Why My Objection May Go Unnoticed within the Relativistic Framework

Text arising from a discussion on the Planète Astronomie forum

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To clarify the reasoning that leads me to this conclusion, I begin with a property well known to physicists: the temporal order of two events separated by a spacelike interval can vary depending on the frame of reference considered, and also for a single observer who accelerates and changes inertial frames. Since this property is well known and incorporated into the relativistic conception of causality, physicists may tend to recognise in my example a familiar situation, already accounted for by the theory, and consider that it raises no new difficulty.

In my view, the epistemological framework of relativity, with its restricted approach to causality, thus tends to obscure the difficulty raised by my objection. By focusing on the possibilities for transmitting an influence and on preserving causal order, one risks overlooking a more fundamental approach to causality. For a relationship between an antecedent and a consequent to be effective, the physical realities involved must exist and behave in a determinate manner. In the philosophical approach I defend, causality therefore concerns more than the succession of events: it must also account for the existence and behaviour of physical realities.

Yet the shuttle and missile objection concerns precisely this question: if the plane of simultaneity determines what physically exists at the shuttle's present instant, how could the missile change from the status of "already exists" to that of "does not yet exist" solely as a result of the shuttle's acceleration? The absence of a direct causal connection is not sufficient to resolve this difficulty.

It should be recalled here that, under Einstein synchronisation, assigning the same time coordinate to distant events rests on the equality of the one-way speed of light in both directions. The connection between this speed and the planes of simultaneity is therefore central to my reasoning.

It is in this sense that my objection seems to me impossible to sidestep: if planes of simultaneity are assigned this physical significance, the contradiction I identify must be examined. If they are not assigned this significance, one relinquishes the interpretation of the relativity of simultaneity as a physical difference concerning what presently exists. In either case, according to my reasoning, the universal physical invariance of the one-way speed of light is called into question, since it entails

precisely this physical relativity of simultaneity. I see this as a possible starting point for a change in the conceptual framework of physics.

I develop this distinction between causality and physical existence in the following note:

Causality and Physical Existence

My open letter to Aurélien Barrau also forms part of this perspective:

Open Letter to Aurélien Barrau

Kind regards,

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