Refutation of the quantum probability rule

We assume the method and apparatus of Meth8/VŁ4 with Tautology as the designated *proof* value, F as contradiction, N as truthity (non-contingency), and C as falsity (contingency). The 16-valued truth table is row-major and horizontal.

LET: p, q, r, s: E, f, m, n; & And; + Or; > Imply; = Equivalent, is;

From: Caves, C.M.; Fuchs, C.A.; Manne, K.; Renesl, J.M. (2003). "Gleason-type derivations of the quantum probability rule for generalized measurements". arxiv.org/pdf/quant-ph/0306179.pdf

III. The quantum probability rule, A. Linearity with respect to the non negative rationals: Every frame function is trivially additive, for consider two POVMs, {E1, E2, E3} and {E1 + E2, E3}. Clearly both are POVMs if either is, and the frame-function requirement immediately yields f(E1) + f(E2) = f(E1 + E2) . (3.2)

From this we obtain a homogeneity property for multiplication by rational numbers. We can break an effect nE into m pieces to form the effect (n/m)E. Using the additivity property twice, we obtain

mf(n/m)E = f(nE) = nf(E) ⇒ f(n/m)E = (n/m)f(E) . (3.3)

The function f is thus established to be linear in the non negative rationals. We can extend to full linearity by proving continuity.

We evaluate the antecedent of Eq. 3.3 and rewrite it as

mf(n/m)E = (f(nE)=nf(E)) (3.3.1)
((r&q)&((s\r)&p)) = ((q&(s&p))=((s&q)&p)) ; FFFF FFFT FFFF FFFF (3.3.2)

Eq. 3.3.2 as rendered diverges from contrarity by one value T.

We weaken the argument of Eq. 3.3.1 by removing either f(nE) or nf(E) since they are equal.

mf(n/m)E = (nf(E)) (3.4.1)
((r&q)&((s\r)&p)) = ((s&q)&p) ; TTTT TTTF TTTF TTTF (3.4.2)

Eq. 3.4.2 is *not* tautologous, diverging by three values of F.

From Eqs. 3.3.2 and 3.4.2, this means subsequent assertions do not follow. Hence the function f is not established to be linear, and continuity (or homogeneity) of f cannot be proved.

Remark: In 1935 von Neumann stopped "believing" in Hilbert space. Rosinger, E.E. (2004). What is wrong with von Neumann's theorem on "no hidden variables". arxiv.org/abs/quant-ph/0408191, quoting: Birkhoff, G.D. (1961). Proceedings of Symposia in Pure Mathematics. 2:158, American Mathematical Society, with the respective letter dated 13 November 1935.