Refutation of Bell's inequality by the Zermelo-Fraenkel (ZF) axiom of the empty set

Abstract: Bell's inequality is in the form of P(A not B) + P(B not C) ≥ P(A not C). By applying the ZF axiom of the empty set, Bell's inequality takes the form of P(A not B) + P(B not C) ≠ P(A not C). Neither equation is tautologous, with the latter relatively weaker as the negated truth table result of the former. Hence, Bell's inequality and the ZF axiom of the empty set are summarily refuted in tandem.

We assume the method and apparatus of Meth8/VŁ4 with ᴛautology as the designated *proof* value, **F** as contradiction, ɴ as truthity (non-contingency), and ᴄ 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; & And; > Imply, greater than; < Not Imply, less than;
> = Equivalent; @ Not Equivalent; (p=p) ᴛautology; ~(p<q) (p≥q).

From: Guz, Kajetan. (2016). The new axiom of set theory and Bell inequality.
arxiv.org/ftp/arxiv/papers/1603/1603.08916.pdf (kajetan at guz dot pl).

Bell's inequality is written in the form of an inequality of probabilities:

> P(A not B) + P(B not C) ≥ P(A not C)   (1.1)

> ~(((p&(q&~r)) + (p&(r&~s)) < (p&(q&~s))) = (p=p) ;
> <div align="right">TTTT TFTT TTTF TTTT   (1.2)</div>

However, experiments in quantum physics contradict this inequality. All interpretations to date are directed against the thought experiment of Einstein, Podolsky and Rosen (EPR). Attention [was not paid], however, to the imperfection of the mathematical apparatus used to describe quantum reality. Using the new axiom of empty sets we ... present Bell's inequality in a different form. Each of the three sets A, B and C has its respective empty set: $\varnothing_A$, $\varnothing_B$ and $\varnothing_C$ as $P\varnothing_{A\bar{B}} + P\varnothing_{B\bar{C}} \neq P\varnothing_{A\bar{C}}$. Bell's inequality takes the form:

> P(A not B) + P(B not C) ≠ P(A not C)   (2.1)

> ((p&(q&~r)) + (p&(r&~s))) @ (p&(q&~s)) ;   **FFFF FTFF FFFT FFFF**   (2.2)

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

This confirms Bell's inequality is refuted on its face by Eq. 1.2.

By applying the ZF axiom of the empty set, this confirms Bell's inequality is also refuted in Eq. 2.2 and fares relatively weaker as the negated truth table result of Eq. 1.2.

What follows by extension is that the axiom of the empty set itself is also *not* tautologous.