

ABSTRACT**Title: DUALITY: THE WAR FOR EXISTENCE! ©2015***(Panpsychism, defined?)*

My marathon swimming son¹, Jon Erikson, passed away in July 2014 and his death has prompted me to ponder some serious realities of Panpsychism²⁻⁴. This is suggested as the real "mysterious connection" in the essay question. "Feelings" guide the many achievements of physicists, mathematicians, and yes, even swimmers. A relaxed feel of water is required to swim, or even to float. Whence came force and energy to swim? Activities of water and a swimmer are dual, the former being quite massive and stable, and the latter less so in motion. An inscribed sphere in a regular tetrahedron is similar as a quantitative model. Assuming such dualities as mass and it's energy, such relationships may be written;

I. Regular tetrahedron, as energy \Leftrightarrow Inscribed sphere, as mass
(as photon/electron; swimmer/water; shell/nucleus; people/government..)

Left and right sides of (I) are expressed as their respective geometrical area-to-volume ratios. Symbolically, $(A/V)_T = (A/V)_{i.s}$, where A, V, T, and "i.s" represent area, volume, tetrahedron, and sphere. Geometric manipulation converts both A/V's to a dimensionless linked Surface-to-Content ratio, S/C. The sphere/tetrahedron (I) duality serves as a model guide to balance other dualities as system/environment effects. In making such dualities, Dr. Tykodi's "thermo-staedic" for steady-rate systems⁶⁻⁸, and my thesis⁵, *Thermodynamics of the Steady State*, of some 56 years ago are helpful for dynamic definitions, i.e. at steady-rates. Several S/C ratios, differences, and/or percent, $A/(A+V)$, are tabulated. These values are properties of nature for links to be evaluated and tested as defining panpsychism.

Author Bio

Ted Erikson earned a BS ChE ('52) and a MS Chem ('59) from IIT and a Gas-Surface Interaction diploma ('65) from MIT. He spent 23 years at the IIT Research Institute as a Senior Chemist resulting in 2 patents and 10 publications followed by 16 years teaching chemistry, math, and physics in public schools. Erikson is also an accomplished marathon swimmer. His beacon in life is chaos, "a state of things where chance is supreme" all things considered.

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(Panpsychism, defined?)

(1) INTRODUCTION-

"Is there a model that can be created as a guide?" The maze of things that exist becomes chaotic in possibilities to consider. This essay merges some swimming, geometric, and thermodynamic expertise to create a basic model for a broad dual property of nature. Dual actions of all things as "surface-to-content-ratio" applies to "all creatures, small and large" vis.: photons-electrons-protons-molecules-bacteria-animals-whales. Finding space to occupy and hold, time to exist, and fend off challenges is a battle for all things!

Swimming involves "masses within" controlling "wavy" motions of arms and legs without, with partial body rotations. Feeling water within, through, and without has given me, I think, considerable insight to various role(s) of temperature, heat, work, power, energy and action.

It was in a dream a short time after the loss of my soul mate in 2005 that her words, "The *water will talk to you*" emerged several times. We had shared the quandary of life for many years. Then, being both puzzled and hearing impaired, perhaps her words were really, "...the water will talk *through* you"! These words have provided my motivation ever since. I leave it to the reader to decide whether these are swimmer words, water's, or even Diane's, as they are written here. It is, after all, an attempt to illuminate models for sensual feeling and memory for thought as they may appear in matters of water, life, power, and energy, i.e. panpsychism. That will be for the reader to decide.

Sections on I-Swimming, II-Geometry, III-Thermodynamics, IV-Summary, and V-Acknowledgements follow.

I. SWIMMING (Slow to fast & near to far)

Swimmers seek open water for fame, profit, and attention of various kinds. I was interested in researching water and myself while my son had a goal of beating me. Captain Webb can lay claim to launching this sport with his solo swim of the English Channel in 1895. Table 1 presents some aspects of a father-son history, fairly representative of anyone claiming to be a marathoner.

TABLE 1: TYPICAL OPEN WATER MARATHON SWIM RECORDS

Father Ted Erikson Born: February 17, 1928 Not at rest, but (?)						Son Jon Erikson Born: September 6, 1954 At rest: July 28, 2014					
<u>Some Open water Marathon Swims</u> 3 Lake Michigan (Chicago to Michigan City, Kenosha, and Benton Harbor), 2 English Channel, and Pacific Carillon Isles to SFO GG						<u>Some Open water Marathon Swims</u> 11 English Channel (1,2, & 3 way) 2 Lake Michigan (Chicago to Michigan City & return) and Ocean @ Guaymas, Mexico					
#	Date, Place	Miles	Hours	MPH (ave)	Mtrs/Sec (ave)	#	Date, Place	Miles	Hours	MPH (ave)	Mtrs/sec (ave)
1	1961, Lake, M.	36.75	36.62	1.004	0.442	1	1969, Channel ¹	21.5	11.37	1.89	0.844
2	1962, Lake M.	50.00	35.62	1.404	0.628	2	1971, Lake M.	36.75	25.18	1.46	0.650
3	1963, Lake M.	60.00	37.42	1.603	0.717	3	1971, Ocean	26.1	12.14	2.15	0.960
4	1964, Channel	21.5	12.42	1.73	0.77	4a	1975, Channel ²	43.0	30.0	1.43	0.64
5	1965, Channel	43.0	30.05	1.43	0.64	4b	1979, Channel ²	43.0	22.26	1.93	0.86
6	1967, Ocean	31.5	14.63	2.163	0.963	5	1980, Lake M.	36.7	19.20	1.88	0.836
						6	1981, Channel ³	64.5 !	38.45	1.68	0.739

Both hold historic marks; Jon Erikson established the first triple non-stop crossings of the English Channel, while Ted Erikson was first to traverse Farallon Islands to the Golden Gate Bridge, a record held for 47 years.

Swimming raises the question whether one is a wave of mass traveling on a sea of energy or a wave of energy traveling on a sea of water's mass. With heat being a form of energy and also contained in mass, dual interactions of mass and its expressions of energy are ubiquitous. As are physical arm and leg action motions of pushing water backward in efforts to go forward. In a movie run reverse, one concludes that it is the action of water moving forward pushing a swimmer. A swimmer's action and water's reaction are physically identical. Not really in reality because no real swimmer can duplicate this.

Like a Russian "troika", physical, mental, and emotional power can be hooked up three ways differently to swim fast or far; - a 1-D series of 3, a 2-D pair led by another, or 3-D, all leading in parallel - where each has most favorability to control power, direction, and/or speed. There are 1-D, 2-D, and 3-D separate dimensions of space

Marathon swimming becomes robotic and trance-like. Training implants the rote actions intrinsically. One can be sleeping or meditating through long swims only to return to consciousness when feedings are necessary, emergency conditions arise, or walking onto the shore of one's goal. Water temperature is sensed to adjust pace for one's metabolism.

I once watched a person at the bottom of a pool, staying there. Pulling him to the surface, he sputtered "It seemed so simple in school". Feeling water is required to teach one to swim, not dry land. Intensive training caused me to "feel" new capillaries forming to nourish specific muscle demands, particularly in shoulder exertions.

Dual actions interchange at near the same frequency, one expressing energy from external features (arms and legs) and another supplying reserves by large numbers (Avogadro?) of internal body mass food energies. In terms of the concept being developed here, some examples:

Rough velocity estimates for duality links such as; (a) swimmer @ ~ 2 meters/sec \leftrightarrow water @ \sim zero); (b) shell @ near c , the light \leftrightarrow nucleus @ practically zero and (c) light @ $c \leftrightarrow$ electron @ $< c$); allow crude estimates of S/C . Using Table 2, respective S/C 's as percent tetrahedral are 55%, 91.6%, and 100.0 percent.

II. GEOMETRY (spheres and tetrahedrons.)

Consider the model as a regular tetrahedron with an inscribed sphere. (See Figure 1) Mass is generally spherical, being the most stable of solid Platonic figures. Energies are portrayed by the tetrahedron, being the least stable and more "active". Independently and geometrically derived, their "area-to-volume" activities are equal!

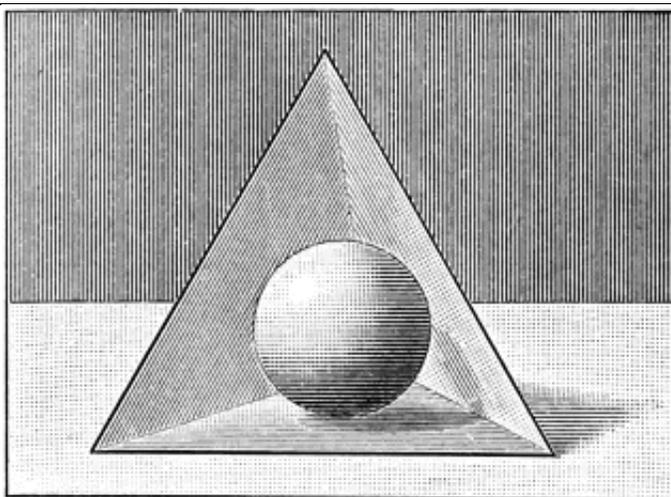
Figure 1: A REGULAR TETRAHEDRON WITH AN INSCRIBED SPHERE

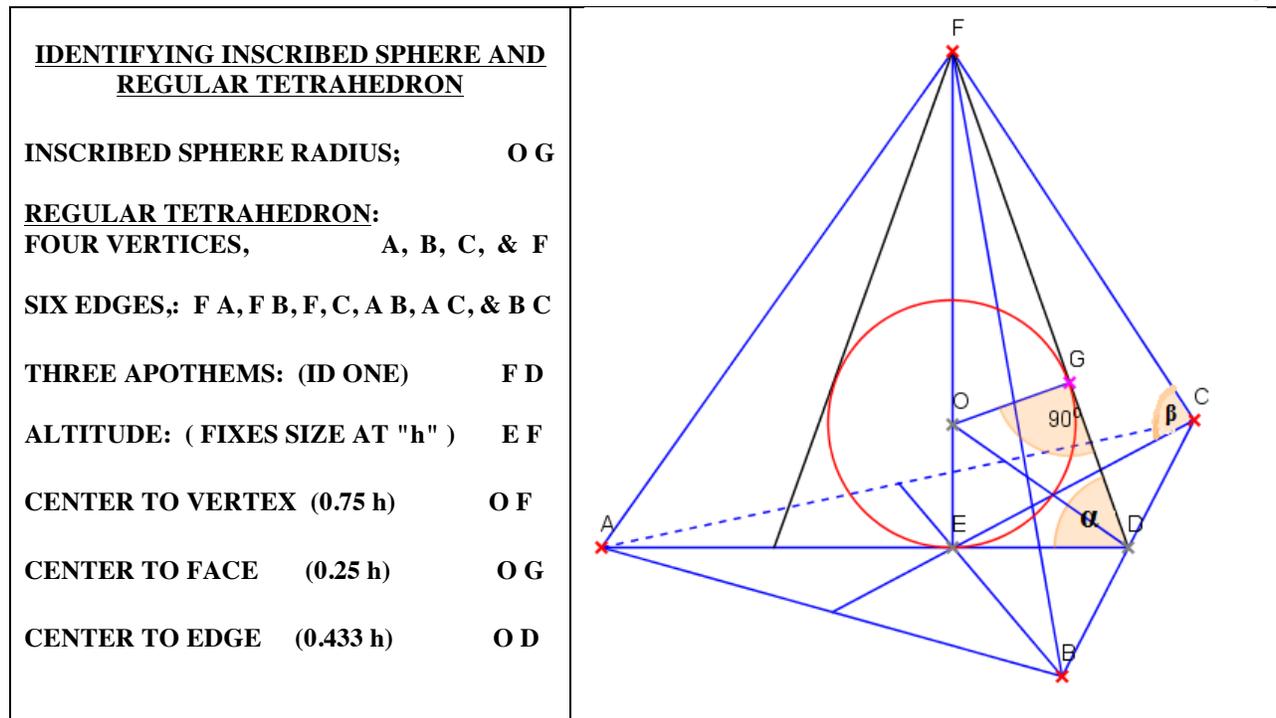
GIVEN;

A REGULAR TETRAHEDRON WITH ANY ALTITUDE OF "h" FIXES RADIUS OF INSCRIBED SPHERE AT "(1/4) h"

THEN: AREAS, A_T AND A_{is} , AND VOLUMES, V_T AND V_{is} , AS RATIOS CANCEL THE "h" FOR BOTH AND FIX NUMERICAL VALUES AT AN IDENTICAL 3.308.

AREA-TO-VOLUME RATIOS ARE ALSO IDENTICAL AT $12/h$ OR FOR THE INVERSE, $0.0833 h$. WHERE "h" FIXES SIZE FOR EITHER.





Given: An inscribed sphere, radius R, in a regular tetrahedron, Edge E.

(1) The altitude fixes size and scales $R = 0.25h$ and $E = 1.2247 h$

(2) From standard geometric formulas for areas and volumes.

Regular tetrahedron $A_T / V_T = (2.5979 h^2) / (0.2165 h^3) = 12/h$

Inscribed sphere $A_S / V_S = (0.78754 h^2) / (0.06545 h^3) = 12/h$

One finds that A_T / V_T is identically equal to $A_S / V_S = 12/h$ at any "h" !

(3) Ways exist to cancel, "h", making numerically dimensionless ratios, e.g.:

$(A^3/V^2)_T = 374.1$ and $(A^3/V^2)_S = 113.2$ (cubing areas and squaring volumes)

$(A^{3/2}/V)_T = 19.34$ and $(A^{3/2}/V)_S = 10.64$ (isolating per unit volume)

$(A/V^{2/3})_T = 2.684$ and $(A/V^{2/3})_S = 2.199$ (isolating unit area numerator)

(4) Linking these values, surface-to-content, S/C, emerges as ratios, differences, or percent tetrahedral (say), characterize features to be identified as appropriate properties of nature.

TABLE 2 - SOME COMPARISONS OF AREA AND VOLUME LINKS

Dimensionless (appropriately powered) *		Surface to Content, S/C			
I.D./*	REG. TETRAHEDRON	INSCRIBED SPHERE	RATIOS	DELTA	PERCENT
0	$[(A^3/V^2)_T]^*$	$[(A^3/V^2)_S]^*$	T/S	(T - S)	% T
6 / 24	$19,600 \times 10^5$	16.36×10^5	1198	19,583	100.0

5 / 12	139,951	1,636,250	10.94	127,159	85.7
4 / ?	7234.	1205.	6.005	6029	85.7
3 / 6	374.1	113.1	3.306	263	76.7
2 / 3	19.34	10.64	1.818	8.7	64.5
1 / 1	2.684	2.199	1.221	0.485	55.0

Power factors of area in the numerator and volume in the denominator vary the dimensionless A/V term considerably to grow or decay S/C relations. The proton-to-mass ratio of 1836/1, or its square root of 42.86, are marks to relate, and identify, common S/C's. Combining the power factors of area in the numerator and volume in the denominator for a working A/V term to convert to S/V is a bit too complex to explain here.

IV: THERMODYNAMICS (Heat and work)

The following table is helpful to identify words, symbols, units, and their combinations in discussions following: (My key for not forgetting)

TABLE 3: SOME RELATIONSHIPS OF ENERGIES

Identification	Ratio of Energy, E, to	Measured quantity (or constant)
Einstein	Mass, M, implies \Rightarrow	Light velocity squared, c^2
Mechanical	Distance, d, implies \Rightarrow	Force, F (F =M x acceleration)
Pressure	Volume, V, implies \Rightarrow	Pressure, P
Surface	Area, A, implies \Rightarrow	Surface tension,
Charge	Volt, ∇ , implies \Rightarrow	Charge, q^* (the electron)
Light	Frequency, f, implies \Rightarrow	Planck constant, h
Power	Time, t, implies \Rightarrow	Power, joules/sec
Heat	Temperature, T, implies \Rightarrow	Entropy heat, calories
Etc.		

First, a game with dimensional units. Using standard symbols and units, the combination, one, (h/c^2), implies units of Kg-sec, and two, (c^3/G), implies Kg/sec. Multiplying "one" and "two" produce Kg^2 , while dividing "one" by "two" produce sec^2 . Taking square roots of these final unit results imply \pm mass and \pm time. The eight combinations (multiplied and divided) support notions of waves. In sum, mass motion is \pm in direction and mass growth is \pm in size.

Three thermodynamic laws dictate the interactions of heat and work. Dr. Tykodi's treatment of the steady-state as a thermo-*staedic* system is more realistic since time and mass (as energy) are included, i.e., $U = q - w$ are treated as rates. As heat equilibrium (death) is sought from energies in space, mass, and time the

entropy still increases, but treated in a non-equilibrium "steady" fashion. "Haste makes waste" was key with Dr. Tykodi. In new cycles, as waves of birth and death, can influence of surface-to-content imbalances (i.e. activities) also direct entropy directions?

Physical work is energy done in 1-D, i.e. force times distance (as a vector!). Heat transfers a form of energy that tends into 2-D and 3-D directions. Hence, Similar to Carnot efficiency based on temperature, swimming (water motion) efficiency is based on water fluidity.

Work, E , done by bacteria and a human swimming can be equivalent if (when, ha ha!) sufficient bacteria are trained properly. (ants and elephant?, minnows and human?, easier to imagine?). To compare the work of bacteria E as power times time to human E requires a large number of bacteria (Avogadro #?). Symbolically, $E = P t$ for a human with $E = p T$ or $E = p \# t$ for the bacteria where longer time, T , or larger numbers, " $\#$ ", are needed for a numerical equality of equivalence.

In sum, this implies that tiny-small-big things (e.g., photons, electrons, protons, molecules, bacteria, animals, whales, etc.) must have a pansychist awareness of each other's presence to sustain a workable and definable system-environment link. Like the Hitachi slit experiment ¹³ (below) proves, electrons have an unknown property of nature (memory?) that induces them to coordinate their action over time into something really real!

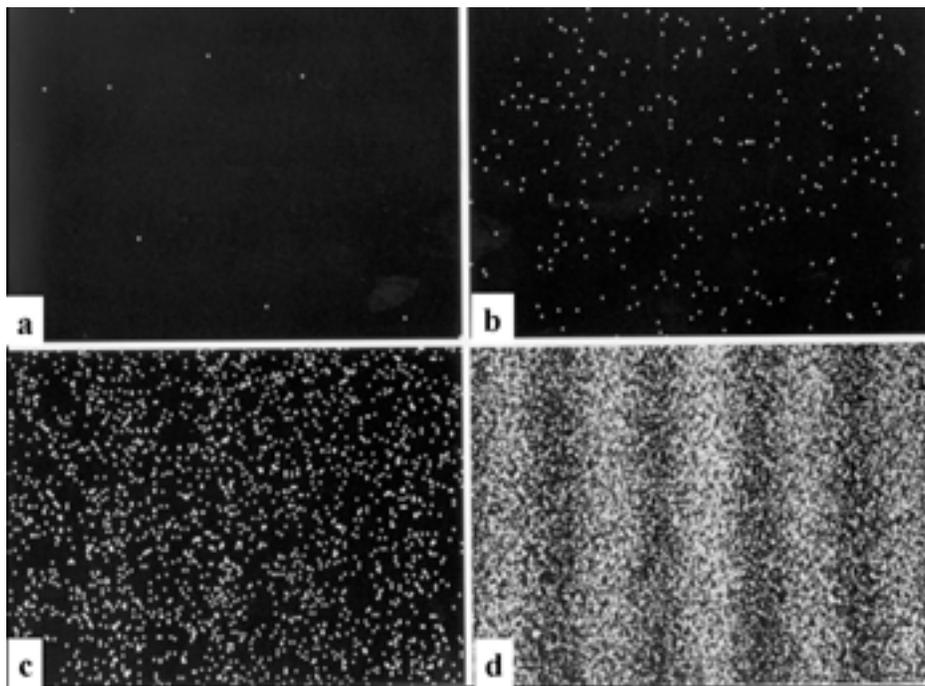


FIGURE 2 - THE DOUBLE SLIT EXPERIMENT
 (Deterministic or probabilistic?)

The number of electron accumulated on the screen:
 (a) 8 electrons; (b) 270 electrons; (c) 2000 electrons; (d) 160,000. The total exposure time from the beginning to the stage (d) is 20 min.

Repetition of an event involves time or frequency. Dividing E/f (as Planck constant, h , and E/t (as power) produces t/f . In 3-D space, it unlikely their definition as simple inverses applies. But if $t = 1/f$ is assumed, then one or the other is squared which implies a positive or negative, i.e. a future anticipated, a past remembered with a transitory and a vague "zero" present.

Finally, pressure as E/V divided by surface tension as E/A produces A/V , the equal area-to-volume ratio introduced for an inscribed sphere in any regular tetrahedron. From the dimensionless combination, (A^3/V^2) powered "X", $(A^3/V^2)^X$, to any exponent emerges dimensionless and varied surface-to-content ratios. Thus, (S/C) implies dual connection of ratios, differences, or percent (tetrahedron, say) that vary for spherical and tetrahedral structures. This provides quantitative explanations for unusual results, dealing with particle mass ratios (e.g, protons to electrons), particle lifetimes, fine structure constant, charge creations, gravity, etc.

V. SUMMARY AND CONCLUSIONS

This submission submits an idea that provides an answer to questions that Diane and I sought since 1961, "Why does anything do what it does?" For my case "What are origins for force and energy created to swim?" has continued since her death. The duality of sphere-to-tetrahedron ratios to relationships of mass-to-it's energy gives a basis for comparisons that are logically real and deterministic. Creatures, big, small, and tiny, move and grow as waves of energy and mass that appear and disappear as crests and troughs. Such ideas originated from reading many works¹² of dozens of authors. Then applied various ways in a dozen presentations¹³ at local APT meetings.

Panpsychism, as an ancient philosophy, suggests all things have awareness. An excellent review⁴ (The Stanford Encyclopedia) writes, "Broadly speaking, there are, at bottom, only two positions that can promise the desired integration: panpsychism and emergentism. If one believes that the most fundamental physical entities (quarks, leptons, bosons, or whatever physics will ultimately settle upon) are devoid of any mental attributes, and if one also believes that some systems of these entities, such as human brains, *do* possess mental attributes, one is espousing some kind of doctrine of the *emergence* of mind."

If emergentism fixes memory, then panpsychism dictates future response. Physics ignores this possibility, motion energy being a main focus. But motion can merge masses, growth can evolve, and some conservation laws are violated, by

fiat.

The approach proposed in quantum theory applies squared amplitudes to waves as a 50-50 probability. The End Notes in a previous essay² tried to resolve probability with dimensions. Motion connects two points as a 1-D line. Three points, not linear, generates a 2-D triangular area. Space requires four non-linear points to define dual and equal activities as a tetrahedron or as a sphere. Three lines connect four points 16 ways as "trees". Coupled together, they suggest 3-fold probabilities; 1/16, 9/16 and 6/16 for 3-D, 2-D, and 1-D spaces, respectively, i.e. there is only a 0.0625 percent probability for anything to control or be created in 3-D space. Probability is less satisfying than determinism, the latter as Einstein's unreached goal to his death.

The geometric ratios of tetrahedrons to spheres create well-definable duality models. It relates "needs" of non-zero factors in both numerator and denominator to exist. "Wins", that make either zero or infinity in this duality war destroys all! To prove their existence, dual needs of both - light for a surface of mass and mass for time duration to exist - are required.

VI. ACKNOWLEDGEMENTS_

This writing is dedicated to my deceased son, Jon Erikson, partner Diane Richards, mentor Dr. Ralph J. Tykodi of IIT, and the black dog, Umbra. Still living are so many others from Hyde Park and Chicago's Lake Michigan's "Point" where swimming and swimmers have played so many significant roles keeping me alive. Finally, this writing has required more mental stress, physical energy as calories, and emotional lost memories than any of my marathon swims! #

*Roger Penrose, one of the greatest thinkers in physics says the human brain—and the universe itself—must function according to some theory we haven't yet discovered.

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