

Principles of a New Mechanics (re-writing, 2005).

Ilya Geller

igeller@lexiclone.com

Abstract.

There are two theories – the Theory of Internal Relations and the Theory of External Relations, for which:

1. For the Theory of Internal Relations Reality consists of a closed and countable set of objects-and/or-subjects; where change in any object-and/or-subject can be observed only through a change in the state of the given object-and/or-subject;
2. For the Theory of External Relations Reality consists of an open and uncountable set of objects-and/or-subjects; where change in any object-and/or-subject can be observed only as a relation between no less than two objects-and/or-subjects.

I consider the Theory of External Relations to be the boundary case for the Theory of Internal Relations: a closed and countable set in time becomes an open and uncountable one, within limits. Reality in time strives to become Reality in the immutability of eternity: the objects-and/or-subjects of Reality are the second derivative from Reality, which strive to integrate themselves into the state of the first derivative from Reality and cease to be objects-and/or-subjects.

Reality.

According to the Merriam-Webster Online Dictionary:

Main Entry: re-al-i-ty

1 : the quality or state of being real

2 a (1) : a real event, entity, or state of affairs <his dream became a *reality*> (2) : the totality of real things and events <trying to escape from *reality*> b : something that is neither derivative nor dependent but exists necessarily

- in reality : in actual fact

I consider Reality to be everything that is and is not.

The Theory of External and Internal Relations.

There are two theories - the Theory of Internal Relations and the Theory of External Relations¹. For the Theory of Internal Relations, the universe is closed and the number of objects-and/or subjects is finite; for the Theory of External Relations, the universe is not closed and the number of objects-and/or-subjects is infinite.

In reference to the Theory of Internal Relations, Ludwig Wittgenstein wrote:

"6.45 To view the world *sub specie aeterni* is to view it as a whole - a limited whole.

6.522 There is indeed the inexpressible. This *shows* itself, it is the mystical."²

The Theory of Internal Relations observes all the changes in the universe, without exception, only through the refraction of those changes within a single given object-and/or-subject.

The Theory of External Relations is the one generally accepted in science: on the basis of its position one observes the external signs of the relationships between an infinite number of objects-and/or-subjects while completely ignoring the changes in their internal state. Such a result is attained by means of abstracting from all the internal properties of objects-and/or-subjects. Moreover, for observing External Relations one needs a minimum of two objects-and/or-subjects.

Mechanics, Thermodynamics, Geometry and Topology.

In so far as the New Mechanics proposed by me in this article observes changes in Reality from the point of view of changes in the internal state of objects-and/or-subjects of the second derivative from Reality, it isn't exactly Mechanics, but rather an eclectic mix of Mechanics and Thermodynamics – a kind of Mechanical Thermodynamics.

Also, the observable objects-and/or-subjects of Reality are always supposed to be sets of the parts constituting them – sets of the light quanta constituting them, sets of light quanta among a limited set of light quanta – and so Geometry is not applicable to the New Mechanics: sets don't recognize measures of "distance between", but only quantitative measure – the quantity of light quanta in a given object-and/or-subject.

I consider Geometry to be the exclusive prerogative of the first derivative from Reality and in no way applicable to the second derivative from Reality. Only Topology can be used productively in the description of objects-and/or-subjects of Reality in its second derivative.

Light Quantum.

A light quantum³ is multiple and exists only in changing time; a light quantum is recognized as an always open, in no way limited object of the second derivative of Reality; a light quantum has no complete, fixed form-and/or-content.

If a light quantum is singular, complete and limited – if a light quantum has a mass at rest and can be measured in terms of (linear) Geometry – it doesn't exist in time, it isn't in the world of the second derivative from Reality. It only exists in the world of eternal immutability as Reality, as well as in the world of immutable time of the first derivative from Reality.

Form and Content.

All objects-and/or-subjects of the second derivative from Reality have constantly changing forms-and-contents, divisible by the form and content of a light quantum in a state of rest. Changes of form-and-content can, in the terms of Newtonian Mechanics, be called "accelerations".

Exact measurement of the change of the form-and-content of the objects-and/or-subjects of the second derivative from Reality is impossible, in so far as such changes are constant.

Multiplicity and Singularity.

There are three hypostases of Reality; where Reality is the all:

1. The first hypostasis is the closed immutability of the singularity of Reality, having no parts, no internal world and no experience of time.
2. The second hypostasis is the closed immutability of a singularity which is a set with an internal world but existing in a constant, unchanging time - a singularity which, by its essence, does not appear as one. This state is the first derivative from Reality. By way of illustration, it is a light

quantum in a state of movement without acceleration. This condition is the boundary point for the objects-and/or-subjects of the second derivative from Reality.

3. The third hypostasis of substance is the constantly changing set of light quanta in the second derivative from Reality (the objects-and/or-subjects of Reality, any of which consists of a set - no less than one - of light quanta).

In other words:

1. There exists only one, singular, closed "material point". This is Reality.
2. The second type of objects-and/or-subjects of Reality exists neither in changing time nor in eternity.

I think that this type of objects-and/or-subjects ceases to exist in the world of changing time. This type of objects-and/or-subjects of Reality could be called "material points", although they don't appear as such: they are sets, not singularities. However, a "material point" should be a solid without any internal nature. The second type of objects-and/or-subjects of Reality could also be called "points of accumulation"⁴, although they don't appear as such: they are singularities, not sets.

3. Only the sets of objects-and/or-subjects of the second derivative from Reality, which I have called "points of accumulation", really exist – as present in sensations, in continuous interrelation. "Points of accumulation" are always open sets of light quanta: "points of accumulation" are always in changing time.

"Points of Accumulation".

Any "point of accumulation" is taken to be an open set of light quanta, consisting of no less than two light quanta. "Points of accumulation" are always and continuously changing, interacting with all other "points of accumulation", constantly including sets of light quanta into themselves and being themselves included in other sets⁵. "Points of accumulation" are the objects-and/or-subjects which I observe - The Theory of Internal Relations is the Theory of "points of accumulation".

"Material Point".

Where "material points" are concerned there is a simultaneous solution to the boundary problem - "material points" are single, closed, have a boundary and are absolutely separable. The number of light quanta in the composition of a "material point" is indefinite and undefinable.

The Single Law of Nature.

One supposes the Single Law of Nature to be the striving of a set to become a singularity: the second derivative strives to "integrate itself forward" by becoming the first derivative from Reality and/or Reality itself.

Measure. Observation.

In order to measure, one needs to observe. Observation always involves an interrelation between the subject and the object-and/or-subject of the observation. Observation means a change in the observer as well as in the observed: the observed "point of accumulation" is included in the environment of the observer.

Measure exists only in changing time – measurement is the observation of the world of the second derivative from Reality, from within the second derivative from Reality. There is no such thing as measure for "material points".

From the point of view of the second derivative from Reality it is impossible to make judgments about the quantity and qualities of "material points": "material points" cannot be observed. An observed "material point" is already a "point of accumulation".

The measure for "points of accumulation" is the relation of their content to their form, which is called the Continually Changing Density of "points of accumulation":

$$P' = \frac{m}{1 + dl} \quad \text{and} \quad P'' = \frac{l}{m + dm}$$

where P' and P'' are the Continually Changing Density of a "point of accumulation".

where m is the content of a "point of accumulation" (not its mass!).

where l is the form of a "point of accumulation" (not its distance, not its volume!).

where dm and dl are the increment in the content or form of a "point of accumulation" when compared with the Constant Density of "material points". The values dm and dl are also called the "defect" of a "point of accumulation".

In so far as "material points" are the boundary point for "points of accumulation", the Density of "material points", as the Density of light quanta in a state of rest, is the boundary point for "points of accumulation". And even though from the point of view of an observer in the second derivative from Reality there is no such thing as the density of a light quantum in a state of rest, such a boundary point is called the Constant Density of "material points" and is the non-existent abstraction:

$$P = \frac{m_1}{l_1} = \frac{l_2}{m_2},$$

[

Absolute Symmetry.

It is proposed that there is such a thing as absolute symmetry – the relation of content to form in "points of accumulation" can take on the same values as the relation of form to content.

For example, this means that for a light quantum the relation of its mass at rest to its form at rest is equal to the relation of its form at rest to its mass at rest. In other words, if the mass at rest of a light quantum is 0 and its form in space is 1, then

$$0/1=1/0$$

From this we can make the following affirmation: there exist two kinds of light quanta. One has form. The other has content.

Moreover, one can divide something by zero as well as one can divide zero by something.

Inertia.

The definition of Inertia, then, comes out of the previous considerations:

$$In = P' - P \text{ or } In = P'' - P$$

In other words, Inertia is equal to the defect of a given "point of accumulation".

Nevertheless there also exists (as was mentioned above) a certain intermediary state - that of the first derivative from Reality:

$$P' = \frac{m_1}{l_1 + dl} = \text{const} \text{ and } P'' = \frac{l_2}{m_2 + dm} = \text{const};$$

where both P' and $P'' \neq P$,

In other words, a "point of accumulation" can attain a certain Constant Density of the first derivative from Reality, different from the Constant Density of a light quantum into Reality.

Mass and Dimensions.

Mass and dimensions exist as Geometric magnitudes, as strict abstractions that are non-existent for the second derivative from Reality.

Irregularity of Atomic Weights.

There is an explanation for the irregularity, the leaps, in the relation of the content of the atoms of chemical elements to their forms: the second derivative from Reality spreads out into those forms that have a value closest to that of Constant Density. In other words, the relation of form to content or of content to form for every chemical element is the value closest to that of Constant Density. The life duration of a chemical element is directly proportional to the closeness of the relation of that element's form to its content or its content to its form, to the value of Constant Density: the value of Inertia defines the life duration of chemical elements.

The Law of Nature.

The Law of Nature for the first derivative from Reality is expressed in the standard formula of Newtonian Mechanics:

$$G \frac{m_A * m_B}{l^2} - F = 0$$

where m_A and m_B are the mass of two "material points",

l^2 is the Geometric distance between two "material points",

G is the relation of the number of all existing light quanta to the number of light quanta in the state of the first and second derivatives from Reality,

F is the force of two "material points" in the state of the first derivative from Reality as they strive to return and/or pass into the state of Reality,

0 is Reality.

The Law of Nature for the second derivative from Reality is expressed in a formula that is a derivative from the Law of Nature for the first derivative from Reality:

$$\frac{m_1}{l_1 + dl} * \text{tr} \left(\frac{dl}{dt} \right) * \frac{m_2}{l_2 + dl} * \text{tr}' \left(\frac{dl}{dt} \right) * d \left(\frac{L}{M} \right) - F = 0;$$

or

$$\frac{l_1}{m_1 + dm} * \text{tr} \left(\frac{dm}{dt} \right) * \frac{l_2}{m_2 + dm} * \text{tr}' \left(\frac{dm}{dt} \right) * d \left(\frac{M}{L} \right) - F = 0;$$

where:

$m_1/(l_1 + dl)$ and/or $l_1/(m_1 + dm)$ is the Continually Changing Density of the first "point of accumulation";

$m_2/(l_2 + dl)$ and/or $l_2/(m_2 + dm)$ is the Continually Changing Density of the second "point of accumulation";

tr is one of the trigonometric functions - *sec*, *sin*, *cosec* and *cos*;

dt is an interval of time;

$d(M/L)$ is the Continually Changing Constant, the relation of the number of all existing light quanta to the number of light quanta in the state of the first and second derivatives from Reality;

F is the force of a given "point of accumulation" as it strives to pass into the state of the first derivative of Reality; where a given "point of accumulation" is a set of no less than two parts.

0 is Reality.

Trigonometric Functions in the Law of Nature.

The presence of the functions **sec**, **sin**, **cosec** and **cos** – in the Law of Nature for the second derivative from Reality is explained by the non-linear character of the decrease or increase of the value of inertia of "points of accumulation". I suppose the character of the decrease or increase of the value of inertia of "points of accumulation" to be harmonious. In other words, the presence of these functions in the formula is purely speculative.

Moreover, when they reach the boundary point – the trigonometric functions become equal to 1 or 0 – the laws of the New Mechanics pass into the Law of Nature of Newtonian Mechanics for the first derivative. And the trigonometric functions become equal to 1 or 0 when the increment of form or content of the "point of accumulation" ceases to exist – the "point of accumulation" ceases to accelerate – the "point of accumulation" becomes a "material point".

The Continually Changing Constant.

The Continually Changing Constant - G in the Law of Nature of Newtonian Mechanics, $d(M/L)$ in the New Mechanics – is, in Newtonian Mechanics, a constant. This is because, for the first derivative from Reality, there is no changing time. This constant characterizes the relation of the number of light quanta in a state of rest to the number of those that are not in that state. That magnitude cannot be said to be constant for the second derivative from Reality, as it is changing continually. If one is situated within the second derivative from Reality, it is impossible to fixate the change $d(M/L)$.

Nevertheless, one cannot rule out the existence of other Universes.

Conclusion.

A "point of accumulation" strives to become a "material point" with a force F proportional to its defect. Such a striving is always present in any "point of accumulation", in any given object-and/or-subject. In other words, I suppose human reason to be a manifestation of that striving.

Such a supposition gives me a weighty argument in favour of the following speculation: the world surrounding humanity is a rational one!

1 B.Russell. My Philosophical Development

2 Ludwig Wittgenstein. Tractatus Logico-Philosophicus

3 I take a quantum to be the *apeiron*, the smallest existing division of Reality - "the *apeiron*, from which the elements [are formed]." Anaximander of Miletus.610-656 B.C.

4 A point of accumulation (an open set) always strives to become a/the material point (a/the closed set); and that this striving is the motivation for the universe to "spin" around, to change: the point x of the topological space $X \rightarrow M$ strives to include (for the sake of closeness) some other points of accumulation in its neighborhood.

5 This means that the boundary problem - the problem of finding the boundary of the objects-and/or-subjects of the Universe, the search for where a given "point of accumulation" ends - does not have and cannot have a solution.