

# Toward Dialectic Matter Element of Extenics Model

Florentin Smarandache  
Department of Mathematics  
University of New Mexico, Gallup, NM 87301, USA

**Abstract:** Based on the authors intensive investigation on the oriental dialectics, the paper presents a novel theoretical frame of matter element in the world leading science, extenics dealing with inconsistency or incompatibility, covering the widest range of application area from informatics, system engineering to management and finance. The dialectic matter-element is defined as the integral of all existing and prospecting ones based on all the infinite possible cognitive models. The novel model serves as the origin of constraint matter elements, the unity of both state description and cognitive action (cognition force with respect to neural science), a latent part of extenics, and possibly as essence of matter element. It explains, in a novel perspective, the origin of a name, and uncovers the source of contradiction and even the impetus of cognition.

**Keywords:** Extenics; matter element; dialectics; cognition; contradiction; identity; reference frame; latent part; imaginary part; extension.

## 1. Background

The matter-element theory based science, extenics funded by Chinese mathematician Cai Wen, has experienced 28 year's difficulties. Although it becomes the world leading science, we can only say it may seem more a simulation of dialectics than real. Regarding as a source of prospecting dialectic mathematics and methodology, there is no reason to overestimate or to underestimate its value.

Extenics believes in a latent part (imaginary part) description, and then what is the imaginary part of extenics? How to extend extenics itself? As to the scope of mathematics, some mathematicians in the world, American or French we coped with in new generation fuzzy theories or neutrosophic theories and information fusion, have included so called non-mathematics into mathematics, such as "Book of Changes". Yes, mathematics has no scope as long as human does not fix it. To our observation seldom have mathematicians provided anything valuable on the origin issues in this paper.

The point we make out to be a basic logic issue:  $A \neq A$ , in that there are two aspects of A: symbolic A and the extension of A, where symbolic A refers more to an instant appearance relative to a default scenario, and people refer more to the extension of A that is subject to an evolution chain in which the integral of all the appearances of A seems inexpressible.

To start with we need to induce the background extenics – a traverse discipline of philosophy, mathematics and engineering aiming to solve conflicts, contradictions, inconsistency and incompatibility.

### 1.1. The world leading science: extenics.

"The theoretical frame, which takes basic-element theory, extension set theory and extension logic as pillars, and the special extension methodology are formed. The applied technology in various fields is called extension engineering. Extension theory, extension methodology and extension engineering constitute extenics. What is called contradiction problem is the problem whose goals cannot be realized under the existing conditions.

During the study, the researchers of extenics have found there are all kinds of contradiction problems in many engineering fields, such as management, controlling, computer technology, artificial intelligence, machine and electronic engineering, etc. Then, do we have any regular technique to solve contradiction problems? Can we establish a set of method to deal with contradiction problems? This is the start of extenics research. <sup>3</sup>”

“Logical cells and extension models of extenics: Mathematical model can deal with a lot of precise problems, but cannot deal with the problems under certain conditions such as the one in the famous ancient Chinese story “Prince Caochong weighs an elephant”, whose goals and conditions are incompatible. The reasons are, when one solves contradiction problems, he has to consider the things themselves and their characters besides the quantity relation; parts of the transformations solving contradiction problems are quantitative and some are qualitative; classical mathematics studies the definite things, but to solve contradiction problems, we have to consider the transformations of things (including quantitative change and qualitative change). Therefore, mathematical model is difficult to describe the process of solving contradiction problems. To deal with all kinds of contradiction problems in real world with formalized method, firstly we should study how to describe the various things. For this purpose, extension theory establishes matter-element  $R = (N, c, v)$ , affair-element  $I = (d, b, u)$  and relation-element  $Q = (s, a, w)$  (be called jointly basic-element) to describe matter, affair, and relation. They are the logical cells of extenics. The formalized models describing information, knowledge, intelligence and all kinds of contradiction problems with basic-elements are called extension models. With the extension models, we are able to take advantage of extension theory and extension method to generate many strategies to solve contradiction problems according to the extensibility of basic-element. Extension theory has three pillars: basic-element theory, extension set theory, and extension logic.”

“Basic-element theory: Extensibility of basic-element and conjugate nature of matter-element are the core of basic-element theory. And the important feature of extension theory is to represent these natures with formalized symbols. They are the ground on which the strategies solving contradiction problems are generated. Extensibility includes divergence, correlativity, implicative nature and expansiveness. Conjugate nature includes materiality, systematicness, dynamic nature and antithetical nature.”

In extenics contradiction comes from “habitual field and the variability of problems”. See Ref. 4 for more on theoretical architecture.

### 1.2. Matter element theory: the base ground of extenics:

We consider an object and  $v$  the quantity of  $N$  about  $c$ . These  $N, c$ , and  $v$  are called three essential factors of a matter element. Here  $v = c(N)$  reflects the relationship between the quantity and quality of an object. If an object has multiple characters or more than one of them are needed to be listed out, then a multi-dimensional (for example, n-dimensions) matter element can be defined as:

$$R = \begin{pmatrix} N, & c_1, & v_1 \\ & c_2, & v_2 \\ & \vdots & \vdots \\ & c_n, & v_n \end{pmatrix}.$$

When an object is dynamic or its dynamical character must be studied, then a dynamical matter element could be defined as  $R = (N(t), c, v(t))$ . The dynamical matter element expresses the variations of the object

with time.

### 1.2.1 Extensibility of matter elements

The key point of treating conflict problems is to study the principal natures of matter elements. A researcher must be creative and jump out from customs and try to expand the thought when one is dealing with the conflict problems by using of matter element methods. The extensibility includes characteristics of diffusion, conjugation, interaction, containing and extension.

#### (i) Divergence natures of matter elements

Nature 1: One object may have multiple characters, it is simplified as single object multiple characters and noted as  $N \prec (N, c, v) \prec \{(N, c_1, v_1), (N, c_2, v_2), \dots (N, c_n, v_n)\}$ ,  $c_i \in C$  and  $v_i \in V$ . Here the sign  $\prec$  stands for extensible.

Example: Let  $N$  = a piece of paper, and  $c_1 = \text{could be fold up}$ ,  $c_2 = \text{water absorb}$ ,  $c_3 = \text{thickness}$ . Then we have a matter element

$$R = \begin{pmatrix} N & c_1 & v_1 \\ & c_2 & v_2 \\ & c_3 & v_3 \end{pmatrix}$$

When a piece of paper is to be used, one can not only think about the normal usage of it, but also the other characters should be calculated, for example, some papers are overlapped and folded up to a box. Another example is that suppose one has been asked to arrange four equilateral triangles with six sticks of match. When an unsuitable condition is added to the equilateral triangles then the problem comes to be a conflict one:

$$R = \begin{pmatrix} \text{Equilateral Triangles,} & \text{number,} & 4 \\ & \text{position,} & \text{on a plane} \end{pmatrix}$$

Nature 2: By a single character there may exist many objects, it is simplified as multiple objects single character and noted as  $N \prec (N, c, v) \prec \{(N_1, c, v_1), (N_2, c, v_2), \dots (N_n, c, v_n)\}$ ,  $N_i \in N$  and  $v_i \in V$ . An example to use this nature is that an American purchaser named Mailce was pointed to buy fire-resistant boards for floor decoration but this kind of materials were sold out in the market. What he did was to substitute the boards with fire-resistant papers. The demand was satisfied and the cost was greatly reduced, too. To describe this question with matter element theory, so we have a normal matter element

$$R_1 = \begin{pmatrix} \text{Fire - resistant Boards,} & \text{fire - resistant function,} & a_1 \\ & \text{price,} & b_1 \end{pmatrix}$$

and  $R_2 = \begin{pmatrix} \text{Fire - resistant papers,} & \text{fire - resistant function,} & a_2 \\ & \text{price,} & b_2 \end{pmatrix}$

So long as  $a_2 \geq a_1$  and  $b_2 \leq b_1$ , the substitution is reasonable. Later Mailce developed this thought to “Value Engineering Techniques”, so we could say that the basis of “Value Engineering Techniques” happened to be the extensibility of matter elements.

Nature 3: For different parameters an object about a character could have different quantities. It is called simply as single object single character with multiple quantities and could be formulated as  $N \prec (N, c, v(t)) \prec \{(N, c, v(t_1)), (N, c, v(t_2)), \dots, (N, c, v(t_n))\}$ , here  $t_i \in T$ . An example to support this nature is that by man made satellites more and more channels and signals need to be emitted but too many transmitters would make the satellite overloaded. To overcome this difficulty, a scheme of “divide time to fit multi-channel” was designed. To describe this question with matter element theory, it can be written as:

$R = (\text{transmitter } A, \text{ emit parameter, } a) \prec (\text{transmitter } A, \text{ emit parameter, } f(t))$ , here

$$f(t) = \begin{cases} a_1, & t \in (n, n + \frac{1}{17}) \text{ Sec.} \\ a_2, & t \in (n + \frac{1}{17}, n + \frac{2}{17}) \text{ Sec.} \\ \dots & \dots \\ a_{17} & t \in (n + \frac{16}{17}, n + 1) \text{ Sec.} \end{cases}$$

and 17 channels with only one transmitter is pre-supposed.

#### (ii) Conjugation of matter elements

Just like the domain definition for complex numbers, matter elements include real and imaginary parts, too. For a given object  $N$ , it could be written as  $N = \text{Re } N \oplus \text{Im } N$ , where the  $\text{Re } N$  is the real part of  $N$  and  $\text{Im } N$  the imaginary part of it. A kind of product as a matter element has two sides of valuation. One is the product itself, the real part of it. The effective of the brand of the product and the reputation of the producer belong to the imaginary part of the matter element. There are many successful examples of using the imaginary parts of matter elements to civil decision makings and even in military directions.

#### (iii) Interaction of matter elements

When there exist certain interactive dependencies between objects about the quantities of some characters, it will be called interactions of matter elements. For a given matter element  $R$ , all the about objects or about characters interactive dependant matter elements are called a interactive dependant network. A varying of a quantity about a character of an object in a net may yields relative varying in quantity of the same character of another object in the same net. This character may be used in market planning. A kind of food for children, its price was 6 yuan/sack. For being more attractive to the customers, the company added small playthings with price of 0.5 yuan/piece in the sacks and the new price for a sack is 10 yuan/sack. And then the sales volume greatly increased and the company got a big mount of profits. This is an example of taking up transform using the interactive net nature of matter elements.

#### (iv) Implication of matter elements

If  $A @$  and then certainly  $B @$ , this called  $A$  implies  $B$ , notified as  $AB$ . Here  $@$  stands for existence. The relation between  $A$  and  $B$  is called Implication.

#### (v) Extension of matter elements

The extension abilities of matter elements describe the combinations, decompositions and substitutions abilities between different matter elements.

### 1.2.2. Matter element transformation

After introducing the concept of extensibility to matter elements, transformations on objects, characters of objects and quantities of characters could be as specially designed calculations (operations) applied to matter elements. These calculations can handle the transforming of quantities and also the qualities of objects.

The extensibilities of matter elements pointed out the main thought methods of solving practical problems and the methods, policies and knacks to solute problems could be described with a series of matter element transformations. There are four basic transformations of matter elements: substitution, resolution, addition/subtraction and expansion and also four basic calculations for matter elements: and, or, multiplication and inversion. Some researchers studied the philosophical subjects of matter elements and extenics.

## 2. The Origin of Dialectic Matter Element Issue

To discuss the true face of mater element we need to doubt that his theory might have been based on the same paradox as most sciences do. Although one may congratulate Prof. Cai for the realization of transforming contradiction into consistency, it seems still, to our intuition, a prototype. On the other hand mental cognition is prone to elude us.

It is true that extenics has inherited to some extent fuzzy/neutrosophic logic and fuzzy/neutrosophic set which we are always criticizing, e.g. to matter element  $R = (N, c, v)$ , we cannot help asking: "How does one know that matter element R is of name N, character c, and value v".

In his paper "To be or not to be, A multidimensional logic approach" Carlos Gershenson has generalized proofs on:<sup>5</sup>

- Everything is and isn't at a certain degree.
- Nothing can be proved (that it exists or doesn't) (authors: relative to our current intelligence).
- I believe, therefore I am (i.e., I take it true, because I believe so).

"Most of us will believe it exists, though. The same thing happens for existence of psychic powers, aliens or the chupacabras (let's avoid god as long as possible...). You can't prove their existence rationally. But some people believe in them. And you can't say they're absolutely wrong because you can't prove their non-existence. Then, there are some people who believe in them."

How much do men understand the nature? See the BBS discussion about time, space and matter in China Science and Technology Forum (years ago posts, but new links in Chinese provided):

- Space is not empty (<http://blog.china.com/u/060703/2812/200607/8128.html>)

"Since 1998 cosmologists have found that the universe expands in extraordinary speed. The driving force is a mysterious hidden energy. According to astronomic observations the hidden matter would make up 90% of the universe and still remains unknown to men ... Hidden energy, hidden matter are still black holes in science."

BBS discussion: "Simply speaking, space is hidden energy, and hidden energy is space. Space is matter. It can be extremely harmful to cut them apart or to refer the hidden energy to some pure antimatter."

- Time is fixed without change – the absolute miss of relativity (<http://blog.china.com/u/060703/2812/200607/8124.html>)

"Time is a concept, a measure of the universe vacant space through the concept of space. Time is not matter. It is an invisible and intangible 0 in space – Time does not exist to moving matter... Light speed is capricious ..."

Beside the forum discussion, there are more to see: "Distance and time are 'illusory'; Things can be created from 'nothing'; The origin of the universe."<sup>6</sup>

As Dr. Odenwald acknowledges, "We don't have a full mathematical theory for describing this state yet, but it was probably 'multi-dimensional'...Nothingness (that gives rise to the present universe) was not nothing,

but it was not anything like the kinds of ‘something’ we know about today. We have no words to describe it and the ones we find in the Oxford English Dictionary are based on the wrong physical insight.”

And also the Japanese Emoto’s experiment illustrated in the Chinese version of Ref. 6:

“The crystal shape of water varies with human mental and lingual actions – It appears beautiful to kindness and ugly to malice.” See Ref. 7 for more in English.

Is human mind highly developed? Not at all in the reincarnation chain.

For valid introduction of scientific research on reincarnation see Ref. 8. An American psychologist holds that “70% of human can clearly recall his past life through hypnotization”, and there exists such a kind with inborn recollection.<sup>9</sup>

Modern science relies on instruments, eventually out of eyes, to derive conclusion - To put it bluntly, via sight, hearing, smelling, taste and touch senses in normal state. All achievements of current and prospecting science attribute to a self – I find, I deduce, I devise, I summarize, I set up ... However science shows inability to the essence of self. How surprising! How do those rules and theories hold valid? One feels more ignorant to such issues as ‘who am I’, ‘What is the *noumenon*, ontology of mind<sup>10</sup>’.

On the contrary, scientific discoveries in some aspects are approaching or partially proving Albert Einstein’s point that space, time and matter are illusions of human cognition.

Therefore the statement “Matter element R is of name N, character c and value v” actually stands for: “Matter element R *possibly* has name N, character c and value v - for indication only.” To carry out the discussion, I need to trace the origin of the name R.

### 3. Dialectic Matter Element

Matter element never exists alone. It relies on a cognition system or cognition model existing in a particular cognition background. For convenience we attribute both factors to cognition model which is supposed to imply the background. Prof. Cai calls it condition.

What is space? An unoccupied place – no space exists beyond the occupation, and therefore it is assumed and void. As to time, merely a procedure of matter change, and no time exists beyond this change. How can one calculate time if there were no celestial body? Therefore time relates to a base ground of matter change – it is a mental fabrication.<sup>10</sup>

Then the relativity, or condition in Cai’s words, of matter element, for matter element  $R=(N, c, v)$ . Suppose that under the same condition person 1 sees it as  $R_1=(N_1, c_1, v_1)$ , but person 2 sees it as  $R_2=(N_2, c_2, v_2)$ , ..., person k sees it as  $R_k=(N_k, c_k, v_k)$ . Are they same? If exactly so in mental perception, not only in language or name, we think it would be ridiculous, for the same name is reflected with different things in consciousness even in different instances of time. Now that  $R_1, R_2, \dots, R_k$  are different, where does  $R=(N, c, v)$  come from? ***What are the distinctions from other matter elements discovered?*** This is the start of our dialectic model: matter element exists dependently on cognition model and cognition procedure, otherwise it has no meaning.

#### 3.1. Definition

Our focus is on the origin of R and seen (in mental reflection) as  $R_1, R_2, \dots, R_k$ . There is an old saying in China: “Ten thousand time’s change does not depart from the original stand” – Let’s define the original stand R. If  $R_1, R_2, \dots, R_k$  are instance, partial or distorted appearances of R, it would be decisive to describe the R. For a man in different clothes at different time, we never regard his name equivalent to an instance in one particular dress, but we do regard in all the possible clothes. In other words, R signifies the identity of all the instant appearances relative to a particular perspective. In philosophy we call it the unity of opposites, or the identity in a contradiction.

Now that every  $R_k=(N_k, c_k, v_k)$  is partial, we need to describe the significance of the integral

$$\int \sum R_k \cdot d(\text{cognition model } k) \quad (3.1)$$

as the relatively more general representation of matter element, its limit is defined:

$$\text{dialectic}(R) = \text{Lim}_{n \rightarrow \infty} \int \sum_{k=1 \text{ to } n} R_k \cdot d(\text{cognition model } k) \quad (3.2)$$

as the most general model, or *dialectic matter element*, which should be recognized as the identity.

However does it converge? Never mind, since it signifies the multidimensional cognition procedure on a single element, and  $R_k$  acts as a particular case in cognition model  $k$ , one may confirm that he will eventually find the ultimate reality of the multidimensional appearances. How can it come?

Let's consider:

$$d(\text{cognition model } k) = d(\text{cognition model } k) / d(\text{cognition model } C) \cdot d(\text{cognition model } C) \quad (3.3)$$

where cognition model  $C$  denotes the ultimate common reference frame or reference system, and have

$$\text{dialectic}(R) = \text{Lim}_{n \rightarrow \infty} \int \sum_{k=1 \text{ to } n} R_k \cdot d(\text{cognition model } k) \quad (3.2)$$

$$= \text{Lim}_{n \rightarrow \infty} \int \sum_{k=1 \text{ to } n} R'_k \cdot d(\text{cognition model } C) \quad (3.4)$$

where  $R'_k = R_k \cdot d(\text{cognition model } k) / d(\text{cognition model } C)$ , i.e., matter element  $R_k$  in the ultimate common reference frame  $C$ 's respective.

The point: does there exist such a common reference frame? This can be a problem of unified field theory which science is not able to prove. However based on our persistent investigation on oriental classical culture we believe that the mutual ultimate common reference frame exists in everyone's hidden consciousness, and everyone can realize the genius to see the ultimate truth in the ultimate life.

Meaning:  $R$  in broad sense, or the identity in different scenarios.

Although Prof. Cai uses the term "*quanzheng wuyuan*" (literal: holo-character matter element) to describe, we still find it improper to the kernel issues. See the cognition model transformation implied:

What is  $R$  -  $R=(N, c, v)$  - How do you know - My feeling - Is you feeling valid - Never invalid - How to verify - Myself is the verification - What is yourself - ... .

Now to the point one can go no further, nor can science do, especially on something with reincarnation. Never mind. Since all the possible cognition models are included, even of the most genus species in some sense, or the ultimate species in evolution, it sees the essence. For this reason we propose the imaginary part in description as in number theory:

$$\text{dialectic}(R) = \text{imaginary part}(R) \quad (3.5)$$

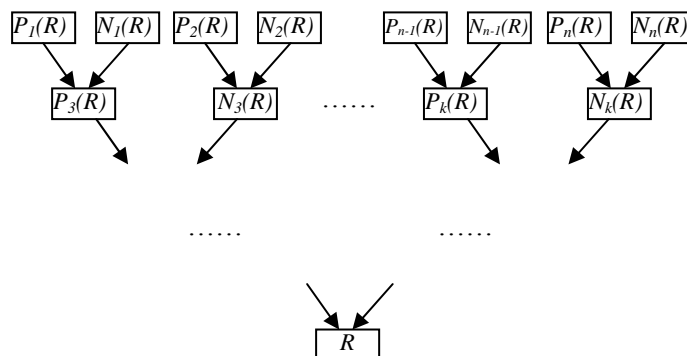
to distinguish from those based on the incompleteness discussed above, and from Prof. Cai's latent part definition  $lt(R)$ .

As to *completeness*: Just consider:

$$\int \text{PositiveImage} \cdot d(\text{a positive cognition model}) + \text{NegativeImage} \cdot d(\text{the negative cognition model})$$

Is it a more complete description?

Consider that  $R$  can be the dialect element in some aspect or scenario, but not in another, it is necessary to make it recursive ( $P$ : positive;  $N$ : negative) toward the endless chain :



Is it a more complete description now?

We would not use the term ontology which is widely used by scholars, since dialectic matter element can be inexpressible in some sense, but needs a name.

### 3.2. Properties

It defines existence via innate relations, and indicates the origin of contradiction.

Identity: the similarity of  $R'_k$  in view of a particular common cognition model, and thus the dialect sense of the matter element name is derived. This property uncovers the unity of contradiction implied in the name.

As to the term “identity”, we originally refer to a property in a Chinese theory “On Contradiction”, which means compatibility, consistency in the opposites. We can also let this issue open to the future.

Prof. Cai may express this property with “truth value  $> 0$ ”.

Contradiction: Although there exists identity, and thus exists a name, one cannot exclude the identity of opposites. The driving force of cognition lies just in these opposite cognition models. Extenics aims to contain contradictions and transform them, but might not be clear with such issue that contradiction serves as the source or impetus of evolution. And more in fact, contradiction best indicates characteristic of matter, which is the innate property distinguishing one name from another, and one cognition model from another.

Prof. Cai may express this property with “truth and false value = 0”.

Unknown property: identity fails to appear, so makes one feel unknown, or, no one regards the various  $R_k$  as the same existence.

Dialectic property: even though one sees identity, contradiction, unknown properties etc. but never sticks to, never asserts anything. He remains peace and quiet undisturbed, and in this way he relies on his deepest instinct to meditate, to touch the hidden forms of existence, and finally toward a kind of freedom, instead of logical means of truth or false. In other words: never arbitrarily assert anything (any  $R$ ) before the endless purification.

Procedural property: Matter element is not only a data representation, but also a deductive action, such as:

- Confirmative deduction: deduction based on supporting  $R = (N, c, v)$
- Opposing deduction: deduction based on negating  $R = (N, c, v)$
- Contradictory deduction: deduction based on both supporting and negating  $R = (N, c, v)$ . Extenics is designed to conduct this.
- Unknown behavior: I don't know, but may reserve the question.
- Those above signifies that a dialect reader is ready for both directions, pros and cons, or at a simultaneous parallelism, seemly neutral but not stand – He stands on no background, sticks to no logic, and therefore to be impartial.
- Dialectic behavior: neither to conduct positive deduction, assertion nor negative ones. Seldom intentionally resolve to settle conflicts or contradictions. In stead of sticking to what he understands, one remains calm, undisturbed in meditation, cultivating his innate instinct and finally reaching an insight or even a kind of freedom. Machines however are not apt at this.

Mechanical effect: Multiple deductions may coexist in a single cognition process, and the brain is just in the state of temporary balance under these multiple force actions. Therefore  $R = (N, c, v)$  is rather a cognition process or equilibrium property under cognition forces than a description of cognition state which would have no sense apart from a cognition process. Therefore  $R = (N, c, v)$  rather refers to behavioral action or force action than a concept or truth-false value based on some criteria. We hope this mechanical issue can reach



neural or biological sciences.

#### **4. Significance**

This model describes matter existence via identity property, describes matter distinctions via opposition property, and describes deeper relation of matter or characteristic via unity of contradiction. Just because this integral description implies the unity of contradiction based on opposite cognition models, it has the power to depict characteristic of matter.

In the extension perspective, one can develop extension behaviors:

- Positive extension: transformation based on identity property, to discover life-force of element
- Negative extension: transformation based on opposition property, to discover anti-life force of element
- Contradiction extension: transformation based on both identity and opposition properties, to discover characteristic and essence of element
- Unknown state: In case of unclear identity property, propose the question.
- Identity with others: to describe similarity.
- Opposition to others: to describe distinction, thus makes people discriminate things.

Since an element may have the multiple propensities as mentioned above, it would be more dialectic to base our descriptions on force action contrast, rather than on truth-false values which is hard to indicate multiple mechanical actions.

This description of dialectic matter element model has reached the unity of representation and action, of status and procedure, of static and dynamic states, of traditional logic and neural net, of narrow sense and broad sense, and of outside surface and essence.

#### **5. Concluding Remarks**

Dialectic processing suggests a revolution in information technology – the extenics oriented knowledge reform and the impact on cyber culture. It would redefine the scope of mathematics, as some pioneer mathematicians did.

As the difference between human and machine, human is precious with his wisdom to know himself. On the contrary, machine can be never more than a logic notebook. In this point of view dialectic cognition should not rely on some intelligent machine – never mount an additional head on your existing one, to make a big fuss beyond mind.

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