Refutation of hiding classical information by using quantum correlation of a two-party state

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: probability, |0⟩, |1⟩, √2; ~ Not; & And; + Or; - Not Or;
\> Imply, greater than; < Not Imply, less than; = Equivalent; @ Not Equivalent;
% possibility, for one or some; # necessity, for all or every;
(p@p) ordinal 0; (%p>#p) ordinal 1; (%p<#p) ordinal 2; (p=p) ordinal 3.

Basis states (basis vectors) as qubits are defined as:

|0⟩ to (|0⟩+|1⟩)/√2 and (0.1.1)
q>((q+r)\s) ; TTTT TFTF TTTT TFTF (0.1.2)

|1⟩ to (|0⟩−|1⟩)/√2 (0.2.1)
r>((q-r)\s) ; TTTT TTTT TTTT TTTT (0.2.2)

Qudits are defined as:

|00⟩ to [(|0⟩+|1⟩)/√2]*[(|0⟩+|1⟩)/√2] (0.3.1)
[q>((q+r)\s)]&[q>((q+r)\s)] = ((q+r)+((%p<#p)&(q&r)))\(%p<#p) ;
TFFT FTFT TFTF FTFT (0.3.2)

|11⟩ to [(|0⟩- |1⟩)/√2]*[(|0⟩- |1⟩)/√2] (0.4.1)
[r>((q- r)\s)]&[r>((q- r)\s)] = ((q+r)- ((%p<#p)&(q&r)))\(%p<#p) ;
NNTT TTTT NNTT TTTT (0.4.2)

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"[C]consider an example of hiding classical information by using quantum correlation of a two-party state. (1.0)

Suppose, we encode a single bit of classical information in two orthogonal entangled states where the encoding map is given by (2.0)

|0⟩ → (1/√2)(|00⟩+|11⟩) and (2.1.1)

q>(((((q+r)+((%p<#p)&(q&r)))\(%p<#p))+
(((q+r)- ((%p<#p)&(q&r)))>(%p<#p)))\s) ; FFTF FFTF FFFT FFFT (2.1.2)

|1⟩ → (1/√2)(|00⟩- |11⟩). (2.2.1)

r>(((((q+r)+((%p<#p)&(q&r)))\(%p<#p))-
(((q+r)-((%p<#p)&(q&r)))>(%p<#p)))\s) ; TTTT TTTT TTTT TTTT (2.2.2)

The encoding map in Eq. 2.0 is supposed to have a measurement that will have equal probabilities to become 1 or 0. (3.0)

We write Eq. 3.0 to mean: the measurement of the basis states of Eqs. 2.1.1 and 2.2.1 imply a combined probability of]0,1[. (3.1)

(p=((q>(((((q+r)+((%p<#p)&(q&r)))\(%p<#p))+(((q+r)-((%p<#p)&(q&r)))
>(%p<#p)))\s))&
(r>(((((q+r)+((%p<#p)&(q&r)))\(%p<#p))-(((q+r)-((%p<#p)&(q&r)))
>(%p<#p)))\s)))) > ((p>(p@p))&(p<(%p>#p))) ;
`TFTF TFTF TFFT TFFT` (3.2)

Remark: Eq. 3.2 as rendered is *not* tautologous. This refutes encoding classical binary information into quantum states.

[Looking] at states of both the subsystems, it has no information about the classical bit. (4.0)

Eq. 3.2 of the encoded subsystems contains information about the classical bit, refuting Eq. 4.0

Here, ... although classical information is actually hidden from both the subsystems, it is spread over quantum correlation of the encoded states." (5.0)

Eq. 3.2 makes clear that no classical information is actually hidden from the subsystems and does not spread over quantum correlation of the encoded states.

"[To] deal with the encoding of quantum information in an arbitrary *composite* quantum state... ask the question: *can quantum information be hidden from both the subsystems and remain only in the correlation?* (6.0)

If so, then somehow quantum information gets spread over the 'spooky' correlation and remains invisible to both the subsystems that are possessed by the local observers... . (7.0)

[T]his spreading of quantum information over quantum correlations as 'masking' quantum information. (8.0)

[The authors] prove that such masking is not possible for arbitrary quantum states, (9.0)
although [they showed] that it is possible for classical information to be masked." (4.0)

Eqs. 6.0, 7.0, 8.0, and 9.0 do not follow after the refutation of Eq. 5.0.

We conclude that quantum information cannot mask classical bivalent information. This further finds moot the possibility of masking quantum information.