"...I believe that the theory that space is continuous is wrong, because we get these infinities and other difficulties, and we are left with questions on what determines the size of all the particles. I rather suspect that the simple ideas of geometry, extended down into infinitely small space, are wrong."

Richard Feynman

"It is true that the concept of three-dimensional time is in direct conflict with the ideas of homo sapiens, but it is only conflicts with facts that are fatal, and human ideas as to the dimensions of time are not factual. As brought out previously, the long-standing concept of time as one-dimensional is based on a misunderstanding of the nature of time dimension. A dimension of time is not a dimension in space, nor is it anything space-like; it is a property of time itself. The scalar nature of the time term in the equation of motion is not a result of time being one-dimensional; it results from the fact that time has no direction in space, regardless of how many dimensions or directions of its own it may have. Thus there is nothing at all in our observations that precludes time from being three-dimensional, as required by the conclusion that time has all of the properties which we observe in space.

Dewey B. Larson

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EXECUTIVE ORDERS FROM ISUS PRESIDENT

Year: 1992-1993

1. The president rules that Nehru's paper on the birotating photon does not meet the qualifications established by ISUS for publication. It presents a completely different theory of the photon, not an extension or revision of the RS concept. In our system there are four possible basic scalar motions: uniform linear motion, linear vibratory motion, uniform rotational motion, and rotational vibratory motion. We identify units with linear vibratory motion as photons. There can be no rotation before the existence of the photon, where only the uniform space-time progression exists (and this can in no way be caused to rotate). The rotations of the sub-atoms and the atoms exhaust all the possible dimensions for rotation.

2. The president rules that Kirk's article claiming that space-time is equivalent to nothing be thrown out, as it is not in keeping with the elementary rules of logic. A is A and not non-A. Space-time is space-time and not nothing. In the context of a universe of motion, nothing means zero motion (and is non-existent). But space-time is unit motion (and is an existent—in S. Alexander's phrase it is the "stuff" of all existents). Therefore space-time is not nothing. Q.E.D.

3. The president has requested Ronald Blackburn to add the first paragraph of chapter one of Larson's New Light on Space and Time to the brochure to replace the removed section on prices.

4. The president rules that quality is far more important than quantity in regard to the number of pages or issues of Reciprocity. The president is intent on enforcing a stricter interpretation of the publishing policy of ISUS to ensure the continued integrity of the Reciprocal System. It is important to remember that ISUS is a scientific organization and not a writers' club. The president does not want ISUS to be embarrassed if a well-known establishment figure picks up a copy of Reciprocity and reads it.

On November 22, 1992, signed

[Signature]

ISUS President
### National Science Foundation
**Small Business Innovation Research Program**

**PROJECT SUMMARY**

<table>
<thead>
<tr>
<th>NAME OF FIRM</th>
<th>Transpower Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS</td>
<td>1 Oak Drive</td>
</tr>
<tr>
<td></td>
<td>Parkerford, PA 19457</td>
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</tbody>
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**PRINCIPAL INVESTIGATORS (NAME AND TITLE)**

Ronald W. Satz, Ph.D., Systems Engineer & President

**TITLE OF PROJECT**

A Crucial Experiment: Scattering with Neutralized Alpha Particles

**TOPIC TITLE**

Physics

**TECHNICAL ABSTRACT (LIMIT TO 200 WORDS)**

On p. 360 of *Intermolecular Forces: Their Origin and Determination* (Oxford: Clarendon Press, 1981), authors Geoffrey C. Maltland, Maurice Rigby, E. Brian Smith, and William A. Wakeham state "These observations lead inevitably to the conclusion that none of the potential models used for these tests has been a good representation of the entire, true intermolecular function." So not all is well with the conventional electrical theory of matter originated by Ernest Rutherford.

Rutherford's experiments of 1911 did, of course, disconfirm Thomson's "plum pudding" atom model, and if Rutherford's model were the only alternative left, we would have to conclude that it is correct. But there are always alternatives. Another type of force could be causing the repulsion of the alpha particles. To verify that electrical forces are causing the scattering, one would have to bombard the gold foil with the same atoms, helium, without the charges, and verify (by some means) that no scattering (or at least considerably different scattering) took place. The conditions of the experiment would have to be identical to that of the original except for the lack of the charges.

Transpower Corporation proposes to carry out the experiment with the help of a world-wide expert in alpha particle scattering and detection (employed at Victoreen). The key innovation will be the technology required to neutralize the alpha particles.

**KEY WORDS TO IDENTIFY RESEARCH OR TECHNOLOGY (8 MAXIMUM)**

Scattering, Alpha Particles, Neutral Particle Scattering, Electrical Theory of Matter

**POTENTIAL COMMERCIAL APPLICATIONS OF THE RESEARCH**

The experiment will be discussed in Transpower's forthcoming commercial software package on the design and analysis of experiments. Longer term, the knowledge gained from the experiment should enable the synthesis of new materials.
More Calculations with the Reciprocal System Scattering Equation

by Ronald W. Satz

In my previous paper on Rutherford scattering\(^1\), I worked out the Reciprocal System equation for the scattering constant, \(K_s\):

\[
K_s = \frac{K_G}{(16s_0^4E_k^2)m^2/sr} \tag{1}
\]

where

\[
K_G = \frac{\left[F_p s_0^4/(156.44)^4\right]}{\left[\ln^4(t_{\text{eff}}/\ln2(t'_{\text{eff}})\right]} \tag{2}
\]

\[
F_p = 3.27223\times10^{-3} \text{ Newtons}
\]

\[
s_0 = 4.558816\times10^{-8} \text{ meters}
\]

\[
\ln^2(t'_{\text{eff}} = 1
\]

(because helium has no electric displacement)

\[
E_k = 7.03\times10^{-3} \text{ J}
\]

(for alpha particles from polonium 210)

Simplifying eq. 1 with the above constant values yields

\[
K_s = 1.63\times10^{-29}\ln^8(t_{\text{eff}}) \text{ m}^2/\text{sr}
\]

This leaves the value of \(t_{\text{eff}}\) to be determined. Let the principal specific rotation of the atoms of the target foil to be designated \(t_1\), let the subordinate specific rotation be designated \(t_2\), and let the specific rotation of the helium atoms be designated \(t_{\text{He}}\). Recall that the principal rotation of an atom is effective in two dimensions and the subordinate in one. Also recall that for combinations of unlike atoms the geometric mean is used to calculate the effective rotation. Finally, recall that the rotation of helium is effective in only one dimension. So the equation for \(t_{\text{eff}}\) is

\[
t_{\text{eff}} = \left[\left(t_1^2t_2\right)^{1/3}\times t_{\text{He}}\right]^{1/2}
\]

\[
(t_1^2t_2)^{1/3}\times(t_1^2t_2)^{1/3}L^3 \tag{3}
\]

The values for \(t_1\) and \(t_2\) for all chemical elements are given in Reference 2 and are the same as those used in the calculations for interatomic distance in the solid state. The value for \(t_{\text{He}}\) is 3.

The scattering equation based on conventional Coulombic theory is

\[
K_s = z^2Z^2e^4/(256\pi^2\varepsilon_0^2E_k^2) \tag{4}
\]

where

\[
\begin{align*}
z &= 2 \text{ (for helium)} \\
e &= 1.602\times10^{-19} \text{ coulombs} \\
\varepsilon_0 &= 8.85\times10^{-12} \text{ coulombs/N-m}^2 \\
E_k &= 7.03\times10^{-13} \text{ J}
\end{align*}
\]

With the above values, eq. 3 reduces to

\[
K_s = 2.694\times10^{-32}z^2
\]

Now let's tabulate the results of calculations with the two theories for a representative sample of elements most like to be used in scattering experiments.

Note: In Reference 1, I rounded gold's \(t_{\text{eff}}\) to 4.2 and calculated 2.93*10^{-28} for the scattering constant, rather than 2.956*10^{-28}.

The table reveals the considerable difference in the results of the two theories, particularly for the elements with lower atomic number. In the Reciprocal System, elements having the same magnetic displacements have the same value for scattering constant, because with helium the electric displacement doesn't enter into the situation; if a "non-inert" beam of particles were used, the electric displacement would matter. In the Coulombic theory, each element has a different value of scattering constant because each successive element adds a proton to the alleged nucleus.

Another important distinction between the theories is that the values of the scattering constant in the Reciprocal System are the same whether the helium beam is charged or not. The Coulombic theory would predict no scattering for a beam of neutralized alpha particles. This difference in theories is the basis for my proposed crucial experiment\(^3,4,5\).

As with the electrical theory of matter, the Reciprocal System needs more work on its
"fine structure." For instance, it's not clear from the theory at this time whether or not different isotopes of the same element would have the same equilibrium interatomic distance and the same scattering constant; indications are that the isotope effect, if presents at all, would be minor. The Coulombic theory ignores the isotope effect, too.

Additional quantitative work needs to be done on the theory of interactions of atoms at much lower energy levels. In the limit, at zero temperature (vibratory motion) and zero translational motion, an atom at a distance of \( s_0 \) from another atom will be repelled by the reverse gravitational force that exists at the boundary, and thus no compound will be formed. If an inward translational motion exists such that the atom gets within \( s_0 \) of another atom, and no outward thermal motion exists, the cohesive force of the space progression will overcome the repulsive force of gravitation, and a compound will be formed (assuming the valences are right). In the Reciprocal System, state of matter is a property of the individual atom or molecule and not the aggregate. At room temperature, helium is a gas, whereas gold and most other metals are solids, and thus no compounds can be formed between them; the thermal vibration of the helium atoms keeps them from staying within \( s_0 \) of the gold or other metallic atoms. (This is the situation in the Rutherford scattering experiments; just one thermal vibration of the helium atom or alpha particle brings it back to \( s_0 \), where the repulsive force at the boundary kicks it out to the time-space region in due course.) At much lower temperatures—when helium atoms are individually in the solid state—the outward effect of the thermal vibration and the repulsive force could be less than the inward effect of the cohesive force of the space progression, making the formation of compounds with other elements possible. Here, with the further conditions of neither too much nor too little translational motion of the helium atoms, no scattering would take place.

References:


HOW SPACE AND TIME ARE INSEPARABLE

Frank H. Meyer

(The essence of this paper, titled "How Space and Time Are Inseparable", was presented October 24, 1992 at Winona State University to the Fall Meeting of the Minnesota Area Association of Physics Teachers.)

INTRODUCTION

The careful way at MAAPT Meetings we budget time, allowing each speaker a total of 15-20 minutes, reminds me of a startling comment of Benjamin Franklin in his AUTOBIOGRAPHY:

"Don't squander time, for it is the stuff life is made of."

I much prefer Dr. Franklin's definition of time to the operational definition that time is what you measure with a clock. This physicists' definition of time concerns only the absolute component of time and does not respond to the challenge that relative time is a major daily constituent of human lives. Nothing is more certain than death; nothing is more uncertain than the hour.

The operational definition of time is not only ambiguous about time, but also does not provoke us to inquire whether time is the only stuff our lives are made of. If Franklin is right, our lives are composed of increments of time from birth to death. Are we not then, as finite physical beings, also composed of increments of space, the stuff of our finite height, surface area, volume and weight? And so far as each of us is another physical being, the motions of our mouths, ears, eyes, lungs, hearts, nerves, psyches, and other organs of our bodies and minds, strongly suggest that we are physically made entirely of quantized space-time and/or motion increments.

For time and space together evidently are motion and nothing but motion, whether in the stars and planets or in us, other animals and plants. This is why Aristotle and Leonardo da Vinci remarked each in his own time that who would understand Nature must seek to understand Motion. In more recent times D.B. Larson has confirmed that the unity of the entire finite physical universe lies in the Conservation of Motion rather than the Conservation of Matter or Energy.

As motion, space and time invariably are related in a very special way: time and space are always reciprocally related. Motion reasonably accounts for how space and time, while relatively independent, are absolutely inseparable. In this respect time and space are like the two blades of a scissors, so long as it remains a scissors. Larson¹, discoverer of this fundamental physical law, first published its truth in 1959. Thereafter, he ceaselessly proposed to natural scientists that they put the lawful fact and verity of space-time reciprocity to the test. He promised that with its aid physicists would be able to revalue and at last unify the science of physics.

Humankind has begun already to verify, can and does daily verify the motional fact and law of space-time reciprocity. We have done and do so in all of the few space-time realms of the finite physical universe immediately accessible to us. For instance, we routinely measure motion as speed. Speed is the scalar magnitude of the relation between space and time as motion. Less space and/or more time invariably mean slower speed. More space and/or less time mean faster speed. Space-time reciprocity means that more space can be equivalent to less time and/or more time can be equivalent to less space.

Space-time reciprocity invariably is found to exist throughout the few realms of space-time daily and nearly accessible to us. Therefore, it is by far the most conservative and rational postulate about the general and universal nature of space-time that we can extrapolate and adopt for examining the nature of space-time and/or motion throughout all the many space-time realms less frequently and more remotely accessible to us. We feel justified in assuming that the general hypothesis of a reciprocal relation between space and time, which holds good in the known region also holds good in the unknown, in general.

SPACE AND TIME ARE QUANTIZED AND EQUAL, NOT IDENTICAL. Time cannot be reduced to space; time has no dimensions in space.

Space cannot be reduced to time; space has no dimensions in time.

The reciprocal relation between space and time, invariably found when measuring

motion, implies that both time and space exist in finitely divisible units. This means that space and time are quantized. This means that neither space nor time is continuous; neither is infinitely divisible, contrary to some modern and ancient belief.

If you think it far-fetched for the Reciprocal System to question the truth of the space-time continuum postulate of Relativity Theory, remember that the principal modern author of the latter theory, A. Einstein, himself came to doubt the verity of the continuum postulate: "I am tending to the belief that it is impossible to advance further with the continuum theory."

By reason of the postulated reciprocal relation between space and time, each individual unit of motion is a relation between one unit of space and one unit of time, a motion at unit speed.

Unit speed equals the ratio of one space unit to one time unit. The magnitude of this speed is the magnitude of the absolute speed of light in vacuo. This magnitude, designated $c$, has been carefully measured and is well-known. The absolute speed, $c$, is known to be equal to $2.9979 \times 10^{10}$ cm/sec.

Since the value of $c$ is reliably known, it becomes feasible to compute both the smallest time duration unit, $t_1$, and the smallest space length unit, $s_1$.

A physical location in space is a point or segment of the line of the space progression at a given time.

A physical location in time is a point or segment of the line of the time progression at a given place.

Unit speed, $c$, is the speed of the physical location in which any photon originates and in which it remains, so long as it remains a photon.

Unit speed, $c$, is a function of absolute finite minimum time duration, $t_1$, and absolute finite minimum space length, $s_1$.

Larson chose after due inquiry to tag the Rydberg fundamental frequency constant, $v$, as that frequency among all other measured frequencies that enables human-kind to disclose the metric CGS value of $t_1$, the minimum time duration unit. The magnitude of $v$ is well-known to atomic physicists, amounting to $3.288 \times 10^{15}$ cycles/second. Larson shows that the photon is a compound motion and that frequency is the name physicists have adopted to and distinguish the velocity of a photon's oscillatory motion from that of the rectilinear motion of its physical location, that we call the velocity or speed of light in vacuo. In frequency measurement the cycle per second is taken as the unit on the assumption that frequency is a function of time only.

The natural unit of frequency, being a velocity, is one unit of space divided by one unit of time. For the Rydberg fundamental frequency, $v$, this is equivalent to one half-cycle per unit of time instead of one full cycle, as a full cycle involves one unit of time in each direction. Hence the measured value of $v$ must be expressed as $6.576 \times 10^{15}$ half-cycles/second.

Expressing the frequency $v$ this way in terms of reciprocal time, is equivalent to using the natural unit of space, $s_1$, in combination with the CGS unit of time, $t_1$, to represent the CGS unit of frequency. Thus, leaving the space term out of account is equivalent to giving it unit value. The smallest time duration unit $t_1$, or what Larson calls the natural unit of time in CGS terms, is the reciprocal of the Rydberg fundamental frequency, $1/v = 1.52 \times 10^{-16}$ second.

Now to obtain $s_1$, the smallest space length unit, or what Larson calls the natural unit of space, multiply $t_1 = 1.52 \times 10^{-16}$ second by $c = 2.9979 \times 10^{10}$ cm/sec. Therefore, $s_1 = 4.55 \times 10^{-6}$ cm.

Larson's careful novel approach to examining the structure of motion, space-time and the photon in the light of observed space-time reciprocity has yielded an abundance of new promising results: that space and time are quantized, that the magnitudes of the space quantum and the time quantum have been computed and that the space quantum and the time quantum are physically equal but not identical. Perhaps the most important and startling result of Larson's work is its implication that the speed of light is not the speed of light traveling through space and time but is instead the absolute universal uniform speed of the three-dimensional scalar progression of space with time progression. That is, the speed of light is the uniform speed of physical locations, whether or not occupied by photons, neutrinos, other massless particles or even galaxies.

Throughout the twentieth century others have proposed and tried unsuccessfully to resolve the light wave-particle paradox. Though unsung and unexamined by the physics profession until now, the offered
solution by Larson compares favorably with answers given by the best of the profession of scientists. A typical practical answer was provided that came near to the solution offered by Larson's Reciprocal System:

“Our only way out...seems to be to take for granted the fact that space has the physical property of transmitting electromagnetic waves, and not to bother too much about the meaning of the word.”

“From the quantum phenomenon it appears to follow with certainty that a finite energy can be completely described by a finite set of numbers (quantum numbers). This does not seem to be in accord with a continuum theory and must lead to an attempt to find a purely algebraic theory for the description of reality. But nobody knows how to obtain theory.” (my italics)

**ABSOLUTE SPACE IS NOT IMMOVABLE. SPACE PROGRESSES UNIFORMLY OUTWARD WITH UNIFORM TIME PROGRESSION AND THE EXPANDING UNIVERSE BETTER CHOICE OF REFERENCE FRAME ORIGIN.**

Absolute zero speed has been a popular but poor choice for origin of reference frames used to graph motion. For this purpose the planet Earth is not immovably located at the center of the physical universe. Nor is the Sun. Nor is Absolute Immovable Space.

Neither absolute zero speed nor infinite speed occurs nor can occur and has not been observed to occur anywhere or anymore than perpetual motion throughout the physical universe. No stationary ether, no absolute rest can be found, because infinity is excluded from the physical universe and motion is conserved. The total quantity of motion is finite. Since all physical quantities and phenomena are manifestations of motion, they are measured in terms of 1/n and n/1, where n is finite but not mathematical zero. No infinities are possible.

Larson has proposed a more suitable candidate as preferred origin for reference frames used to graph motion: unit speed, the speed of light in vacuo. Larson attributes the background of the physical universe to undisplaced motion at unit speed. Such motion is formed by the three-dimensional uniform outward scalar space quanta progression with three-dimensional scalar outward time quanta progression of physical locations at the rate of one space quantum to one time quantum. All physical things come out of no thing but unit motion instead of something else, such as quarks, air, water, earth or fire.

This undifferentiated, one to one (1/1) space-time motion, a primary consequence (but certainly not the only consequence) of the reciprocal character of the relationship, by itself is motion with no thing moving (for this space-time in itself is no thing) and does not represent any activity in the physical universe.

No supporter of the Reciprocal System denies the existence of quantized units of motion. Larson goes so far as to affirm that discrete units of motion are the only physical existents. He then goes on to show how all physical things are formed by **speed displacement from unit speed** of assemblies of these units. But it is also essential to note that these fundamental units of motion themselves are not things; the units of motion are motions (no thing at all moving): nothing but motion.

In other words, I think that the above fairly describes what Dewey Larson meant in the following affirmation: “The significant point here is that the basic undifferentiated motion outward at unit speed, one unit of space per unit of time, is the physical equivalent of nothing at all, the datum from which all physical activities extend, the reference system to which all such activities, or phenomena, can be related. In order that there may be physical phenomena there must be some deviation from this basic uniformity, some displacement, as we will call it, of the one-to-one space-time ratio either in the direction of more space or of more time, and the amount of this displacement determines the magnitude of the phenomenon. The basic physical quantities are not measured from the mathematical zero, but from this unit space-time ratio.” (Italics Larson’s)

Thomas Kirk agrees with Dewey Larson that undisplaced space-time is the physical equivalent of nothing at all. Ronald Satz reports several recent errors published in RECIPROCITY. “The worst example is the contention that undisplaced space-time is equivalent to nothing at all.” Are Mr. Kirk and Mr. Larson in error? Dr. Satz contends: “Undisplaced space-time...is not equivalent to nothing, which is zero motion.” Are Messrs Larson and Kirk contending then that Motion at Unit Speed is Motion at Zero Speed? Evidently not. In his haste to convict his peers of negligence, Ronald Satz overlooked another obviously relevant denotation of the word ‘nothing’: nothing also means no thing. Dewey Larson and Thomas Kirk and Frank
Meyer are only saying that undisplaced space-time is no thing; undisplaced space-time is motion without any thing moving, motion at unit speed. Physical entities, including gravitating things, electrons, photons, other massless particles, etc., happen only subsequently due to speed displacement from unit speed.

Independent motions, according to the Reciprocal System, resulting in the existence of some physical things, such as photons, electrons, atoms, etc., are only brought into existence themselves, subsequent to the happening of the primary undifferentiated outward motions at unit speed. These primary motions constitute the background, the framework, the natural system of reference, and for the physical universe.

**The Natural System of Reference**

The primary motions are those which can exist independently of the existence of motions of other types. Primary motions are constituted by undisplaced space-time scalar motion at unit speed.

Independent motions of the material sector are the result of speed displacements from unit speed in the direction of more space.

Inasmuch as we postulate that the universe is three-dimensional, we can represent the scalar progression of space by a line in a stationary three-dimensional reference system, measuring the corresponding progression of time by means of a scalar device, a clock. In this reference system, a positive motion is represented as outward from a reference point, and a negative motion as inward.

Independent motions of the cosmic sector are the result of speed displacements from unit speed in the direction of more time.

Inasmuch as we postulate that the universe is three-dimensional, we can represent the scalar progression of time by a line in a stationary three-dimensional temporal reference system, measuring the corresponding progression of space by the means of a scalar device, a clock. In this reference system, a positive motion is represented as outward from a reference point, and a negative motion as inward.

The initial point of the progression of an individual unit of motion is zero. As the distance between two points cannot be less than zero, it follows that the primary motions are necessarily outward, increasing the distances relatively to the initial points.

The progression is scalar. It is simply outward without any inherent direction.

Motion outward from the initial point of progression is therefore outward from all points of reference.

Therefore, any two physical locations are progressing outward from each other at unit speed; that is, their separation is increasing at the rate of one unit of space per unit of time.

The natural reference system is that system in which the primary motions do not cause any change in the position of physical locations.

Thus, it follows that the natural reference system is progressing outward at unit speed relative to the spatial system of reference.

Unit speed is the speed of light.

(The various features of the theoretical universe emerge from the deductive development without labels. It is therefore necessary to identify the physical phenomena to which they correspond. The correlation is usually quite evident, as in this instance. In any event, it is self-verifying, as any error would quickly show up as a discrepancy in the subsequent development.

Since the postulate specifies that nothing exists other than discrete units of motion, and the natural system of reference is a direct consequence of the existence of the primary units, this reference system is the framework, or background, of the physical universe of motion, and does not represent any activity in that universe. The natural reference system, as defined, is therefore, the physical zero, or datum level, from which all physical activity extends.

The outward progression of the natural reference system relative to the stationary system of reference is identical with the "expansion of the universe", reported by the astronomers.

**Existence of Independent Motions Besides the Primary Motions**

At this point we have arrived by deduction from our basic premises, at an explanation of the general background of the physical universe that is essentially in agreement with the astronomers' assumption. (Our derivation leads to a uniform outward speed, rather than to a speed that varies with the distance, as produced by the kind of an expansion assumed by the astronomers, but this difference is easily accounted for, because there is a known force, gravitation, that acts against the outward motion, with a
magnitude varying as an inverse function of the distance.)

The advantage of deriving this explanation of the universal background from a set of general premises, rather than merely assuming its existence, lies in the fact that further deductions can be made from these same premises. Instead of a single process involving the universe as a whole, the explanation that we have just derived from the premises of the theory of the universe of motion identifies the expansion as the result of outward scalar motions of physical locations. This opens the way for the existence of other scalar motions of the same physical locations, independent motions, as we will call them.

REFERENCES
6. Satz, Ronald RECIPROCITY, XX, 4

Corrigenda for ReciprocitY, XXI (1), Spring 1992

(p-page No; pr-para No.; lc/rc - left/right column; l - line No.)

p.6: The title should be "Birotation and the Doubts of Thomas"

p.8. rc. 1.4 from bottom: "1992" should be "1991"

p.15. lc. pr.2. 1.7 from bottom: "(z being less)" (should be "(z being less)"

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The conclusion that all properties of either space or time are properties of both space and time would be immediately demolished if any of the properties extrapolated from one to the other turned out to be inconsistent with established facts and in view of the great differences which appear to exist between space and time as we ordinarily envision them it would seem off hand that discrepancies of this kind should be easy to locate. But we will find on close examination that this is not the case; there is no conflict or inconsistency anywhere.

"Since the conclusion that both space and time have all of the properties observed in either space or time individually has been derived by means of processes which are entitled to a high degree of confidence, and since there is no factual evidence that is inconsistent with this conclusion, whereas there is strong evidence supporting the validity of the innovations which it introduces into physical relations we are justified in considering this conclusion as correct."

"Every conclusion that we derive from the original hypotheses offers us an opportunity to test the validity of the entire system of hypotheses plus derivatives. Such a test cannot give us a positive result; that is, even if the conclusion is found to agree with the observed and measured facts in all respects, this does not assure us that the system is valid, since there is still a possibility of conflict with other facts at present unknown, a possibility that can be eliminated only by complying with some much more stringent requirements. But any test can give us a negative result. If the conclusion conflicts with any positively established fact, this is sufficient for disproof."

- Dewey B. Larson

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Periodic Table, Revisited

Thomas Kirk

A recent article in Reciprocity made an attempt to show relationships between elements represented in the conventional periodic table but not in the table structured by Dewey Larson. In that article, a periodic table showing the pattern of elements radically skewed to the electronegative was presented as a reconciliation of the apparent lack of correspondence in Larson’s table. However, if we take a closer look at Larson’s periodic table, we find that all of the missing relationships actually are present. In addition, many other very important relationships are represented that are not shown in either the skewed of the conventional table.

Periodic Table A is Larson’s table with the only modification being the addition of shading in the region that is the “Transition Elements”. These are the elements that can be either n electronegative or n electropositive. This is one of the most profound aspects of Larson’s table in that it provides the mechanism or link for the progression of atom development. Without this link, to achieve the element 2-2-2(1), atom building must somehow achieve 2-2-0 and then gain a unit of negative displacement. However, the atom reaches 2-2-0 from the 2-1-2 state is a critical question.

The answer lies in the transition elements, which under proper conditions undergo a reorientation of their displacements. For example, it is possible that when carbon of the form 2-1-4 is placed under the proper heat and pressure conditions, it transforms from ordinary black carbon to diamond, 2-2-(4). From this new level, additional mass units are added and the atom building process continues to 2-2-0 and on up to the next transition element 2-2-4, Silicon, where the cycle continues.

This is perhaps the most important and unique aspect of Larson’s table. Yet, if we realize that the shaded zone in Table A is actually no separation at all, then the rows are fully continuous from left to right and from right to left, as shown in Table B and C, respectively. The situation is that a simple two dimensional array of elements can not directly represent all of the relationships, thought the columns only line up when the transition gap is eliminated by sliding the elements to the right or left. This is sort of a three dimensional array, with the third dimension being the position based on displacement separation both above and below the reference level, instead of just one or the other.

The similarities of elements in columns n units above or below the inert level, ending at the transition element, are relationships shown in Table A, Larson’s table. Relationships of elements in contiguous rows without the transition gap of Table A, extending further below or above inert levels, as shown in Table B and C, also have similar validity.

Table B represents the extension below the inert level, and this fully encompasses all of the relationships considered by the author presenting the skewed table. These are the ones shown in the conventional periodic table, that are proposed by that author to be reconciled in his skewed table. Larson's table provides these relationships when the transition gap is deleted, and also provides the crucial link for atom building as described above.

The other author's table expands the gap greatly between the maximum mass electropositive element and the next inert level. For example, atomic number 56, element 4-3-2, must somehow make the incredible leap of 30 atomic numbers (60 mass units or 120 displacement units) to 4-4-0 and then build down 29 negative atomic numbers (58 mass units or 116 displacement units) to 4-4-(29), the next element in the series. This is a very awkward situation.

The other major advantage of Larson’s table over the others is that connecting the rows across the transition elements to the electropositive side (Table C) establishes a new set of relationships, heretofore unrecognized. A review of the properties of the most closely related elements, beginning with 46 in the upper row and 64 in the lower, and extending to 51 and 67, respectively, reveals that the properties of softness, malleability and ductility of these metals transition in a corresponding manner along their rows for elements in the same columns in Table C.

The other author provides specific examples of elements with similar properties that are shown in the tables, as indicated below:
Aluminum (13) and Gallium (31)  Table B, Periodic & Skewed
Aluminum (13) and Scandium (21)  Table A
Zirconium (40) and Strontium (90)  Table A, Table C
Molybdenum (42) and Tungsten (74)  Table B, Skewed
Molybdenum (42) and Uranium (92)  Table A, Table C

Only the expanded view of Larson's table represents all relationships, the others are severely lacking.

The other author mentions that there seems to be some sort of special status for the 14 and (14) electric rotations. The Larson derived tables show that this 14 level has a coincidental relation with the very stable inert level. This can be seen in Table B for level (14) and in Table C for 14.

One point that is presented in the other author's article is that his table shows the "rare earth" elements on a leg removed from the table as a whole. "Elements are forced into positions that are beyond this range only with difficulty, and by virtue of the pressure of the electron flux. The inherent improbability of this arrangement is what engenders the anomaly of the rare-earths, including the one for which they are named - their rarity." Actually there is no value in this, because these elements are not rare in the first place. "The least abundant rare-earth or lanthanide element, Thulium, is believed to be more plentiful than silver, cadmium, gold or iodine," There is nothing compelling that sets them apart from the remainder of elements. Aside from the erroneous rarity, the author fails to elucidate on the alleged "anomalous properties".

The idea that a group of elements should be removed from the table and set aside in a separate block is not advantageous. There is no reason to expect such a complete lack of continuity in nature, and what continuity there is can only be gleaned from showing them in their proper position relative to the remainder of elements.

To substantiate the concept of a radically biased electronegative distribution of elements, the author presents an entirely new atom building scheme. He fails to mention that the atom building process derived by Larson was by neutrino absorption. The new one presented is by absorption of electrons, which are actually negative mass units and would reduce the mass of an atom and not increase it. Further, electrons are single units of such rotational displacement and a mass unit is two units. Absorption of electrons would have to involve two at a time or the atom would be imbalanced, an unacceptable condition, whereas a neutrino is a complete potential mass unit.

Larson's atom building process is well founded and logical and relies on the proven passage of neutrinos through the environment. The idea of an "electron flux" is not factual science. Uncharged electrons as far as we know cannot move through space, so the flux would more likely be charged electrons. These should be more easily detected than neutrinos, but evidently do not exist. Still, there exists speculation that if an uncharged electron where to exist in space, it would propagate much like a photon.

The proposed electron flux concept besides being undetectable has serious theoretical flaws as well. If such a flux were to be effective on the environment as proposed, then electrons must strike objects of mass. Once in contact with the mass, the electron would be completely trapped, since it is clear that electrons cannot move through space and always remain within the net time structure of the mass. This would lead to an unlimited buildup of electrons in any matter, unless it is postulated that once electrons are absorbed to a certain capacity, no more can enter the mass even if they contact the mass. Since there is no charge to this "electron flux", they would have no difficulty in contacting a mass filled with electrons. However, it is clear that matter does have the capacity to hold very large quantities of electrons at high voltages, much higher than the state of ordinary matter. Therefore, there would seem to be no specific mechanism to deny entry of a new electron into a material object. The objects in a region say billions of years old, should have very high voltages. There is no evidence of this sort of potential difference in the cosmos, for example huge lightening bolts between old and stars and young stars as a globular cluster is absorbed by a galaxy.

The discussion in the other author's work continues with the concept of positron absorption which has the same flaw that it is one displacement unit, not the required 2 for a mass unit. Further, the author calls for absorption of positrons into the magnetic...
displacement. One increment of magnetic displacement requires $8n^2$ displacement units. How enough positrons would be available for say 32 mass units is not made clear. Also, long before a positron ever gets to the proper conditions for absorption by an atom, it would be neutralized by an electron within matter.

There should be some very serious consideration, before we throw out Larson's periodic table and his atom building process. Presented in Table D is a compilation of all three Tables A, B, and C, representing all of the relations revealed by each of these tables. I would recommend that we consider utilizing Table D and see what secrets it may hold. Again, Table D actually is Larson's table, but with more relations represented through linkage provided within the transition elements.

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