Bell’s theorem refuted mathematically for Professor X.

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Abstract
Bringing an elementary knowledge of sums and averages to Bell (1964), we refute Bell’s theorem.

1 Introduction
1.1. (i) With Bell-(#) denoting Bell 1964:(#), we label the formulas between Bell-(14)-(15): (14a)-(14c). (ii) We replace Bell’s $P(\hat{a},\hat{b})$ with $E(a,b)$; etc. (iii). Sharing Bell’s indifference (p.195)—ie, $\lambda$ may be continuous or discrete (we can work with both)—we include both possibilities in (12). (iv) Thus, based on Bell-(1): $A_i = A(a,\lambda_i) = \pm 1$; etc. (iv) Like Bell (1964), we are bound by EPRB here.

1.2. (i) Taking math to be the best logic, it may flow for several lines before we comment. (ii) By absurd (▲) we mean math-false. (iii) Its contrary here is QM_TRUE (■): for, given its success, QM is the gold-standard for results here. (iv) WM denotes our theory (wholistic mechanics) since 1989.

2 Analysis

Bell-(14a) = $E(a,b) - E(a,c) \Leftrightarrow E(a,b) = \frac{1}{n} \sum_{i=1}^{n} A_i B_i$; $E(a,c) = \frac{1}{m} \sum_{j=1}^{m} A_j B_j$. (1)

= $\frac{1}{n} \sum_{i=1}^{n} A_i B_i - E(a,c) \Leftrightarrow$ We do not require $A_i = A_j$, but see §3: (2)

= $\frac{1}{n} \sum_{i=1}^{n} A_i B_i [1 - A_i B_i \cdot E(a,c)] \Leftrightarrow A_i B_i A_i B_i = 1; \frac{1}{n} \sum_{i=1}^{n} 1 = 1$. (3)

\[ \therefore |E(a,b) - E(a,c)| = \left| \frac{1}{n} \sum_{i=1}^{n} A_i B_i [1 - A_i B_i \cdot E(a,c)] \right| \Leftrightarrow |X| = |Y| \text{ if } X = Y. \] (4)

= \[ \frac{1}{n} \sum_{i=1}^{n} |1 - A_i B_i \cdot E(a,c)| \Leftrightarrow \frac{1}{n} \sum_{i=1}^{n} A_i B_i \leq \frac{1}{n} \sum_{i=1}^{n} 1; \sum_{i=1}^{n} 1 = 1; \text{ etc.} \] (5)

\[ \leq |1 - E(a,b) E(a,c)|; \text{ our QM-true result. } \] (6)

\[ \neq \text{ Bell-(15) } = \text{ Bell-(14b) } = 1 + E(b,c); \text{ its RHS an absurdity. } \] (7)

Thus: 0 ≥ |$E(a,b) - E(a,c)$| - |$E(b,c)$| - 1 $\equiv$ Bell’s inequality. ▲ (8)

0 ≥ |$E(a,b) - E(a,c)$| - |1 - $E(a,b) E(a,c)$| $\equiv$ WM-inequality. ■ (9)

$-a \cdot b \neq E(a,b) = - \int d\lambda \rho(\lambda) A(a,\lambda) A(b,\lambda) \equiv$ Bell’s theorem. ▲. (10)

$-a \cdot b = E(a,b) \neq \frac{1}{n} \sum_{i=1}^{n} A_i B_i \neq - \int d\lambda \rho(\lambda) A(a,\lambda) A(b,\lambda) \equiv$ WM-theorem. ■ (11)

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3 Discussion

- (1): is the common start-point Bell-(14a): for Bell [us]; en route to his [our] inequality (9) [(10)].
- (2): no difficulty arises if we match results via $A_i = 1$ with $A_j = 1$; $A_i = -1$ with $A_j = -1$.
- (3): in passing (though not required here): $\frac{1}{\sqrt{2}} \sum_{i=1}^{m} \sum_{j=1}^{n} A_i B_j = \frac{1}{\sqrt{2}} \sum_{j=1}^{m} A_j B_j$.
- (4): allows a simpler help-note after (5).
- (5): the help-note says it all.
- (6): by reduction.
- (7): uses the most basic definition of an expectation; a conventional arithmetic mean.
- (8): nb: by observation and using math-facts: (14b) = (15); but Bell-(14b) ≠ (14a)! ▲
- (9): shows (8)’s absurd upper bound to be 0. ▲ Under QM, that bound is $\frac{1}{\sqrt{2}}$. ■
- (10): shows (9)’s QM-true upper bound is 0; ie, under QM, that bound is 0. ■
- (11): absurd, like (9). ▲ QM-true (12) refutes them both. ■
- (12): QM-true, as tested via (7)-(11); or independently. QED. ■

4 Conclusions

3.1 (i) (8) pinpoints Bell’s error: Bell-(14a) ≠ Bell-(14b). (ii) The source of his error lies in that terse clue below (14b): using Bell-(1).
(iii) The QM-truth for Bellians is this: it is absurd to use Bell-(1) beyond the bounds of EPRB—from David Bohm—the experiment that underpins his study.

3.2. In Bell’s terms, our comments [•] next highlight our departure from his theorem and beliefs:

Bell (1964:199): ‘The QM expectation $-a \cdot b$ [LHS (11) ▲-(12)] cannot [sic] be represented, either accurately or arbitrarily, in the form of Bell-(2) [ie, RHS (11) ▲-(12)].’ Line below Bell-(3): ‘(11) ▲ is true [sic], so (12) ■ is not [sic] possible.’ Bell (1964:195): ‘any theory reproducing LHS (12) ■—the QM predictions—must be nonlocal [sic].’ (Therefore, since the QM predictions are well-founded, locality must be abandoned [sic].) Thus, from Bell (1990:13): ‘I step back from asserting that there is AAD and I say only that you cannot [sic] explain things by events in their neighbourhood.’

3.3. (i) Using Bell’s technique—but avoiding pitfalls (via our QM-true (10) ■ & (12) ■)—we refute Bell’s inequality (9) ▲ and Bell’s theorem (11) ▲ mathematically and quantum mechanically. This adds to our findings elsewhere: (9) ▲ & (11) ▲ may be refuted without reference to quantum theory. QED.

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6 References
