Big Shock. Bell's theorem collapses again.

Ilija Barukčić [1, 2]

[1] Horandstrasse, DE-26441 Jever, Germany.
[2] Corresponding author: Barukcic@t-online.de

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Abstract

Both from the points of view of recognition and understanding, the knowledge of fallacies can arm us against many kinds of mistakes and can help us to overcome serious scientific disagreements in a reasonable way. Being able to avoid or to detect fallacies can been viewed as a supplement to criteria of good scientific reasoning. Fallacies can be identified in several different ways. One way is to derive a logical contradiction such as +0 = +1. Still, a unified theory of fallacies giving us a systematic framework for demarcating fallacies and other kinds of mistakes is to be achieved. The present inquiry focuses on the logical and mathematical content of Bell's theorem. As we shall see, Bell's theorem itself is a false but popular belief, a deceptively bad argument. Bell's theorem is the most profound logical fallacy of physics and of science as such.

Keywords

Relativity Theory; Quantum Theory; Unified Field Theory; Causality;

1. Introduction

A crucial assumption of classical sciences and of sciences at all, has been that at least in principle classical logic is valid. The principle (or law) of non-contradiction is the foremost and the firmest among the principles of classical logic. Any serious scientific inquiry, reasoning or communication cannot do without. There are arguably many versions of the principle of non-contradiction to be found in literature. An alternate way of understanding principle (or law) of non-contradiction is to treat the principle (or law) of non-contradiction as a mathematical equation. In general, it is not true **+0 = +1**, otherwise +0 is itself and equally+0 is not itself, it is something else, it is +1 in the same respect. At a fundamental level, quantum theory itself cannot contradict the principle (or law) of non-contradiction and classical logic as such. The incomplete description of objective reality as provided to us by today's quantum mechanics is based on a number of assumptions (Bell's theorem [1], CHSH inequality, Kochen-Specker theorem et cetera) and is in striking conflict with classical logic. Following the principles of the fundamental Idealist philosophy of **Bishop Berkeley** today's incomplete description of objective reality as pro-

vided to us by quantum mechanics forces us to study objective reality while using blurred glasses although objective reality as such is strict and clear. Especially, d'Espagnat points out: "**The doctrine that the world is made up of objects whose existence is independent of human consciousness turns out to be in conflict with quantum mechanics and with facts established by experiment**." [2] In accounting for the importance of Bell's theorem let us recall Stapp's point of view too. According to Stapp, "**Bell's theorem is the most profound discovery of science**." [3]. Thus far, let us peer behind the curtains of Bell's theorem once again. This publication will make the proof, that **Bell's theorem is the most profound logical fallacy of science**.

2. Material and methods

Logically or mathematically, Bell's theorem is formulated as **a non strict inequality**.

2.1. Definitions

Definition: Strict inequalities

In terms of algebra, a strict inequality possesses either the symbol > (strictly greater than) or < (strictly less than). A strict inequality is without an equality condition. In general, it is

$$a < b \tag{1}$$

while the notation a < b means that "a is strictly less than b". In the same respect, it is

$$a > b \tag{2}$$

while the notation a > b means that "a is strictly greater than b".

Definition: Non strict inequalities

In contrast to strict inequalities, a non strict inequality is an inequality where the inequality symbol is $\geq$ (either greater than or equal to) or $\leq$ (either less than or equal to). Consequently, a non strict inequality is an inequality which has equality conditions too. In terms of algebra, we obtain

$$a \leq b \tag{3}$$

The notation $a \leq b$ means that "a is either less than or equal to b". Equally it is

$$a \geq b \tag{4}$$

The notation $a \geq b$ means that "a is either greater than or equal to b". A non strict inequality can lead to a either or fallacy, a so call 'black or white' fallacy.

Definition: Locality due to Einstein

Albert Einstein did not hide his dissatisfaction with the Copenhagen dominated Interpretation of quantum mechanics. Einstein's dissatisfaction culminated in the paper "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?" [4]. Following the arguments of Einstein, Podolsky and Rosen, "**the description of reality as given by a wave function is not complete**" [5]. In contrast to Copenhagen's demand of

non-locality, Einstein's principle of locality is based on the assumption of independence of events. In **Dialectica**, Einstein wrote:

"Fur die relative **Unabhängigkei**t räumlich distanter Dinge (A und B) ist die Idee characteristisch: äussere Beeinflussung von **A hat keinen unmittelbaren Einfluss auf B**; dies ist als << **Prinzip der Nahewirkung**>> bekannt, das nur in der Feld-Theorie konsequent angewendet ist. Völlige Aufhebung dieses Grundsatzes würde die Idee von der Existenz (quasi-) abgeschlossener Systeme und damit die Aufstellung empirisch prüfbarer Gesetze in dem uns geläufigen Sinne unmöglich machen." [6].

Translated into English:

<The following idea characterises the relative **independence** of objects far apart in space (A and B): external influence on **A has no direct influence on B**; this is known as <<**the Principle of Local Action**>>, which is used consistently only in field theory. If this axiom were to be completely abolished, the idea of the existence of quasi enclosed systems, and thereby the postulation of laws which can be checked empirically in the accepted sense, would become impossible.>

Due to Bell and his theorem: "It is the requirement of locality, or more precisely that the result of a measurement on one system be unaffected by operations on a distant system with which it has interacted in the past, that creates the essential difficulty." [7]. A local realistic interpretation of quantum mechanics is still not achieved.

Definition: Bell's Inequality/Theorem

Bell's inequality/theorem touches upon many of the fundamental physical issues and of philosophy as such. As long as Bell's theorem is valid, "**causality and locality** … [*is, author*] … **incompatible with the statistical predictions of quantum mechanics**." [8]. Bell published his theorem as **a non strict inequality** [9] as

$$1+E(b,c)\geq\left|E(a,b)-E(a,c)\right| \tag{5}$$

where b, c and a are the local detector settings of the apparatus and E(a,b), E(a,c), E(b,c) denote the expectation values. Due to Bell's theorem, **either**

$$1+E(b,c)=\left|E(a,b)-E(a,c)\right| \tag{6}$$

is true **or**

$$1+E(b,c)>\left|E(a,b)-E(a,c)\right| \tag{7}$$

is true but not both simultaneously. The following table is able to illustrate the last relationship.

Table 1. Bell's theorem as a strict inequality

1	>	**| E(a,b) – E(a,c) | -E(b,c)**

Due to Equation (7), Bell's theorem demands that

$$1+E(b,c)-\left(\left|E(a,b)-E(a,c)\right|\right)>0 \tag{8}$$

Definition: Bell's term

We define Bell's term **B** as

$$B \equiv 1 + E(b,c) - \left(\left| E(a,b) - E(a,c) \right| \right) > 0 \tag{9}$$

Due to Equation (8), Bell's theorem demands that Bell's term has to be greater than zero.

2.2. Axioms

Axiom I. (Lex identitatis).

To avoid any kind of a logical fallacy, the following theory is based on the axiom:

$$+1 = +1. \tag{10}$$

3. Results

3.1. Theorem. Bell's first way to define the number 1

Claim.
Bell's theorem defines the number 1 as

$$+1 = + \left| E(a,b) - E(a,c) \right| - E(b,c) \tag{11}$$

Direct proof.
Due to our Axiom I, it is

$$+1 = +1 \tag{12}$$

We add the term **E(b,c)** and do obtain the relationship

$$1 + E(b,c) = 1 + E(b,c) \tag{13}$$

According to Equation (6), this is equivalent with

$$1 + E(b,c) = \left| E(a,b) - E(a,c) \right| \tag{14}$$

Rearranging Equation (14), we obtain

$$1 + E(b,c) = B + \left| E(a,b) - E(a,c) \right| \tag{15}$$

Bell's theorem demands finally that

$$+1 = \left| E(a,b) - E(a,c) \right| - E(b,c) \tag{16}$$

Quod erat demonstrandum.

3.2. Theorem. Bell's second way to define the number 1

Claim.
Bell's theorem defines the number 1 in the same respect in a second way as

$$+1 = |B > +0| + |E(a,b) - E(a,c)| - E(b,c) \tag{17}$$

Direct proof.
Due to our Axiom I, it is

$$+1 = +1 \tag{18}$$

We add 0 to Equation (18) and do obtain the relationship

$$+1 = +1 + 0 \tag{19}$$

Equation (19) can be rearranged as

$$+1 = +1 + E(b,c) - |E(a,b) - E(a,c)| + |E(a,b) - E(a,c)| - E(b,c) \tag{20}$$

Due to Equation (9), Equation (20) simplifies as

$$+1 = |B > +0| + |E(a,b) - E(a,c)| - E(b,c) \tag{21}$$

Quod erat demonstrandum.

The following table may illustrate this relationship.

Table 2. Bell's theorem as an equality

		| B > O |
1	=	**+| E(a,b) – E(a,c) | - E(b,c)**

which is equivalent with

Table 3. Bell's theorem as an equality

		1 - | E(a,b) – E(a,c) | + E(b,c)
1	=	**+| E(a,b) – E(a,c) | - E(b,c)**

3.2. Theorem. Refutation Of Bell's Theorem In General

Claim.
Bell's theorem is **neither** mathematically **nor** logically correct. If you accept Bell's theorem as valid then you must accept too that

$$+0 = +1 \tag{22}$$

Proof by contradiction.
In general, due to axiom I it is

$$+1 = +1 \tag{23}$$

According Equation (16), we obtain

$$\left|E(a,b) - E(a,c)\right| - E(b,c) = +1 \tag{24}$$

Due to Equation (21) we find then straightforwardly that

$$\left|E(a,b) - E(a,c)\right| - E(b,c) = \left|E(a,b) - E(a,c)\right| - E(b,c) + \left|B > 0\right| \tag{25}$$

Rearranging Equation (25), we obtain

$$+0 = +\left|B > 0\right| \tag{26}$$

Dividing Equation (26) by Bell's term (| B > +0 |), it is

$$\frac{+0}{+\left|B > 0\right|} = \frac{+\left|B > 0\right|}{+\left|B > 0\right|} \tag{27}$$

or at the end

$$+0 = +1 \tag{28}$$

Quod erat demonstrandum.

Bell's theorem might at first seem logical but in fact, the same makes no sense at all. Because of this, Bell himself has committed a logical fallacy. It is not correct that +0 = +1.

4. Discussion

There are quite a few ways to construct valid and logically consistent mathematical inequality. But likewise, there are many ways to fail at constructing valid and logically consistent mathematical inequalities. When presenting his theorem, Bell's goal was to convince the audience to agree with his point of view. To do that, Bell reduced a very complex problem with many possible solutions, as having only two possible solutions, **either**

$$1+E(b,c)=\left|E(a,b)-E(a,c)\right| \tag{29}$$

is true **or**

$$1+E(b,c)>\left|E(a,b)-E(a,c)\right| \tag{30}$$

is true. Bell's theorem is a fallacy of false choice or the fallacy of the false alternative, it is an either–or fallacy. **Bell's theorem is the most profound logical fallacy of science**. A theory grounded on an axiom such that

$$+0=+1 \tag{31}$$

can prove any incorrect position as true and every correct position as false. Such a theory or theorem is meaningless and worthless.

5. Conclusions

Bell's theorem is already refuted for many times [10]- [11]. 'Big shock', Bell's theorem collapses again.

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