

Commentary on Ross & Spurrett

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# The vessels and the glue: space, time, and causation

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**Abstract:** In addition to the “universal glue”, which is the local mechanical causation, the standard explanatory scheme of classical science presumes two “universal vessels”, which are global space and time. I call this outdated metaphysical setting “black-and-white” because it allows for only two principle scales. A prospective metaphysics able to bind existing sciences together needs to be “colored”, that is allow for scale relativity and diversification by domain.

If our world could be satisfactorily accounted for by a single Science, then we would not need to distinguish a particular science of metaphysics or any other particular science. Since this is not the case and we have numerous sciences which cannot be reduced into one *trivially* (to say the least), we need metaphysics to work on gluing those sciences together, be the *glue* some kind of

reduction to universal physical laws or something else. Aristotle invented metaphysics (which he called *first philosophy*) to bind physics (by which he meant broadly the study of all natural phenomena) with mathematics and logic (so afterwards the latter two disciplines could be considered as tools for the former). Since Aristotle's physics has branched into numerous disciplines our need for the unifying science of metaphysics is even stronger than Aristotle's. A scientist calling for a *free lunch* has two options: either to take uncritically the nostalgic dogma of reductionism according to which in the distant future all sciences will collapse back into physics (to leave aside unification dogmas borrowed from outside of science), which is epistemologically irresponsible, or to give up the idea of unity of science, which turns science into a combination of mystery and stamp collecting. If no reasonable and testable reductionist hypothesis can be made *now* then this is a job of metaphysicians to suggest tentative ways to glue sciences by means other than reduction. It goes without saying that working on binding sciences together a metaphysician must have a good understanding of what she is going to bind. Otherwise the unifying efforts of a metaphysician will be simply ignored by the scientific community and for good reason. As Ross and Spurrett show this unpleasant situation is not uncommon even for the mainstream metaphysical discussion.

Now let me be more specific about the *glue*. Ross and Spurrett label as “localist metaphysics” and “localist paradigm” a generalised explanatory pattern of classical (and hence outdated) mechanics where the global dynamics is reconstructed from local interactions of point masses, and those interactions are interpreted in causal terms. Two remarks are here in order. First, a historical one. The Cartesian idea of explaining global dynamics in terms of strictly local *pushing* never worked well. Newton's gravitational *pulling* is a long-distance, not strictly local, interaction. This made the gravitational force an extremely doubtful concept in the eyes of Newton's contemporaries (Leibniz (1890) expressed his misgivings on this point in the form of bitter irony), and this concept was formally dispensed with by the introduction of the Lagrangian and Hamiltonian formalisms (which did *not* aim to meeting the Cartesian localist requirement, however, so Redhead's point could be made even within classical mechanics without his reference to general relativity). Second, and more important, if we ask what binds things together when one applies the explanatory pattern of classical mechanics then the answer that this is the local or pseudo-local interaction of point masses interpreted in causal terms will be only partial. Obviously this role is also played by *space* and *time*. Since *glue* is a localist metaphor we shall call space and time (in the Newtonian absolutist sense) *vessels*. Apparently the *vessels* work better across disciplines than the *glue* (localist causation): while it remains a controversial point whether we can and should specify one type of causality working across all special sciences or

specify parochial types of causality particular to given disciplines, or do both, the idea that every material entity or process exists (or occurs) in the *same* physical space and time (or spacetime) sounds commonsensical. It is moreover interesting that tentative parochial space-time concepts, in particular biological ones, are also known although they remain marginal (Vernadsky 1988).

While causality (the glue) within the classical setting is indeed local or pseudo-local, space and time (the vessels) are *global* in the sense that they supposedly allow for locating all possible point masses and all possible events in a *uniform* way (as Ross and Spurrett put it, “measurement values are not indexed to neighborhoods of points”). So the interplay between the local and the global scales in the classical framework involves the vessels *and* the glue. But this framework does not allow for any *intermediate* scale: we have global space and time comprising everything and structureless point masses interacting only locally (so the idea of long-distance interaction does not exactly fit the paradigm). For this reason I doubt that “localist metaphysics” is an appropriate term to characterize the described setting. I suggest “*black-and-white* metaphysics” to stress the fact that it allows for only two principle scales.

I cannot discuss here details of any tentative metaphysics that could be relevant to contemporary physics and other sciences. Apparently it should be *not* black-and-white but allow for hues of gray (Nottale’s *scale relativity*) and perhaps be also colored (diversified by domain). The philosophical literature discussing spacetime concepts of the fundamental physics is vast but it is not always accurately taken into consideration in metaphysical discussions. (A common mistake is to limit discussion to *special* relativity while only general relativity is a fulfilled theory of spatiotemporal dynamics). It is more difficult to say what is going on with the concept of causality in contemporary physics just because, as Ross and Spurrett note, it apparently does not play any essential role there. Perhaps this is too easy an answer though. It is more useful to study the evolution of the concept attentively than just to say that it dies off. For (to put it in functionalist terms) the *role* played by the concept of causality, viz. the role of *glue*, apparently remains essential, and if classical causality dies off then this or a similar role must be taken by something else. Reichenbach’s early attempt to reconstruct causality in terms of “marks” and its development by Ross and Spurrett in terms of information processing are promising. I would like to note the fact that Reichenbach’s suggestion about causality is hardly separable from his analysis of relativistic spacetime.

## **References**

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