Does Einstein's Spook Have a Mirror Image?

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Abstract: Albert Einstein removed the tumbling stone with his 1918 writing "dialog about objections against the theory of relativity". The aim of this article is to reveal that which was uncovered by its removal. Albert Einstein's dialog has received serious criticism and has been called erroneous. But the critics have never replaced it with something consistent and complete; so this article presents a choice to them. The aim of the article is NOT about the twin paradox itself. That matter was settled a long time ago. [The Journal of American Science. 2007;3(2):35-35].

Key words: twin; EPR; paradox; mirror; spook; locality

The EPR paradox and the twin paradox are both paradoxes in which Albert Einstein played an important role. In the EPR paradox Albert Einstein together with Boris Podolsky and Nathan Rosen challenged quantum mechanics. Their aim was to show the incompleteness of quantum mechanics, but non-locality was uncovered instead.

In the twin paradox the relativity theory was challenged and Einstein was left explaining how it is possible for two identical clocks to show different elapsed time when taken different paths. Einstein explains (in his 1918 written dialog) that a homogenous gravitational field appears for the "spaceship twin" when accelerating backwards. The effect of this gravitational field compensates exactly enough to clear up the paradox. If one calls the spaceship twin Alice and the Earth twin Bob the following occurs: As soon as Alice pushes the button to activate the rockets for her return journey Bob's clock will go relatively faster compared to Alice's clock. When Alice pushes the button it affects Bob's clock in the instant moment. It is impossible for Bob though to notice anything of this effect in that instant moment.

In quantum mechanics exactly the same event occurs as pointed out by the EPR trio. When Alice "pushes the button" (to make a measurement on her particle) it affects Bob's particle in the instant moment. It is impossible for Bob though to notice anything of this effect in that instant moment. This is what Einstein called "spooky action at a distance".

It is strange to realise that the man who criticised quantum mechanics for all of his life, partly because of the spooky action at a distance was in fact the first one to come up with the spooky action. Niels Bohr missed a beautiful opportunity here. Instead of defending quantum mechanics against the EPR paradox he could have mirrored the paradox in the relativity theory. Einstein would have been left with the following dichotomy: Either

1. The result of an acceleration performed at one part **A** by an object has a not local effect on the physical reality of a distant object at part **B**, in the sense that the relativity theory can predict outcomes of this not local effect acting on **B** or
2. The relativity theory is not complete in the sense that some element of the physical reality corresponding to **B** cannot be accounted for by the relativity theory (that is, some extra variable is needed to account for it.)

Albert Einstein is no longer there to keep the spooky action out of the relativity theory. Who dares to call him-/herself an Einstein and solve this mirrored EPR paradox?

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Einstein, A. (1918) "Dialog über Einwände gegen die Relativitätstheorie", *Die Naturwissenschaften* **48**, pp697-702, 29 November 1918 (English translation: dialog about objections against the theory of relativity).