

The Unity of The Mathematical Science and Ethics in terms of evolutionary scale

Hallo,

I wish to share with you my view of the possible associations among Entropy, Brain skills, Ethics (in terms of evolutionary scale) and mathematical reasoning.

In the interesting article *Generalized Entropy from Mixing: Thermodynamics, Mutual Information and Symmetry Breaking* (<http://lanl.arxiv.org/pdf/0906.2458v1.pdf>) *Dr. Fariel Shafee* expands information forms beyond their fixed states, in order to refine the research of symmetry and symmetry braking.

Maybe her ideas can contribute for better understanding of *Drake Equation*, as seen, for example, in the interesting work of *Prof. Marcelo Gleiser DRAKE EQUATION FOR THE MULTIVERSE: FROM THE STRING LANDSCAPE TO COMPLEX LIFE* (<http://arxiv.org/pdf/1002.1651.pdf>).

He also suggests that complex *AND* intelligent forms may be flourish if a given realm is actually asymmetric (<http://www.dartmouth.edu/~mgleiser/>).

In my opinion, symmetric and asymmetric conditions are complements of a one unified realm, where complex *AND* intelligent forms are the flourishing linkage among asymmetry and symmetry.

In the interesting book *Cosmos & Culture: Cultural Evolution in a Cosmic Context* <http://history.nasa.gov/SP-4802.pdf> we find the following paragraphs:

"But is that enough? Perhaps cultural evolution will, and should, lead us to a kind of "post-intelligent," "post-technological" universe—a universe that isn't predominantly ruled only by the forces of intelligence and technology, but also by the forces of morality and creativity. Should it? Why not? We see evidence for the forces of morality and creativity all around us." (*Mark L. Lupisella*, page 344)

"Lacking a theory of cultural evolution on Earth, we are unable to predict the cultural evolution even of our own species in the near future." (*Steven J. Dick*, page 481).

According to this view, being complex *AND* intelligent form has a better chance to flourish if *Intelligence* is not interpreted and manifested only in terms of *Logical reasoning*.

It is well known that one of the most powerful tools that our civilization uses is The Mathematical Science (which is currently known and used almost only in terms of *Logical reasoning*).

One of the main reasons of the rapid acceleration of this science is the logical reasoning's agreements that stand at its foundations, which are mostly based on verbal_symbolic skills, where *Ethical reasoning* is not a significant factor of the current main stream of the Mathematical Science.

In my opinion, rapid acceleration of *Ethical reasoning* into fragmented-only cultures, religions, nations etc... + technology that is derived from partial brain skills (verbal-symbolic-only skills, which are taken as context-dependent-only frameworks) is a very explosive cocktail that may lead us to self-made destruction.

I think that one of the ways to reduce the chance of self-made destruction of complex AND intelligent forms like us, is to define a cross-cultural (cross-contexts) framework that may be used as a common base ground for both *Ethical reasoning* AND *Logical reasoning*, where verbal_symbolic AND visual_spatial skills are complement aspects of it.

For the past 30 years I am trying to develop such a framework, and this goal is definitely beyond the abilities of a single person.

Anyway, I wish to share with you some of my last results, which deal with possible association among ethical and logical/technological skills.

As already mentioned above, the current agreement among the majority of mathematicians about the nature of the mathematical science, is mostly based on verbal_symbolic view of this science (visual_spatial skills are generally not involved with valid mathematical results (they have to be translated into verbal_symbolic skills, in order to be considered as valid mathematical results)).

As a result of this partial use of brain skills, any mathematical theory is (hopefully) a consistent framework of unproved collection of decelerations (almost only verbal_symbolic brain skills are used). The current attitude of verbal_symbolic-only interpretation unfortunately provides only isolated (context-dependent-only) frameworks, such that using the terms "mathematical branches" is misleading, if there is no comprehensive framework of these context-dependent-only frameworks, which actually demonstrates the linkage among them, such that they can really be considered as "branches of a one tree" or as "organs of a one organism".

By the current paradigm, which is mostly derived from verbal_symbolic brain skills, any given professional mathematician (or group of professional mathematicians) is asked to invent\discover his\their context-dependent framework by avoiding any changes of already agreed context-dependent frameworks.

In my opinion, Context-dependent-only approach actually disagrees with evolutionary approach (which is not free of mutations of notions\notations) of the mathematical science.

In my opinion, an evolutionary approach (which is not free of mutations of

notions\notations) of the mathematical science may be developed if brain skills are actually associated with each other, during the mathematical work.

Here is a quote taken from *Dr. Kajsa Bråting's* interesting article *Visualizations and intuitive reasoning in mathematics* (http://www.math.umt.edu/tmme/vol9no1and2/1_TME_vol9nos1and2_pp1_18.pdf), where she writes (page 16):

"With experience we can learn to interpret the visualization in different ways, depending on what is asked for. The more familiar we become with mathematics the more we may be able to "read into" the visualization."

I think that this statement is significant also for verbal_symbolic interpretations, and in this case one may be able to interpret things beyond *AND* according to what is asked for (global *AND* local views may complement each other into a one comprehensive framework).

I wish to share with you some notions about, for example, objects like sets and members of sets, which are derived from visual_spatial interpretation of symbols.

By not being restricted only to Geometry, Metric-space etc., visual_spatial skills enable to interpret that the outer "{" and "}" symbols of a given set are not taken in terms of members' membership (in terms of "belong to" , "does not belong to" or partial belonging as done by Fuzzy logic).

This post has 4 parts, but first let us use visual_spatial skills in order to minimally express the fundamental notion of Ploychotomy, which is the dichotomy of *NOthing* and *YESthing*, as follows:

The definition (and the minimal needed symbolic expression) of the dichotomy of *NOthing* and *YESthing*:

NOthing (not notated by any symbol) is that is below members' membership.

YESthing (notated by the outer "{" and "}" symbols) is that is above members' membership.

According to these definitions (and the minimal needed symbolic expression), the empty set (notated as $\{\}$) is the minimal expression of *NOthing* and *YESthing*, where:

1) *NOthing* (not notated by any symbol) is below members' membership (it is not understood in terms of "belong to" , "does not belong to" or partial belonging as done by Fuzzy logic).

2) YES*thing* (notated by the outer "{" and "}") is above members' membership (it is not understood in terms of "belong to" , "does not belong to" or partial belonging as done by Fuzzy logic).

(The linkage of NO*thing* and YES*thing* is derived from *Unity (thing)* among them, and it is discussed in **part 3** of this post).

The universe of members is between YES*thing* and NO*thing*, where NO*thing* and YES*thing* are not understood in terms of members' membership ("belong to" , "does not belong to" or partial belonging as done by Fuzzy logic).

An example: If $\{\{\}, 2, \{2\}\}$ is the considered universe, then the outer "{" "}" is at membership level 2, $\{\}$ and 2 are at membership level 0 and $\{2\}$ is at membership level 1 (for more details, please see **Part 2**, page 6).

Part 1:

In this part we are using the visual_spatial notion of outer "{" and "}" (as described above) in order to understand the relations among sets and members, by translating the Barber story into sets and members.

First, here is the story as quoted from Wikipedia (http://en.wikipedia.org/wiki/Barber_paradox):

"The barber shaves only those men in town who do not shave themselves. All this seems perfectly logical, until we pose the paradoxical question: **Who shaves the barber?**

This question results in a paradox because, according to the statement above, he can either be shaven by:

1. himself, or
2. the barber (which happens to be himself).

However, none of these possibilities are valid! This is because:

- If the barber does shave himself, then the barber (himself) *must not* shave himself.
- If the barber does not shave himself, then the barber (himself) *must* shave himself."

Let us translate this story into the concept of sets and members, by using relations that are derived from visual_spatial skills between these concepts.

"*The barber shaves*" is equivalent to the outer "{" and "}" (YES*thing*), where the outer "{" "}" (YES*thing*) is above members' membership (it is not understood in terms of "belong to", "does not belong to" or partial belonging as done by Fuzzy logic).

"*only those men in town who do not shave themselves.*" is equivalent to the members, which are (below the outer "{" "}" (YES*thing*), which is above members' membership (it is not understood in terms of "belong to", "does not belong to" or partial belonging as done by Fuzzy logic)) AND (above NO*thing* (not notated by any symbol), which is below members' membership (it is not understood in terms of "belong to", "does not belong to" or partial belonging as done by Fuzzy logic)).

So "*the Barber shaves*" can't be below the outer "{" "}" (YES*thing*), which is above members' membership (it is not understood in terms of "belong to", "does not belong to" or partial belonging as done by Fuzzy logic)).

From the standpoint of visual_spatial skills, the "paradox" is artificially derived from the attempt to define "*The barber shaves*" in terms of members' membership by missing the fact (derived from visual_spatial skills) that it is above members' membership ("*The barber shaves*" can't be defined in terms of "belong to", "does not belong to" or partial belonging as done by Fuzzy logic). By understanding the difference of being a set and being a member of a given set (as derived from visual_spatial skills) Russell's paradox is naturally avoided, without any need of special axioms (as done, for example, by *ZF(C)*).

Some additional comments:

One may claim: "*Perhaps the barber is a woman?*"

In my opinion, Humour is the taste of life as long as it feeds life's development.

So, in order to not avoid the research by using some joke, let us examine the following quote also taken from Wikipedia (http://en.wikipedia.org/wiki/Barber_paradox):

"Notice that the paradox still occurs if we claim that the barber is **a man in our town with a beard**. In this case, the barber does not shave himself (because he has a beard); but then according to his claim (that he shaves all men who do not shave themselves), he must shave himself.

In a similar way, the paradox still occurs if the barber is **a man in our town who cannot grow a beard**. Once again, he does not shave himself (because he has no hair on his face), but that implies that he does shave himself."

From the standpoint of visual_spatial skills both claims are wrong, since **the act of shaving one's face** is true at the level of a member of a given set, but it is not necessarily true at the level of the given set, and (as shown above) the barber is equivalent to the level of a set (so, it is not necessarily true about the barber's face).

Part 2:

In this part we are using the notion of different levels of membership (that are derived from visual_spatial skills) as follows:

- 1) **NOthing** (not notated by any symbol) is below members' membership.
- 2) **YESthing** (notated by the outer "{" and "}") is above members' membership.
- 3) No level of members' membership is reducible into **NOthing** or extensible into **YESthing**.
- 4) Membership can have infinitely many levels, where each level is wider (or higher) than the previous levels.
- 5) The smallest level of membership is level 0, and examples of level 0 are: {}, 2, 236.67, etc... ({} is taken here in terms of 0 membership, which is above no membership at all (as defined by **NOthing**)).
- 6) The next level of membership is level 1, and examples of level 1 are: {{}}, 2, 236.67, {{{}}, {2}, {236.67}, etc...
- 7) The next level of membership is level 2, and examples of level 2 are: {{{{}}}, 2, 236.67, {{{{{{}}}}, {{{{2}}}}, {{{{236.67}}}}, etc...
- 8) There can be several different levels of membership in a given expression, for example: {}, {{{}}, 2, 236.67, 2, {{{{{{}}}}, {{{{{{236.67}}}}, 2}}}, etc ...

(1) to (8) are not understood in terms of the standard notion of Set (which does not distinguish between the difference of being a set and being a member of a given set, as done in the case of Russell's Paradox) but they are easily understood in terms of the notion of Set (that is derived from visual_spatial skills), as shown in **part 3** of this post. Level 0 of membership can't be but in-vitro (since **NOthing** is below members' membership).

The wider (or higher) levels of membership can be in-vivo with respect to lower levels, or in-vitro with respect to higher levels.

The terms in-vitro (the object is isolated from a wider environment, for example: { }) and in-vivo (the object is not isolated from a wider environment, for example: {{ }} or {{ }, {{ }} } etc...) are not restricted here only to biological systems.

Some additional comments:

Let us examine the notion of "*The set of all ideas*" by using visual_spatial skills, as follows:

"*The set of all ideas*" is in itself an idea.

If the "*The set of all ideas*" is one of its members, then by not ignoring the levels of membership we get "*The set of all ideas (of all ideas)*", which is not "*The set of all ideas*".

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If the "*The set of all ideas (of all ideas)*" is one of its members, then by not ignoring the levels of membership we get "*The set of all ideas (of all ideas (of all ideas))*", which is not "*The set of all ideas (of all ideas)*", Etc... ad infinitum ... , such that "*The set of all ideas (of all ideas (of all ideas (of all ideas (of all ideas))))...*" is inherently incomplete in terms of members' membership.

Some claims: "*This is why the naive set theory is, well, naive. It isn't suitable for any formal result that admits this sort of self-reference. Why do you insist on deriving a framework from something known not to work?*"

My answer, in this case, is:

"*By using visual_spatial skills, one enables to understand that the inherent incompleteness of members' membership is the irreducibility of members into **NOthing** (not notated by any symbol) and the non-extensibility of members into **YESthing** (notated by the outer "{" and "}" symbols).*

This inability is significant in order to understand non-Entropic (naturally open) abstract\non-abstract frameworks.

The attempt to define completeness at the level of members prevents the understanding of non-Entropic (naturally open) abstract\non-abstract frameworks.

It has to be stressed that the understanding of non-Entropic (naturally open) abstract\non-abstract frameworks, is essential for further development of living creatures."

According to this view, members' membership incompleteness (whether it is symmetric or asymmetric) is the, so called, natural conditions of the flourish of

complex *AND* intelligent forms (more details about symmetry and asymmetry are given in **Part 4**, under the title Some notions about further possible developments of "The Science of Distinction").

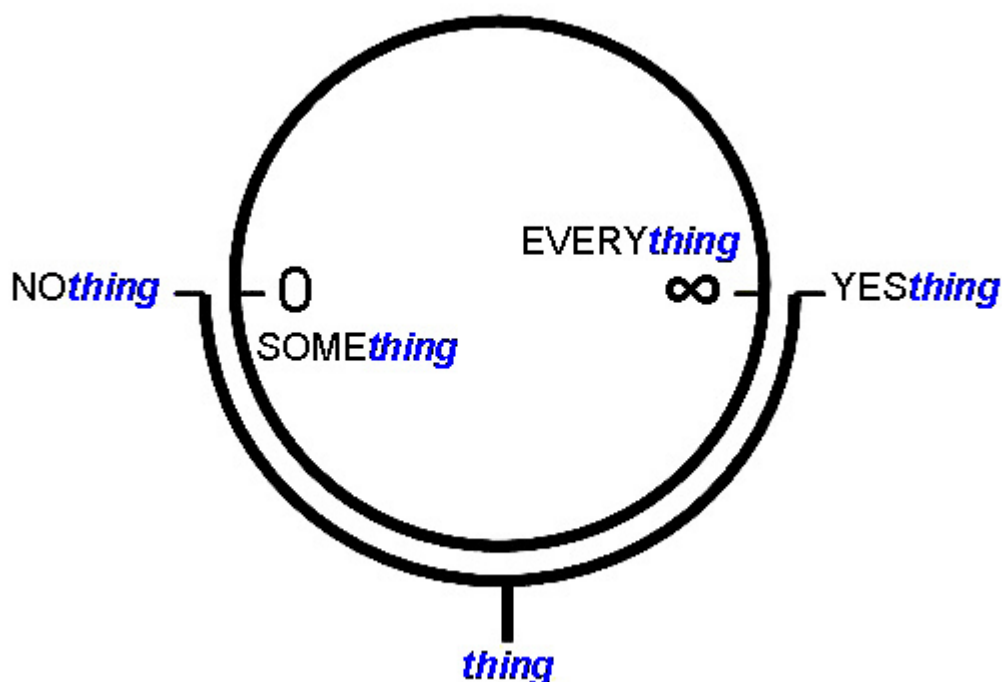
Part 3:

In this part we define the considered framework in terms of *Unity*, as follows (visual_spatial skills are used here, but the diagrams are not necessarily interpreted only in terms of Geometry, Metric-space etc):

Let's use a cross-section of *Riemann sphere* through its 0 and ∞ poles.

The concept of Set is closed under the polychotomy of YES*thing* and NO*thing*.

That is among polychotomy is *thing* (known also as *Unity*), as follows:



NO*thing* is weaker than any measurement at members' level.

YES*thing* is stronger than any measurement at members' level.

Unity (*thing*) is among NO,SOME,EVERY,YES Polychotomy.

By following the notions above, the outer "{ " "}" represents YES*thing*, no symbols

between the outer "{" "}" represent **NOthing**, and between these extremes we have **SOMEthing** and **EVERYthing**.

According to these notions the universe of members is between **YESthing** and **NOthing**, where **NOthing** and **YESthing** are not one of the members (members can have outer "{" "}", which are always below the outer level "{" "}" of a given set).

(An example: In the considered universe $\{\{\},2,\{2\}\}$, the outer "{" "}" is above members' membership).

Some notes about *Category theory*

Here is a quote taken from *Stanford Encyclopedia of Philosophy* (<http://plato.stanford.edu/entries/category-theory/>) about *Category Theory*:

"Furthermore, it can be argued that the relation between a type and its token is *not* represented adequately by the membership relation. A token does not belong to a type, it is not an element of a type, but rather it is an instance of it. In a categorical framework, one always refers to a *token* of a type, and what the theory characterizes directly is the type, not the tokens. In this framework, one does not have to locate a type, but tokens of it are, at least in mathematics, epistemologically required. This is simply the reflection of the interaction between the abstract and the concrete in the epistemological sense (and not the ontological sense of these latter expressions.) (See Ellerman 1988, Marquis 2000 and Marquis 2006.)"

A *token* that is not taken in terms of membership with respect to (w.r.t) a *type*, is equivalent to the visual_spatial notion of **YESthing**, which is above members' membership (notated by the outer "{" and "}"), such that a set is not its own member.

But *Category Theory* does not deal with *Unity (thing)* among NO,SOME,EVERY,YES, Polychotomy, as done by the suggested framework.

Part 4:

In this part we illustrate some examples of mathematical work, that can be done according to what is written above:

2 is some membership level 0, or in other words, it is only in-vitro.

If 2 is understood as $|\{\{\},\{\{\}\}\}|$ or $|\{\{\{\}\}\}|$, then 2 is a measurement tool of membership level 2 in the case of $\{\{\{\}\}\}$, or the mixing of membership levels 0 and 1 in the case of $\{\{\},\{\{\}\}\}$, where the internal "{" and "}" are in-vitro w.r.t the external "{" and "}" and the external "{" and "}" are in-vivo w.r.t internal "{" and "}".

By not using 2 as membership level 2, it is only in-vitro, as already shown above.

In case that we use in-vivo on $\{1,2,3\}$ (where the in-vivo is done by the outer "{" and "}"), it is also possible to define $\{2\}$ as the in-vivo w.r.t 2 (where 2 is in-vitro w.r.t $\{2\}$).

By using visual_spatial skills, one enables to understand that no given member is complete, since it is not reducible into **NOthing** and/or it is not extensible into **YESthing**. Furthermore, by understanding *Unity (thing)* among Polychotomy, NO,SOME,EVERY,YES are incomplete w.r.t *Unity*.

Here are some notations of my notions, in terms of mathematical spaces (spaces which are not necessarily restricted into Geometry, Metric-space etc.), which are equivalent to the notions of sets and members of sets (as shown above):

$||;$ = the cardinality of **NOthing** (that is below members' membership).

$||;$ = the cardinality of **YESthing** (that is above members' membership).

thing is the *Unity* among Polychotomy.

The power of continuum is defined as the ability of a given space to be at **AND** beyond (not at) the domain of given space(s) or sub-space(s) (where sub-space(s) is/are a mixture of a given space and lower spaces, associated by *Unity (by the thing)*). The following notations express the cases of lower spaces or sub-spaces that are entirely on a given higher space:

$|\mathbf{c}_0|;$ = the cardinality of 0-space does not have the power of the continuum.

$|\mathbf{c}_1,\mathbf{c}_0|;$ = the cardinality of 1-space has the power of the continuum, but the cardinality of 0-spaces on it do not have the power of the continuum.

$|\mathbf{c}_2,\mathbf{c}_1,\mathbf{c}_0|;$ = the cardinality of 2-space has the power of the continuum, but the cardinality of 1-spaces and 0-spaces on it do not have the power of the continuum.

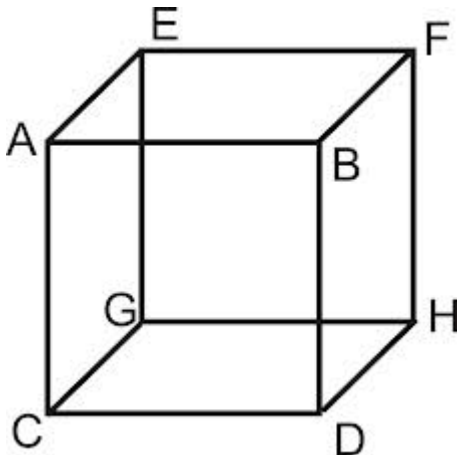
$|\mathbf{c}_3,\mathbf{c}_2,\mathbf{c}_1,\mathbf{c}_0|;$ = the cardinality of 3-space has the power of the continuum, but the cardinality of 2-spaces, 1-spaces and 0-spaces on it do not have the power of the continuum.

...

etc. ad infinitum ... where no space > 0 has the power of the continuum of **YESthing** (that is permanently above members' membership).

In general, no collections of lower spaces or collections of sub-spaces that are entirely on a given higher space, have the power of the continuum of that space.

In addition to collections of lower spaces or collections of sub-spaces that are entirely on a given higher space, there can be a lower space that has the power of the continuum w.r.t a given higher space if the given lower space is not entirely on a given higher space (The Reflection Principle also in terms of visual_spatial skills, is used), for example:



Line segment AC has the power of the continuum w.r.t plans ABFE and CDHG.

Line segment AC does not have the power of the continuum w.r.t plans ACDB, ACGE, EFHG and FHDB.

In my opinion, the subject at hand is that the power of the continuum is not satisfied in terms of collections, which in turn has a direct influence on our understanding of the concept of Entropy (the inability of collection of lower spaces or sub-spaces to completely cover a given space > 0 , provides non-entropic and therefore an ever-developed (abstract\non- abstract) realm).

Some notions about further possible developments of "The Science of Distinction"

Researches of Brain functions (for example <http://www-e.openu.ac.il/geninfor/openletter/ol18/pages12.pdf>) show that there is no universal clear-cut specialization between left and right hemispheres. Yet Brain function is amplitude between “Seeing Local” and “Seeing Global (non-local)”.

“Brain’s Left-hemisphere” is a general name for local observation, where “Brain’s Right-hemisphere” is a general name for global (non-local) observation.

The exact locations of “hot spots” in the brain do not prevent the possibility that Brain functions are comprehensive Local\Global (Non-local) Amplitude.

As much as we know, “traditional” mathematical community was developed mostly by local observations that are characterized by strict verbal_symbolic asymmetric expressions (the expressions are asymmetric forms of step-by-step serial working methods, which are commonly used by mathematicians, where symmetric forms, which have simultaneous and parallel working methods, are not commonly used).

The visual_spatial non-strict and symmetric expressions are not commonly used by the “traditional” community, and what we call *Organic Mathematics* [1] is an afford to combine visual_spatial AND verbal_symbolic skills into a one comprehensive framework, as follows:

x is researchable.

Definition 1: **Identity** is a property of x , which allows its recognition.

Definition 2: **Copy** is a duplication of a single **identity**.

Definition 3: If x has more than a single **identity**, which does not allow its recognition, then x is called **Uncertain**.

Definition 4: If x has more than a single **copy**, then x is called **Redundant**.

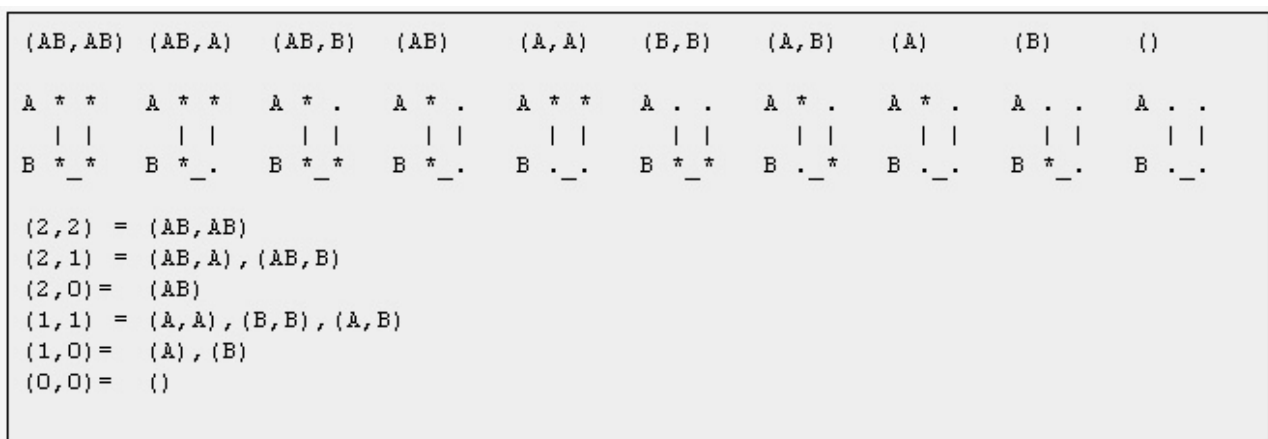
Uncertainly x Redundancy Distinction-Trees (URDT) are used on variables of a given mathematical expression, for example:

$A^2=B$ or $A=B$ are mathematical expressions.

According to URDT, these expressions are some cases of already strict objects (which are notated, in this case, by strict A and strict B symbols) that are used as the variables of, for example, $A^2=B$ or $A=B$ expressions.

Here is an example of URDT tool, in this case:

2-Uncertainty x 2-Redundancy Distinction-Tree shows exactly how non-strict identities (AB,AB) are changed into strict (A,B) identities:



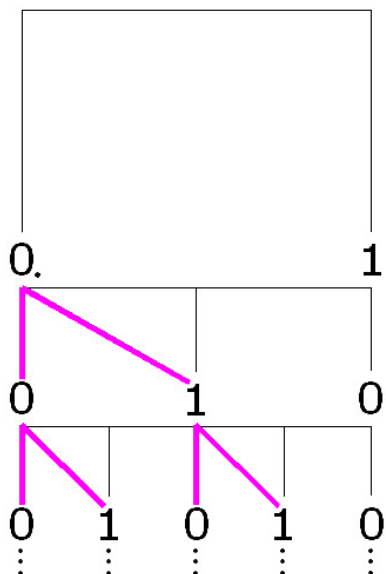
Any appearance of that tree is called Distinction State (DS), where any DS is under a structure called Frame (F), for example: (AB,B) is a DS that is under F (2,1), where AB is non-strict and B is strict (no uncertainty is involved with strict objects).

An example of strictness is the case of DS (A,B) under F (1,1) under the 2-Uncertainty x 2-Redundancy Distinction-Tree, and this case is an example of the common use among mathematical expressions. By using URDT one becomes aware of the fact that strict mathematical expressions are some particular case of more comprehensive framework, which according to it the mathematical expressions themselves are under certain degrees that are defined, for example, among F (2,2) and F (1,0) (F (0,0) is the common null state of all n-Uncertainty x n-Redundancy Distinction-Trees, where n is any non-negative integer).

URDT may help to be aware of the case that the interactions can be done in parallel, serial, or any possible intermediate states between them, where the mathematical expressions themselves are not excluded (otherwise we may get conclusions, which are based on the case that we actually using only strict expressions as hidden (and unconscious) assumptions of our mathematical work). According to this view, URDT may first be used as a tool that helps to be more aware of one's mathematical work, in order to avoid (as much as possible) hidden assumptions. Maybe URDT can be used as a factor of the formal development of "*The Science of Distinction*". A version of some preliminary steps of that subject (by Moshe Klein and me) can be found in the following paper (this version was written before URDT, but the notions of URDT are used there): [1] <http://ijpam.eu/contents/2008-49-3/5/5.pdf> (International Journal of Pure and Applied Mathematics, Volume 49 No. 3 2008, 329-340)

* Number's notion, which is derived from verbal_symbolic AND visual_spatial skills

According to "Traditional" Mathematics (which is commonly expressed by verbal_symbolic skills) $0.111..._2 = 0.999..._{10} = I$ where I is the considered mathematical object (the number itself) and $0.111..._2$ or $0.999..._{10}$ are some numerals (out of many representations) that represent number I . By using verbal_symbolic AND visual_spatial skills as follows:



one may understand that no branch of that tree actually reaches any other branch of that tree "downward", no matter how many levels that tree has (in other words, there is no homeomorphism between 0-dimensional space (notated by "0"; "1" symbols) and 1-dimensional space (notated by " _____ " spatial non-composed object)).

According to this framework $0.III..._2$ is a number of its own < number I by $0.000...I_2$ where the "... I " part of that number is the irreducibility of ___ 1-dimensional space into 0-dimensional space (known as a point). By using verbal_symbolic AND visual_spatial skills one enables to distinguish between non-local numbers like $0.III..._2$ or $0.000...I_2$, and local numbers like I or 0 . Furthermore, no collection of, for example, 0-dimensional spaces or segments on 1-dimensional space, has the power of the continuum of 1-dimensional space.

By understanding the power of the continuum in terms of spatial skills, one may understand that no collection of lower spaces or sub-spaces (where a sub-space is a mixture of a given space and lower spaces) of a given space (mathematical or physical) has the power of the continuum of that space, or in other words, any given collection of "hosted" sub-spaces or lower spaces is incomplete with respect to the given "host" space.

The terms "host"\ "hosted" are used here in order to clarify that the "host" and the "hosted" are defined but not made of each other.

The non-locality of $0.III..._2$ or $0.000...I_2$ is "naturally vague" in terms of location, and one actually discovers/invents that the *Real-line* has a non-empty collection of non-local numbers between 0-dimensional space and 1-dimensional space.

By generalization, given a "host" space, no collection of "hosted" lower spaces and/or sub-spaces has the power of the "host" space.

In the interesting article **VISUALIZATION IN LOGIC AND MATHEMATICS** (pages 16-17) (<http://www.scribd.com/doc/48740656/Visualization-Explanation-Reasoning-Styles-in-Mathematics-Synthese-Library>) **Prof. Paolo Mancosu** writes about Von Koch's discovery of the snowflake, which was motivated by Weierstrass' analytical (and I would say verbal_symbolic-only) reasoning.

I wish to share with you some notion about Von Koch's fractal, which is derived from verbal_symbolic AND visual_spatial skills, as follows:

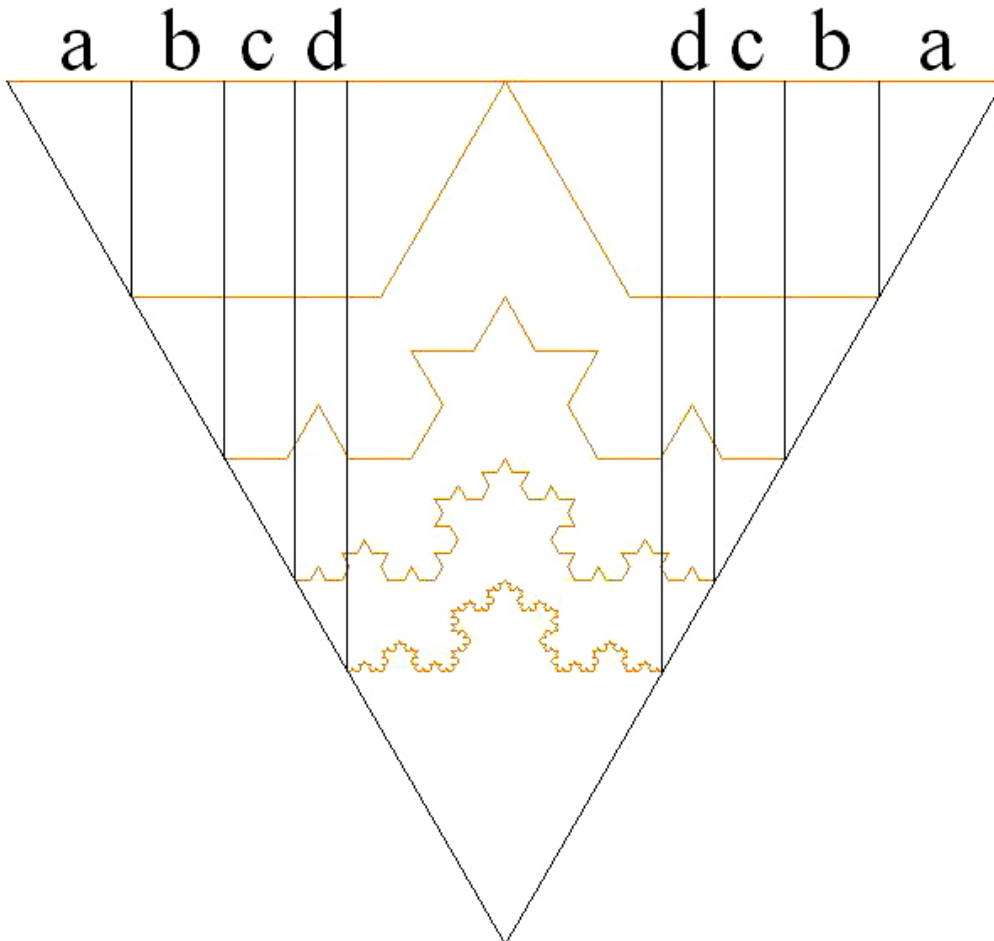
- 1) Take a straight 1-dimensional element with length X .
- 2) Bend it and get 4 equal sides along it, as done in the first step of Koch's fractal.
- 3) Since the length between the opposite edges is changed into the sum of only 3 sides, and since the number of the sides after the first bending is 4 sides, we have to

multiply the bended 1-dimensional element by $\frac{3}{4}$, in order to get back length X .

As a result the bended 1-dimebsional element has constant length X , but the length between its opposite edges becomes smaller (it converges).

Now define 1-dimebsional element with length $2*a$ and subtract this length from length X .

4) By repeating (2) and (3) infinitely many times we get the expression $X - 2*(a+b+c+d+...)$, as follows:



5) According to verbal_symbolic-only reasoning $X - 2*(a+b+c+d+...) = 0$

6) According to verbal_symbolic AND visual_spatial reasoning $X - 2*(a+b+c+d+...) > 0$ since by this reasoning $2*(a+b+c+d+...)$ existence as infinite convergent series is derived from the constant length of X , such that X is irreducible into length 0, no matter how many bended levels of X length are defined.

7) Since X is irreducible into length 0 (according to verbal_symbolic AND visual_spatial reasoning), then $2*(a+b+c+d+...)$ can't be but $< X$, and as a result $X - 2*(a+b+c+d+...) > 0$.

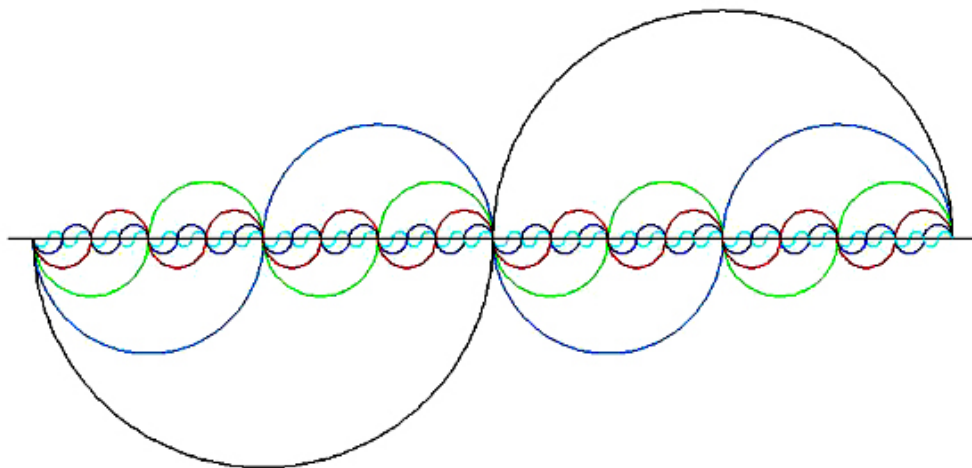
8) *Conclusion:* According to verbal_symbolic AND visual_spatial reasoning the "sum" of $2*(a+b+c+d+...) < X$.

Also according to (8), the subject at hand is that the power of the continuum is not satisfied in terms of collection, which in turn has a direct influence on our understanding of the concept of Entropy (the inability of collection of lower spaces or sub-spaces to completely cover a given space > 0 , provides non-entropic and therefore ever-developed (abstract or physical) realm). I wish to add some notes about figure 8 (page 15) that appears in *Dr. Kajsa Bråting's* article. This figure can be used as an **analogy**, which may help to interpret the concept of *Unity* awareness, as follows:

Unity awareness (an interpretation)

In my opinion, the ability to manipulate environments is in direct proportionality with the complexity of the manipulator (where Complexity is not a synonym for Complicated, exactly as Simplicity is not a synonym for Triviality). In order to not be broken apart, Complexity must be rooted in Simplicity, such that the balance of the considered manipulator is kept during manipulations. If creatures like us have the power to build today atomic and hydrogen bombs, and tomorrow anti-matter bombs, I think that it is important to develop the tuning between Simplicity and Complexity in order to survive these powers.

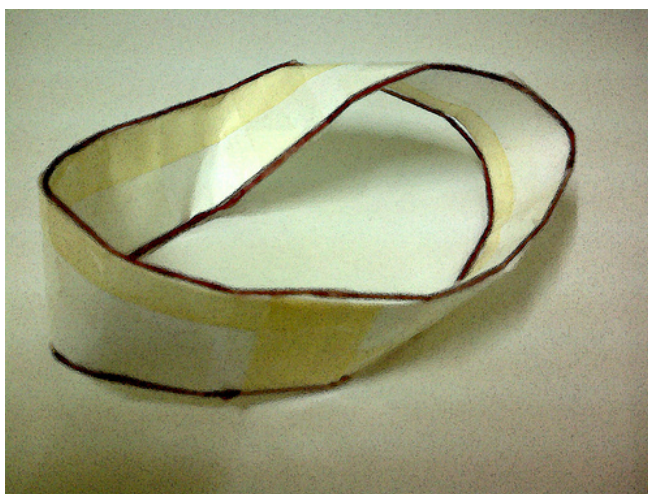
Maybe this simplicity is actually the non-subjective aspect of one's awareness, which enables the subjective aspect at the level of thoughts to be consistent with the subjective aspect of other creatures like us. This consistency may be expressed by the ability to use Ethics (in terms of evolutionary scale that is not restricted into any particular school of thought, religion, culture or civilization) *AND* Logical\Technological skills, as organs of a one balanced framework, and during the practical interaction among the subjective and the non-subjective, *Unity* awareness becomes concrete in daily life. The following diagram is an **analogy** of *Unity* awareness in terms of 1-dimensional space, such that being curved (represents the subjective and complex aspects of a given realm) or straight (represents the objective and simple aspect of that realm) is not known in terms of Dichotomy (where dichotomy is a particular case of Polychotomy):



According to this interpretation, a given realm is actually consistent, if *Unity* awareness becomes concrete in daily life, and maybe the mathematical science is actually fulfilled, if it is used to develop *Unity* awareness.

Here are some results, which are derived from the linkage among the observed, the observer and the tool of observation that are influenced by **Prof. Kauffman's** lecture (<http://www.youtube.com/watch?v=KkYcFaldQ4g>) at the *Workshop on Reflexivity in Mathematics and Cybernetics*:

A 1-dimensional element along the edges of 2-dimensional Möbius strip is a single reflexive element in 3-dimensional space (as can be seen in the following picture):



Any partial observation along the 2-dimensional Möbius strip is taken as 2 opposite 1-dimensional elements along its edges.

Without loss of generality, the given picture is a visual_spatial proof that the sum of partial observations is not the same as the whole observation.

This result is equivalent to the inability of some collection of lower (abstract or physical) spaces to fully cover a given higher (abstract or physical) space, if observation is not ignored.

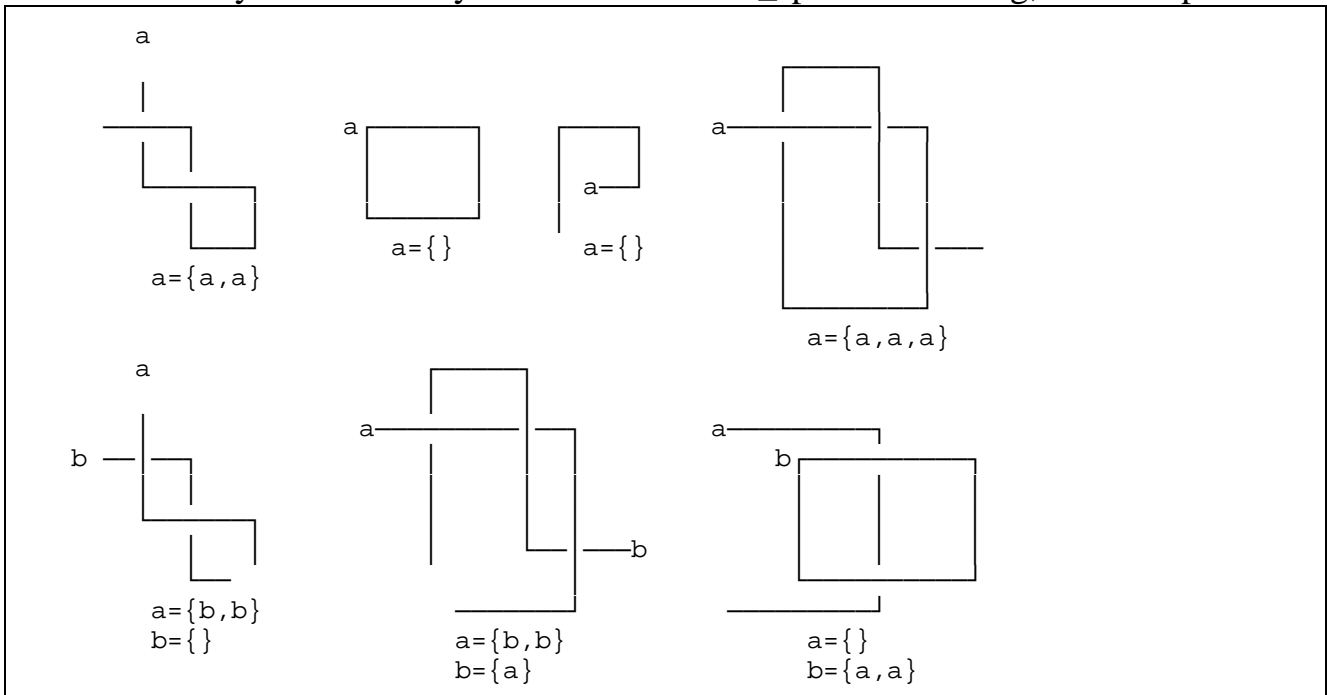
For example, let's research the following statement:

"Without a loss of generality, the given example is a visual_spatial proof that the sum of partial observations is not the same as the whole observation."

If the power of the continuum is understood in terms of observation, then no sum of any amount of partial observations (such that each observation can't get the reflexivity of the 1-dimesional element at the level of 3-dimensional space) has the power of the continuum of the whole observation, and the picture above rigorously demonstrates this claim. According to this notion, the attempt of "traditional" mathematicians to define the whole in terms of the sum of collection of partial

observations is derived from non-satisfactory verbal_symbolic-only reasoning of hard reductionism, where observation (in terms of self awareness) is not a factor of that reasoning.

Knot set theory uses verbal symbolic *AND* visual_spatial reasoning, for example:



By this theory, a member of a given set is defined as a rope under rope, where a set is the rope in itself (notated by the outer "{" and "}"). So Russell's paradox is avoided by Knot set theory, which is also derived from higher level of observation in terms of self-awareness. Self-awareness is the bridge for natural responsibility, where natural responsibility is expressed as a consistent (harmonious) flourishing linkage among self-aware creatures *AND* the surround environment (Polychotomy is unified creatively *AND* consistently). An **actual linkage** among *Ethical reasoning AND Logical reasoning* may be found as an important factor for the survival and further development of self-aware creatures like us.

By “**actual linkage**” I mean that it is an *ongoing project* of many people (academic researchers and non-academic researchers) who agree about the need of such project, where the Internet provides the preliminary StratUp platform. Currently this kind of project looks as an impossible mission, when we observe the aggressive relations and disagreements among many cultures, schools of thoughts, countries, religions, economic systems, etc., and according to this view we already have lost the privilege to ignore the actual results of the aggressive disagreements among us. Diversity may be a fundamental condition for actual day-by-day evolution, such that the different (abstract or physical) expressions are known as organs of a one realm, where any given expression contributes to the dynamic balance that enables further degrees of complexity’s development of this realm, up to the level of each expression. Both Western *AND* Eastern cultures have treasures that can complement each other into an actual scientific framework of such *ongoing project*, where self aware observers are

responsible during **actual participation** for its success, by achieving day-by-day *Unity Awareness*.

Some notions about Entropy

Today we know that there were tiny irregularities in the Big-Bang's space/time fabric, where these irregularities are maybe the fundamental conditions which allowed the existence of galaxies and clusters of galaxies, which has a foam-like shape when observed from a great distance. This foam-like shape is the result of opposite tendencies of Energy/Matter integration/differentiation fluctuations. These fluctuations and their results can be found in any observed scale of our universe.

From the second law of Thermodynamics we know that there is a global tendency in the observed universe, which actually eliminates the difference between integration and differentiation at the macro level, until these fluctuations do not express clear and ordered Energy/Matter phenomena. We can ask: "How did the original fluctuation, which its thermodynamics "death" we observe, came into existence?" Another question is: "Do we interpret correctly the Energy/Matter integration/differentiation fluctuations in the observed universe?" Let us examine a different model of these observed fluctuations. By using the Inflationary theory (as suggested by Alan Guth) of the Big-Bang, we may say that the first fluctuation had a strong correlation, which allowed the very early universe to "speak" in the same fundamental "language" called by us "the laws of nature".

Let us examine this correlation.

1) It stands at the basis of the observed tendency to eliminate the difference between integration and differentiation at the macro level.

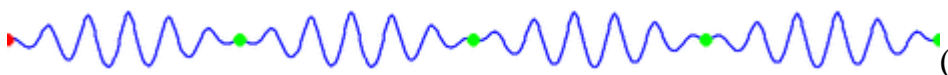
2) It holds an elastic-like "memory" of several and different degrees of space/time curvatures which approach to the singular state (before the inflation) from different "points of view". These different "points of view" of different degrees of space/time curvatures, actually prevent a smooth return (in terms of Gravity) to the singular state. Maybe the result of this non-smooth return is the diversity of different degrees of complexity that exist in the observed universe.

By this model there is direct proportionality between the smoothness of a given return, and the complexity of the information structure that is based on this return. Also there is direct proportionality between a given return and self-aware states that can be found in non-trivial complex systems like living creatures. At this stage most of the observed universe has the tendency to become "flat" at the macro level (which is recognized as increased entropy) but by this model there is the possibility that in the very long term, there will be more structures that are based on "smooth" return*, and life phenomena, which we are a part of, will be the main principle that shapes the observed universe.

Please be aware that this model does not avoid The Copernican Principle because it gets Life phenomena in terms of cosmological evolutionary scale (which is not focused only on life phenomena as exist on planet Earth). More about this subject, in terms of cosmological evolutionary scale, can be found in <http://www.scribd.com/doc/16547236/EEM> and <http://www.scribd.com/doc/16669828/EtikaE>.

Some sketches of *Cybernetic Kernels*

According to the current knowledge of Velocity, Phase velocity (marked in this illustration by a red point) can be greater than Group velocity (marked in this illustration by green points), for example:



(http://en.wikipedia.org/wiki/Phase_velocity)

Since information moves only in Group velocity (according to the current agreement among the majority of the physicians) then Phase velocity is not considered as information that moving faster than the speed of light (*SRT* is not violated).

Careful observation of Phase velocity shows that it is unlimited (can be infinite).

According to my interpretation, actual unlimited Phase velocity is achieved only if the observed space is taken *at-once* (no local observation of some point or some sub-space with respect to a given space, is measured), or in other words, the measured space is a non-composed whole (please see the interesting article of *Dr. K. Ghosh* <http://ijpam.eu/contents/2012-76-2/11/11.pdf>).

In other words, by considering a given "host" space, no amount of "hosted" spaces or "hosted" sub-space is the "host" space, where non-local numbers (as shown above *) are the measurement tools of this inability. If we analyze 0 and ∞ in terms of *Length* or *Curvature* we find that 0 and ∞ are context-dependent, for example:

Under the context of *Length*, 0 is the smallest *Length*, known as a point, where ∞ is the largest *Length*, known as an endless straight line, where in this case *Length* 0 is the "hosted" space and *Length* ∞ is the "host" space. Under the context of *Curvature*, 0 is the smallest *Curvature*, known as an endless straight line, where ∞ is the largest *Curvature*, known as a point, where in this case *Curvature* 0 is the "host" space and *Curvature* ∞ is the "hosted" space. But there is also a cross-contexts view of "host"\ "hosted" spaces, which are not closed under the concepts of *Curvature* or *Length*, since they are definable in both cases. According to this cross-contexts view, the term **memory** is equivalent to "host" space, and the term **object** is equivalent to "hosted" space. In this case the concept of Number is defined as **memory\object** interactions, as demonstrated by the notion of **Cybernetic*

Kernels:

By using **memory\object** interactions as the basis of Organic Numbers the researcher is basically educated to be aware of himself during research. This fundamental attitude enables to define and develop the bridging between Ethics and Formal Logic. An example of such development can be shown by the idea of Cybernetic Kernels:

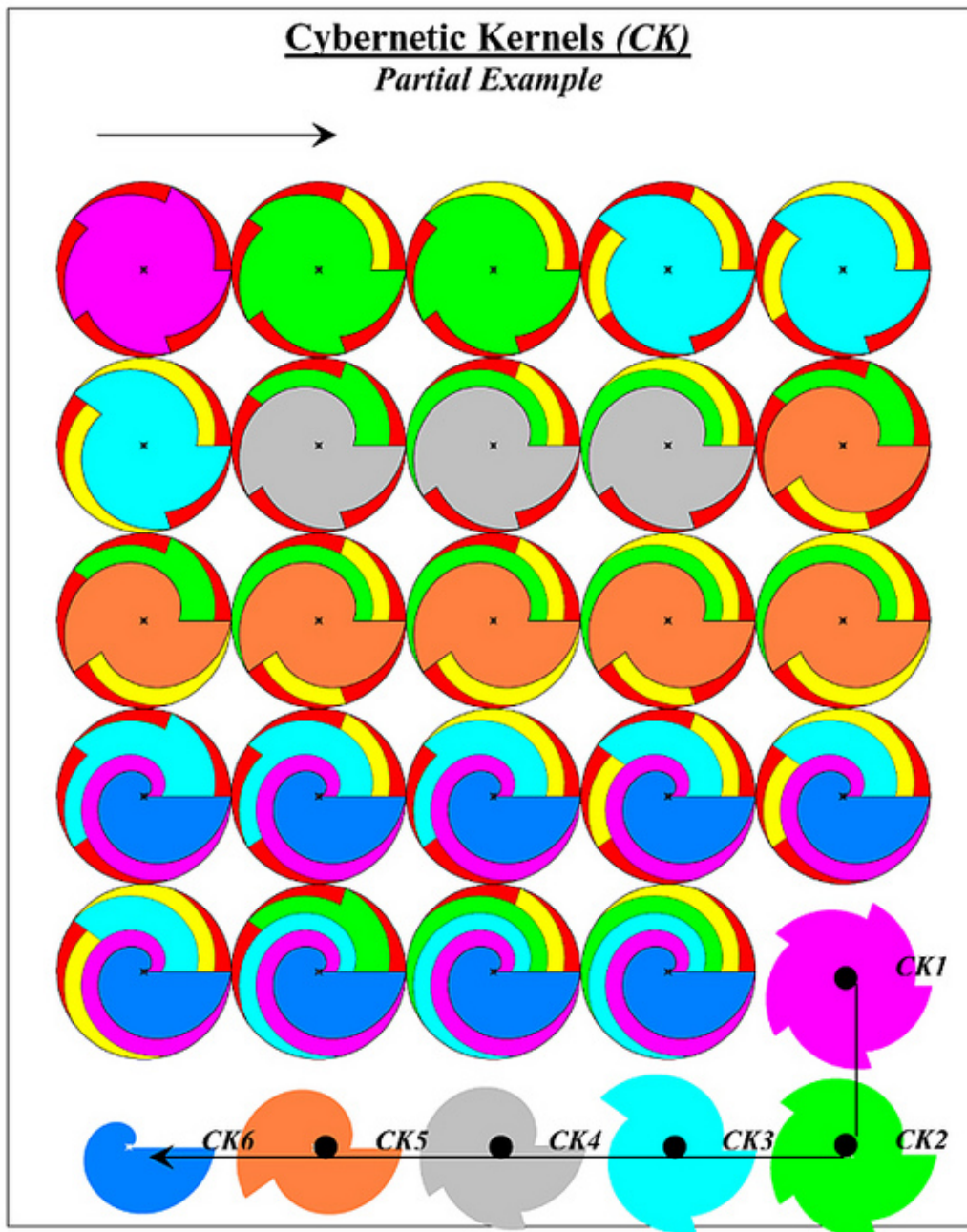


Fig. 13

There are 6 different CKs in Fig. 13, which are ordered by the number of their self-interference. If we give an "elastic" property to CKs, then CK1 is changed to CK6, and the level of ON5 Cybernetic Efficiency is increased at each step. When the Cybernetic Efficiency is increased, ONs' redundancy and uncertainty levels are reduced, which enables complexity and self-awareness to be developed. We think that both Ethics and Formal Logics have a common principle, which is: to develop the bridging between the simple and the complex under a one comprehensive framework that is aware of its results (it is **naturally responsible**).

I will appreciate very much your reply.

Sincerely Yours,

Doron Shadmi