Refutation of Bell's inequality by positive reasons

Abstract: Bell's inequality as defined by P(A&~B)+P(B&~C)-P(A&~C)=P(A&~B&C)+P(B&~C&~A)≥0 is refuted as TTT**F** TTT**F** TTTT TTTT.

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). Results are a 16-valued truth table in row-major and horizontal, or repeating fragments of 128-tables for more variables.

LET p, q, r, s: P, A, B, C;
~ Not; + Or; - Not Or; & And; > Imply, greater than; < Not Imply, less than;
= Equivalent; @ Not Equivalent;
(p=p) Tautology; (p@p) **F** as contradiction, ordinal zero; ~(p<q) (p≥q).

From: [Academic's name purposely suppressed by the instant author.] (2018). Email communication.

There is also an easy proof for (Eq. 6.1, Bell's inequality), which provides positive reasons for believing it to be a tautology by writing:

P(A & ~B) = P(A & ~B & C) + P(A & ~B & ~C) (1.1)
(p&(q&~r))=((p&((q&~r)&s))+(p&((q&~r)&~s))); TTTT TTTT TTTT TTTT (1.2)

P(A & ~C) = P(A & ~C & B) + P(A & ~C & ~B) (2.1)
[= P(A & B & ~C) + P(A & ~B & ~C)]
(p&(q&~s))=((p&((q&~s)&r))+(p&((q&~s)&~r))); TTTT TTTT TTTT TTTT (2.2)

P(B & ~C) = P(B & ~C & A) + P(B & ~C & ~A) (3.1)
[= P(A & B & ~C) + P(~A & B & ~C)]
(p&(r&~s))=((p&((r&~s)&q))+(p&((r&~s)&~q))); TTTT TTTT TTTT TTTT (3.2)

Then calculate
P(A & ~B) + P(B & ~C) - P(A & ~C) = (4.1.1)
[= P(A & ~B) + P(B & ~C) - P(A & ~C))]
(((p&(q&~r))+(p&(r&~s)))-(p&(q&~s)))=(p=p); TTT**F** T**F**T**F** TTT**F** TTTT (4.1.2)

By substitution from Eqs. 1.2, 2.2, 3.2:

((((p&((q&~r)&s))+(p&((q&~r)&~s)))+((p&((r&~s)&q))+(p&((r&~s)&~q))))-((p&((q&~s)&r))+(p&((q&~s)&~r))))=(p=p) ; TTT**F** T**F**T**F** TTT**F** TTTT (4.1.3)

P(A & ~B & C) + P(B & ~C & ~A) (4.2.1)
((p&((q&~r)&s))+(p&((r&~s)&~q)))=(p=p) ; **FFFF** **F**T**FF** **FFF**T **FFFF** (4.2.2)

P(A & ~B) + P(B & ~C) - P(A & ~C) ≥ 0 (5.1.1)
(~(((p&(q&~r))+(p&(r&~s)))-(p&(q&~s)))<(p@p))=(p=p) ;
FFFT **F**T**F**T **FFF**T **FFFF** (5.1.2)

$$P(A \mathbin{\&} {\sim}B \mathbin{\&} C) + P(B \mathbin{\&} {\sim}C \mathbin{\&} {\sim}A) \geq 0 \tag{5.2.1}$$

(~((p&((q&~r)&s))+(p&((r&~s)&~q)))<(p@p))=(p=p) ;

TTTT T**F**TT TTT**F** TTTT (5.2.2)

$$P(A \mathbin{\&} {\sim}B) + P(B \mathbin{\&} {\sim}C) - P(A \mathbin{\&} {\sim}C) = P(A \mathbin{\&} {\sim}B \mathbin{\&} C) + P(B \mathbin{\&} {\sim}C \mathbin{\&} {\sim}A) \geq 0 \tag{6.1}$$

(~ ((((p&(q&~r))+(p&(r&~s)))-(p&(q&~s)))=((p&((q&~r)&s))+
(p&((r&~s)&~q))))<(p@p))=(p=p) ; TTT**F** TTT**F** TTTT TTTT (6.2)

Eq. 6.2 as rendered is *not* tautologous. This means the conjecture by positive reason proof for Bell's inequality is refuted.