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Temporal Order, Causal Order and Non-locality in EPR

Abstract

Violations of so-called “measurement independence” condition --also known as “no-conspiracy”-- in the context of common cause explanations of the Einstein-Podolski-Rosen (EPR) correlations can be accommodated either by considering an alternative temporal order of events, by altering the usual (forward in time) direction of causation, or by a combination of these two. The resulting common cause models are in each case radically different, specially when it comes to locality/non-locality considerations. In particular, whether the resulting causal model displays non-local features or not depends on which combination of temporal order and causal order is presupposed.

The aim of this paper is thus to provide an account of how these three issues are related. That is, to assess how the choice of a specific temporal arrangement for the causally relevant events involved in the EPR experiment, the presupposition of a certain causal order (usually taken to be forward in time) and locality/non-locality issues might relate each other.