* ce que Yager appelle "hedging" dans un des ses articles.

Evidemment on ne sait pas la cardinalité de cet élement *x* mais pour simplifier les choses on peut toujours considérer que simplement *x=a_{n+1}* qui représentera le singleton complémentaire à tous les autres éléments du FoD de telle sorte que FoD={*a_1,...,a_{n+1}*} constitue une liste d'éléments exhaustifs et exclusifs 2 à 2 si on veut se placer dans le cadre du modèle de Shafer par exemple. Même si on considère *x={a_{n+1},a_{n+2}}=a_{n+1}⋁a_{n+2}* il suffit alors d'adapter les formules avec cette nouvelle hypothèse de structure pour *x* si cette hypothèse est justifiable.

Idem si on préfère considérer *x=a_{n+1}⋁a_{n+2}⋁a_{n+3}*, etc, etc. Il n'y a pas de problème fondamental à mon avis.

Le seul problème est l'obtention ou l'ajustement des BBAs que l'on veut combiner. La technique de Hedging consiste alors à ajuster les BBAs en intégrant ce terme de hedging *x* aux BBAs initiales. Par exemple, supposons

*Theta={A,B} (incomplete frame)* et

*Case1: normalized BBA*

---

m(A)=0.1 m(B)=0.2 m(A\/B)=0.7

alors si on suppose Theta={A,B,x} (closed frame)

soit on garde m(A)=0.1 m(B)=0.2 m(A\/B)=0.7 comme avant

ou bien on peut prendre (mais cela dégrade la spécificité de l'information de la BBA originale)

m(A\/x)=0.1 m(B\/x)=0.2 m(A\/B\/x)=0.7

ou bien aussi

m(A)=0.1 m(B)=0.2 m(A\/B\/x)=0.7

ou bien aussi

m(A\/x)=0.1 m(B\/x)=0.2 m(A\/B)=0.7

Tout cela est très discutable en fait.

*Case2: non-normalized BBA*

---

si on considère m(A)=0.1 m(B)=0.2 m(A\/B)=0.5. on a dans ce cas m(A)+m(B)+ m(A\/B)=0.8 < 1

Cette BBAs correspond aux *"D numbers" de Deng*.

Dans ce cas si on veut travailler sur Theta={A,B,x} (closed frame) on pourra toujours faire l'ajustement de la BBA en une BBA normalisée

m(A)=0.1 m(B)=0.2 m(A\/B)=0.5 et m(x)=0.2

ou bien

m(A\/x)=0.1 m(B\/x)=0.2 m(A\/B\/x)=0.5 et m(x)=0.2.

Il y a de différentes méthodes d'ajustement possibles mais qui restent à mon avis très ad-hoc.

[Florentin Smarandache]

Je me rappelle que je t'avais proposé la fusion des masses dont la somme est différente de 1.

Tu n'as pas aimé ça.

Ça pourrait marcher dans le cas d'incomplet FoD.

On peut se placer dans notre cadre de la DSmT aussi, avec les éléments non-exclusifs, et la somme différente de 1 (plus petite = incomplète, ou plus grande = contradictoire).

Je pense que la somme > 1 personne ne l'a considérée.

Est-ce qu'il y a des articles, sauf de Deng qui est confus, sur les masses avec la somme différente de 1?

## Inverse Entropie

Merci, pour ta réponse.

J'avais eu des problèmes de virus depuis deux semaines,

Je prends toujours des antibiotiques et je suis sans energie…

J'avais imaginé le problème d'inversion de toi de la façon suivante:

Sur la FoD Theta, ensuite sur la $2^\theta$, toutes les masses:

m: $2^\theta \rightarrow [0, 1]$.

Si l'on compute les entropies de toutes les masses, on pourrait trouver tous les nombres entre [0, 1].

Je crois que pour chaque nombre $n$ dans [0, 1] il y au moins une masse $m_n$ telle que

l'entropie de $m_n$ est égale à $n$.

Je n'ai pas pu vérifier/montrer ça, mais c'est possible.

Si c'est vrai, alors ils n'existent pas des valeurs des entropies telle qu'aucune masse n'a pas cette entropie valeur.

Tu a prouvé pour l'entropie < 1/e je pense…

## Importance and Liability of Sources

[to Jean Dezert]

Les restrictions sur "importance" et "reliability" des sources sont bien à considérer, mais leurs équations ne sont pas bien faites.

L'on peut considérer ces deux (importance + reliability) implémentés sur la PCR5 et faire un article. Quelle est ton idée?

## Masses-Intervales

L'on a parlé de la possibilité que la masse ne soit pas exacte, par exemple m(A) = [0.3, 0.5], qui arrive dans la pratique...

## If Bel is zero then Pl can be any number in [0, 1]

Several Polish researchers (Pavel Sevastjanov, Ludmila Dymova, and Krzysztof Kaczmarek) try to impose the Dempster-Shafer Theory (DST) against Atanassov - Intuitionistic Fuzzy Set, but their assumption that 'if Bel(X) = 0 then Pl(X) = 0 as well' is wrong. We may have Bel(X) = 0 and Pl(X) may be any number in [0, 1], depending on the bba.

They attacked me previously, but I responded to them in a paper (they dislike even the fuzzy set/logic, all fuzzy extensions) - and they say only the DST can be used.

I have even written to them by email, and showed them the Zadeh's Counter-Example and other counter-examples by Jean, me, and Albena where the DST fails, but they are deaf to these.

# GEOMETRIC SPACES AND MODELS

## Types of Geometries

[Florentin Smarandache]

Euclidean Geometry = all geometric axioms are 100% true.

Non-Euclidean Geometry = a geometry where ONLY the fifth postulate/axiom is 100% false. Yes, hyperbolic, elliptic, spherical are Non-Euclidean Geometries.

AntiGeometry = a geometry where at least one axiom is 100% false; therefore, the Non-Euclidean Geometry is a particular case of the AntiGeometry since the fifth postulate is 100% false. But other geometric axioms may also be 100% false in the AntiGeometry, and you may have many axioms that are 100% in the AntiGeometry.

NeutroGeometry means that at least an axiom (no matter which one) is partially true, partially indeterminate, and partially false, and no axiom is 100% false since this case would fall under AntiGeometry.

Hybrid (also called Smarandache) Geometries are mixed geometries, i.e. elliptic and hyperbolic etc.

## Non-Euclidean Geometry vs. AntiGeometry and NeutroGeometry

[Florentin Smarandache]

1) The non-Euclidean geometry is a particular case of AntiGeometry, i.e. when one axiom only (the fifth postulate) is 100% false.

2) The AntiGeometry is a geometry that has at least one axiom (no matter which one) 100% false. Therefore, the AntiGeometry may have more 100% false axioms, while the other axioms may be either partially true, or totally true.

3) The NeutroGeometry is a geometry that has an axiom (or more) that are partially true, and partially false, and partially indeterminate; and no AntiAxiom (i.e. axiom that is 100% false).

## Non-Euclidean, AntiGeometry, and NeutroGeometry

[Florentin Smarandache to Prem Kumar Singh]

The denial of an axiom in an axiomatic system may entail the alteration of other axioms, either partial or total denial of other axioms, and this depends on the geometric space and model we work in.

For the spherical geometry (Riemannian Geometry, or elliptic geometry), the space is a sphere, and the model is that a line is considered to be a big circle of the sphere.

In this geometric space and model, two axioms become false: that of parallels, and that of the number of lines passing through two given points.

But there are geometrical models of Non-Euclidean Geometry where only the axiom of parallels is denied while all the axioms are true.

I will send one of them to you.

Lobachevsky Geometry (hyperbolic geometry) is also a Non-Euclidean Geometry, but it has only the axiom of the parallels that is denied, all other axioms may be true.

So, the Riemannian Geometry, as a Non-Euclidean Geometry, happens to have two axioms that are denied.

The Non-Euclidean Geometries are AntiGeometries, because they have at least one denied axiom.

Therefore, Riemannian Geometry and Lobachevsky Geometry are AntiGeometries - since the AntiGeometries have denied axioms, no matter which ones and no matter how many.

AntiGeometry = at least one axiom is 100% false/denied.

NeutroGeometry = at least one axiom is partially true, partially indeterminate, and partially false (and no axiom is totally false/denied).

Please check this link/paper:

http://fs.unm.edu/NSS/NeutroGeometryAntiGeometry31.pdf .

## Non-Euclidean Geometry vs. NeutroGeometry

[Florentin Smarandache to Prem Kumar Singh]

In your paper "Data with Non-Euclidean Geometry and Its Characterization" anywhere you used "Non-Euclidean Geometry" you had to use "NeutroGeometry".

This is a mathematical error, Dr. Prem, please believe me as a friend.

"Non-Euclidean Geometry" means that ONLY the Fifth Postulate (Through a point exterior to a line it is possible to draw only one parallel to the given line) is 100% false.

This has two types: hyperbolic geometry (when there exist infinitely many parallels to the given line), and elliptic geometry (when there is no parallel to the given line).

That's it.

For any other geometric axioms or theorems that are partially denied you have to use the NeutroGeometry, and that are totally denied you have the AntiGeometry.

The Non-Euclidean Geometry is a particular case of the AntiGeometry.

Data Sets with Non-Euclidean Geometry and Its Characterization

Herein you deal with NeutroAlgebra, not with Non-Euclidean Geometry, since you have no geometric fifth postulate about: the Laws in our society, about Gender, about Citations, about Brain etc.

How do you apply the Fifth Postulate to the Citations for example, or to the Brain?

## Hybrid (Smarandache) Geometries (HSG)

[Florentin Smarandache to Erick González]

Since the HSG is too diverse {you may take any geometric axiom (or more axioms) from any geometric system, and deny it (or them) either partially, or totally (but in at least two different ways)}, it is hard to get some common feature to all of them.

You may go by classes of HSG (for example if you deny a specific axiom and construct several models for it, then check what the common properties of all of them).

## NeutroGeometry is a NeutroAlgebra Principle on a Geometric Space

[Florentin Smarandache]

In NeutroGeometries at least one axiom, definition, theorem, proposition, property etc. is only partially satisfied. For example, a theorem may be only partially true in a NeutroGeometry (an in general in a NeutroAlgebra). NeutroGeometry is a NeutroAlgebra principle [ http://fs.unm.edu/NA/neutroAlgebra.htm ] on a geometric space.

## Logometria

[Tomasz Witczak]

"Logometria" by Wacław Wolski, in Polish language.

> This was very early and quite specific attempt to formulate something like fuzzy-modal-and-probabilistic logic at once and in geometric setting.

[Florentin Smarandache]

Very interesting. Can you please send me in English (or French, or Spanish) its definition and an example of it?

So, I may help with ideas about it (or we may even cooperate if you're interested in).

Similarly to the NeutroAlgebra & AntiAlgebra (and of course the NeutroTopology & AntiTopology) I developed the NeutroGeometry & AntiGeometry

[ http://fs.unm.edu/NSS/NeutroGeometryAntiGeometry31.pdf ], where things are happening in a geometric (not algebraic, not topological, etc.) space:

*NeutroGeometry* = at least one geometric axiom is partially true and partially false (and no axiom is totally false).

*AntiGeometry* = at least one geometric axiom is totally false (for example, the Non-Euclidean Geometries are in this category).

## Neutral Geometry

[Prem Kumar Singh]

> I understand that is why I wrote that AntiGeometry is fully motivated from Non-Euclidean. Lobachevsky told one of the failures of Euclid Postulates lead Imaginary Geometry. Later people called it Non-Euclidean. It means failure of fifth postulates means non-Euclidean. Later Riemannian was given failure as second also non-Euclidean.
>
> See here the issue of parallel postulates is separately dealt with and some people call it Neutral Geometry.
>
> https://link.springer.com/chapter/10.1007/978-3-319-74135-2_2

[Florentin Smarandache]

You consider only the Euclidean Geometry, but the AntiGeometry means negation of at least one axiom in ANY TYPE OF GEOMETRIES not only Euclidean, i.e. negation of axioms in Projective Geometry, Affine Geometry. Convex Geometry...

Therefore, AntiGeometry is much larger than Non-Euclidean Geometry.

The AntiGeometry results from the 100% negation of any axiom (or theorem, concept, etc.) or even of more axioms (or theorem, concept, etc.) from any type of geometric axiomatic system (Euclid's, Hilbert's, etc.) and from any type of geometry such as (Euclidean, Projective, Finite, Affine, Differential, Algebraic, Complex, Discrete, Computational, Molecular, Convex, etc.) Geometry, and the NeutroGeometry results from the partial negation of one or more axioms [and no total negation of no axiom] from any geometric axiomatic system and from any type of geometry.

One more thing: Non-Euclidean Geometry is referring only to the Euclid's postulates, but AntiGeometry is also referred to the Hilbert's axioms and even other axiomatic systems in Euclidean Geometry as well.

It is the Non-Euclidean Geometry that is a particular case of AntiGeometry, not the other way around.

[Florentin Smarandache]

I know about Neutral Geometry, where the fifth postulate is removed, it can be part of Hybrid Geometry (HSG) or NeutroGeometry or AntiGeometry where it is partially true and false, or only false, or even true (so all possibilities).

Neutral Geometry was not defined by me.

I said that in a neutral plane (where there are only the first four Euclid axioms), if you add the Fifth Euclid postulate, you will end up

with three possibilities: the Fifth Euclid Postulate is 100% true (Euclidean Geometry), or 100% false (Non-Euclidean Geometry and AntiGeometry and maybe Hybrid Geometry), or partially true and partially false (NeutroGeometry or Hybrid Geometry).

I hope you are convinced now that Non-Euclidan Geometry is a particular case of AntiGeometry (that was my point).

# SETS AND SYSTEMS
# ALGEBRAIC STRUCTURES, TOPOLOGY

# Neutrosophic Set, different from Intuitionistic Fuzzy Set

[to B. De Baets, I. Couso, D. Dubois and L. Good,
Editors-in-Chief of *Fuzzy Sets and Systems*]

[Reviewer #2]

> *Reviewer #2:* In the Introduction (page 3, line 52) there is the WRONG assertion "IFSs were extended by Smarandache [17] to neutrosophic sets (NSs)". Indeed, if we put $m(x) = T(x)/(T(x) + I(x) + F(x))$ and $n(x) = F(x)/(T(x) + I(x) + F(x))$ we obtain immediately an intuitionistic fuzzy set (IFS). By the same way we can see that the so-called "single valued neutrosophic set (SVNS)" is representable by an interval-valued intuitionistic fuzzy set.

[Florentin Smarandache's response to Reviewer #2]

*a.* If you normalize, you squeeze/force the neutrosophic components

$$T_1, I_1, F_1,$$

with $T_1 + I_1 + F_1 > 1$, that have some degree of independence (or degree of contradiction), into the neutrosophic components respectively

$$T_2, I_2, F_2,$$

with $T_2 + I_2 + F_2 = 1$, that are totally dependent of each other, as in intuitionistic fuzzy set, so the neutrosophic components lose all their degree of independence. Clearly, $T_1, I_1, F_1,$ and respectively $T_2, I_2, F_2$ represent different objects.

*b.* Similarly, if you normalize, you squeeze/force the neutrosophic components

$$T_1, I_1, F_1,$$

with $T_1 + I_1 + F_1 < 1$, that have some degree of incompleteness (or degree of contradiction), into the neutrosophic components respectively

$$T_2, I_2, F_2,$$

with $T_2 + I_2 + F_2 = 1$, that have no degree of incompleteness, as in intuitionistic fuzzy set, so the neutrosophic components lose all their real degree of incompleteness.

Clearly, $T_1$, $I_1$, $F_1$, and respectively $T_2$, $I_2$, $F_2$ represent different objects in this case as well.

*c.* Even if you normalize the neutrosophic components

$$T(x), I(x), F(x),$$

by dividing each of them by their sum, after applying the Intuitionistic Fuzzy Set (IFS) operators you get different results than applying the Neutrosophic Set (NS) operators,

since the IFS operators completely ignore the Indeterminacy (or Hesitancy as they call it),

while NS operators give a full consideration to the Indeterminacy.

Please read this paper: http://fs.unm.edu/Raspunsatan.pdf.

Please also read the most general form called refined neutrosophic set, where one has:

$$T_1, T_2, \ldots; I_1, I_2, \ldots; F_1, F_2, \ldots;$$

http://fs.unm.edu/RefinedNeutrosophicSet.pdf, that you cannot, in no way, represent by an IFS.

See an elementary example where the sum of the components is 1 to simply prove that the results are different between IFS and NS:

***IFS Intersection*** (one applies *min/max* as fuzzy *t-norm*/*t-conorm*, but the same conclusion you get if you apply other *t-norms/t-conorm*):

$(0.5, 0.4, 0.1) \wedge_{IFS} (0.3, 0.1, 0.6) =$

$=$ (min{0.5, 0.3}, hesitancy ignored, max{0.1, 0.6}) =

$=$ (0.3, hesitancy, 0.6) = (0.3, 0.1, 0.6).

***NS Intersection***:

$(0.5, 0.4, 0.1) \wedge_{NS} (0.3, 0.1, 0.6) =$

= (min{0.5, 0.3}, max{0.4, 0.1), max{0.1, 0.6}) =

= (0.3, 0.4, 0.6).

So, indeterminacy makes a difference:

(0.3, 0.1, 0.6) ≠ (0.3, 0.4, 0.6).

NS is more important since it takes into consideration the Indeterminacy, while IFS does not.

Similarly, different results you get by applying other operators (union, negation, implication, equivalence, etc.).

*d.* IFS cannot reflect incomplete information, but NS can.

In NS one may have neutrosophic triplet components whose sum is strictly less than 1, for example <0.6, 0.2, 0.1> which means incomplete information, but in IFS it is mandatory that $T + H + F = 1$.

*e.* IFS cannot reflect paraconsistent (conflicting) information, but NS does.

In NS one may have the neutrosophic triplet components whose sum is strictly greater than 1, for example <0.7, 0.3, 0.5> which means paraconsistent (or conflicting) information, but in IFS it is always mandatory that $T + H + F = 1$.

*f.* The Hesitancy ($H$) in the IFS is totally dependent from the Truth and Falsehood, actually Hesitancy is only a remainder from $T$ and $F$; while in NS the Indeterminacy ($I$) is independent from $T$ and $F$. This is the big difference between IFS and NS.

Therefore, NS is more flexible than the IFS.

> By the same way we can see that the so-called "single valued neutrosophic set (SVNS)" is representable by an interval-valued intuitionistic fuzzy set.

By the same way we can prove that the single-valued neutrosophic set cannot be representable by an interval-valued intuitionistic fuzzy set.

By the way, I heard that *Fuzzy Sets and Systems* journal also refuses to publish IFS papers as well and all other types of fuzzy extension papers.

## Neutrosophic Set vs. Intuitionistic Fuzzy Set

[Florentin Smarandache to Mihaela Colhon]

*T* is the degree of truth, *F* is the degree of falsehood, opposed to the truth, while *I* = degree of indeterminacy (neutrality), i.e. neither true nor false, something unclear, confused, between true and falsehood.

*(T,I,F)* are part of the neutrosophy's triad (<A>, <neutA>, <antiA>), where <A> is an item (concept, idea, proposition, etc.), <antiA> is its opposite, while of course <neutA> is the neutrality (indeterminacy) between these opposites.

There are many such neutrosophic triads (triplets) in our everyday life, such as:

→ (positive, neutral, negative),

→ (win, draw, loose),

→ (accept, undecided, reject),

→ (membership, indeterminacy, nonmembership),

→ (truth, indeterminacy, falsehood), etc.

Just see [1].

In our studies, we take degrees of each component:

→ degree of <A>, degree of <neutA>, degree of <antiA>.

1 - *F* is the opposite degree of *F*, and 1 - *I* is the opposite degree of *I*.

When *T, I, F* are independent from each other, their sum is $0 \le T + I + F \le 3$, but if *T, I, F* are totally dependent, as in IFS, the sum is $0 \le T + I + F \le 1$.

We have also cases when *T, I, F* are partially independent and partially dependent, then $1 \le T + I + F \le 3$

The advantage of using NS instead of IFS is that NS take care of indeterminacy, while in IFS the hesitancy (indeterminacy) is totally ignored. The Neutrosophic operators use the indeterminacy in their formulas, while the intuitionistic fuzzy operators do not.

The IFS deals only with totally dependent components *T, H* (hesitancy or indeterminacy), *F*, whence $T + H + F = 1$, while NS is more general because it includes all possible cases: *T, I, F* totally dependent (as in IFS), partially dependent and partially dependent, as well as totally independent.

But even when the components are totally dependent and the sum of components is 1, when applying the neutrosophic operators one gets different results than when applying the intuitionistic fuzzy operators, since in NS the indeterminacy occurs into the operators' formulas, but in IFS the indeterminacy (hesitancy) does not occur into the IF operators [hesitancy is completely ignored].

Reference:

[1] F. Smarandache, Indeterminacy in Neutrosophic Theories and their Applications, *International Journal of Neutrosophic Science* (IJNS), Vol. 15, No. 2, PP. 89-97, 2021, http://fs.unm.edu/Indeterminacy.pdf

## Definition of General Neutrosophic Set

[Florentin Smarandache]

Let *U* be a universe of discourse and a non-empty set *A* included in *U*. The *A* is called a General Neutrosophic Set if each element *x* belonging to *A* has a degree of membership *T(x),* degree of indeterminate-membership *I(x),* and degree of nonmemebership *F(x),* such that *T(x), I(x), F(x)* are subsets included or equal to [0, 1].

→ If *T(x), I(x), F(x)* are just numbers included in [0, 1], then it is called Single-Valued Neutrosophic Set.

→ If *T(x), I(x), F(x)* are intervals included in [0, 1], then it is called Interval-Valued Neutrosophic Set.

Neutrosophic Set has a huge range of applications in many fields and has been widely applied around the world.

See http://fs.unm.edu/neutrosophy.htm.

## Neutrosophic Soft OffSet and Neutrosophic HyperSoft OffSet

[to Atiqe Ur Rahman, Muhammad Saeed, and Muhammad Ihsan]

Shukriya.

For components' degrees > 1 or < 0 please see practical applications (from our everyday life) in the below four publications.

We may try to use them for the Neutrosophic Soft Set and Neutrosophic HyperSoft Set of you are interested in, such type of work was never done before, so one actually gets:

Neutrosophic Soft OffSet and Neutrosophic HyperSoft OffSet, see three articles and a book:

http://fs.unm.edu/SVNeutrosophicOverset-JMI.pdf
http://fs.unm.edu/IV-Neutrosophic-Overset-Underset-Offset.pdf
http://fs.unm.edu/NSS/DegreesOf-Over-Under-Off-Membership.pdf
http://fs.unm.edu/NeutrosophicOversetUndersetOffset.pdf

The Neutrosophic Set was extended [Smarandache, 2007] to:

→ *Neutrosophic Overset* (when some Neutrosophic component is > 1), since we observed that, for example, an employee working overtime deserves a degree of membership > 1, with respect to an employee that only works regular full-time and whose degree of membership = 1;

→ and to *Neutrosophic Underset* (when some Neutrosophic component is < 0), since, for example, an employee making more damage than benefit to his company deserves a degree of membership

< 0, with respect to an employee that produces benefit to the company and has the degree of membership > 0;

→ and to *Neutrosophic Offset* (when some Neutrosophic components are off the interval [0, 1], i.e. some Neutrosophic component > 1 and some Neutrosophic component < 0).

Then, similarly, the *Neutrosophic Logic / Measure / Probability / Statistics* etc. were extended to respectively *Neutrosophic Over-/Under-/Off- Logic, Measure, Probability, Statistics* etc.

## Distinction between Plithogenic Set vs. Plithogenic HyperSoft Set

[Edeline Nancy]

> [Doubts in the difference between Plithogenic Set and Plithogenic HyperSoft Set.]

[Florentin Smarandache]

Example of Plithogenic Fuzzy Set

Let $\mathcal{U} = \{x_1, x_2, x_3, x_4\}$ be a universe of discourse, and a set $P = \{x_1, x_3\} \subset \mathcal{U}$.

Let the attributes be:

$a_1$ = size, $a_2$ = color, $a_3$ = gender, $a_4$ = nationality,

and their attributes' values respectively:

— Size = $A_1$ = {small, medium, tall};

— Color = $A_2$ = {white, yellow, red, black};

— Gender = $A_3$ = {male, female};

— Nationality = $A_4$ = {American, French, Spanish, Italian, Chinese}.

The Plithogenic Fuzzy Set is:

*P = { $x_1$( small(0.5), medium(0.6), tall(0.1); white(0.8), yellow(0.0), red(0.1), black(0.2); male(0.9), female(0.1); American(0.2), French(0.3), Spanish(0.1), Italian(0.7), Chinese(0.0);*

*$x_2$( small(0.1), medium(0.4), tall(0.2); white(0.3), yellow(0.1), red(0.3), black(0.1); male(0.8), female(0.0); American(0.3), French(0.1), Spanish(0.4), Italian(0.6), Chinese(0.2) }*

Example of Plithogenic Fuzzy HyperSoft Set

Let the HyperSoft function $F$ be:

$F: A_1 \times A_2 \times A_3 \times A_4 \longrightarrow \mathcal{P}(\mathcal{U})$.

Let's assume that:

$F(\{tall, white, female, Italian\}) = \{x_1, x_3\}$.

The Plithogenic Fuzzy HyperSoft Set has a fuzzy degree of appurtenance of an element $x$ to the set $P$, with respect to each attribute value.

*$F$({tall, white, female, Italian}) = {$x_1$(tall(0.5), white(0.3), female(0.7), Italian(0.8);*

*$x_3$(tall(0.2), white(0.4), female(0.9), Italian(0.6) }*.

Distinction

The distinction between Plithogenic Set (PS) and Plithogenic HyperSoft Set (PHSS) is that:

→ in the PS each element is characterized by all (in this example: $3 + 4 + 2 + 15 = 14$) attribute values,

→ while in the PHSS each element is characterized by $2 \le m \le n =$ total number of attribute values (in this example $m = 4$ and $2 \le m \le 14$).

In the case when $m = 14$, the PS and PHSS coincide.

Remark

We considered the easiest type of degree of appurtenance (fuzzy), but similar examples may be given for all other types of degrees of appurtenance (intuitionistic fuzzy, neutrosophic, and other fuzzy extensions).

## Possibilistic Neutrosophic Set as a particular case of the Type-2 Neutrosophic Set

[Florentin Smarandache]

Using the Possibilistic Neutrosophic set in estimation is a good idea:

$( T(p_T), I(p_I), F(p_F) )$,

which means that the possibility that the value "T" occurs is $p_T$, the possibility the value "I" occurs is $p_I$, and the possibility that the value "F" occurs is $p_F$.

It is a particular case of the Type-2 Neutrosophic Set, defined as

$( T(T_1, I_1, F_1), I(T_2, I_2, F_2), F(T_3, I_3, F_3) )$,

where for example $T(T_1, I_1, F_1)$ means that the possibility that "T" value occurs is $T_1$ possible, $I_1$ indeterminate-possibility, and $F_1$ impossible.

Similarly for $I(T_2, I_2, F_2)$ and $F(T_3, I_3, F_3))$.

## Effective Fuzzy Soft Set

[Florentin Smarandache to Shawkat Alkhazaleh]

Congratulations for the Effective Fuzzy Soft Set.

1) You can continue your research and write a paper on Effective Neutrosophic Soft Set, by considering neutrosophic degrees instead of fuzzy degrees.

2) Also, you can continue to do Effective Fuzzy HyperSoft Set paper,

considering the HyperSoft Set that is a generalization of the Soft Set:

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

## Fuzzy and Intuitionistic Fuzzy Degrees simply converted to Neutrosophic Degrees

When combining various degrees, such as fuzzy, intuitionistic fuzzy, and neutrosophic, I saw that you converted them all to fuzzy, it is okay, but it is easier to convert them all to neutrosophic.

See below:

→ *Fuzzy degree:*

$T = 0.7$

is equivalent to the neutrosophic $T = 0.7$, $I = 0.0$, $F = 0.3$.

→ *Intuitionistic Fuzzy degree:*

$T = 0.7$, $F = 0.2$

is equivalent to the neutrosophic $T = 0.7$, $I = 0.1$, $F = 0.2$.

In the plithogenic set, the contradiction degrees between attribute values are ONLY used for the plithogenic operators $\wedge_p$ and $\vee_p$ in order to do a linear combination of the fuzzy intersection $\wedge_F$ and fuzzy union $\vee_F$ for the attribute values in between the dominant and recessive attribute values.

Surely, considering the recessive degree, as you called it, it may help with decision making.

## IndetermSoft Set vs. Fuzzy Soft Set

[Shazia Rana]

> I have a question about IndetermSoft set.
>
> Whether it would be appropriate to mention that the Fuzzy Soft set, Intuitionistic Soft set and Neutrosophic Soft set and the next extension the plithogenic are all special types of IndetermSoft set?

[Florentin Smarandache]

No, because the IndetermSoft Set has different types of indeterminacies, with respect to their operators, for example:

F(red) = house h1 or house h2 (we do not know exactly which one is red), which means three possibilities: either h1, or h2, or both h1 and h2;

also:

F(green) = not house h3 (we know only that h3 is not green, other houses may be green).

For *Fuzzy Soft Set*:

F(red) = {h1(70%), h2(50%)}

F(green) = h3(0%)

For Intuitionistic Fuzzy Soft Set:

F(red) = {h1(70%, 20%), h2(50%, 45%)}

F(green) = h3(0%, 100%)

For *Neutrosophic Soft Set*:

F(red) = {h1(70%, 30%, 20%), h2(50%, 15%, 55%)}

F(green) = h3(0%, 100%, 100%)

Similarly for *IndetermHyperSoft Set*

F(red, small) = house h1 or house h2 (we do not know exactly which one is red and small),

or

F(green, big) = not house h3 (we know only that h3 is not green and big, so other houses may be green and big)

## Application of IndetermSoft Set

[Florentin Smarandache]

IndetermSoft Set, as extension of the classical (determinate) Soft Set, deals with indeterminate data:

→ when the source that provides the attribute function *F: A→P(H)* is not able to provide exact results about *F(e),* where *e* is an attribute in *A*;

→ or the set of attributes *A* is not well known;

→ or the set *H* is not well known:

*Reference:*

Florentin Smarandache, Introduction to the IndetermSoft Set and IndetermHyperSoft Set, *Neutrosophic Sets and Systems*, Vol. 50, 2022, pp. 629-650. DOI: 10.5281/zenodo.6774960

http://fs.unm.edu/NSS/IndetermSoftIndetermHyperSoft38.pdf

Remark

I did not add any indeterminacy, I found the indeterminacy in our real world. Because many sources give approximate information, not exact information as in the Soft Set.

## Example of IndetermSoft Set

[Florentin Smarandache to Santanu Acharjee]

Assume a town has many houses.

1) Indeterminacy with respect to the function.

1a) You ask a source:

— What houses have the red color in the town?

The source:

— I am not sure, I think the houses h1 or h2.

Therefore, F(red) = h1 or h2 (indeterminate / uncertain answer).

1b) You ask again:

— But, what houses are yellow?

The source:

— I do not know, the only thing I know is that the house h5 is not yellow because I have visited it.

Therefore, F(yellow) = not h5 (again indeterminate / uncertain answer).

1c) Another question you ask:

— Then what houses are blue?

The source:

— For sure, either h8 or h9 (again indeterminate / uncertain answer).

2) Indeterminacy with respect to the set H of houses.

You ask the source:

— How many houses are in the town?

The source:

— I never counted them, but I estimate their number to be between 100-120 houses.

3) Indeterminacy with respect to the set A of attributes.

You ask the source:

— What are all colors of the houses?

The source:

— I know for sure that there are houses of colors of red, yellow, and blue, but I do not know if there are houses of other colors.

This is the *IndetermSoft Set*.

## Bipolar Neutrosophic Set Application

[Florentin Smarandache to *PubPeer* comments]

The Bipolar Neutrosophic Set has six (*T+, I+, F+,* and *T-, I-, F-* ) neutrosophic components.

A simple example is the medication that has side effects.

The *T+, I+, F+* represent the positive poles {degrees of effectiveness, indeterminate-effectiveness, and non-effectiveness (approaching zero from the positive side) respectively} of the medication,

while the *T-, I-, F-* represent the negative poles or the side effects {degrees of damage, indeterminate-damage, and non-damage (approaching zero from the negative side) respectively} of the medication.

Since you mostly commented on the fuzzy and fuzzy-extension papers, founded by people whose names are not welcome to science since they come from small countries, theories that clearly, more or less, have various applications, I'd like to ask you to comment on today's physical theories and very abstract mathematics, which are so idealistic and perfect that many people doubt about their any little tangency with our real world!

Some researchers wrote books on this situation.

## Neutrosophic Isomorphism

[Florentin Smarandache to Vasantha Kandasamy]

Let C = the complex number set.

> 1. Is C x C, the direct product of two complex rings, neutrosophic?

No.

> 2. How can C x C, which is not neutrosophic, be isomorphic with C(<R U I>) or equal to C(I)?

C(I) = C(<R U I>) = {a+bI, where a and b are complex numbers} = {a1+b1i + (a2+b2i)I, where a1, b1, a2, b2 are real numbers} =

= {a1 + b1i + a2I + b2iI, where a1, b1, a2, b2 are real numbers}, which is neutrosophic.

C x C = {(a + bi, c + di), where a, b, c, d are real numbers} is not equal to the above C(I).

C x C is not neutrosophic indeed.

> 3. When C x C is not neutrosophic, only C(I) is neutrosophic. Is C(I) isomorphic to C x C?

If there exists an isomorphism function

$f : C \times C \rightarrow C(I)$

or

$f: C(I) \rightarrow C \times C$

then C x C is isomorphic with C(I), even if one set is neutrosophic and the other set is not neutrosophic.

## A Day-To-Day Real-Life Example for Neutrosophic Bipolar Vague Set

[Florentin Smarandache]

Suppose a doctor prescribes to a patient the medication M in order to cure his disease. But the medication has two effects:

the *positive effect* (that cures his disease), let's say $T^+ = 0.6$ degree of health improvement, $I^+ = 0.2$ indeterminate (unknown) degree of health improvement, and $F^+ = 0.3$ degree of no health improvement;

and a *negative effect* (or side effect, medication M giving birth to another disease), let's say $T^- = -0.7$ degree of new disease development, $I^- = 0.1$ indeterminate (unknown) degree of development of the new disease, and $F^- = 0.4$ degree of no new disease development.

This is *neutrosophic bipolar set* example.

Now, because $T^+ = 1 - F^-$ and $F^+ = 1 - T^-$ we also have a *vague set*.

Hence, the two types of set combined, give a *neutrosophic bipolar vague set* example.

## Neutrosophic Complex Set

[Florentin Smarandache to *Rhipidura Albiventris*]

(a), (c) The addition and subtraction are modulo 2π, therefore no matter what angle values you add or subtract, the result is always the positive remainder modulo 2π, which is a number between [0, 2π).

(b) Therefore, the definition 3.4 is not confusing. I repeat, all operations for the angle values are modulo 2π, so their results fall in the interval [0, 2π).

This sentence "the operations ∪ and ∩ are not defined yet for complex neutrosophic sets" is false, since the operations of union and intersection are defined.

See in Prop. 3.5 the union:

$A \vee B = \left(T_{(A \vee B)}, I_{(A \vee B)}, F_{(A \vee B)}\right)$.

Also, $A \wedge B = \left(T_{(A \wedge B)}, I_{(A \wedge B)}, F_{(A \wedge B)}\right)$,

and the unions and intersections of the neutrosophic components *T, I, F* of the *A* and *B* are defined into the paper.

(c) The neutrosophic complex set is not a “manipulation of symbols” as Rhipidura Albiventris says, but it is able to characterize the quantity (*amplitude*) and quality (*phase*) of each element that belongs to it.

(d) The "winner, neutral, losing" game is referring to neutrosophic three-structural form: *truth/wining, indeterminacy/neutral, false/losing*.

I recommend the person with this fake name Rhipidura Albiventris to also read the original complex set paper by Ramot et al.

## Neutro-Operations, Neutro-Axioms

[Florentin Smarandache]

Let *U* be a universe of discourse and a non-empty set *S* included in *U*. Let *n, m* ≥ 1 be given integers.

Let *H = (S, *1, *2, ..., *n)* be a classical *n*-ary hyper-structure, that has *n* hyper-operations and *m* hyper-axioms.

In order to construct a NeutroAlgebra which is a derivative of *H*, we neutro-sophicate at least one operation, or we change the set *S* (be removing elements from it, or adding elements into it in order to get some neutro-operations or neutro-axioms).

## a+b*I* has two forms

[Florentin Smarandache]

1) *a+bI*, where "*I*" is a literal Indeterminacy (i.e. a symbol, a letter); for example N = 2 + 3*I*, where 2 is the determinate part of the number N, while 3I is the indeterminate part of the number N;

and

2) *a+bI* where "I" is a numerical Indeterminacy (i.e. I = an interval, or in general I = a subset);

(i) for example if I = [-0.1, 0.2] is an interval, then simply the number N = 2 + 3I = 2 + 3·[-0.1, 0.2] = [2+3·(-0.1), 2+3·(0.2),] = [1.7, 3.6] also becomes an interval;

(ii) another example when I is a discrete hesitant subset, let's say I = {0.3, 0.5, 0.8}, then N = 2 + 3I = 2 + 3{0.3, 0.5, 0.8}

= {2+ 3·(0.2), 2+ 3·(0.5), 2+ 3·(0.8)} {2 + 0.6, 2+1.5, 2+2.4}

= {2.6, 3.5, 4.4} becomes a discrete hesitant set as well.

## Types of AntiTopology

[Florentin Smarandache to Tomasz Witczak]

Your paper on AntiTopology, it is very good.

You considered the case when all three topological axioms (Definition 1, and axioms 1, 2, 3) are all 100% false).

That's very good, this is the maximum possible AntiTopology.

Maybe you know the general website of AntiAlgebra (and NeutroAlgebra): http://fs.unm.edu/NA/NeutroAlgebra.htm.

You may also study as future research, the cases when only one topological axiom is 100% false, and the others are 100% true (or partially true); or only two axioms are 100% false while the other one is 100% true (or partially true).

## NeutroTopology and AntiTopology

[Florentin Smarandache to Mohamed AlShmrani]

NeutroTopology means that some classical topological axioms are only partially true [as in neutrosophy: partially true, partially indeterminate, and partially false].

While in classical topology all three axioms are 100% true, but in our everyday life the laws do not apply to the same degree to all individuals.

NeutroTopology is part of NeutroAlgebra:

http://fs.unm.edu/NA/NeutroAlgebra.htm.

AntiTopology: when at least one topological axiom is 100% false. AntiTopology is part of AntiAlgebra.

See this paper in general on NeutroAlgebraic Structures:

http://fs.unm.edu/NSS/NeutroAlgebraic-AntiAlgebraic-Structures.pdf.

## Infi-Topology as particular case of Classical Topology, or NeutroTopology or AntiTopology

[Florentin Smarandache]

The Infi-Topology is a topology where the axiom of union is missing.

So, Infi-Topology is larger than the classical Topology.

Let's construct an Infi-Topology on a given space *S*.

Although the axiom of union is intentionally omitted, we may check it out by curiosity. Then one may arrive to three distinct situations:

*i.* The axiom of union happens to be 100% true (truth T=I), therefore the Info-Topology coincides with the classical Topology.

*ii.* The axiom of union is only partially true ($0 < T < I$), thus Info-Topology is a NeutroTopology.

*iii.* The axiom of union is totally false (falsehood, $F = I$), this Info-Topology is an AntiTopology.

More information from this website about NeutroAlgebra & AntiAlgebra (and implicitly NeutroTopology & AntiTopology):

http://fs.unm.edu/NA/NeutroAlgebra.htm (adjusted from Algebra to Topology).

*References:*

[1] Das, B., Saha, A.K., & Bhattacharya, B. (2017). On infi-topoogical spaces. *The Journal of Fuzzy Mathematics*, 25(2), 437-448.

[2] Binod Chandra Tripathy, Rakhal Das, Suman Da, and Prasanna Poojary, Single-Valued Quadripartitioned Neutrosophic Infi Pre-Open Set in Single-Valued Quadripartitioned Neutrosophic Infi Topological Space [submitted], *Bulletin of Computational Applied Mathematics* (Bull CompAMa) published by Simón Bolívar University, Venezuela, August 2022.

## Refined Neutrosophic Metric Space

[Florentin Smarandache]

***Neutrosophic Metric Space*** to be extended using the ***Refined Neutrosophic Set*** to the **Refined Neutrosophic Metric Space**.

See http://fs.unm.edu/RefinedNeutrosophicSet.pdf.

## Refined Neutrosophic Topology

[Florentin Smarandache to Parimala Manie]

Each element should have *n* neutrosophic subcomponents:

$x( T_1, T_2, ..., T_p;\ \ I_1, I_2, ...I_r;\ \ F_1, F_2, ..., F_s)$

where $p + r + s = n$.

Then the *zero* is: 0(0, ..., 0; 1, ...,1; 1, ..., 1),

And the *one* is: 1(1, ..., 1; 0, ...,0; 0, ..., 0).

## Hybridization of Neutrosophic with Classical, Fuzzy, and Fuzzy Extension Sets

[Florentin Smarandache]

Neutrosophic (*T,I,F*) combined with intuitionistic fuzzy (*T,F*), gives:

— neutrosophic-intuitionistic ( *(TT, TF), (IT, IF), (FT, FF)* ),

where $TT + TF \leq 1$, $IT + IF \leq 1$, and $FT + FF \leq 1$.

Now, the above neutrosophic-intuitionistic combined with Pythagorean Fuzzy Set, $T^2 + F^2 \leq 1$,

— give a neutrosophic-intuitionistic-Pythagorean fuzzy:

( *(TT, TF), (IT, IF), (FT, FF)* ),

where $TT^2 + TF^2 \leq 1$, $IT^2 + IF^2 <= 1$, and $FT^2 + FF^2 \leq 1$.

We can do other hybridizations.

For example, neutrosophic-neutrosophic give:

– ( *(TT, TI, TF), (IT, II, IF), (FT, FI, FF)* )

which ressembles the Refined Neutrosophic Set:

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

## Negative Components

[Florentin Smarandache]

The idea to consider an Intuitionistic Fuzzy Set component as negative, such as Hesitancy (in the year 2023, [1]), is good, but it is not new.

The authors see the neutrosophic underset (in the year 2016, [2]),

where the components were allowed to be < 0 (negative),

even more, see the case when the neutrosophic components are > 1 (neutrosophic overset)

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

http://fs.unm.edu/SVNeutrosophicOverset-JMI.pdf

http://fs.unm.edu/NSS/DegreesOf-Over-Under-Off-Membership.pdf

*References:*

[1] Yang, Youpeng; Lee, Sanghyuk; Zhang, Haolan; Pedrycz, Witold, *Negative Hesitation Fuzzy Sets and Their Application to Pattern Recognition*, Transactions on Fuzzy Systems, 2023.

[2] F. Smarandache, *Neutrosophic Overset, Neutrosophic Underset, and Neutrosophic Offset*, Pons Editions, Bruxelles, 2016,

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

## Type-n Neutrosophic Set

[Florentin Smarandache to Mehmet Unver, Murat Olgun]

You connected the neutrosophic set, with intuitionistic fuzzy set, and then with Pythagorean set - never done before.

This is a Type-3 Neutrosophic Set.

Please continue your excellent research together with your team.

If any questions or needed collaboration, please ask.

See the general type of neutrosophic set (it would be good if you cite the below paper).

Please include in your paper the general definition of Type-n Neutrosophic Set, then explain into the paper how you hybridize three types of types (as I said before), some people will better understand.

F. Smarandache, *Type-n Neutrosophic Set* (section), in author's book *Nidus Idearum. Scilogs, V: joining the dots*, Pons Publishing, Brussels, pp. 125-127, 2019, http://fs.unm.edu/NidusIdearum5-v3.pdf

*Salamo Walecum! Cök güzel!* (I used to speak some Turkish in the Political Refugee Camp in Istanbul and Ankara – 1988-1990.)

## Two Types of Neutrosophic Groups

[Florentin Smarandache to Adel Aleidhri]

There are two types of neutrosophic groups:

– the first one was when $G$ was a classical group, then $G \vee I$ was automatically considered a group (even if the set $G \vee I$ is not a group from a classical view point); call it "neutrosophic group";

– the second when $G \vee I$ is itself a group from a classical way; call it "classical neutrosophic group".

## Turiyam Set as a particular case of the Plithogenic Set and of the Refined Neutrosophic Set

We present the definitions of the Turiyam Set and respectively the Plithogenic Set and Refined Neutrosophic Set, and then we make a comparison between them, showing that the Turiyam Set is a particular case of both, the Plithogenic Set and of the Refined Neutrosophic Set.

Definition of Turiyam Set

*Definition of Turiyam Set* [1, 2]: A set $B$ on $U \neq \emptyset$ that has the form

$$B = \{<x, \mathrm{t}_B(x), i_B(x), f_B(x), l_B(x)>: x \in U\}$$

where $\mathrm{t}_B(x): U \to [0,1], i_B(x): U \to [0,1]$, $f_B(x): U \to [0,1]$, and $l_B(x): U \to [0,1]$ denote the truth value, the indeterminacy value, the falsity value and the Turiyam state (or liberal) value for each $x \in X$ correspondingly by which $\mathrm{t}_B(x)$, $i_B(x)$, $f_A(x)$ and $l(x)$ satisfies the condition $0 \leq \mathrm{t}_B(x) + i_B(x) + f_B(x) + l_B(x) \leq 4, \forall x \in U$.

The *Turiyam* term was taken from the Sanskrit ontological theory.

The Turiyam Set, defined by Singh [1,2], coincides with Belnap's four-valued that uses four components: True (T), False (F), Unknown (U), and Contradiction (C), and Quadripartioned Neutrosophic Set: True (T), False (F), Uncertainty (U), Contradiction (C).

In Turiyam Set the author kept T, F, and U (that he called Indeterminacy, I, as in neutrosophic set), but he baptized the contradiction C by L that he calls Turiyam or liberal or awareness etc. state. Of course, he/she can baptize them by any names, but it is the same object having different letters.

The author says about the fourth component Turiyam (L) that the plithogenic set "considers it as a contradiction rather of taking it as a new dimension". This is untrue.

Definition of the Plithogenic Set

*Definition of the Plithogenic Set* [3] in (2018) below, page 153:

> "A plithogenic set P is a set whose elements are characterized by one or more attributes (parameters), and each attribute (parameter) may have many values. Each attribute's value v has a corresponding degree of appurtenance d(x,v) of the element x, to the set P, with respect to some given criteria.

> These attributes (parameters) and their values may be independent, or dependent, or partially independent and dependent – according to the applications."

The confusion with "contradiction" that the author makes is that in order to build better operators (intersection, union, negation, implication, equivalence, etc.) between plithogenic sets one takes into consideration the degree of contradiction {degree that may be 0 (zero), or 1, or any number in between}. It is not required in the plithogenic set to have, or not to have, contradictory attribute values.

> "In order to obtain a better accuracy for the plithogenic aggregation operators, a contradiction (dissimilarity) degree is defined between each attribute value and the dominant (most important) attribute value."

The *Turiyam Set* is a particular case of the Plithogenic Set, when an element x is characterized by 4 components: T and F that are 100% contradictory, while T and I are 50% contradictory, also F and I are 50% contradictory, but Turiyam L is 100% independent from T, F, and I all together.

In a plithogenic set, any element may by characterized by any number of components, that may be totally independent, or totally dependent, or partially independent and partially dependent.

Definition of the Refined Neutrosophic Set

Turiyam Set is also a particular case of the Refined Neutrosophic Set [4], where one has $n$ independent or dependent or partially independent/dependent neutrosophic components, $T_1, T_2, \ldots, T_p$; $I_1, I_2, \ldots, I_p$; $F_1, F_2, \ldots, F_s$, where $p + r + s = n$, and $p, r, s \geq 0$ are integers, and a least one of $p, r, s$ is $\geq 2$, where

$$0 \leq \sum_{j=1}^{p} T_j + \sum_{k=1}^{r} T_k + \sum_{l=1}^{s} T_l \leq n$$

Therefore all $n$ components may be totally independent, or totally dependent, or partially independent and partially dependent.

The middle term (all three summations together) may be equal to $n$ (when all $n$ components are independent two by two), and strictly smaller than $n$ on the case when some components are dependent on others.

This double inequality assures a total independence of all components, or partial independence, or total dependence.

Thus, taking $p = s = 1$, hence one $T$ and one $F$, and $r = 2$, hence $I_1$ = Indeterminacy ($I$) and $I_2$ = Turiyam component ($L$) independent from all other three components, where $1 + 1 + 2 = 4$, one gets the so-called Turiyam Set.

Or, in general, considering the **Neutrosophy** [7], which is the philosophy that studies the dynamics of the opposites <*A*> and <*antiA*> together with their neutrals <*neutA*>, where <*A*> is an idea, concept, item, proposition, theory etc., while <*antiA*> is the opposite of <*A*>, while <*neutA*> is the neutrality in between them (neither <*A*>, nor <*antiA*>).

We defined a **Law of Multiple Included-Middle** [5], meaning that in between the opposites <*A*> and <*antiA*> there may exist many neutrals (indeterminacies), in other words <*neutA*> is composed from many <$neutA_1$>, <$neutA_2$>, ... .

In your Turiyam case, $T$ and $F$ are the opposites, while $I$ and $Y$ are the included multiple (double, in this case) middles, but all four of them are considered independent.

Algebraic Structures

The algebraic structures deal with numbers and letters. A Turiyam Ring or Turiyam Group, for example, are sets of numbers or letters $x$ that have degrees of truth T, falsehood F, indeterminacy I, but Turiyam degree L that means degree of awareness, or liberal degree.

But a number, or letter, or object in general do not have degrees of awareness or liberal degrees.

While for the Neutrosophic Quadruple Algebraic Structures [6], a number *N* has the form:

$N = a + bT + cI + dF$ with *a, b, c, d* as real or complex numbers, and it has a real meaning:

*a* = the known part of number *N*;

and $bT + cI + dF$ = the unknown part of the number *N*, where *b* is the degree of confidence, *c* degree of indeterminate-confidence, and *d* is the degree of nonconfidence:

http://fs.unm.edu/NA/OnNeutroQuadrupleGroups-slides.pdf

and see also the Refined Neutrosophic Quadruple (pages 188-190):

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

For their multiplication of *T, I, F* we use the *Absorption Law*: the bigger absorbs the smaller, while the their order is given by the experts depending on each application. In an optimistic way we may say that T > I > F, in a pessimistic way: F > I > T. Other orders can also be defined.

But the Turiyam number M = a + bT + cF + dI + eL,

where *e* is the degree of awareness (or liberal degree also called) of a number... does not have any sense in the real world. Sometimes he denoted the degree of awareness by L, other times by Y.

The most general algebraic structure would be on **Refined Neutrosophic Algebraic Structures**, build on refined Neutrosophic Numbers ($N_R$), where:

$N_R = a_1 + \sum_{j=1}^{p} b_j T_j + \sum_{k=1}^{r} c_k I_k + \sum_{l=1}^{s} d_l T_l$, for integers $p, r, s \geq 0$, $p + r + s = n \geq 2$, and at least one of *p, r, s is greater than or equal to 2* (to assure that at least one component of *T, I,* or *F* is refined).

Similarly, all $a_i$, $b_j$, $c_k$, $d_l$ , for $j \in \{1,2,...,p\}, k \in \{1,2,...,r\}, l \in \{1,2,...,s\}$ are real or complex numbers.

*References:*

[1] Singh, P. K. (2021). Data with Turiyam set for fourth dimension quantum information processing. *Journal of Neutrosophic and Fuzzy Systems*, 1(1), 9-23.

[2] Singh, P. K. (2021). Turiyam set a fourth-dimension data representation. *Journal of Applied Mathematics and Physics*, 9(7), 1821-1828.

[3] Smarandache, Florentin (2018). Plithogenic Set, an Extension of Crisp, Fuzzy, Intuitionistic Fuzzy, and Neutrosophic Sets – Revisited, *Neutrosophic Sets and Systems*, vol. 21, 2018, pp. 153-166. http://fs.unm.edu/NSS/PlithogenicSetAnExtensionOfCrisp.pdf

[4] Smarandache, F. (2013). n-Valued Refined Neutrosophic Logic and Its Applications to Physics, *Progress in Physics*, Vol. 4, 143-146, http://fs.unm.edu/RefinedNeutrosophicSet.pdf

[5] Smarandache, F. (2014). Law of Included Multiple-Middle & Principle of Dynamic Neutrosophic Opposition, EuropaNova & Education Publisher, Brussels-Columbus, http://fs.unm.edu/LawIncludedMultiple-Middle.pdf

[6] Smarandache, F. (2015), Symbolic Neutrosophic Theory, EuropaNova, Bruxelles, http://fs.unm.edu/SymbolicNeutrosophicTheory.pdf

[7] Smarandache, F. (2002). Neutrosophy, A New Branch of Philosophy by Florentin Smarandache, in , published by Taylor & Francis Group, UK and USA, ISSN 1023-6627, Vol. 8, No. 3, pp. 297-384, 2002, http://fs.unm.edu/Neutrosophy-A-New-Branch-of-Philosophy.pdf

## Turiyam coincides with Belnap

[Florentin Smarandache]

In [1] the Turiyam set contains 4-tuple: truth (t), Indeterminacy (I), falsity (f), and liberalization (l).

(i) Acceptation of existence of an attribute, rejection of non-existence of the given attribute i.e. true region (t),

(ii) Acceptation of non-existence of given attribute, rejection of existence of given attribute i.e. false region (f),

(iii) Acceptation of both existence and non-existence of given attribute at same time i.e. indeterminate or uncertain region (i),

(iv) Rejection of both acceptation and rejection of attribute at the given time i.e. unknown region (l). It need Turiyam consciousness to explore it.

This is exactly as in Belnap's Logic: True (T), False (F), Contradiction (C), and Unknown (U), and as in Quadruple Neutrosophic Set. In Turiyam Set the contradiction was named indeterminacy (I).

*Reference:*

1. Prem Kumar Singh, Quaternion Set for Dealing Fluctuation in Quantum Turiyam Cognition, *Journal of Neutrosophic and Fuzzy Systems* (JNFS) Vol. 04, No. 02, pp. 57-64, 2022.

## Spherical Neutrosophic Graph

[Florentin Smarandache]

I like the Definition 3.1. from the paper [1]:

A **spherical neutrosophic graph,** on an underlying set V, is a pair G (A, B), where A is a spherical neutrosophic set of vertices in V, and B is a set of spherical neutrosophic relationships/edges on $V \cup V$ .

The authors [1] used the inequalities:

– for vertices, one has:

$$T_A, I_A, F_A \in [0,1],$$
$$0 \le T_A^2 + I_A^2 + F_A^2 \le \sqrt{3};$$

– and for edges (relationships between vertices), one has:

$$T_B, I_B, F_B \in [0,1],$$
$$0 \le T_B^2 + I_B^2 + F_B^2 \le \sqrt{3}.$$

These inequalities are beautiful.

About the other inequalities, between neutrosophic degrees of vertices and edges [1] :

$$T_B(x,y) \le (T_A(x) \wedge T_A(y)),$$
$$I_B(x,y) \le (I_A(x) \wedge I_A(y)),$$
$$F_B(x,y) \le (F_A(x) \vee F_A(y)),$$

we feel they are restrictive, since they are not needed in a general definition of a neutrosophic graph - because each application should have its specific inequalities.

*Reference:*

[1] K. Akalyadevi, & C. Antony Crispin Sweety, A. R. Sudamani Ramaswamy, Spherical Neutrosophic Graph Coloring, AIP Conference Proceedings 2393, 020217 (2022); https://doi.org/10.1063/5.0074403. Published Online: 19 May 2022.

## Soft Set Cartesian Product

[Florentin Smarandache]

Shukriya, Adiqe, for the message.

I visited Pakistan (Abbottabad, Islamabad) several years ago (invited by Prof. Dr. Madad Khan, a good friend).

Thanks for the questions:

> what is difference between "soft set cartesian product" (defined in your paper) and "cartesian product of soft set" (defined in https://doi.org/10.1016/j.camwa.2010.07.014 )

Mine is different from this paper.

If you consider Example 3.2. in the above paper, they got

*H(very costly, beautiful) = {h2, h4, h7, h8} × {h2, h3, h7} (PRODUCT) = {(h2, h2), (h2, h3), (h2, h7), (h4, h2), (h4, h3), (h4, h7), (h7, h2), (h7, h3), (h7, h7), (h8, h2), (h8, h3), (h8, h7)},*

but in my paper we use INTERSECTION, not PRODUCT,

i.e. *H(very costly, beautiful) = {h2, h4, h7, h8} /\ {h2, h3, h7} = {h2} (INTERSECTION)*,

which is the HyperSoft Set.

> Same question for "hypersoft set cartesian product" and "cartesian product of hypersoft set" (defined by us in our book chapter 1)

Please resend it to me by email. Apology, I am overwhelmed with questions and messages.

So, resend it to me.

> In definition of soft set cartesian product (page 2, line 4) the sentence "respectively A1, A2, A3, .... An, their corresponding sets of attributes' values," is mentioned which is not the case of soft set as it deals with attributes only not their attribute values.

I meant the following:

a1 = color, a2 = weight, a3 = location, etc.

and their attribute values may be:

A1 = {white, green, Red}, A2 = {light, heavy}, A3 = {Abottabad, Phoenix, Paris, Bruxelles}...

Should I have used different words?

## NeutroQuadrupleAlgebra

[Florentin Smarandache]

An idea would be this: on the quadruple set that is based on (a, bT, cI, dF) define the division, but this would be a NeutroDivision, since it will not work for all quadruple numbers, we may get indeterminacy.

Use also the absorbance law.

Inverse of an element with respect to multiplication, will be NeutroInverse...

See this article to better understand the quadruple and refined quadruple numbers:

Florentin Smarandache: Neutrosophic Quadruple Numbers, Refined Neutrosophic Quadruple Numbers, Absorbance Law, and the Multiplication of Neutrosophic Quadruple Numbers, Neutrosophic Sets and Systems, vol. 10, 2015, pp. 96-98. doi: 10.5281/zenodo.571562,

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

## Literal and Numerical Cognitive Maps

[Florentin Smarandache to Nivetha Martin]

A neutrosophic cognitive maps assume values of {-1,1,0, I}, where "I" represents the indeterminate associational impact between two factors. The connection matrix bears the value *I*.

You can consider indeterminacy "I" as a *Literal Indeterminacy* (which means you only know that the relationship is indeterminate, but you are not able to measure it),

or *Numerical Indeterminacy* "I", where you can measure the indeterminacy

and it may be any value in [0, 1] depending on each application.

Yes, you may say indeterminacy is 0.2 = 20% for example.

Or, you may also consider the measuring of Indeterminacy by using labels, such as:

Low Indeterminacy ($L_1$), Medium Indeterminacy ($L_2$),

Large Indeterminacy ($L_3$) etc.

as well, when you cannot, or you do not need exact numerical values.

## Epsilon and Delta from Calculus are not Infinitesimals

[to Akira Kanda, Stefan Spaarmann, Victor Christianto, Robert Neil Boyd, Oliver Consa]

The epsilon, delta from the "epsilon, delta definitions or theorems" in calculus are NOT infinitesimals, they are tiny positive numbers close to zero, that's the confusion.

A definition is like this: "For any epsilon > 0, there exist delta > 0, such that...", as you see it is not written " 'infinitesimal' epsilon and delta".

Epsilon and delta are real numbers, for example 10^(-1,000,000) is not an infinitesimal, it is a very tiny number.

An infinitesimal can NOT be written in the set of real numbers R (in our world), not even in the set of hyperreal numbers R*, it is simply denoted by "epsilon", and it does not have a clear value in R* either.

I repeat: a positive infinitesimal is a number strictly greater than zero and infinitely closer to zero... [therefore, not a certain value].

## Another Neutrosophic Likert Scale

[to Ilanthenral Kandasamy]

For the Likert Scale I think we can neutrosophically refine it also as:

F1 = Very Unsatisfied
F2 = Unsatisfied
I = Neutral
T2 = Satisfied
T1 = Very Satisfied

If we combine (union, intersection), F1 and F2 behave as F, while of course T1 and T2 as T.

Examples

*Union:*

*(TA1, TA2, IA, FA2, FA1) /\ (TB1, TB2, IB, FB2, FB1) =*

*= (TA1 /\ TB1, TA2 /\ TB2, IA \/ IB, FA2 \/ FB2, FA1 \/ FB1)*

*Intersection:*

*(TA1, TA2, IA, FA2, FA1) \/ (TB1, TB2, IB, FB2, FB1) =*

*= (TA1 \/ TB1, TA2 \/ TB2, IA /\ IB, FA2 /\ FB2, FA1 /\ FB1)*

*Complement* of *(TA1, TA2, IA, FA2, FA1) is (FA1, FA2, IA, TA2, TA1).*

## NeutroAlgebra

[Florentin Smarandache to Mircea Zărnescu]

În aceeași direcție cu dvs., am avut și eu obiecții privind structurile algebrice clasice, unde axiomele/legile se aplică la toate elementele în același fel, însă în viața reală ați observat că legile se aplică în grade diferite la persoane diferite, unii aflați la putere sunt chiar deasupra legii. Deci structurile algebrice clasice sunt idealiste (nereale).

Și-atunci am dezvoltat ceea ce am numit NeutroAlgebra, adică structuri algebrice unde axiomele/legile sunt doar parțial adevărate (se aplică unor elemente, dar nu altora):

http://fs.unm.edu/NA/NeutroAlgebra.htm.

## NeutroFunction & AntiFunction

[to W.B. Vasantha Kandasami]

I have defined the NeutroAlgebra (that is the algebra where some axioms are only partially true):

http://fs.unm.edu/NA/NeutroAlgebra.htm.

Similarly is the NeutroFunction.

Let A, B be two non-empty sets included into a universe of discourse U. Let f: A --> B, such that:

- for some x ∈ A, f(x) ∈ B {degree of inner-defined (T)}

- for some y ∈ A, f(y) is indeterminate (unclear, unknown, undefined {degree of indeterminacy (I)}

- for some z ∈ A, f(z) ∈ U\B {degree of outer-defined (F)},

where (T,I,F) is different from (1,0,0) that represents the Classical Function,

and from (0,0,1) and/or F different from 1 that represents the AntiFunction.

The AntiFunction is when:

for all z ∈ A, f(z) ∈ U\B (degree of outer-defined).

## Totally well-defined

[Florentin Smarandache]

"Totally well-defined" should be kept in order for the readers to distinguish it from "partially well-defined". In the classical algebraic structures it is enough to write about an operation only that it is "well-defined", it was understood that it is 100% well-defined.

I understand that "totally well-defined" or "100% well-defined" is a tautology or even pleonasm, but I preferred to scientifically be clear that it was dealing with a "partially well-defined" -- this is the main distinction between the classical algebraic structures and NeutroAlgebras (that are only partially well defined).

## Neutro-BL-algebras

[to R. Tayebi Khorami, Arsham Borumand Saeid]

Mouchakeram, for Nodal filters in BL-algebras, *Journal of Intelligent Fuzzy Systems*, 2015!

You may write a paper on Neutro-BL-algebras, i.e. BL-algebras that have some axioms that are only partially true, see this http://fs.unm.edu/NA/NeutroAlgebra.htm.

## Neutrosophic Weibull Distribution

[Florentin Smarandache to Maisam Jdid]

Classical Weibull Distribution was extended to Neutrosophic Weibull Distribution by using the distribution function on indeterminate data {vague, unclear, subsets (that include the unknown crisp numbers)} instead of crisp numbers, etc.

## Distinction between Refined Neutrosophic Set and Plithogenic Symbolic Set

[M. Abobala]

> What are the differences between pilthogenic symbolic set and n refined neutrosophic set?

[Florentin Smarandache]

A neutrosophic set has each element $x(T,I,F)$

where $T, I, F$ are components.

A refined neutrosophic set has each element $x$

with $T, I, F$ refined, as:

$x(T_1, T_2, ...; I_1, I_2, ...; F_1, F_2, ...)$.

A plithogenic set has each element x characterized by many attribute values (like: size, color, weight, etc.):

$v_1, v_2, ..., v_m$.

Further on, the element x belongs to the plithogenic set with a certain (fuzzy, neutrosophic, etc.) degree with respect to each attribute value, for example:

$x(v_1(T_1, I_1, F_1), v_2(T_2, I_2, F_2), ..., v_m(T_m, I_m, F_m))$.

A plithogenic Symbolic Set is an algebraic set (not numerical set as above), defined as:

$a_0 + a_1P_1 + a_2P_2 + ... + a_mP_m$,

where $a_0, a_1, ..., a_m$ are real or complex numbers,

and $P_1, P_2, ..., P_m$ are variables.

On defines the multiplication of variables,for example, as:

$P_i \, x \, P_j = P_{max\{i,j\}}$.

## Neutrosophic Algebraic Structures and Classical Structures

[to Riad Hamido]

If you have a group G(*), the law is *, then G(I) with the neutrosophic law that you defined:

$a+bI \# c+dI = a*c + b*dI$

is a neutrosophic group and a classical group.

Similarly it is possible to extend to ring or field and maybe other algebraic structures:

M(*1, *2) a classical ring or field, then M(I) with corresponding neutrosophic laws may become both:

neutrosophic ring/field and classical ring/field.

## Neutrosophic De Morgan Laws

As in fuzzy, intuitionistic fuzzy and other fuzz-extensions sets, the neutrosophic operators of negation, intersection, union etc. are not unique.

All these operators are approximations of the aggregations, they do not give exact results as in classical Boolean Algebra.

For each of neutrosophic operator there is a class of such operators, since they deal with indeterminate, uncertain, conflicting data.

A neutrosophic operator approximates more or less accurate - depending on each application.

Therefore, the Boolean Algebra Laws may be satisfied for some specific operators (in fuzzy, intuitionistic fuzzy, neutrosophic, etc.) sets and applications, but not for all.

Many laws, axioms, theorems, properties and propositions, which work for the classical theories, do not necessarily work for the fuzzy and fuzzy-extension theories. This is because the classical theories deal with determinate (certain) data, while the others deal with indeterminate (uncertain, unclear) data.

Examples

*Neutrosophic Union ($\vee_n$):*

$(T_1, I_1, F_1) \vee_n (T_2, I_2, F_2) = (T_1 \vee_f T_2, I_1 \wedge_f I_2, F_1 \wedge_f F_2)$

$(T_1, I_1, F_1) \vee_n (T_2, I_2, F_2) = (T_1 \vee_f T_2, 0.5[(I_1 \vee_f I_2) + (I_1 \wedge_f I_2)], F_1 \wedge_f F_2)$ (1)

etc.

where $\vee_f$ = fuzzy union, and $\wedge_f$ = fuzzy intersection.

There are many types of fuzzy unions, such as:

$x \vee_f y = max\{x, y\}$

$x \vee_f y = x + y - xy$

$x \vee_f y = min\{x + y, 1\}$

etc., and many types of fuzzy intersections respectively:

$x \wedge_f y = min\{x, y\}$

$x \wedge_f y = xy$

$x \wedge_f y = max\{x + y - 1, 0\}$, etc.

*Neutrosophic Intersection ($\wedge_n$):*

$(T_1, I_1, F_1) \wedge_n (T_2, I_2, F_2) = (T_1 \wedge_f T_2, I_1 \vee_f I_2, F_1 \vee_f F_2)$

$(T_1, I_1, F_1) \wedge_n (T_2, I_2, F_2) = (T_1 \wedge_f T_2, 0.5[(I_1 \wedge_f I_2) + (I_1 \vee_f I_2)], F_1 \vee_f F_2)$ (2)

etc.

*Neutrosophic Negation ($\neg_n$)*

$\neg_n(T_1, I_1, F_1) = (F_1, 1-I_1, T_1)$

$\neg_n(T_1, I_1, F_1) = (F_1, I_1, T_1)$ (3)

$\neg_n(T_1, I_1, F_1) = (1-T_1, 1-I_1, 1-F_1)$

Neutrosophic De Morgan Laws

Using the above formulas for the Neutrosophic Union (1), Neutrosophic Intersection (2), and Neutrosophic Negation (3) [all in yellow color], the De Morgan Laws work.

Using other formulas for the Neutrosophic Union, Neutrosophic Intersection, Neutrosophic Negation, De Morgan Laws do not work in general.

First Neutrosophic De Morgan Law

$$\neg [(T_1, I_1, F_1) \vee_n (T_2, I_2, F_2)] = \neg (T_1, I_1, F_1) \wedge_n \neg (T_2, I_2, F_2)$$

*Proof:*

$$\neg [(T_1, I_1, F_1) \vee_n (T_2, I_2, F_2)] =$$
$$= \neg (T_1 \vee_f T_2, 0.5[(I_1 \vee_f I_2) + (I_1 \wedge_f I_2)], F_1 \wedge_f F_2) =$$
$$= (F_1 \wedge_f F_2, 0.5[(I_1 \vee_f I_2) + (I_1 \wedge_f I_2)], T_1 \vee_f T_2).$$

Also:

$$\neg (T_1, I_1, F_1) \wedge_n \neg (T_2, I_2, F_2) = (F_1, I_1, T_1) \wedge_n (F_2, I_2, T_2) =$$
$$= (F_1 \wedge_f F_2, 0.5[(I_1 \wedge_f I_2) + (I_1 \vee_f I_2)], T_1 \vee_f T_2).$$

Second Neutrosophic De Morgan Law

$$\neg [(T_1, I_1, F_1) \wedge_n (T_2, I_2, F_2)] = \neg (T_1, I_1, F_1) \vee_n \neg (T_2, I_2, F_2)$$

*Proof:*

$$\neg [(T_1, I_1, F_1) \wedge_n (T_2, I_2, F_2)] =$$
$$= \neg (T_1 \wedge_f T_2, 0.5[(I_1 \wedge_f I_2) + (I_1 \vee_f I_2)], F_1 \vee_f F_2) =$$
$$= (F_1 \vee_f F_2, 0.5[(I_1 \vee_f I_2) + (I_1 \wedge_f I_2)], T_1 \wedge_f T_2).$$

Also:

$$\neg (T_1, I_1, F_1) \vee_n \neg (T_2, I_2, F_2) = (F_1, I_1, T_1) \vee_n (F_2, I_2, T_2) =$$
$$= (F_1 \vee_f F_2, 0.5[(I_1 \vee_f I_2) + (I_1 \wedge_f I_2)], T_1 \wedge_f T_2).$$

## Degrees of min-mean-max

[to Rafael Rojas]

Yes, triangular neutrosophic numbers you can use, in order to have degree of min (T), degree of neutral/mean (I), and degree of max (F).

Surely, for a, b, c you get the distances, as you did, between a and b, then between b and c. then you take some intervals.

## Distinctions between Spherical Neutrosophic Set vs. Pythagorean Neutrosophic Set and Fermatean Neutrosophic Set

Spherical Neutrosophic Set

$T, I, F \in [0, \sqrt{3}]$

$0 \le T^2 + I^2 + F^2 \le 3$

Pythagorean Neutrosophic Set

$T, I, F \in [0,1]$

$0 \le T^2 + I^2 + F^2 \le 2$

Fermatean Neutrosophic Set

$T, I, F \in [0,1]$

$0 \le T^3 + F^3 \le 1$, i.e. T and F have some degree of dependence from each other;

$0 \le I^3 \le 1$, i.e. the Indeterminacy I is completely independent from T and F.

Therefore, one gets: $0 \le T^3 + I^3 + F^3 \le 2$.

We need to graph in 3D (three dimensions) the equation:

$x^3 + y^3 + z^3 = 2$ (using special software like Apple or Wolfram Mathematica).

Below is only $x^3 + y^3 = 1$ in 2D (we can graph it for free online at https://www.desmos.com/calculator):


They are all different sets.

## On the paper "An advanced approach to the system safety in sociotechnical systems"

[to Esmaeil Zarei, Faisal Khan, Rouzbeh Abbassi]

> "Kutlu Gündogdu and Kahraman (2019) proposed a novel fuzzy set named three-dimensional SFS to address the limitations encountered in the previous extensions and deal with more widely uncertain information, vagueness originating from the human judgments, ambiguity in the decision-making process and clarify hesitancy of decision makers' judgments (Kutlu Gündogdu and Kahraman, 2019). These novel sets enable decision-makers to independently define their degree of hesitancy" ([1], page 15)

*Spherical Fuzzy Set* (SFS) is a particular case of the Neutrosophic Set, not the other way around.

See this paper: http://fs.unm.edu/Raspunsatan.pdf.

People copy the first paper by Gündoğlu and Kahraman, which is mathematically false, because the SFS is not a generalization of the neutrosophic set.

Simply, (1,1,1) is a neutrosophic triplet since $1+1+1 \leq 3$, but it is not a SFS triplet since $1^2+1^2+1^2 = 3 > 1$.

> "not including the criticized aspect of the neutrosophic theory, i.e., a sum of μ, v, and π larger than 1" ([1], page 15)

What a hypocrisy! The authors do not see that their SFS has also cases when the sum of the components is larger than 1!

The sum T+I+F > 1 occurs as well in SFS sir.

Let's take (0.7, 0.3, 0.5) which is a SFS triplet,

since $0.7^2 + 0.3^2 + 0.5^2 < 1$, but $0.7 + 0.3 + 0.5 > 1$

In NS I gave real examples where the sum T + I + F > 1 in our real life, see this paper:

http://fs.unm.edu/NSS/PracticalIndependentNeutrosophic36.pdf.

Not only NS was criticized, but SFS as well, but you FORGOT to say that.

See an elementary example where the sum of components is greater than 1:

Practical Example 2

A murderer John Doe is being tried in the court of law for having committed a crime.

There are three player parts in the court: the Persecutor team, which presents the suspect in a negative way, for example F(Doe) = 0.9; the Defense team, that presents the suspect in a positive way, for example T(Doe) = 0.4; and the Jury, that is neutral, where I(Doe) in [0,1].

Herein, the Persecutor and the Defense are totally independent sources (since they are opposite). Therefore, T and F are totally independent.

But the Jury is dependent on the evidence provided by both the Persecutor and the Defense. Therefore, the neutrosophic component I is totally dependent on both T and F.

Let's assume I = 0 means not guilty, I = 1 means guilty, while I in (0,1) means a hung-jury (i.e. some jurors say he is guilty, while others say he is not guilty) or unable to reach a verdict. This is a TriVariate Truth-Value.

*

Unfortunately, your paper has errors with respect to the neutrosophic set!

*Reference:*

[1] Esmaeil Zarei, Faisal Khan, Rouzbeh Abbassi, An advanced approach to the system safety in sociotechnical systems, *Safety Science*, 158, 2023, 105961.

## Examples of $(T, I, F) = (1, 1, 1)$

### The Paradox

A paradox P is a self-contradictory proposition, that is totally (100%) true and totally (100%) false at the same time,

therefore the truth T(P) = 1 and the falsehood F(P) = 1.

But, because the proposition P is simultaneously totally true and totally false,

it is also totally indeterminate (unclear, contradictory, confusing etc.),

whence its indeterminacy I(P) = 1.

### A Classical Paradox

Let's consider the proposition S defined as below:

S = "This statement is false".

If S is true, then This statement is false.

If S is false, then This statement is not false and as such This statement is true.

Therefore, proposition S is true (T = 1) and false (F = 1) simultaneously,

Which means that proposition S is completely indeterminate (contradictory, uncertain, confusing),

whence I = 1.

Soccer Game, another easy example from our everyday life.

There is a soccer game between India and Pakistan.

Three sources evaluate the game, an Indian supporter (as a positive source for India),

a Pakistani supporter (as a negative source for India), and a Korean (as a neutral source for both India and Pakistan).

The Indian supporter totally supports and believes that India will win since India plays at home at New Delhi, so T(India) = 1.

But the Pakistani supporter totally supports and believes that Pakistan will win

since in the previous matches between the countries Pakistan has won against India, so India will lose for sure

according to him, or F(India) = 1.

The third source, the Korean, considers that the advantages and disadvantages for India of winning or losing balance each other,

therefore he certainly believes that there will be a tie game,

or the indeterminacy/neutrality I(India) = 1.

## Thick Function

[To Mohammad Aslam]

I do not understand very well which ones are varying?

Is I = constant interval/set ?

Are XL and XU varying?

XN=XL+XU*IN ; IN belong to [IL, IU], it is reduced to classical statistics when IN=o

For I = [a, b], a ≤ b, constant.

If XN=XL+XU*IN = XL + XU*[a,b] = [XL + XU*a, XL + XU*b],

so you graph two functions:

$y_1$ = XL + XU*a, and

$y_2$ = XL + XU*b

So, the area in between the two curves $y_1$ and $y_2$.

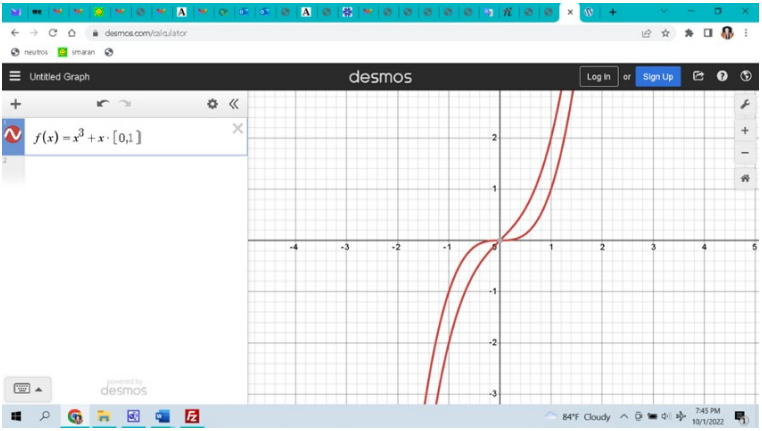
See the Thick Function herein:

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

Do you mean, for example: $f(x) = x^3 + x \cdot [0,1]$ ?

This means the area between $f(xL) = x^3$ and $f(xU) = x^3 + x$ ?

See below the area between two curves:

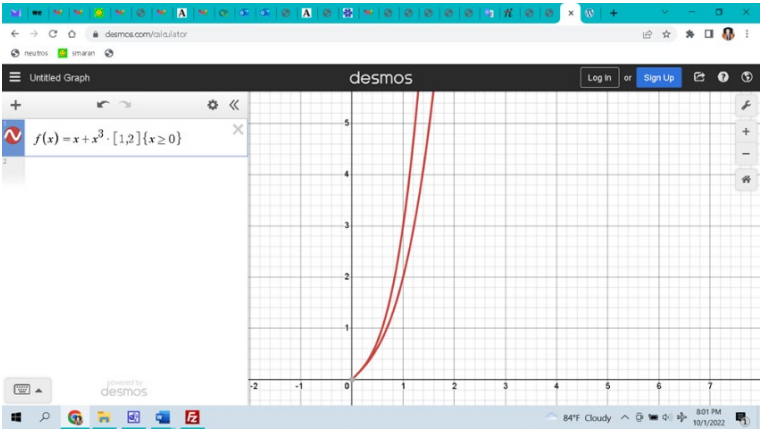



$f(xN) = xL + xU[1,2] = x + x^3[1,2] = [x+x^3, x+2x^3]$,

for $x \geq o$

See below.

The distance between f(xL) and f(xU) increases as x increases:




$I^2 = I$

[to Adel Al-Odhari]

"I" is a literal indeterminacy (i.e., a letter, not a number),

therefore from $I^2 = I$ we then get indeed that $I(I-1) = 0$, but we cannot conclude that $I = 0$ or $I = 1$,

because "I" is not a number.

We have two types:

1) Literal Neutrosophic Numbers,

of the form a + bI, where "a" and "b" are real or complex numbers, and "I" (indeterminacy) is a letter with $I^2 = I$,

for example 3 + 2I.

2) Numerical Neutrosophic Numbers,

of the form a + bI, where "a" and "b" are real or complex numbers,

and "I" (indeterminacy) is a numerical set (interval, hesitant discrete set, etc.),

and $I^2$ is in general different from I,

for example 3 + 2I, where I = [0.5, 0.9],

or 3 + 2I = [3 + 2·(0.5), 3 + 2·(0.9)] = [4, 4.8].

# SUPERHYPERALGEBRA, SUPERHYPERGRAPH, SUPERHYPEROPERATION, SUPERHYPERTOPOLOGY

## SuperHyperGraph*

[Florentin Smarandache to Henry Garrett]

I have introduced the SuperHyperGraph at the beginning of last year:

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

which is also in the Digital Repository of the University of New Mexico, but you refuse to acknowledge it in your text.

Your page 7, Definition 1.5.5 is not accurate, because you do NOT catch the "Super" form of the graph, since Super = P(P(...P(V)...)), which is powerset of powerset of... poserset of V (n times), $n \geq 2$.

Read this paper on SuperHyperAlgebra:

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

published just in your country.

SuperHyperAlgebra is an algebra constructed on the powerset of powerset ....

as in our world where a system is formed by sub-systems, which are form in their turn by sub-sub-systems, etc.

See some elementary example, for $P^2(V)$ which is equal to P(P(V)), powerset of the powerset of V (only two times) into the above paper.

Your notions do not reflect the "Super" prefix.

[*His real name is Mohammad Esmaeil Nikfar.]

## SuperHyperAlgebra is an algebra constructed on the *n*-th powerset of a set

[Florentin Smarandache to Akbar Rezaei]

The SuperHyperAlgebra is an algebra constructed on the n-th powerset of a set S.

I mean:

P(S) is the powerset of S,

then P(P(S)) is the powerset of the powerset of S,

and so on.

This is as in our world, where

a system (set, organization, country, etc.) is formed by sub-systems,

and each sub-system is formed by sub-sub-systems, etc.

For example,

a country is formed by many states,

then each state is formed by many districts,

then each district is formed by many cities,

etc.

## (*n, m*)-hyperoperation vs. (*n, m*)-SuperHyperOperation

We prove that the (n, m)-hyperoperation is different from the (n, m)-SuperHyperOperation.

The (n, m)-hyperoperation was defined by [1,2] in the following way:

Definition of (n, m)-hyperoperation

Let $H$ be a nonempty set, and $n$, $m$ be two positive integers, $n \geq m$.

*P(H)* is the set of all nonempty subsets of $H$ (i.e. the powerset of $H$, without the empty-set),

$H^n = H \times H \times ... \times H$ ($n$ times) is the *n-th Cartesian product* of $H$,

and similarly $(P_*(H))^n = P_*(H) \times P_*(H) \times ... \times P_*(H)$ ($n$ times) is the *n-th Cartesian product* of $P_*(H)$.

Then the mapping *[ ]* defined as follows:

$$[\,]: H^n \to (P_*(H))^m$$

is called an (n, m)-hyperoperation on H, if it is not necessary to emphasize the integers n and m, then we will say that [ ] is a vector valued hyperoperation instead of (n, m)-hyperoperation.

Definition of the $n^{th}$-Powerset of a Set

The $n^{th}$-Powerset of a Set was introduced in [2, 3, 4] in the following way:

$P^n(H)$, as the $n^{th}$-Powerset of the Set $H$, for integer $n \geq 1$, is recursively defined as:

$P^2(H) = P\big(P(H)\big)$, $P^3(H) = P\big(P^2(H)\big) = P\Big(P\big(P(H)\big)\Big)$, ... ,

$P^n(H) = P\big(P^{n-1}(H)\big)$, where $P^\circ(H) \stackrel{\text{def}}{=} H$, and $P^1(H) \stackrel{\text{def}}{=} P(H)$.

The $n^{th}$-Powerset of a Set better reflects our complex reality, since a set $H$ (that may represent a group, a society, a country, a continent, etc.) of elements (such as: people, objects, and in general any items) is organized onto subsets $P(H)$, and these subsets are again organized onto subsets of subsets $P(P(H))$, and so on. That's our world.

Definition of SuperHyperOperations

We recall our 2016 concepts of SuperHyperOperation, SuperHyperAxiom, SuperHyperAlgebra, and their corresponding Neutrosophic SuperHyperOperation Neutrosophic SuperHyperAxiom and Neutrosophic SuperHyperAlgebra [2].

Let $P_*^n(H)$ be the $n^{th}$-powerset of the set $H$ such that none of $P_*(H)$, $P_*^2(H)$, ..., $P_*^n(H)$ contain the empty set $\phi$.

Also, let $P^n(H)$ be the $n^{th}$-powerset of the set $H$ such that at least one of the $P^2(H)$, ..., $P^n(H)$ contain the empty set $\phi$.

The SuperHyperOperations are operations whose codomain is either $P_*^n(H)$ and in this case one has **classical-type SuperHyperOperations**, or $P^n(H)$ and in this case one has **Neutrosophic SuperHyperOperations**, for integer $n \geq 2$.

Classical-type m-ary SuperHyperOperation {or more accurate denomination *(m, n)*-SuperHyperOperation}

Let $U$ be a universe of discourse and a non-empty set $H$, $H \subset U$. Then:

$$\circ^{*}_{(m,n)} : H^m \to P^n_*(H)$$

where the integers $m, n \geq 1$,

$$H^m = \underbrace{H \times H \times ... \times H}_{m\ times},$$

and $P^n_*(H)$ is the $n^{\text{th}}$-powerset of the set $H$ that includes the empty-set.

This SuperHyperOperation is a $m$-ary operation defined from the set $H$ to the $n^{\text{th}}$-powerset of the set $H$.

Neutrosophic m-ary SuperHyperOperation {or more accurate denomination Neutrosophic *(m, n)*-SuperHyperOperation}

Let $U$ be a universe of discourse and a non-empty set $H$, $H \subset U$.

$$\circ_{(m,n)} : H^m \to P^n(H)$$

where the integers $m, n \geq 1$,

and $P^n(H)$ is the n-th powerset of the set $H$ that includes the empty-set.

The Cartesian Product

The Cartesian product

$$(P_*(H))^n = P_*(H) \times P_*(H) \times ... \times P_*(H) \ \{n \text{ times}\},$$

is totally different from my n-th powerset of the set H, denoted by $P^n_*(H)$ which means:

the n-th powerset of the set H, or the powerset of the powerset of ... the powerset of H ($n$ times).

I do NOT use a Cartesian product herein.

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

The n-th-Powerset of a Set better reflects our complex reality, since a set H (that may represent a group, a society, a country, a continent, etc.) of elements (such as: people, objects, and in general any items) is organized onto subsets P(H), and these subsets are again organized onto subsets of subsets P(P(H)), and so on. That's our world.

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## SuperHyperGraph

[to Marcin Jodłowiec, Marek Krótkiewicz, Piotr Zabawa]

Please see a more recent paper (2022):

"Introduction to the n-SuperHyperGraph - the most general form of graph today", http://fs.unm.edu/NSS/n-SuperHyperGraph.pdf.

The idea was to consider the n-th power set of a set, in order to better describe our reality, where a system is formed by sub-systems, which in their terms are formed by sub-sub-systems etc. for the set of vertices and respectively the set of edges.

## SuperHyperTopology

[to Parimala Manie, Saeid Jafari, Karthika Muthusamy, Harish Garg]

A new concept called SuperHyperTopology is based on powerset of powerset... as in real life, where a system is formed by sub-systems, which is turn are formed by sub-sub-systems, etc. See:

*SuperHyperAlgebra and Neutrosophic SuperHyperAlgebra*
http://fs.unm.edu/SuperHyperAlgebra.pdf;
*SuperHyperTopology*
http://fs.unm.edu/NSS/SuperHyperFunction37.pdf.

## Neutrosophic SuperHyperTopology

[Florentin Smarandache to Huda E. Khalid, Gonca D. Güngör, Muslim A. Noah Zainal]

In my previous papers it is "Neutrosophic SuperHyperTopology" so if you use "SuperHyperNeutrosophic Topology", it makes confusion, people may believe that they are different objects. You must keep the same denomination. Why this denomination?

Because you may simply have "SuperHyperTopology" (which is not neutrosophic), or "Neutrosophic SuperHyperTopology" (which of course is Neutrosophic).

Example

Your "SuperHyperNeutrosophic Bi-Topological..." should be "Neutrosophic SuperHyperBi-Topological...", and, similarly, other related concepts.

## NeutroHyperStructures and AntiHyperStructures in Biology and Chemistry

[to Fakhry Asad Agusfrianto, Madeleine Al-Tahan, Mariam Hariri, Yudi Mahatma]

It is a good idea to use the NeutroHyperStructiures in biology and chemistry, such as: on the inheritance of traits from blood groups, and the coat color of Shorthorn Cattle inheritance in your merits paper "Examples of NeutroHyperstructures on Biological Inheritance".

Mathematically we have the following cases:

1) We have an AntiHyperStructure if at least one operation or one axiom is totally (100%) false,

— no matter how other operations and axioms are.

2) We have a NeutroHyperStructure if at least one operation or one axiom is partially false or partially indeterminate,

— and no other operation or axiom is totally (100%) false [since the last case represents the AntiHyperStructure].

3) We have a Classical HyperStructure if all operations and axioms are totally (100%) true.

If we get some axioms which were partially true and partially false as for the NeutroHyperStructure, we also needs to prove that no other operation or axiom is totally false (I mean to make sure that it is not an AntiHyperStructure).

## Empty (Null) Vertex

[Florentin Smarandache to Masoud Ghods]

For the "empty vertex" you say it does not exist.

But, if an existing graph vertex, after a while, has vanished/died/was-destroyed, then it may be interpreted as "empty (or null) vertex" (the vertex has no occupant).

Or an active vivant vertex that later becomes extinct.

For the SuperHyperGraph, when I listed all types of vertices and edges, I did not say that the SuperHyperGraph MUST contain all of them, it depends on each application.

Some applications may not need, for example, super-vertices, or no indeterminate edge, or no empty-vertex, etc. but being built on a graph with vertices or edges of the form as powerset of a powerset etc. it is still a SuperHyperGraph.

I tried to define all possible types of vertices and edges.

You said that you removed the null-vertices, no problem, but the graph was still a SuperHyperGraph.

# Global Degree and Individual Degree for the HyperSoft Set

[Florentin Smarandache]

## HyperSoft Set

Smarandache has extended in 2018 the Soft Set to the HyperSoft Set [3, 4] by transforming the function *F* from a uni-attribute function into a multi-attribute function.

### Definition of HyperSoft Set

Let $\mathcal{U}$ be a universe of discourse, *H* a non-empty set included in *U*, and *P*(*H*) the powerset of $H$. Let $a_1, a_2, \dots a_n$, where $n \geq 1$, be $n$ distinct attributes, whose corresponding attribute values are respectively the sets $A_1, A_2, \dots, A_n$, with $A_i \cap A_j = \emptyset$ for $i \neq j$, and $i, j \in \{1, 2, \dots, n\}$. Then the pair $(F, A_1 \times A_2 \times \dots \times A_n)$, where $A_1 \times A_2 \times \dots \times A_n$ represents a Cartesian product, with

$F: A_1 \times A_2 \times \dots \times A_n \to P(H)$

is called a HyperSoft Set.

For example, let

$$(e_1, e_2, \dots, e_n) \in A_1 \times A_2 \times \dots \times A_n$$

then

$$F(e_1, e_2, \dots, e_n) = G \in P(H).$$

### Classification of HyperSoft Sets

With respect to the types of sets, such as: classical, fuzzy, intuitionistic fuzzy, neutrosophic, plithogenic, and all other fuzzy-extension sets, one respectively has: Crisp HyperSoft Set, Fuzzy HyperSoft Set, Intuitionistic Fuzzy HyperSoft Set, Neutrosophic HyperSoft Set, Plithogenic HyperSoft Set, and all other fuzzy-extension HyperSoft Sets [3, 5 - 9].

Applications of HyperSoft Set and its corresponding
Fuzzy / Intuitionistic Fuzzy / Neutrosophic HyperSoft Set

Let $H = \{h_1, h_2, h_3, h_4\}$ be a set of four houses, and two attributes:

*s = size*, whose attribute values are *S = {small, medium, big}*,

and l = location, whose attribute values are L = {central, peripherical}.

Then $F : S \times L \to P(H)$ is a HyperSoft Set.

*i)* For example, F(small, peripherical) = {$h_2$, $h_3$}, which means that the houses that are small and peripherical are $h_2$ and $h_3$.

*ii)* A Global-Fuzzy HyperSoft Set [what has been used from the foundation of HyperSoft Set in 2018] may assign some global-fuzzy degrees, for example:

*F(small, peripherical) = {$h_2$(0.7), $h_3$(0.2)},* which means that with respect to the attributes' values *small and peripherical* all together, $h_2$ meets the requirements of being both small and peripherical in a global-fuzzy degree of *70%*, while $h_3$ in a global-fuzzy degree of *20%*.

*i)* An Individual-Fuzzy HyperSoft Set may also assign some individual-fuzzy degrees, for example:

*F(small, peripherical) = {$h_2$( small(0.5), peripherical(0.8) ), $h_3$( small(0.3), peripherical(0.2) )},* which means that with respect to the attribute value *small* $h_2$ meets the requirement in an individual- fuzzy degree of *50%* and for the attribute value *peripherical* in an individual-fuzzy degree of *80%*. And similarly, for $h_3$.

*ii)* Further on, a Global-Intuitionoistic Fuzzy HyperSoft Set may assign some global-intuitionitsic fuzzy degrees, for example:

*F(small, peripherical) = {$h_2$(0.7, 0.1), $h_3$(0.2, 0.6)},* which means that with respect to the attributes' values *small and peripherical* all together, $h_2$ meets the requirements of being both small and peripherical in a global-intuitionistic fuzzy degree of *70%,* and does not meet it in a global-intuitionistic fuzzy degree of *10%*; and similarly for $h_3$.

*i)* An Individual-Intuitionistic Fuzzy HyperSoft Set may also assign some individual-intuitionistic fuzzy degrees, for example:

F(small, peripherical) = {$h_2$( small(0.4, 0.3), peripherical(0.7, 0.2) ), $h_3$( small(0.3, 0.1), peripherical(0.2, 0.2) }, which means that with respect to the attributes' value small $h_2$ meets the requirement in an individual-intuitionistic fuzzy degree of 40% and does not meet it in an individual-intuitioniostic fuzzy degree of 30%, and for the attribute value peripherical in an individual-intuitionistic fuzzy degree of 70% and does not meet it in an individual-intuitionistic fuzzy degree of 20%. And similarly, for $h_3$.

*i)* Further on, a Global-Neutrosophic HyperSoft Set may assign some global-neutrosophic degrees, for example:

*F(small, peripherical) = {$h_2$(0.7, 0.5, 0.1), $h_3$(0.2, 0.3, 0.6)},* which means that with respect to the attributes' values *small and peripherical* all together, $h_2$ meets the requirements of being both small and peripherical in a global-neutrosophic degree of *70%,* the indeterminate-requirement in a global-neutrosophic degree of *50%,* and does not meet the requirement in a global-neutrosophic degree of *10%*. And similarly, for $h_3$.

*ii)* An Individual-Neutrosophic HyperSoft Set may also assign some individual-neutrosophic degrees, for example:

F(small, peripherical) = {$h_2$( small(0.5, 0.4, 0.6), peripherical(0.8, 0.0, 0.1) ), $h_3$( small(0.3, 0.4, 0.2), peripherical(0.2, 0.3, 0.7) )}, which means that with respect to the attribute value small $h_2$ meets the requirement in an individual-neutrosophic degree of 50%, and the indeterminate-individual degree is 40%, and it does not meet it in an individual-neutrosophic degree of 60%; in the same way with respect to $h_2$'s attribute value peripherical.

And similarly, for $h_3$.

*i)* In the same fashion for other fuzzy-extension HyperSoft Sets.

Remark

An Individual-neutrosophic HyperSoft Set is actually equivalent to a multi Neutrosophic HyperSoft Set, where 'multi' is equal to the number of attributes.

# LOGIC, PROBABILITY, STATISTICS

## Four Values Logic

[Prem Kumar Singh]

> The Four-valued logic exists in digital circuits also as 1, 0, Z and X. The 1 and 0 represents *true* and *false*, Z stands for *high impedance*, whereas X represents *do not care* conditions. It is also used for data transmission in controller area network as: *False, True, Error Condition,* and *Not installed*. The *Error Condition* means there is a technical problem obstructing the data acquisition. The last one is *Not installed*, used for a feature that does not exist. These types of features or data transmission should be disregarded for logical calculation.

## Neutrosophic Logic as a 3D Logic

[Florentin Smarandache to Marco Brigliadori]

I like the idea of 3D logic, a logic with 3 independent poles. I have defined a 3D logic as Neutrosophic Logic, with degrees that are totally independent and opposite to each other: *Truth, Falsehood, Indeterminacy*. This 3D logic has the domain into a cube.

Superposition in here it would be interesting to do.

## Proposition in Classical Logic and Modern Logic

[Florentin Smarandache to Luis Enrique Aponte Pérez]

Let *P* be a logical proposition (or theorem, property, lemma, etc.) in classical logic. If *P* is 100% true in the classical logic, then in a modern logic *P* may be:

— either 100% true,

— or only partially true (0 < true <100%),

— or 0% true.

It depends on the type of modern logic it is referred to, and on the application it is used to.

While the Refined Neutrosophic Logic is an n-D logic (n-dimensional logic, based on n poles, where $n \geq 2$).

## Refined Neutrosophic Probability

[Florentin Smarandache to Huda E. Khalid]

Just go ahead and extend the *Pentapartitioned Neutrosophic Probability Distributions* to *Refined Neutrosophic Probability Distributions*, where you have *n* sub-probabilities,

See http://fs.unm.edu/RefinedNeutrosophicSet.pdf.

*Reference:*

Suman Das, Bimal Shil, Rakhal Das, Huda E. Khalid, and A. A. Salama, "Pentapartitioned Neutrosophic Probability Distributions", *Neutrosophic Sets and Systems*, Vol. 49, 32-47, 2022.

## Diversity of Neutrosophic Operators

[Amr Mohammed]

> I am very interested in the concept of the neutrosophic set.
>
> But I have some questions, and I hope you can help me obtain the answer.
>
> The scientists described the relationship of inclusion of neutrosophic sets from several different angles.
>
> Does the diversity of this description have a philosophical meaning, or does it enrich the research process in the study of algebraic structures? Is this difference equivalent?

[Florentin Smarandache]

The neutrosophic (and similarly fuzzy, intuitionistic fuzzy, etc.) set/logic operators are approximations, not exact results as in classical fuzzy set/logic — because they work with partial (not total) truths/memberships.

So, it depends on each application and on the expert to choose what operator gives a more accurate result than another operator.

## The Score, Accuracy, and Certainty Functions for the Spherical Neutrosophic Set

Let N be a set of single-valued neutrosophic triplets of the form (*T, I, F*), where $T, I, F \in [0, \sqrt{3}]$.

The Score Function:

$$S : N \to [0, \sqrt{3}],$$

$$S(T, I, F) = \frac{T + (\sqrt{3} - I) + (\sqrt{3} - F)}{3}.$$

The Accuracy Function

$$A : N \to [-\sqrt{3}, \sqrt{3}]$$
$$A(T, I, F) = T - F$$

The CertaintyFunction

$$C : N \to [0, \sqrt{3}]$$
$$C(T, I, F) = T$$

## Neutrosophic Statistics vs. Interval Statistics

Woodall et al. confused the *literal* neutrosophic numbers with *numerical* neutrosophic numbers, and their interval approach INCREASES THE INDETERMINACY, instead of reducing it as neutrosophic statistics does.

## NonStandard Analysis

NonStandard Analysis (NSA) uses infinitesimals and infinities.

If ε is an infinitesimal, then 1/ε is an infinity.

A positive infinitesimal, let's call it ε, is a number strictly greater than zero, but infinitely closer to zero.

Such a number does not exist in our real world.

Also, the real number r added to an infinitesimal ε, r + ε, is called hyperreal.

I have tried to use NonStandard Analysis in the Neutrosophic Logic, in order to make a distinction between

→ the relative truth (truth in some worlds, but not in all worlds - according to Leibniz), that I assigned it the value 1,

→ and absolute truth (truth in all possible worlds - again according to Leibniz), that I assigned the value $(1^+)$,
which is a right monad.

This was for a philosophical point of view.

Afterwards, I approximated the monad $(1^+)$, which is a set of hyperreals strictly greater than 1, by 1 + ε, in order to come back to the Earth (real space R) from the imaginary hyperspace R*, which is the set of hyperreals (= an extension of the real space R).

For example, if one says that a proposition P has the degree of truth $(0.7^+)$ in NSA.

That means that the degree of truth of proposition P is strictly greater than 0.7 but infinitely closer to 0.7.

In terms of desired accuracy, we choose ε, and we approximate $(0.7^+)$ that is unclear in the real world, by a tiny interval (0.7, 0.7+ε). Assume the desired accuracy is $10^{(-5)}$, then one takes ε = 0.00001, whence the degree of truth of proposition P is in the tiny interval (0.7, 0.70001).

## Area under Neutrosophic Probability Distribution

[M. Aslam]

> The area under neutrosophic probability distribution can be 1, or larger than 1, or less than 1. In classical statistics it is 1. How will we justify our neutrosophic distribution?

[Florentin Smarandache]

The area under neutrosophic probability distribution curves can be between [0, 3], as in neutrosophic set and logic.

Because one has three curves:

T(E) = chance that the event E will occur;

I(E) = indeterminate-chance of the event E;

and

F(E) = chance that the event E does not occur.

T(E) is like a classical probability distribution function, so T(E) may have the area 1.

Similarly I(E) and F(E) they are independent classical probability distributions, so each one may have the area 1.

Since we deal with a MultiVariate Truth-Value (truth upon many independent random variables) as in our real-life world:

http://fs.unm.edu/NSS/PracticalIndependentNeutrosophic36.pdf

A real-world example

The following event E takes place:

E = {There is a street protest in Minneapolis}.

a. From the point of view of the Human Rights Activists the protest is positive, because people have the right to express their view, and consequently the CNN television station (reflecting the left politics) joys it. Let's say T(positiveness) = 0.8.

b. But, from the point view of the Police, the protest is negative, since the protesters are violent and destroy and burn houses and injure people; then the Fox News television station (reflecting the right politics) presents the negative side of the protest: violence, destruction, arson, chaos. Let's say F(negativeness) = 0.9.

c. Let's consider an unbiased (neutral) Media that reports on the event. This is the neutral source, it evaluates the event in general as, e.g., I(indeterminacy = positiveness mixed with negativeness) = 0.4.

As seen, $T + I + F > 1$, and the three neutrosophic components T, I, and F are totally independently assessed, since the Human Right Activists, the Police, and Media are three different and independent entities.

Try to find a sample of pieces to be fabricated within one month.

Several of the pieces may get fabricated with some defects, so at the end of the month we do not get the expected number of pieces, but an approximation. Therefore the sample size is not clear.

As in fuzzy, intuitionistic fuzzy and other fuzz-extensions sets, the neutrosophic operators of negation, intersection, union etc. are not unique.

All these operators are approximations of the aggregations, they do not give exact results as in classical Boolean Algebra.

*NeutroPhysics* is this: in the same physical space, at least one physical law behaves differently with respect to some elements than with others. Or, the physical law does not apply in the same degree to all space elements.

I had objections about the classical algebraic structures that they are too perfect, too uniform, where all operations and axioms behave the same for all elements - which is different from our world where the laws apply in various degrees to the people. That's why I developed the NeutroAlgebra & AntiAlgebra, where the operations and axioms are not 100% true, but only partially true (as in our life). Sometimes, even totally false!

Any system grows and grows until the system riches a point of terminus, or saturation of itself...

Where from it starts to decay...

If the law does not apply equally to all citizens, then the country is not a democracy. It is also true that some countries have a higher degree of democracy than other countries. But it is a utopia to have the law apply to the same degree to all citizens, therefore a pure democracy does not exist.

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