THE CLAIM OF THE MINIMUM CONTRADICTIONS AND ITS CONSEQUENCES IN THINKING AND PHYSICS

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Abstract

A purpose of this paper is to show that "Any system that includes the Aristotle logic(including the *sufficient reason principle*) and the earlier-posterior axiom leads to contradiction". This can also be stated as a Goedel like statement but it is not restricted by the arbitrary hypothesis that there is an algorithm which permits the derivation of only true statements. Another purpose is to show the consequences of this statement in thinking and physics by the aid of a claim for minimum contradictions; such a consequence is a stochastic matter-space-time physics on the basis of which new phenomena can be explained and the correlation between thinking and physics can be traced.

1. Introduction

Our experience that everything changes leads to dialectics. However, our experience of our basic communication system reveals that it obeys the Aristotle logic. Thus, the question of how we can speak logically for a changing world is raised. When we speak about an object C, we assume that it remains constant even though it has changed. Of course, in our thought there is not all information about the object C but some of its general characteristics which, at a first sight, remain constant; i.e. the object C falls into some categories which do not change during the change of C. This is an aspect according to which the laws of thinking are different from those of physical reality. Therefore, it is expected that our thinking leads to contradiction when it investigates physical reality.

Kant was the first to notice this fact; he showed that when logic is applied in reality itself, it leads to contradiction[1].

However, he claimed that beyond analytic propositions there are synthetic propositions a priori i.e. considered to be absolutely correct. According to Kant, these propositions relate to space and time and furthermore to arithmetics.

Because of the difference between the laws of thinking and the laws of reality itself many philosophical aspects have been stated which, at a first sight, seem to be irrational. When we say "everything changes", we can notice that this statement is in contrast with itself since it expresses something constantly valid. We could interpret this contradiction as follows: "everything changes" is constant as thought while at the same time it is something which happens in physical reality. Thus, a non standard logic stating irrational statements related to physical reality can be developed without these statements to be properties of thought. On this basis, non standard logic systems have been recently developed as the one of da Costa [2] which may be very useful for the solution of practical problems. However, the following question could arise: is thought something different from physical reality? Obviously, non standard logic systems cannot give an answer to this since their consistency is based on the existence of this difference.

The answer to this question could come from the investigation of thought i.e. investigation of what can produce statements regarded as a priori valid.

Thus, it would be important to show whether the Kantian system is valid; i.e. whether logic together with the notions of space, time or arithmetics can compose a complete and consistent system.

Relativity theory, Quantum mechanics and Goedel theorems have disturbed the Kantian system but not in such a way that we could state the following:

Statement I: "Aristotle logic with arithmetic lead to contradiction."

A purpose of this paper is to show that the sufficient reason principle is not more arbitrary than the rest Aristotle principles of logic and to show that statement I can be proved with the aid of this principle. Another purpose is to investigate the consequences of statement I in thinking and Physics.

2. GRT, QM and Goedel Theorems.

Relativity theory has disturbed Kantian system since it leads to various paradoxes as the twins paradox[3]. Moreover, according to Goedel, it leads to a universe in which the causality principle is violated[4]. QM implies a probability function according to which a particle can exist and not exist at the same time.
However, both the GRT and the QM are based on hypotheses which interpret the experience which has been revealed. They do not prove the disturbance of the Kantian system; they just show a disturbance through hypotheses which have until now been satisfactorily but not completely verified.
The strongest arguments against Kantian system are, perhaps, Goedel's theorems as it will be shown later. However, these theorems led to misunderstandings. What Goedel proved is: [5]

Statement II: "An ω-consistent system including Peano's arithmetics cannot be complete".

This statement was proved on the basis of the arbitrary hypothesis that there is an algorithm which permits the derivation of only true statements.
According to H.Putnam, *Goedel's second incompleteness theorem states that if a system 'S' of formalized mathematics – that is, a set of axioms and rules so precisely described that a computer could be programmed to check proofs in the system for correctness – is strong enough for us to do number theory in it, then a certain well-formed statement of the system, one which implies that the system is consistent, cannot be proved within the system.* [6]
As Putnam noticed, this Goedel's theorem had been misinterpreted; e.g. Lucas based his investigation on the statement[6]:

Statement III: "Any consistent system which includes Peano's arithmetics cannot be complete".

If statement III was valid, the Kantian system would be disturbed since this statement might lead to statement I. In fact, according to statement III, the system logic-arithmetics cannot be explained in a logical way; thus, it includes a contradiction, which does not permit its explanation in a complete and consistent way. Of course, statement III has not been proved in spite of efforts made by Church, Schroeter and others[7]. R. Penrose investigated the 2nd Goedel's theorem and, taking into account the fact that it is not completely valid in the form of statement III, concluded that: [8]

Conclusion I: There is a part of our thinking which cannot be computational; this part could be investigated by laws of physics.

There are doubts that there is a possibility for non computational thinking able to be investigated by the laws of physics to exist [6]; however, Penrose conclusion takes completely into account what exactly has until now been proved[8].
According to what was mentioned, neither GRT or QM nor Goedel's theorems have disturbed the Kantian system completely. However, they have showed a strong trend which we should investigate. This investigation will take place later on the basis of the Aristotle logic and on condition that it includes the sufficient reason principle.

3. The Aristotle Logic

It is known that the principles of the Aristotle Logic are the following[9]:
1. The identification rules i.e.:
1a. A is A,
1b. A is not ~A,
1c. It is impossible for something to be A and ~A
2. The Sufficient Reason Principle
The principles of the Aristotle Logic are not proved but it has been noticed that they are valid in our communication through the language.
For the purposes of this paper, we will use the Sufficient Reason Principle in its absolute form stated by Leibniz[10] as it will be shown later. This principle derives from the fact that we do not feel safe with any arbitrariness. We always want to find the reason why everything is valid.
The sufficient reason principle is not usually applied for the derivation of various theorems. For practical purposes, we accept some axioms as valid and we derive theorems which we can apply in a useful way.
However, the sufficient reason principle is not more arbitrary than the rest Aristotle logic principles; on the contrary it claims their complete application. For the purposes of this paper, this principle will be used since its main target is the statements validation in general and not some statements validation for practical purposes. More specifically, this principle, on condition that it is meaningful (see elucidation), will be used in the form of the following principles:

Principle I: No statement is valid without a sufficient-logical reason out from it.

Principle II: No statement is valid if it cannot be logically proved through some statements different from it.

Principle II declares that any statement in order to be valid must derive as an inference through other statements and not as an implication since as implications are regarded only the Aristotle Logic principles; thus, in order to avoid any further arbitrariness we should claim the provability of a statement through other statements which are considered to be valid.
In order to avoid any misunderstanding, in the following, when we say Aristotle Logic, we mean the logic which obeys the principles 1a, 1b, 1c and 2, where the principle 2 is stated through principles I and II.

Elucidation:
1) The Sufficient Reason Principle cannot apply to Aristotle Logic itself since according to this principle Aristotle Logic requires Aristotle Logic (logical reasons); this makes any other reason non active.
2)The Sufficient Reason Principle has no meaning out from logic since it requires the existence of logical reasons.
3) We don't know if the Aristotle Logic is valid. In the following, we suppose that Aristotle Logic is valid; thus, it can apply to the text of the proof that follows. If Aristotle Logic were non valid, then it itself would impose the silence, and any logical communication would have meaning only on the basis of a claim for minimum contradictions (see section 5); this claim is the main target of this paper.

4. The Contradictions of logical systems

For the purposes of this paper we use symbolic logic [11] but the inferences produced are not the same as the ones of the known proposition logic. The Aristotle Logic we use is denoted as Λ and , as it was mentioned, it includes the Sufficient Reason Principle.

On this basis, the following statement will be proved as valid:

Statement IV: Any system which includes Aristotle logic Λ *and at least one statement which is not theorem of* Λ *leads to contradiction*.

Proof: We consider a statement A regarded as a set of statements so that:

$$A \equiv A_1 \cdot A_2 \cdots A_n$$

We consider also the system:

$$\Pi \equiv \Lambda \cdot A$$

According to logic Λ, in general it is valid that:

$$\Pi \text{ is complete} \vee \Pi \text{ is not complete} \qquad (1)$$

The notion of *completeness* is related to the Aristotle Logic Λ. In this work, we consider that the system $\Pi \equiv \Lambda \cdot A$ is complete if the statements which derive from it, including the Logic Λ and the statement A, are valid due to the system itself and not due to any other further statements.
According to the sufficient reason principle, statement A must have a logical reason to be valid; this principle cannot apply to Logic Λ itself which is regarded as valid(see elucidation of section 3). According to this principle in general, we have:

$$A \Leftrightarrow (\Lambda \supset A) \vee \text{“}A \text{ is logically proved through some statements different from it”} \qquad (2)$$

where “$\Leftrightarrow$” means equivalence and $\Lambda \supset A$ means that A is theorem of Λ.
If Π is complete, it means, as it was mentioned, that its validation is due to the system Π itself and not due to something out of it.
Thus, if Π is complete because of (2) we have:

$$A \Leftrightarrow (\Lambda \supset A) \qquad (3)$$

Relation (3) is in agreement with what proposition logic has proved for Principia Mathematica; it has been proved, with the aid of logic, that this system is complete and consistent and therefore there is sufficient reason for its validation on condition that logic is valid; its axioms are compatible with logic[5].
If $\sim(\Lambda \supset A)$, we have that $\Lambda \cdot A$ leads to contradiction since according to (3), $(\Lambda \supset A)$ is the only condition for A to be valid.
Thus, statement (1) on condition that $\sim(\Lambda \supset A)$ leads to:

$$\Pi \text{ is inconsistent} \vee \Pi \text{ is not complete} \qquad (4)$$

Statement (4) can be extended to any system $\Pi' \equiv \Lambda \cdot A \cdot A'$ since $\sim(\Lambda \supset A)$ implies that $\sim(\Lambda \supset A \cdot A')$. Thus, we can notice that statement (4) is a Goedel like statement because it can be stated in the following form:

Statement V: Any consistent system which includes Aristotle logic Λ *and a statement which is not theorem of* Λ *is incomplete.*

According to statement V, we never have a complete system on condition that it is consistent and on condition that $\sim(\Lambda \supset A)$. This means that if we add any number of statements(even

infinite), the system produced remains incomplete when the conditions mentioned are valid; thus, if the produced system is consistent, we can never state logically the deeper reasons of Π validation i.e. Π cannot be logically proved through any system of statements different from it. *This is in contrast with the sufficient reason principle (principle II); therefore, if the system under discussion includes this principle, it cannot be consistent i.e. it leads to contradictions.*
But the statement:

$$\sim(\Lambda \supset A) \tag{5}$$

is valid on condition that:

$$\sim(\Lambda \supset A_i) \tag{6}$$

where A_i any statement of the set of statements $A \equiv A_1 \cdot A_2 \cdots A_n$.
Thus, we always have contradiction if $\sim(\Lambda \supset A_i)$. This proves statement I which, as it will be shown in the following, can apply for the case of the earlier-posterior axiom.
The earlier-posterior axiom in arithmetic can be stated as follows:

1. *Zero (0) is a number* (7)
2. *There is the next of any number x* (8)

For x=0 the next is 1. If this axiom was theorem of logic Λ , then the number 1 should derive from 0. However the notion "1" is not included in the notion "0" and, therefore it is not valid that:

$$\exists(x=0) \supset \exists(x=1) \tag{9}$$

In fact, according to the common way in which we learn and use numbers, we can correspond 0 to non existence of something and 1 to its existence. Of course, the non existence of something cannot imply logically its existence. Thus, the earlier-posterior axiom is not theorem of logic; therefore statement IV can apply to systems, which include this axiom i.e. the following can be stated:

Statement VI: Any system which includes Aristotle Logic Λ and the earlier-posterior axiom, leads to contradiction.

5. The Claim of the Minimum Contradictions-Consequences in Thinking

5.1 *General*
Our basic communication system consists of Aristotle logic and of a hidden axiom which postulates the existence of earlier and posterior. In fact, every word or phrase is constructed in such a way that the letters or the words are put one after the other. Thus, the basic communication system obeys the statement VI; However, we notice that statement VI cannot be stated because it is based on the basic communication system which, according to statement VI itself, is contradictory.
Thus, statement VI imposes the silence.
When we communicate, we use a hidden claim according to which *"what is accepted as truth is what includes the minimum possible contradictions"* since the contradictions cannot be vanished . According to this hidden claim, which we could name as *"claim of the minimum contradictions"* [12], we obtain a logical and an illogical dimension. In fact, through this

axiom we try to approach logic (minimum possible contradictions) but at the same time we expect something illogical since the contradictions cannot be vanished.
It is noted we cannot state that *this claim is true* because of statement VI. According to this claim, statement VI can be stated, since contradictions are permitted, but it leads to *silence. Thus, the claim of the minimum contradictions can be regarded only as a necessary condition of communication. Therefore, this claim, and whatever derives from it, includes the arbitrariness deriving from breaking the silence while, at the same time, it constitutes a tendency to logic.*

5.2. The "Causa Suis" Claim
According to the claim of minimum contradictions, statement VI can be stated. Thus, any statement A, since it is expressed through language, is contradictory. If we assume A as valid, then A cannot be explained i.e. it behaves as causa suis.

5.3 Comparison with Putnam's Minimal Principle of Contradiction
At this point, it would be interesting to compare the present aspect with Putnam's, according to which "There is at least one a priori truth"[13]. According to statement VI, our communication system leads to contradiction. Thus, the question is raised: Can we say that nothing is truth? If so, according to Putnam, there is the truth: "nothing is truth". However, according to statement VI, "nothing can be stated", therefore, it cannot be stated that: "nothing is true", "it is true that nothing is true", "nothing can be stated", " it is true that nothing can be stated" and so on. For the same reason, it cannot be stated that the minimal principle of contradiction is true i.e. it cannot be stated that it is true that *not every statement is true and false.* As it was mentioned, it can neither be stated that the claim of the minimum contradictions is true since this claim includes the arbitrariness deriving from breaking the silence.
We may notice that the difference of the present aspect from Putnam's is due to the inner structure of language i.e. to the earlier-posterior axiom.

5.4. Relative Aspects
The claim of the minimum contradiction appears during communication. It is a consequence of empirically confirmed principles and, therefore, it can be regarded as an empirical principle. Due to the existing contradictions, it implies a non definite description of things. There are already expressed points of view according to which language cannot define exactly the things.
Heracletus says for speech (or reason) : "… ούτε λέγει ούτε κρύπτει αλλά σημαίνει" (…neither says nor hides but signifies) [14]. This is compatible with an ontological point of view (in Greek αποφατική άποψη) which is characterized by the notion "συναμφότερον" which means that something is accepted as valid even if it is contradictory [15]; the latter has been empirically verified through investigation of texts from ancient times until now [16].
The communication vagueness implied by the claim of the minimum contradictions seems to have similarities with the vagueness of Wittgenstein's language games. However this claim derives on the basis of correctness rules in contrast to Wittgenstein's point of view[17].
In all these cases, the present point of view might reinforce what intuitionally was accepted as valid.
It is noted, according to the claim of the minimum contradictions, that there is a logical and an illogical dimension in our understanding the world. This facilitates us to approach in a logically linked way notions such as freedom, will, faith, intuition e.t.c. which are incompatible, in a first sight, with our original logical way of thinking [12].

5.5. Conclusions
Taking into account the above mentioned, we may draw, in relation to thinking in general, the following:

1.Language is something dynamic and flexible and these properties are due to the basic communication system which could be the foundation of a universal language which is accepted as existing [18].
2.There is a strong indication that thought is a part of physical reality since, according to statement VI and to the claim of the minimum contradictions, our way of thinking is characterized by uncertainty as reality itself does.
3.Many points of view are compatible with the present aspect. However, it is out of the limits of this paper to mention them. What can be said is that this point of view approaches the inability of our basic communication system through a commonly accepted way i.e. through the basic communication system itself.

6. Consequences in Physics

6.1 *General*
The systems of axioms we use in Physics include the communication system and, therefore, their contradictions are minimized when they are reduced to the communication system itself. *Therefore, we have minimum contradictions in Physics when it is based only on the basic communication system i.e. on the Aristotle Logic and on the 'earlier-posterior axiom'*[19].
In order that such a physics will be valid, a unifying principle is needed since everything, i.e. matter, field, space-time should be described in earlier-posterior terms.
Thus, *in a first sight*, for a least contradictory physics we can state the following statement:

Statement VII: Any matter space-time system can be described in earlier –posterior terms.

It is noted that time implies the existence of earlier and of posterior; space does, too. If I say 10 cm, I mean the existence of 1,2,...,9,10 i.e. the existence of earlier and of posterior. Therefore, the existence of earlier and posterior is the condition for space and time to exist and vice - versa. Thus, because of statement VII, for a least contradictory physics we can state the following statement:

Statement VIII: Any matter system can be described in space-time terms.

Since everywhere there is space-time and not something else, space-time can be regarded as matter itself. A matter system, in general, has differences within its various areas. This means that a matter system, in general, is characterized by different rates of earlier - posterior (time) within its various points. Since space is also locally affected by the local rate of earlier-posterior, it is expected to be deformed due to different rates of earlier-posterior.
In a second sight, taking into account the above mentioned and applying the claim of the minimum contradictions, we conclude that matter-space-time can have logical and contradictory behaviour at the same time; this can be valid when space-time is stochastic.
Notice: The stochastic space-time mentioned does not imply a probabilistic determinism because, according to what was mentioned, in sections 5.1, 5.2 it is implied that there is always an arbitrariness deriving from breaking the silence. This will become clearer in section 6.4.

6.2 *A Stochastic Space-Time Geometry* [20].

a. Definitions
For the purposes of this section the following definitions are useful:
i. *As reference spacetime we define a euclidean spacetime to which, through transformations of deformity, any field can correspond.* Any magnitude of it will be denoted by the subscript $_0$. A point A_0 of the reference spacetime occupies, by the action of the field, a position $A \neq A_0$

ii. *As Hypothetical Measuring Field (*HMF) is defined *a hypothetical field, which consists of the reference spacetime, in which at every point* A_0 *exist the real characteristics of the corresponding point* A *of the real field..*
iii. *In a* HMF, *we define as relative spacetime magnitude sr the ratio of a real infinitesimal spacetime magnitude ds to the corresponding infinitesimal magnitude* ds_0 *of the reference spacetime*: i.e. $sr = ds/ds_0$. This can apply to any magnitude, *i.e .to relative time* or to *relative length* in a direction $\vec{n}$. Relative spacetime magnitudes can apply either to a spacetime continuum, or to a statistical matter field. In the latter case, the above magnitudes are designated with a dash ($^-$) which denotes the local mean value.

b. A General Property
On the basis of the conclusions of section 6.1, without any other assumption, for the mean value $\overline{sr}(\vec{r},t)$ of any relative space-time magnitude at a point $(\vec{r},t)$ of the HMF, it is valid:

$$\overline{sr}(\vec{r},t) = \left\langle \overline{sr} \right\rangle V_0 P(\vec{r},t) \qquad (10)$$

where $P(\vec{r},t)$ is the matter presence probability density and V_0 the volume of the reference space-time. This function implies that any space-time magnitude can exist and not exist at the same time and that there is a logical structure in terms of probabilities which characterizes the matter-space-time distribution.

c. The Property of Self Similarity
On the basis of Eq.(10), the property of self similarity can be proved as valid. This property has been observed in chaotic systems with an inner structure and this has been widely verified through fractal geometry[21].

d. The non Locality Effect
There is a phenomenon of interaction at a distance without transmission with certain velocity of this interaction through some medium. Such a phenomenon has been experimentally verified by Alen Aspect[22], and it might be explained according to what was mentioned in paragraph b. In fact, according to eqn(10), the "non existing" which is dimensionless has a probability to "exist" everywhere. Therefore*, the distance between two different points of a space-time-matter field has a probability to be zero.* Moreover, the "non existing" might be regarded as active due to the energy conservation principle[23]. Thus, an active "non existing" due to zero distance might act everywhere at the same time.

e. The Logical Dimension of Thought.
As it has been mentioned, the "non existing" is out of space-time; therefore, it is not characterized by the earlier-posterior axiom; therefore, statement VI cannot apply to it. Thus, the "non existing" seems to be non contradictory and this might be the reason of the logical part of our thought since it might be regarded as active. However, we cannot approach this notion logically; it could be treated through the claim for minimum contradictions.

6.3. *The Hypothesis of the Quantum Space-Time(QST)* [20]
Taking into account the conclusions mentioned in sections 6.1, 6.2, we can reach a quantum space-time mechanics which is equivalent to the hypothesis of the quantum space-time (QST); this hypothesis is based on the unification of the physical meaning of the notions which derive either from the GRT or from the QM[20].
According to the QST hypothesis, the QM is valid in the HMF, while the GRT can be regarded as valid when the spacetime uncertainty has a tendency to be eliminated. The matter-space-time can be defined by means of a Ψ function while at every point of the HMF the gravitational acceleration can be expressed through a unified formula which can be applied

for any field. Thus, under certain assumptions, the results and the consequences of either the GRT or the QM can be regarded as valid through this hypothesis. This does not disturb the already verified while it provides new possibilities for new phenomena explanation. Thus, overunity effect phenomena related to heavy and light water electrolysis[23] as well as the Casimir effect[20], can be explained on a fundamental basis with the aid of this hypothesis. According to this hypothesis, a matter field can be described locally by a particle field whose probability density function $P(\vec{r},t)$ can derive from Schroedinger's relativistic equation because this equation, according to the QST hypothesis, characterizes locally any field . This implies that $\overline{sr}(\vec{r},t)$, $P(\vec{r},t)$ can be either positive or negative; positive values could correspond to matter and negative ones to antimatter.
All these are also valid for the electromagnetic (em) space which is regarded as a gravitational space whose magnitudes are imaginary[23].

6.4. *Conclusion*s
The above mentioned require many irrational notions. The Ψ function is complex, which cannot be logically explained. The notions of negative or imaginary space-time are not comprehensible. The notion of a negative probability density is not logical. The notion of an active "non existing" is out of any logical approach. It is noted that Ψ wave function cannot be defined since there are not boundary conditions for something incomprehensible. This affects the $P(\vec{r},t)$ function. Thus, there is always the arbitrariness mentioned in the notice of section 6.1. However, all these can have a physical meaning and at the same time can be approached through a logical structure, a fact which requires such a way of thinking that they could be mentally accepted. This way of thinking might be provided through the claim of the minimum contradictions, according to which we approach the reality logically while, at the same time, we expect contradictions. It is noted that statement VI leads to a different physics if stated as a Goedel like statement[24,25]. However, such a statement is restricted by the hypothesis of system consistency; this is equivalent to the aspect that it is a priori accepted that thought differs from physical reality.

7. Discussion

We may notice that the simple principles of Aristotle logic which at a first sight seem to be obvious to any one lead in a reasonable way to a more complicated way of thinking which is characterized by contradictions and by a tendency to logic at the same time. This thinking is in agreement with what the experience of communication has revealed and it is powerful enough to have laws of physics derived. According to this thinking there are not privileged areas in nature; even thought is regarded as a part of physical reality. However this way of thinking even linked is far from what at a first sight we regard as truth.
It is noted that the claim of the minimum contradictions and some of its consequences were stated in previous works [12,19,20,23,26]. However, the proof of statement VI did not explicitly refer to the sufficient reason principle. This work aimed to present a more integrated aspect about the claim of the minimum contradictions and its consequences. This Paper was presented at the Vienna Circle International Symposium on Logical Empiricism held in Vienna 2001 and here it is presented again due to its connection with the problems of Natural Sciences.

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