RALPH KENYON
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A Look at the "Boundary"

General Semantics has most often been characterized as a non-Aristotelian ($\overline{A}$) system of evaluation based upon non-Euclidean ($\overline{E}$) geometry and non-Newtonian ($\overline{N}$) physics. The very use of non-() and the common symbology; $\overline{A}$, $\overline{E}$, & $\overline{N}$; is derived directly from the "Aristotelian" two-valued logic system.

Non-Euclidean refers to geometries which are "curved" instead of "flat". Non-Newtonian refers to the Theory of Relativity and it's (not so well-known) competitors. Non-Newtonian is really a misnomer. What is meant is a system of relativistic theories with varying curvature and consequences. As yet, physicists have not been able to disconfirm most of the competing theories. All satisfy the relation $E=MC^2$. The "boundary" between the Newtonian kinetic energy, $E = ½M_0V^2$, and the relativistic kinetic energy $E = MC^2 - M_0C^2$ can be calculated. $M = M_0 \;/\,(\sqrt{1-V^2/C^2})$ $\rightarrow$ $M = M_0(1-V^2/C^2)^{-½}$ which by the binomial expansion becomes: $M=M_0\,(1 + ½V^2/C^2 + ½(3/2)(V^2/C^2)^2/2 + \text{etc.})$ So: $MC^2 = M_0C^2 + ½M_0V^2 + ⅜M_0V^4/C^2 + \text{etc.}$ But $E=MC^2 - M_0C^2$, therefore $E = ½M_0V^2 + ⅜M_0V^4/C^2 + \text{etc.}$ Notice that the first term in the expansion is the Newtonian 'term' for kinetic energy. The difference between Newtonian and Relativistic energy can be approximately calculated by evaluating the term $⅜M_0V^4/C^2$ for a hypothetical speed of 500 mph. 500 mph is 223.52 mps (meters per second). The speed of light, C, is 299,792,500 meters per second. $⅜M_0V^4/C^2$ becomes : $M_0(3/8)(223.52)^4/(299{,}792{,}500)^2$ which is: $0.0000000104M_0$. At 500mph the difference between Newtonian and relativistic kinetic energy is less than one part in <u>ten million</u>. So who's going to notice? -- High energy physicists, astronauts, etc. In order for the difference to reach 1%, the speed must be 15,650 mph or 6,997 meters/sec. Newton never went that fast (at least not Sir Isaac Newton_{1700}). In short, Newtonian mechanics (as it's called by physicists) is a good first approximation to relativistic mechanics. The fact is, all engineers dealing with relatively low energies use Newtonian mechanics. The precision and accuracy of relativistic mechanics is not needed for "ordinary" every-day calculations.

Non-Euclidean refers to geometries which are "curved" instead of "flat". The distinction is similar to the difference between Newtonian (classical) physics and Relativistic physics. Only for very large areas is there any significant difference. In space measurement, "curvature" is a "global" property. The "local" properties for Euclidean and non-Euclidean geometries do not differ. What distinguishes Euclidean from non-Euclidean is the so-called "fifth postulate" or the is parallel postulate". Of many equivalent forms, one convenient for illustration is: "Through a point not on a given line, ____ Parallel line(s) may be drawn to the given line." What one puts in the blank space determines whether the geometry will be Euclidean or not. Euclidean geometry is formed when 'one and only one' completes the definition. Spaces with positive curvature are formed when 'none' completes the definition. The surface of the earth is an example. Spaces with "negative" curvature are formed when 'more than one' completes the definition. The "saddle" shaped surface is an example. If you pick a finite whole number, the resulting geometry, if possible, I would call "quantum geometries". Geometry using only the first four postulates is called "absolute geometry".

In both Physics and Geometry the "classical" examples are special cases of the more general extensions. $N \subset \overline{N}$ and $E \subset \overline{E}$ (the '-' here is not used in the same manner as in set theory or other mathematics. $\overline{E}$ is an extension of E which includes E. In mathematics, X and $\overline{X}$ have nothing in common.). The most general two-valued orientation, of which I am aware, which is used in connection with language, is that from gestalt psychology, "figure and background (ground)", the concept of a "distinction". A consistent and powerful formulation using this approach was published in Laws of Form by G. Spencer Brown. Brown develops a three- and an Infinity- valued logic system using <u>time</u> and <u>function</u>. (He had already incorporated indexing with "mark of distinction" and levels were included in distinguishing among "arithmetic", "algebra" and "calculus".) Of special significance is the "third" value which Brown calls "imaginary". This third value is "generated" in a natural way similar to the generation of the "imaginary" number 'I' ($\sqrt{-1}$) from 0 and 1 in algebra. Consistency is a property of real valued logic (T,F) analogous to "order" being a property of real numbers (real valued variables) in algebra. Like "complex numbers" there is a "complex logic" (which is only one of many non-Aristotelian systems). Just as "ordinary" every-day calculations with mathematics do not need the power and generality of complex numbers, "ordinary" every-day reasoning does not need the power and generality of complex logic.

In summary, the $\overline{A},\overline{E},\overline{N}$ trilogy is a more general extension of the A,E,N trilogy. $\overline{A},\overline{E},\overline{N}$ is needed whenever great accuracy, or great precision, or ultrafine distinctions are needed. $\overline{A},\overline{E},\overline{N}$, can be roughly characterized as multi-causal, multi-dimensional, multi-level. Lest the misapprehension possible in this characterization be developed, we must remember that I have not accounted for the following perspectives: $\overline{A},E,N$; $A,\overline{E},N$; $A,E,\overline{N}$; $\overline{A},\overline{E},N$; $\overline{A},E,\overline{N}$; or $A,\overline{E},\overline{N}$. All of these possibilities are in some way "between" A,E,N, and $\overline{A},\overline{E},\overline{N}$.