A Relational Approach to Space and Motion: Present, Inertia and Causality

A supplement to “Inertia as a Path to Metaphysics”, addressing a common present and the redefinition of the fundamental concepts of physics.

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In my text “Inertia as a Path to Metaphysics”, I did not develop the connection I draw between a fully relational conception of space and motion and the existence of a present for the Universe.

In my approach, the relations between bodies, themselves composed of several constituents, do not merely describe their arrangement: they ground the very existence of space. If these relations ceased to exist, space would likewise cease to exist. Their present existence and their transformation must therefore be accounted for. It is at this level that I locate the necessity of a common present, without assuming that all clocks run at the same rate. What matters here is to consider what the present existence of these relations constitutive of space implies for the Universe as a whole.

This also clarifies what I mean by a fully relational approach: the presently existing relation between constituents must underlie both the existence of space and the motion of bodies. In light of this dual requirement, general relativity does not seem to me to constitute a fully relational approach. Making spacetime geometry dynamic and coupling it to material content does not, by itself, establish that space and all motion, including inertial motion, arise from an interrelation currently acting between constituents.

I also wonder to what extent researchers developing loop quantum gravity have examined this causal requirement. In the conception I defend, it calls for a reconsideration of inertia and impulse: both the imparting of motion and its continuation after the initial action has ceased must be explained within a single causal framework.

The question therefore concerns the fundamental concepts upon which physics is built. Should a fully relational approach to space and motion not lead to a coherent and unified redefinition of the foundational concepts of physics, incorporating causality at a more fundamental level than relativity does?

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