

“A Quantum Psychological Approach to Translations and Rotations of Mental Representations,”
or “Do I Realize a Quantum Spinor?”

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In this seminar, I will introduce some reasons for believing that people have quantum realizations of certain psychological phenomena and what it might mean to address these questions from a scientific perspective.

I will first provide a brief introduction to why and how I began to develop a quantum logic approach to psychology in the 1970's in order to represent a type of concept degeneracy attributed to schizophrenic reasoning. Then, I will discuss the von Neumann interpretation of quantum theory as a non-distributive lattice. The Stern-Gerlach experiment will be used as an example of a such non-classical logical experience.

I will overview my “synaptic spanning” model for the human processing of physical information which is formally based upon the Schwinger measurement algebra. Schwinger's selecting/non-selecting measurement paradigm will be suggested as a means for coding fundamental ambiguities of experience, such as Yuri Orlov's “doubt states” within his “wave logic” approach to psychology. Translations and rotations will be realized as spectral shifts of projection-valued measures generated by Schwinger Type I and Type II observables.

The quantum psychology model will be contrasted with classical set theoretic descriptions such as can be found in “Boolean” black box models of “synaptic summation” and in hologram-like interference models of “synaptic superposition.” Differences will be addressed (1) between classical set theoretic structures and quantum space theoretic structures, (2) between classical wave equations and quantum ray representations, and (3) between Poisson brackets and commutator brackets.

I will review some experimental data pertaining to the perception of translational and rotational degrees of freedom: (1) Bernstein's Fourier decomposition of translational motion study, (2) Lashley's ablation-memory studies, (3) von Bekesy's neuronal superposition study, (4) Shepard's mental rotation studies, (5) N.Y.U.'s S.Q.U.I.D. (Superconducting Quantum Interference Device), (6) Oshins' description of self-referential motion associated with certain Chinese “internal” martial arts and other meditative motions.

I will demonstrate that I have classical spinorial properties through the double covering of the rotation group exhibited in the relative orientation-entanglement relation of part of myself with respect to the rest of myself. The necessity of a solid object or impenetrable region of space for representing the $SU(2)$ symmetry of such classical “finite size spinors” will be contrasted with ordinary rotations $SO(3)$ of classical rigid objects. The difference between classical spinors which realize a continuous infinity of intermediary position and quantum spinors which realize the virtual symmetry structure of an elementary quantum dichotomy will be discussed. I will describe and propose a psychological Aharonov-Susskind-Bernstein effect such as a reversal of spinorial, virtual brain current activity as a consequence of relative self-rotation by 2π .

As time and interest permit, I will be open to discussing such other possible empirical consequences of a quantum psychology approach as chiral superpositions, ray representations, unitary inversions, and (non-metric, negationless) relativistic quantum logic and the search for prerequisites to consciousness. Other possible topics could include (1) some evolutionary and developmental consequences to this work, (2) Orlov's word association tests, (3) differences between the quantum logic approach and “fuzzy logic” or “laws of form” logic, and (4) philosophical implications of the quantum metalogic such as in resolving “the liar's paradox.”