"A theoretical abstract structure for sampling, classification, and analysis of systems: Unification, with P.E.G. as an example"

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To:
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Preface

To introduce the total intent of the paper, changes made due to doubts in initial first draft made by classmates, and just to correct the author is adding a foreword.

This is a paper which tries to remain intuitive, and not a mathematical treatise. The introduction of this abstract sampling machine is to render finite the infinite. In other words, "An infinite machine, finished with an infinite problem, allows one to consider the task finite or computable. Then to move to a system of equations, using the rules of the system to force adherence, which allows for possible system wide refinements, and several avenues for future discovery.

To clarify about Turing and Church, one book I found on Theory of Computing was perfectly intuitive, but I am adding some more rigorous refinements to language here. "The assumption that the intuitive notion of 'computable function' can be identified with the class of partial recursive functions is known as *Church's hypothesis or the Church-Turing thesis or sometimes Church's thesis*."[1]

The reader should not worry about the lack of complexity at this juncture. The power of this paper is the simplicity. Three degrees: BS in Petroleum Engineering, MS in Systems/Computer Science, an MBA, and tremendous work toward the PhD are summarized in this paper along with a lot of outside work. Everyone should enjoy this paper.

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[1] Hopcroft, Ullman, *Introduction to Automata Theory, Languages, and Computation*, Addison-Wesley Publishing Company, Inc. , 1979

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Abstract

Instead of identifying just the major energies, this paper assumes all "energy events" are significant. In essence, all events of all kind, known or unknown must be represented to ensure "Total Unification".   This theoretical paper defines a method to build, classify, contain, and manage this "Total Unification".   Using the Normal Distribution, the Information Systems and Decision Sciences construct known as a "Bucket", and a system pattern by Ohm, and Einstein. A proposal for completion is offered by the author, with future research and applications suggested.

1) Problem Definition:

While planning to classify and study an infinite variety, number, and magnitude of samples there is a problem with pre-defining the sample and possibly missing a large variety simply by not allowing them by design. If one variety is missed then the system is not complete. The solution would be to create an unbiased system which is open to all and large enough to remain continuous, and flexible enough for change in case of a new form of sample.

2) Significance of the Problem:

We define a system while in the process of collecting. This procedure may be limiting the overall variety of samples. This may occur in many areas of sampling. In essence, we block out variety by the design of our classification scheme. Energies are just one example.   Also, by defining a system of equations researchers may be able to examine specific types of energy like Newton's gravity.   The author hopes to attain a hybrid form for gravity which can fit into this system or another proposed system.

3) **Plan of Study:**

Using an abstract machine, like the Touring Machine, the researcher hopes to elaborate on design concepts. As tools for this "Abstract Sampling Machine" the researcher employs the "Normal or Gaussian Probability Distribution" as the bucket structure, a small expert rule system to coordinate the storage of sampling, the ISDS Logical structure of "If Then Else" as the Logical Bucket Director, and the P.E.G. pattern with special emphasis on "G" to ensure the success of unbiased system wide completeness. Then gravity is analyzed and proposed work is offered with respect to refinements of Newton's Classic form to better fit the P.E.G. system pattern. This effort appears to fall short, and a further proposal for study is offered to alter the first two equations so that the system pattern matches the hybrid for Newton's classic.

The Universe of the Abstract Sampling Machine

Let's define a Universe of nothing but samples of energy. No matter of any sort exists, and it was a mess of confusion in the beginning. Energies of that Universe are infinitely numerous, and possibly infinite numbers of each type of sample. The samples are not real as matter, but imaginary as energy. However, the samples point to things that are very real. If there is something real anywhere then it has a representative sample of energy in this Universe. In this sense, the resulting collection is like a polling construct or a phone book of all things great and small. It is a very orderly and efficient party!

This abstract sampling machine works on that plane of only energy samples. In other words, in this simulation, it is assumed that all things exist by proxy on this plane. Also, that this machine has been working for so long that all samples are collected. The machine has halted, and waits for any new arrivals to that universe. Time to analyze!

General Information concerning Abstract Machines:

"There are numerous variations of abstract computing machines, each with slightly different conventions. The Turing Machine is usually very simple, and at first was used to check strings. Given the Turing Machine M and string x, does M accept x?"[2]

"Church's thesis – To say that the Turing Machine is a general model of computation is simply to say that any algorithmic procedure that can be carried out at all (by a human, a team of humans, or a computer) can be carried out by a TM. (An algorithm is a procedure that can be executed on a Turing Machine.) The advantage of having such a definition is that it provides a starting point for a discussion of problems that can be solved algorithmically, and problems (if any) that cannot." [2]

The underlying beauty of these abstract machines is that it forces simplicity, and eliminates bias. No telling what types of problems may be uncovered with a totally unbiased abstract sampling machine. Without analyzing problems in this manner many functions previously thought trivial proved to exhibit non-polynomial (NP) growth, in space, time or both.

More complicated systems can be comprised of Turing Machine (TM) or Abstract Machine (AM) composites which are achieved by executing one TM or AM after another.

"A host of well known combinatorial problems such as "the Salesman Problem" or "All Pairs, Shortest Path", the "Materials Problem" raw material usage optimization,

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[2]   John Martin, *Introduction to Languages, and the Theory of Computation*, Third Edition,. (McGraw-Hill Higher Education, 2003)

and many thousands of others that have been proven NP. These examples are over an astonishing variety of problem domains.**"** [2]

"What if in space and time many NP problems can be solved in polynomial time? Does P=NP? What if the hard instances are actually rather rare, and in practice the problem can almost always be solved in polynomial time? It did not take researchers very long to discover that this is exactly what happens for certain forms of the NP problems." [3]

The "Abstract Sampling Machine" is not the first abstract machine, and may not even be classified as a computing machine. It is simply a construct designed along the lines of the Turing Machine, which achieves a certain goal. To convince the researcher that if one can assume all energies have been accounted for by this infinitely old abstract machine. Then what can be achieved? This machine is born out of necessity to be a front end to the analysis of the "G-Bucket" of the P.E.G. system.   In this sense the Abstract Sampling Machine is a very simple and possibly new approach to looking at an infinite problem.   The key is that this machine has no expectations!

The Abstract Sampling Machine:

1.) Probability Distribution, an infinite construct.

Carl Friedrich Gauss,

"A German mathematician and scientist of profound genius who contributed significantly to many fields, including number theory,

analysis, differential geometry, geodesy, magnetism, astronomy and

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[3]   Percus, Gabriel Istrate, and Christophery Moore, *Computational Complexity and Statistical Physics***,** (Oxford University Press, 2006). Page 5-6.

optics. Sometimes known as "the prince of mathematicians", Gauss had a remarkable influence in many fields of mathematics and science and is ranked beside Euler, Newton and Archimedes as one of history's greatest mathematicians."[4]

"Named after Carl Friedrich Gauss, the normal distribution, also called Gaussian distribution, is an extremely important probability distribution in many fields. It is a family of distributions of the same general form, differing in their location and scale parameters: the mean ("average") and standard deviation ("variability"), respectively. The standard normal distribution is the normal distribution with a mean of zero and a standard deviation of one."[5] "The Bell shaped Normal or "Gaussian" Distribution has a domain that is the set of all real numbers."[6]   This is the construct which describes the shape of the collection of energies sampled.

For instance, the energy denoted as "P" or Power by Georg Simon Ohm is defined as one Watt. This point on the bell curve represents the lower tail of the curve. As by design, this limit is three standard deviations from the mean.

The energy denoted as "E" or Energy by Albert Einstein is a collection of energy each with a magnitude that is three standard deviations from the mean on the upper tail of the curve. This is a massive individual magnitude of energy, and represents the upper limit of the overall system.

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[4]   "Carl Freidrich Gauss", From Wikipedia, The Free Encyclopedia,
              http://en.wikipedia.org/wiki/Carl_Friedrich_Gauss
[5]   "Normal Distribution", From Wikipedia, The Free Encyclopedia,
              http://en.wikipedia.org/wiki/Normal_distribution
[6]   Robert Johnson, *Elementary Statistics*, 4th Edition, (Duxbury Press, Boston, 1984), Chap.6, P. 202 para. 1.

In between these two limits comprise what is referred to in this paper as "G" or the all inclusive God, Gravity and all things statistically significant or Germane.   This section of the bell curve represents everything inside of six standard deviations or about 99.75% of all energies!   These energies may include: Emotion, the meta-physical, life, in other words all energies other than P or E.   Even the bible states, "There is faith, hope, and love; but the greatest of these is Love." [7]

2.) If Then - Else, the Decision Structure.

Blaise Pascal,

"Pascal devoted his unusual talents to mathematics, physics, and religion.   He was the inventor of the first digital calculator "The Pascaline. ."[8]   He is considered a forefather of the computer age.

The P.E.G. system requires two decisions and the catch all bucket.   The "Catch All or Bucket" construct used to complete an Information System robustly is more commonly known as "Else".   The meta language used in the example is nearest to Pascal.

```
"If       "null"    then    Halt/Wait/ and Try Again Later
ElseIf    Logic 1 [Power]   then    Rule 1 [ R * I² ]
ElseIf    Logic 2 [Energy]  then    Rule 2 [ M * C² ]
          .
ElseIf    Logic n    then    Rule n

Else       [ G = True ]
    Rule "Collect to catch all bucket [ L * A² ]"  " [9]
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[7]   *The Bible*, 1 Corinthians, Chapter 13, verse 13.
[8]   William R. Shea, *Designing Experiments & Games of Chance The Unconventional Science of Blaise Pascal,* (Science History Publications, USA, 2003) Pages: ix, xi, 4, 10 and 11.
[9]   Nested if-then-else Structure
    http://helpnet.installshield.com/robo/projects/langref/LangrefNested_ifthenelse_structure.htm

X = 0, 1, 2 …., n provide a perfect decision system for classification of various types of samples, events or in this case various examples of energies.

If the sample is empty the system halts for a period.   Else if the sample of energy equals the magnitude of "P" then it is placed in the "P" list or pushed onto the "P" stack. Else If the sample of energy equals the magnitude of "E" then it is placed in the "E" list or pushed onto the "E" stack. The third and last option "Else", if the first two are not satisfied then the energy sample is sent to the center distribution "G".

"The various rules involve collecting events in a counted list of virtually identical samples. In fact, in most cases only one sample and a count need to be stored. However, a pointed link list headed by a counter would work. At this time the efforts are concentrated on the abstract and theoretical concepts and not the implementation.

A main emphasis of this paper is the Expert System in general, and specifically the "Bucket" which robustly completes the abstract system logically, and without doubt. If there is still doubt: years of programming, and testing has proven that this type of logical catch all is fail proof.   The truly wonderful part of this application is to solve a very real problem with abstract concepts and programming constructs.

3.) The Transform Pattern

 Now certain that all possibilities are handled, the individual system pattern can be discussed.

George Ohm,

$$\text{Power} \ = \ R \ * \ I^{\,2}$$

$$= \ \text{Resistance} \ * \ \text{Current}^{\,2}$$

The transform involves one variable multiplied by the square of another variable to create a third.   Ohm's work was empirical by nature in the 1880's. This is very similar to Fourier's transform describing heat transfer. In fact, many transforms in several areas are very similar. That does not detract from the years of work that Ohm pioneered in electrical conduction. Credit was given to Fourier and Poisson by Ohm. "Ohm assumed that the three constants and the mode of handling the differential equations that had been used by Fourier and by Poisson in their heat problem would be directly applicable to electrical conduction."[10] Should any one person expect to lay a claim on a transform which may best describe how the Universe operates? Let's agree to make the advancements real, in a collaboration where a specialist gets credit for his or her particular work.

Albert Einstein,

$$\text{Energy} \ = \ M \ * \ C^{2}$$

$$= \ \text{Mass} \quad * \quad \text{LightSpeed}^{\,2}$$

Einstein derived his equation or transform mathematically due to the size of the theoretical nature of

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[10]   Rollo Appleyard, *Pioneers of Electrical Communication*, (MACMILLAN AND CO, LIMITED, ST. MARTIN'S STREET, LONDON,1930), Chapter VII, Georg Simon Ohm, page 201, para. 2 and 3.

the proposition. We get to look at the similarities of the transform, and note that once

again there are several. The magnitude or scale is vastly different, but the individual

variables, and the overall transform are very similar.   "Einstein could not abandon the

belief that physics described the laws that govern "real things", nor could he abandon the

belief that there are no explanations that contain contradictions, which had driven him to

his successes explaining photons, relativity, atoms, and gravity."[11]

Einstein was obviously working on his theory of Grand Unification at this time.

If we take the time to actually compare Power and Energy the variables are very similar

in nature. Mass and Resistance play exactly the same part!   With super conductivity,

electric current is basically moving at very near the speed of Light!

Once again, the second variable is squared, and then multiplied by the first in each

equation to transform into the composite on the left of the equal sign. This is a defining

factor in the overall system, and once a system is defined the rules must be strictly

followed. The third and last equation was not solved in any conventional manner. So we

must put on the unconventional hats, solve for all energy, and ensure none are left out.

Only then can we solve for other individual energies, or groups of energies such as

elements.

Leonard Bollingham (with VIRGINIA!),

$$\text{“G”} = L \ * \ A^2$$

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[11]   Albert Einstein, from Wikepedia, the free encyclopedia,
http://en.wikipedia.org/wiki/Albert_Einstein

$$= \text{Love} \quad * \quad \text{Anger}^2$$

From the first site of the Ohm and Einstein biographies until presented as a sixth grade science project, this project was simply romantic. Since that time, it has been a quest through three degrees including a B.S. in Engineering, an M.S. in Systems/Computer Science, and an MBA, and hopefully soon when the Unification intrigue comes to a close, the PhD! Every class, book, and hint: for Unification.

The author proposes a philosophical bucket which contains the infinite variety of all energies, and still adheres to the transform pattern. As part of the "system" it must adhere to the form of the other two equations. The author hopes to create an untouchable and perfect system to look at any and all energies.

Einstein was looking for G which was the gravitational force to complete his system. "He was also trying to explain nature's many anomalies. One such anomaly is the weirdly migrating orbital ellipse of Mercury."[12] The author attempts to go a step further to include all things, with energies such as emotion, religion, philosophy, life, gravity, and also tries to take into account anomalies. All things create various samples of energy, and are themselves energy. Even God who is Love, and sometimes angry or wrathful can be described in terms of Energies. In general, "G" encompasses every other possible form of energy that is not described as the weak or strong electromagnetic forces, Power and Energy.

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[12]   Corey S. Powell, *God in the Equation, How Einstein Transformed Religion*, (Free Press, 2002), Page 65, paragraph 3.

With the complete system in place and all sample collected, imagine the abstract sampling machine has halted. The illustration is an approximation of how the collection would appear as the figure below:
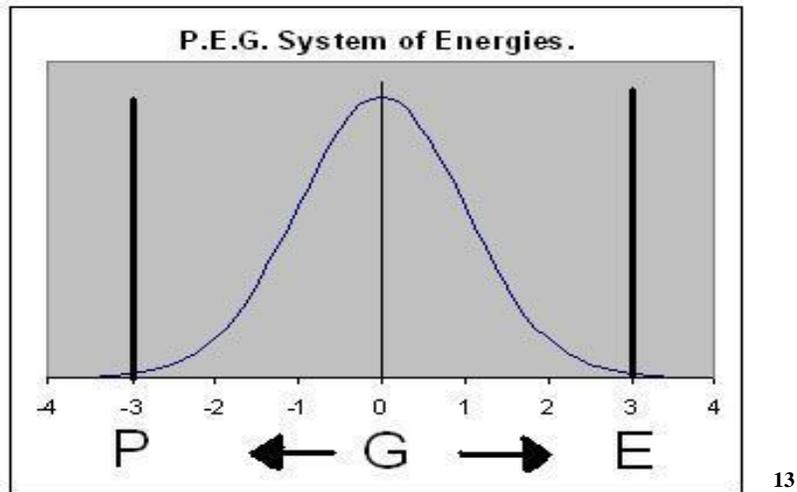
The outliers are beyond the three sigma fences of P and E. The bucket system for all energies "G" is represented by the area between the two fences Power, and Energy. This expert decision system, the normal distribution, and the completion of the real system with the abstract "bucket" construct complete the scope of this paper.

The "P.E.G." System from where Einstein left superimposed into this form:

$$P. = R \times I^2 \quad \text{weak EM forces}$$

$$E. = M \times C^2 \text{ strong EM forces}$$

$$G. = ? \times ?^2 \text{ What can relate gravity?}$$

The sixth grade science project with the authors initials for Love and Anger. The rest was left as an exercise, which turned into a 35 year quest.

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[13]　　　Drawing a Normal Curve with Excel, created and enhanced with fences and labels for P.E.G., http://www.tushar-mehta.com/excel/charts/normal_distribution/
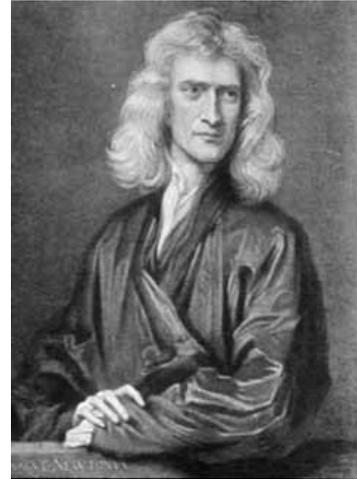
$$G. = L \times A^2 \quad \text{everything else}$$

Possible Future Research

Let's examine the specific parts of the energies represented by the bucket, "G", and take a look at gravity.

Sir Isaac Newton,

"Newton's insights proved to be so overwhelmingly powerful, he was the first scientist ever knighted."[14] Newton used the example of a falling apple to create his Law of Universal Gravitation as every object in the Universe attracts every other object with a force directed along the line of centers for the two objects that is proportional to the product of their masses and inversely proportional to the square of the separation between the two objects. Does light and current accelerate from 0 to a constant velocity when they are turned on? What distance, and time does it take for light to reach it's pace? Are there secrets to be revealed if all three equations exhibit accelerations and velocities which cause anomalies that may only be explained by two separate variable velocities? Might different speeds, directions, times, or a combination of factors explain the anomalies? The reader should realize that one cannot start the day or leave a red light driving at the speed limit. There has to be a period of acceleration. If it is not there, then how is it hidden?

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[14] **Sir Isaac Newton: The Universal Law of Gravitation**
http://csep10.phys.utk.edu/astr161/lect/history/newtongrav.html

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Classical Newtonian physics describes the law of gravity as,

Law of Universal Gravitation

Every object in the Universe attracts every other object with a force directed along the line of centers for the two objects that is proportional to the product of their masses and inversely proportional to the square of the separation between the two objects.

$$F_g = G\,\frac{m_1 m_2}{r^2}$$

F_g is the gravitational force
m_1 & m_2 are the masses of the two objects
r is the separation between the objects
G is the universal gravitational constant

14

This can be reduced to:
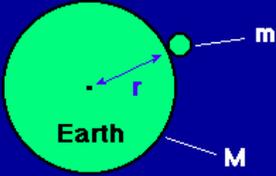
Earth

$$Weight = F_g = \left(G\,\frac{M m}{r^2}\right) = mg$$

$$= g$$

M is the mass of the Earth
m is the mass of the object
r is the radius of the Earth
g is the acceleration due to gravity at the Earth's surface

14

Fg = M * A, does not fit the system transform pattern, as the second variable is

not squared.   For future research perhaps it is possible to arrive at a special exception of

G = M * V * V where the Velocities may be unique vectors with slightly opposing

directions?   Perhaps a study of the anomaly of the maximum velocity achieved by a

falling object is in order? Experimentation involving opposing vectors may explain this example of a "hybrid acceleration" which settles into a velocity.

Perhaps we can surmise that forcing adherence to a system of equations allows the Rule of two unique vectors of the third variable be applied throughout the system of three equations.   Very exciting stuff! Imagine anomalies in Power and Energy explained by two distinct Current vectors I_1 and I_2, and two distinct Light Speed vectors C_1 and C_2!

How about re-evaluating the physical elements that comprise our universe? Perhaps we are denying ourselves the discovery of new elements simply because of the way we classify the Periodic Table?   Perhaps we are forcing energy into unnatural configurations or combinations in order to transform into matter which will "fit" into our periodic table?   There are hundreds of other similar problems for future research.

Conclusions:

The main emphasis in this paper is to classify all energies theoretically in an unbiased format.   The Abstract Sampling Machine provides a solution.

A single type or instance of energy was chosen to begin classification, and analysis, or definition: Newton's Gravity.

As a system, P.E.G. makes a strong argument to consider Einstein's Energy as a law based on Ohm's Law and Newton's Law. It has been a little over a hundred years since his work was first introduced, and it is still the only answer. It is identical in nature to a known Law, and a guideline to a possible refinement of Newton's Law.   A system of three perfect laws would probably prove to be enough for a new start for all.

In any case, this work has been achieved through years of incredibly hard research, and completed for this class with the "Abstract Sampling Machine".   Even

though we concentrated on Gravity, there are many other forms of energy that matter in

the P.E.G. system of Total Unification. The Bucket is full, remember "G" = God,

Gravity, and all energies statistically significant (Germane). The book mark is available
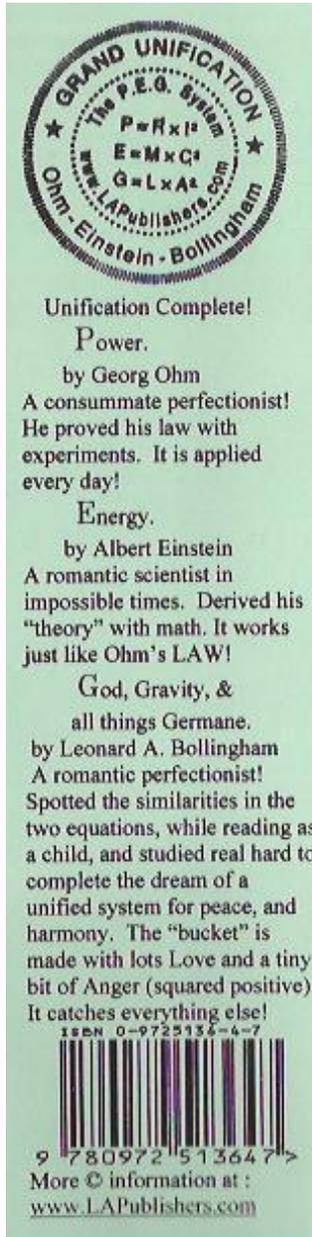
on the website.[15]

　　　Might the future version of Einstein's Grand

Unification look like the following:

$$P. = R \times I_1 \times I_2 \qquad \text{Weak EM forces}$$

$$E. = M \times C_1 \times C_2 \qquad \text{Strong EM forces}$$

$$G. = M \times V_1 \times V_2 \qquad \text{Gravitational EM forces}$$

All within a Total Unification of

$$G, G, \ \& \ \text{all things } G. = L \times A_1 \times A_2$$

?

　　　One may wonder what types of discoveries will be

achieved once we start really trying?

Unification Complete!

Power.
by Georg Ohm
A consummate perfectionist!
He proved his law with
experiments. It is applied
every day!

Energy.
by Albert Einstein
A romantic scientist in
impossible times. Derived his
"theory" with math. It works
just like Ohm's LAW!

God, Gravity, &
all things Germane.
by Leonard A. Bollingham
A romantic perfectionist!
Spotted the similarities in the
two equations, while reading as
a child, and studied real hard to
complete the dream of a
unified system for peace, and
harmony. The "bucket" is
made with lots Love and a tiny
bit of Anger (squared positive).
It catches everything else!
ISBN 0-9725134-4-7

9 780972 513647

More © information at :
www.LAPublishers.com

The main emphasis is the push for Einstein's LAW! The P.E.G. system is a second wish.

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[15]　　　Leonard Alan Bollingham**,** *Bollingham Unification/BLOG Website***,**
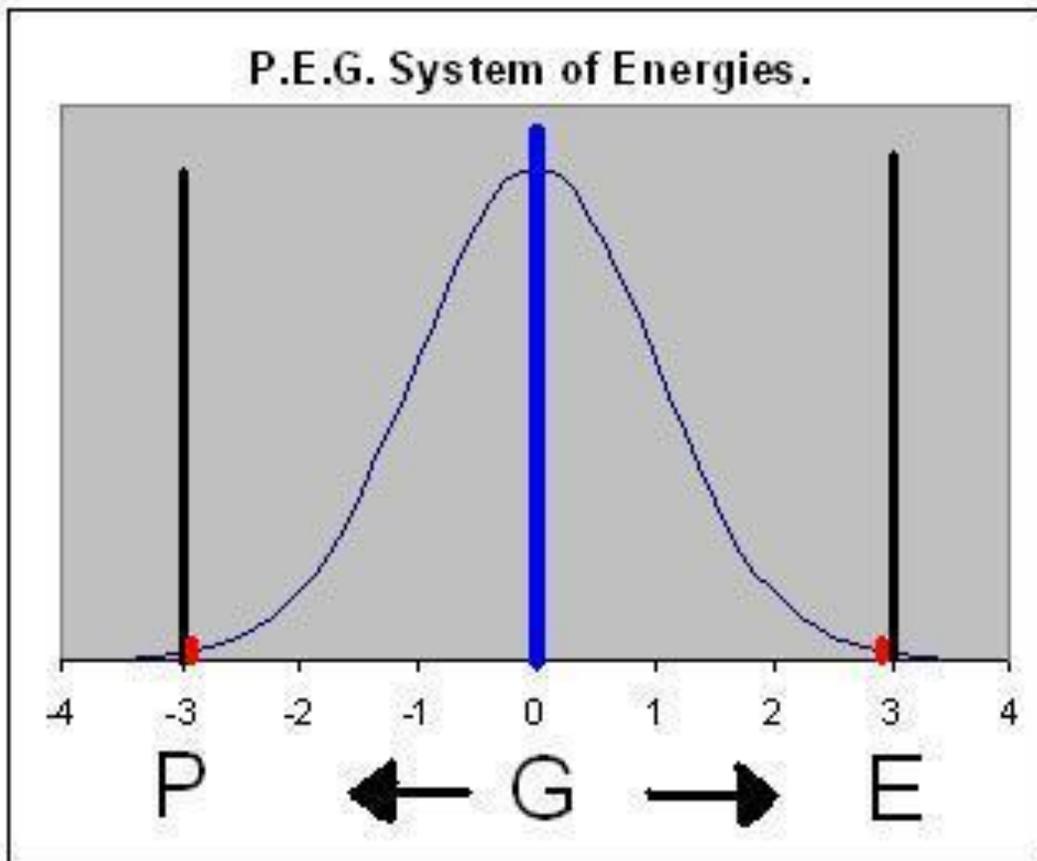http://www.LAPublishers.com

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3.)   Allon Percus, Gabriel Istrate, and Christopher Moore, *Computational Complexity and Statistical Physics*, (Oxford University Press, 2006). Page 5-6.

4.)   **"**Carl Freidrich Gauss", *Wikipedia, The Free Encyclopedia*, http://en.wikipedia.org/wiki/Carl_Friedrich_Gauss

5.)   **"**Normal Distribution", *Wikipedia, The Free Encyclopedia*, http://en.wikipedia.org/wiki/Normal_distribution

6.)   Robert Johnson, *Elementary Statistics*, 4th Edition, (Duxbury Press, Boston, 1984), Chapter 6, P. 202, paragraph 1.

7.)   *The Bible*, 1 Corinthians, Chapter 13, verse 13.

8.)   William R. Shea, *Designing Experiments & Games of Chance, The Unconventional Science of Blaise Pascal*, (Science History Publications, USA, 2003) Pages: ix, xi, 4, 10 and 11.

9.)   **"***Nested if-then-else Structure*", helpnet.i*nstallshield.com*, http://helpnet.installshield.com/robo/projects/langref/LangrefNested_ifthenelse_structure.htm

10.)   Rollo Appleyard**,** *Pioneers of Electrical Communication***,** (MACMILLAN AND CO, LIMITED, ST. MARTIN'S STREET, LONDON,1930), Chapter VII, Georg Simon Ohm, page 201, paragraph 2 and 3.

11.)   Albert Einstein, from Wikepedia, the free encyclopedia, http://en.wikipedia.org/wiki/Albert_Einstein

12.)   Corey S. Powell, *God in the Equation, How Einstein Transformed Religion***,** (Free Press, 2002), Page 65, paragraph 3.

13.)   Drawing a Normal Curve with Excel, enhanced with fences and labels for P.E.G.**,** http://www.tushar-mehta.com/excel/charts/normal_distribution/

14.)   **"**Sir Isaac Newton: The Universal Law of Gravitation", *UTK.edu*,

http://csep10.phys.utk.edu/astr161/lect/history/newtongrav.html

15.) Leonard Alan Bollingham**,** *Bollingham Unification/BLOG Website***,**
http://www.LAPublishers.com

This may be what two different Anger vectors (red, just inside both fences) look like, with Love (blue) in the center?