Refutation of the quantum qutrit ternary probability

We assume the method and apparatus of Meth8/VŁ4 with `T`autology 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: probability, Alice [Bob is *not* Alice]; outcomes (0,1,2), measures (0,1);
~ Not; & And; + Or; > Imply, greater than; < Not Imply, less than; = Equivalent;
% possibility, one or some; # necessity, all; (p@p) 0, zero; (%p>#p) 1, one; (%p<#p) 2, two.

From: Hu, X-M.; Liu, B-H.; Guo, Y.; Xiang, G.Y.; Huang, Y-F.; Li, C-F.; Guo, G-C.; Kleinmann, M.; Cabello, A. (2018). Observation of stronger-than-binary correlations with entangled photonic qutrits. arxiv.org/pdf/1712.06557.pdf .

Correlations between the outcomes of measurements performed by two parties, called Alice and Bob, are described by joint probabilities *P(a,b|x,y)*, where *x* and *y* are Alice's and Bob's measurement settings, respectively, and *a and b* are Alice's and Bob's measurement outcomes, respectively. The experiment is a bipartite Bell-type experiment in which Alice randomly chooses between two different measurements, *x* = 0,1, each of them with three possible outcomes, *a* = 0,1,2, and Bob randomly chooses between two different measurements, *y* = 0,1, each of them with three possible outcomes, *b* = 0,1,2. (1.1)

r=(((%p>#p)+(%p<#p))+(p@p)) ;
s=((%p>#p)+(p@p)) ;
((r=(((%p>#p)+(%p<#p))+(p@p)))&(s=((%p>#p)+(p@p))))
> (p&((q&(r&s))+(~q&(r&s)))) ; `TTTT NNNN TTTT CTCT` (1.2)

In fact, the result of the experiment demonstrates that none of the four measurements (Alice's or Bob's) can be binary. (2.1)
((r=(((%p>#p)+(%p<#p))+(p@p)))&(s=((%p>#p)+(p@p))))
> ~(%r=((%p>#p)+(p@p))) ; `TTTT TTTT TTTT CCCC` (2.2)

Eqs. 1.2 and 2.2 as rendered are *not* tautologous.

To weaken the argument, we test the sum of the propositions of the outcomes to be greater than one as tautologous, because after all that is the state supposedly observed by experiment.

If outcomes are 1,2,0, then the sum of probabilities are greater than 1. (3.1)
(r=(((%p>#p)+(%p<#p))+(p@p)))>(%p>#p) ; `TTTT NNNN TTTT NNNN` (3.2)

Remarks: The cited paper was paid for by the governments of China, Hungry, Spain, Sweden. The footnoted data set link at personal.us.es/adan/binary.htm is a table of 16 columns and 4500 rows. We could not replicate the χ^2-values in Table II. Consequently, we applied the N-by-M contingency test (superset of Chi-squared test with expected values derived from observed values) on the first 1000 rows. We found Fisher P <= 01, χ^2 = 0.0000001; df = 14,985. In other words, the data set as published is random data. We conclude this impugns the data collection, data set, results, and entire experiment.