Strategy on T, I, F Operators.
A Kernel Infrastructure in Neutrosophic Logic

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Abstract: The paper presents an initial explorations on T, I, F operations based on genetic concept hierarchy and genetic referential hierarchy, as a novel proposal to the indeterminacy issue in neutrosophic logic, in contrast to the T, I, F values inherited from conventional logics in which those values would fail to demonstrate the genetic aspect of a concept and accordingly loose the connection between generality and practicality. Based on the novel definition of logic and on the relativity of T, F concept, it illustrates that T, F are hierarchical operations which inter-consist and inter-complement each other, that "I" relates to a learning behavior profiled by an inspiration from I-ching, and that the neutralization operation, as the means to solve contradictions, will eventually come to the unification of opposites, leading to the fundamental issues in Buddhism and such alike. It also implies that Buddhism and Daoism are not religions.

1. The self-contradictory of conventional mathematics

Conventional mathematics has its fatal defects in itself:
- The logic it exploits is nothing more than a misleading concept.

  In (Liu, Smarandache [2]) we have launched a strong argument in the misleading definition of logic. Even the simplest logic as "The earth turns around the sun" and "I'll visit him if it doesn't rain and he is in" can lead to ambiguous or contradictory actions of agent (Liu [1]), as shown in:
  1) Fact: a belief rather than truth
  2) Logic: dependent of situations, not absolute
  3) Logic is negating itself
  4) Logic is only one perspective of learning, not an independent entity
  5) As a part of learning, logic is dynamic
  6) As a part of learning, logic is multilateral
  7) Logic is always partial
  8) Illusion and creativity

  Logic should be, in our opinion, *a tradeoff operation* in order to adapt to its environment. Then a specific model becomes such a tradeoff between ideal philosophic description and practical application description, in the hierarchy from philosophic layer down
- The conception in mathematics should be more a unifying operation of tradeoff than rigid definitions or axioms.

  The common silliness in mathematics is that: the more specific, the more contradictory.

  In (Liu [2]) Liu Feng stands that conceptual name actually acts as a tradeoff to unify the diversity of concepts—it comes as the outcome of contradiction:
  - Everything can be named, but never absolutely proper. It is a name, but never a perfect name
  - Name is always subjective, relative to the perception and perspective of observer
  - Name itself implies anti-name. Whenever there is a name, it can never be a perfect name.
  - We are cheated by or trapped in those created by ourselves. First, there is only relative name, no absolute name. Second, name actually acts as a tradeoff to unify the diversity of concepts—whenever there is name, there is contradiction as well.
- Mathematics tries to reach the most complete specifications, but where on earth are they (Liu, Smarandache [1])?
  - There is no absolute completeness in the world; if there is, it is nothing more than

our subjective beliefs, or we were gods.
- There remains an infinite integration procedure of dynamic accumulation of both consistent and inconsistent knowledge, during which the more incomplete knowledge is modified, revised, and adapted as further proposals, which tends to be verified and improved into less incomplete one.
- Accordingly, **if there is complete mathematics, it would be not mathematics at all** (at least not in the conventional sense).

True, conventional mathematics is really negating itself. Let's then try mathematics without mathematics, just as Florentin Smarandache did in his avant-garde movement in literature (Smarandache):

- Let's do literature... without doing literature! Let's write... without actually writing anything.

How? Try mathematics without completeness! Try logic, set, and probability without determinacy, in contradictory dual perspective. Try concept in contradictory definition. This open methodology, I believe, should be the original intention of neutrosophy as a new branch of scientific philosophy.

2. The indeterminacy of nature and the role of neutrosophy

Even a definite logic like "I'll visit him if it doesn't rain and he is in" can lead to ambiguous actions (Liu [1]):

- I have confirmed that it hasn't rain whole day and he really keeps indoor, but when I become confident of it, it is too late to go
  —Pure logic implies indeterminacy itself.
- The truth value of not-raining / raining is (0.3, 0.7), so I decide not to. But just as I start something else, the clouds promises impending shine, so I change my mind.
  —Human behaves in partial way, e.g., in mood.
- Wait until the truth value becomes (1,0), but it never happens.
  —Human cannot behaves in extremity of logic.
- I decided to wait until the truth value of not-raining, raining reaches (0.8, 0.2) and that of he-is-in, he-is-not-in reaches (0.8,0.2), but how can I react to the case when I ring his door, he is out punctually at the moment or he is in the toilet?
  —Human needn't obey the logic he made.

Now let's take a more definite logic: "The succession of spring, summer, autumn and winter on the earth is the absolute truth." Could anyone prove it? No, not even if we exist or not (Gershenson).

- We have just mentioned that fact is merely a belief—it is believed absolute because hard have people doubt the validity; People have long been holding this belief which is also indeterminate.
- Statistics itself exhibits indeterminacy—it only reveals possibility, not determinacy.

Daodejing shows that everything in the world is indeterminate by nature (Liu [2]).

"Dao, daoable, but not the normal dao; name, namable, but not the normal name." We can say it is dao when referring to the natural law, but it doesn't mean what we say. Whenever we mention it, it is beyond the original sense. We can call something by name, but it doesn't mean what we call. Whenever we call it, it is beyond the original sense too.

Buddhism illustrates that all the appearances in the universe are made up of uncertainty (voidness) (The Diamond Sutra):

- The physical appearances mentioned…are not physical appearances. All appearances are empty and false. If one sees all appearances as no appearances, then one sees the Thus Come One (the truth as the unity of appearance and essence, author's note).
- The view of self, view of others, view of living beings and view of a life *is not* the view of self, view of others, view of living beings and view of a life. Therefore *they are called* the view (appearance of, author's note) of self, view of others, view of living beings and the view of a life.
- As to speaking Dharma (the truth, law of nature, author's note), no Dharma can be spoken. Therefore it is called 'speaking Dharma'."
- All conditioned (intentioned, author's note) dharmas (the truth, laws of nature) are like a dream, an illusion, a bubble or a shadow, like dew or like a lightning flash. Contemplate them thus.
- A Bodhisattva (a being "gifted" with genuine wisdom, author's note)…should neither

rely on forms, nor sounds, smells, tastes, tangible objects or dharmas…he should not rely on appearances.

As the conclusion, a particular appearance is conditional, or constraint with situations. When we mention the universal appearance, we refer to the essence in infinite layers of depth, it is indeterminate in nature—independent of situations. Or: **determinacy is conditioned while indeterminacy is universal**.

The role of neutrosophy has thus been designated as the bridge between differential appearances and the integral character of individual.

- Law of Equilibrium (Smarandache):

    The more <A> increases, the more <Anti-A> decreases. One has the following relationship:

    <A> · <Anti-A> = k · <Neut-A>,

    where k is a constant depending on <A>, and <Neut-A> is a supporting point for balancing the two extremes.

    If the supporting point is the neutralities' centroid, then the above formula is simplified to:

    <A> · <Anti-A> = k,

    where k is a constant depending on <A>.

    Interesting particular cases:

    Industrialization × Spiritualization = constant.

    Science × Religion = constant.

    White × Black = constant.

    Plus × Minus = constant.

    Everything × Nothing = universal constant, or $\infty \times 0$ (= $0 \times \infty$) = universal constant.

    We are directing towards a mathematization of philosophy, but not in a platonian sense.

3. Mathematics based on T, I, F operators

3.1 Indeterminacy of referential system

The genetic principle of a referential system:

Concept is created only through relativity.

- It is not until "it is" is extracted from "it is not" when concept is born:

    When beauty is abstracted (Merel)

   Then ugliness has been implied;

    When good is abstracted

    Then evil has been implied.

    Therefore "it is" and "it is not" inter-depend on each other (T and F inter-depend on each other).

- Accordingly (back to author), an infant builds up his primitive concept through primitive division, e.g., between light and dark, based on which (as the basic distinction) further distinctions can be made as sub-concepts.

- Accordingly, a family tree of concept comes as a cumulative (recursive) effect of distinctions, as illustrated in I-ching as how the trigrams are generated from a primitive abstraction of yin-yang (as 1, 0):

    When yin-yang is abstracted as the first pair of referential objects 1,0, we can begin abstracting those referred to 1 leading to 11, 10, same to 0: 01, 00, to get four referential objects 00 01 10 11, keeping on to have eight 000 001 010 011 100 101 110 111, … this is the way our concept family is built up.

    Concept family comes as a hierarchical structure in the above genetic step, where the nodes closer to the root denote more general classes, and a subtree rooted from a child can be
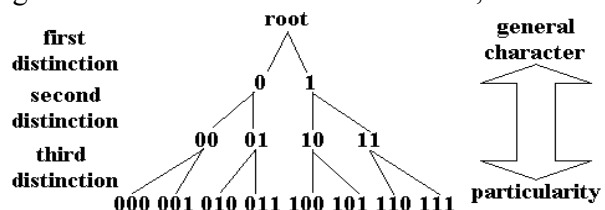
regarded as sub-concept.

- The hierarchy of attributes of concept should be generated in the same manner: first the distinction of general (or universal) attributes, then the particular ones.
- So is a referential system, more general descriptions of the referential system is closer to the root, and a subsystem is represented by a subtree.

Now that we have generalized the genetic behaviors of concept and referential system based on the basic Daoist principle in I-ching (also Book of Changes), we should note the indeterminacy of concept and the indeterminacy of referential system lying in the following issues:

- The way of split-up of yin-yang (the way of the distinction) is optional or arbitrary, one needn't obey the same way of distinguishing things as another, dependent on time-space factors, individuality, temporal mood, hidden factors, etc.
- Accordingly there can be infinite number of genetic trees to the same root.
- A tree can be attached to an arbitrary parent in an arbitrary manner as a sub-concept, sub-attribute or sub-referential-system.

As the consequence, there is no determinate referential system at all. In other words, concept and referential system are merely relative. This is the bottleneck.

3.2 The need for T, I, F operations

To avoid being trapped in these relative values (persisting in the relativity), we had better regard them as T, I, F operators to explore the relativity to different time-space domains, to different referential systems, and to hidden parameters.

- Conventional values of T, I, F (true, indeterminate, false) represented in percentages depend heavily on the indeterminacy of referential systems. They never seem perfect values in that they are incomplete or relative, so they mean more operators than figures.

  If T, I, F values can be carried out unconditionally, there is no need to explore indeterminacy. In fact, situation changes from one, supporting T operation, to another, supporting F. Since we cannot predict these situations, the availability of T, I, F values remains doubt.

  Logic in essence is a tradeoff of desired and undesired (Liu, Smarandache [2]), there are no T, I, F values independent of environment. So T, I, F refer more to the tradeoff operation relative to referential systems, etc.

- Based on taiji figure, T and F operations work in pairs, they complement and inhibit each other (Liu, Smarandache [2]), inter-consist each other and transform into each other. This effect is improper to be represented by T, I, F values especially in percentages.

  If a single T or F operation succeeds then it becomes a conventional problem, but strictly conditional.

  In fact there are no absolute T, F operations (or values), a T operation (or value) can be F relative to another referential system (Smarandache). T implies F and vice versa, they inter-consist each other.
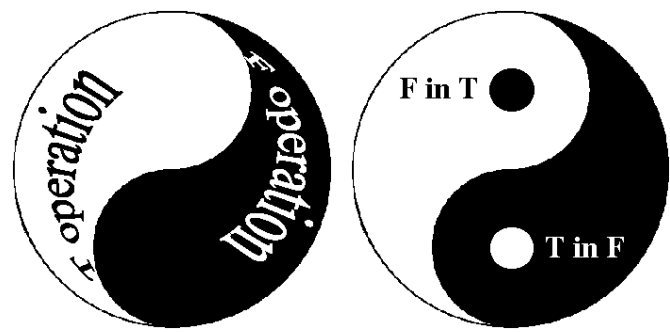
 Finally T F operations (also to values) are
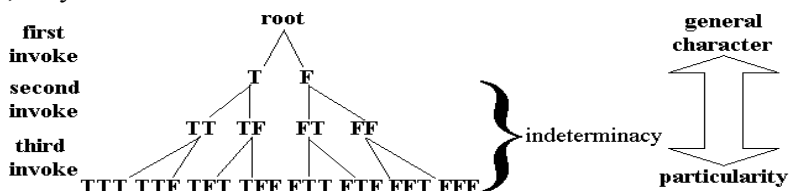
neutralized. Note that we are not talking to the trueness or falseness in percentages, but the tradeoff operation in recursive manner—T means feasibility, not truth.

- Indeterminate operation refers more to a learning procedure as has been profiled in (Liu, Smarandache [1]):

    The further insight on contradiction compatible learning philosophy inspired from the Later Trigrams of King Wen of I-ching shows that:

    When something (controversial) is perceived (in Zhen), it is referred (in Xun) to various knowledge models and, by assembling the fragments perceived from these models, we reach a general pattern to which fragments attach (in Li), as hypothesis, which needs to be nurtured and to grow up (Kun) in a particular environment. When the hypothesis is mature enough, it needs to be represented (in Dui) in diverse situations, and to expand and contradict with older knowledge (in Qian) to make update, renovation, reformation or even revolution in knowledge base, and in this way the new thought is verified, modified and substantialized. When the novel thought takes the principal role (dominant position) in the conflict, we should have a rest (in Kan) to avoid being trapped into depth (it would be too partial of us to persist in any kind of logic, to adapt to the outer changes). Finally the end of cycle (in Gen).
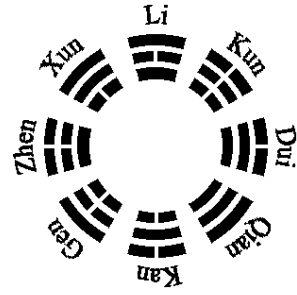
    This philosophy shows that contradiction acts as the momentum or impetus to learning evolution. No controversy, no innovation. This is the essentially of neutrosophy (Smarandache).

- T operation may activate a routing in neural network and F inactivate or inhibit it. So neutrosophy should be applicable to neural network as it intended.

4. On the limit of neutralization

When we speak of the most general character of concept, the most general referential system or the most general logic, we are actually talking about the neutralization operation in endless depth, and we will eventually come to the point: is it yin or yang (is it a concept or not, is it T or F)? In fact, it is neither yin nor yang but the unification of yin-yang.

- When we take it as yin (or yang), we unintentionally raise a contradiction (Liu, Smarandache [1]) in this split-up of yin-yang, since "it is" or "it is not" is strictly relative.
- More we uphold the relative opinion, more contradiction underlying. Therefore we can only solve it in the opposite way: neutralization.
- The infinite neutralization process will eventually reach the reunification of yin-yang as if there will not seem any evidence of yin or yang (there doesn't seem any evidence of the distinction between "it is" and "it is not")
- Then we will have reached a unification of intentionality and unintentionality—this is the basis for the universal conception.
- Is it possible to everyone? Sure, as long as we stop upholding everything even this doctrine (as if there is no distinction between stop and nonstop).
- In fact, everything is void in nature in the unification perspective, as are illustrated in endless depth in Buddhism. In this referential system most things we normally do worth nothing, what seem worthy to do can seem nothing in our common referential system. We should point out that the "doing nothing" in Daodejing seems rather a distorted translation from Chinese term wuwei.
- This is the starting point of the supreme wisdom with which we can understand ourselves and understand the universe.

5. Concluding remarks

There is no absolutely mathematics in reality, nor to neutrosophic logic discussed here, which is

proposed in a "abnormal" style—indeterminate style.

Determinate mathematics is only applicable in well defined closed (not open to indeterminacy) models which are assumed determinate in a tiny fraction of their domains: time, space, etc., analogous to the differential aspects in calculus (we can assume its determinacy in the smallest fraction of the domain).

If there is a universal mathematics trying to provide the universal resolution, it must be void in form, otherwise it must have stood on a default (particular) referential system. It may be analogous to the integral of opposite parts.

As the neutralization of the opposites, neutrosophy opens a new space of indeterminate mathematics.

What we call sciences are strictly conditional and relative to our common referential system—they can be pseudosciences in other referential systems. What we call religions can be sciences. Buddhism and Daoism may not be religions based on the most perfectly unified field perspective to which our present sciences limit. Through years of practice of Buddhism, it exhibits the supreme relativity in the most unified referential system. It is the limitless wisdom.

References:

Buddhist Text Translation Society: The Vajra Prajna Paramita Sutra (The Diamond Sutra), 1998, http://www.drba.org/vajra_sutra.htm

C. Gershenson: To be or not to be, A multidimensional logic approach, http://jlagunez.iquimica.unam.mx/~carlos/mdl/be.html

F. Liu [1]: Dynamic Modeling of Multidimensional Logic in Multiagent Environment, 2001 International Conferences on Info-tech and Info-net Proceedings, IEEE Press, People's Post & Telecommunications Publishing House China, 2001, pp. 241-245

F. Liu [2]: Name, Denominable and Undenominable — On Neither <A> Nor <Anti-A>, Proceedings of the First International Conference on Neutrosophy, Neutrosophic Logic, Set, and Probability, University of New Mexico, USA, 2002, http://www.gallup.unm.edu/~smarandache/FirstNeutConf.htm

F. Liu, F. Smarandache [1]: Intentionally and Unintentionally: On Both, A and Non-A in Neutrosophy, Proceedings of the First International Conference on Neutrosophy, Neutrosophic Logic, Set, and Probability, University of New Mexico, USA, 2002, http://xxx.lanl.gov/ftp/math/papers/0201/0201009.pdf

F. Liu, F. Smarandache [2]: Logic: a Misleading Concept: A Contradiction Study toward Agent's Logic Ontology, unpublished

P. A. Merel: TaoDeChing - Lao Tze, 1995, http://www.chinapage.com/gnl.html

F. Smarandache: Neutrosophy: A Unifying Field in Logics: Neutrosophic Logic. Neutrosophy, Neutrosophic Set, Neutrosophic Probability (second edition)，American Research Press，1999, 2000 http://www.gallup.unm.edu/~smarandache/eBook-Neutrosophics2.pdf