

Ternary Probability as a Natural Generalization of 3-Space

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Articles written by E. T. Whittaker in 1903 and 1904 suggest the natural generalization of 3-space as ternary probability. This is proven using basic mathematical statements and an associated transition as main eigenvalues from the product of the symmetric group S_2 and the Klein four-group $\mathbb{Z}_2^2$ to the dihedral of order 12 D_6 and related properties. A generalization of physical theory is suggested.

Ternary Probability

The work of E. T. Whittaker and the property of infinite tetration unique to $\sqrt{2}$ suggest that there are methods for computing wavefunctions by tetration, hyperoperations, interpolation and ternary probability. The gauge used by Whittaker to eliminate the orthogonal sphericity term (Ψ) and reduce the electromagnetic wave from six degrees of freedom to two degrees of freedom (F,G) (Whittaker, 1904) is equivalent with the following statement under the assumptions of calculus and mass-energy:

$$\begin{aligned}\sqrt{3} \ x &= x^{-\sqrt{3}} \\ x &= 0.818\end{aligned}\tag{1}$$

$$\begin{aligned}G &= 0.818G \\ &= 1.214 * 10^{-11} \frac{m^3}{s^2 kg}\end{aligned}$$

Eliminating Ψ is equivalent with gaining an order of magnitude and eliminating G , producing the MOND acceleration constant and permitting coordinate shifting and ternary probability. The MOND acceleration constant can also be produced using physical variables and their assumptions (Titleman, 2026).

Additionally, consider the statements:

$$\begin{aligned}
x + y &= \sqrt{7} \\
x - y &= \sqrt{3} \\
xy &= 1
\end{aligned}
\tag{2}$$

$$\sqrt[3]{8} = 2 \tag{3}$$

Due to asymmetry in Cartesian coordinates (Whittaker, 1903), it is feasible to consider (2) as analogous to vector calculus in 3-space if xy is considered real as $\sqrt{-1}$ is imaginary, $x+y$ or $x-y$ are considered vectors in a 3-parameter space, and (3) is real.

This language of ternary probability is suggested by (2) being commensurate with the transition as main eigenvalues from the product of the symmetric group S_2 and the Klein four-group $\mathbb{Z}_2^2$ (abelian-by-cyclic, nilpotent) to the dihedral of order 12 D_6 (non-abelian, solvable) in Galois theory (Du et al., 2021). The former permutes coordinates independently as a form of orthogonal sphericity $xy \perp zr$ (Titleman, 2026) while the latter combines a primary rotation of order 6 with a single axis reflection of order 2 as a form of wave propagation (Whittaker, 1904).

Classical 3-space is thus only one paradigm for modeling trajectories. Mathematical assumptions of cartesian symmetry and kinematics require matching physical assumptions, such as those made in the Clausius formulation for Root Mean Square (RMS) velocity.

References

- Du, Z., Liu, F., Liu, S., & Qin, Z. (2021). Graphs with $n-1$ main eigenvalues. *Discrete Mathematics*, 344(7), 112397.
- Titleman, M. (2026). The Duality of Whittaker Potential Theory: Fundamental Representations of Electromagnetism and Gravity, and Their Orthogonality. *arXiv preprint* arXiv:2205.08309v9.
- Whittaker, E. T. (1904). On an expression of the electromagnetic field due to electrons by means of two scalar potential functions. *Proc. Lond. Math. Soc*, 1, 367.
- Whittaker, E. T. (1903). On the partial differential equations of mathematical physics. *Mathematische Annalen*, 57(3), 333-355.