A Scientific Adventure: Reflections on the Riddle of Relativity by Ian McCausland. Montreal: Apeiron, 2011. iv + 252 pp. $20 (paperback). ISBN 9780986492662.

This book is highly recommended reading for anyone interested in scientific controversies about firmly accepted mainstream beliefs. It illustrates cogently how proponents of a mainstream view fail to engage substantively even with tightly argued and logical critiques. Although the polemical tactics are quite typical, the substance of this controversy is untypical: The sole point at issue is whether the special theory of relativity (STR) is inconsistent, whether it is based on a logical inconsistency. By contrast, in almost all other such arguments the questions concern the nature of evidence, the reliability of observations, the designs and protocols of experiments.

McCausland has published two articles in the *Journal of Scientific Exploration* (one of them while I was Editor). He had attended the 1991 SSE meeting where he met Jack Good, with whom he subsequently had a long exchange over the validity of STR. I had reviewed favorably McCausland's earlier book, *The Relativity Question* (*Journal of Scientific Exploration, 3* [1989] 217–219). The present work is in some sense an update of that one. The earlier book focused chiefly on Herbert Dingle's role in questioning STR; this one recounts McCausland's continuation of Dingle's struggle.

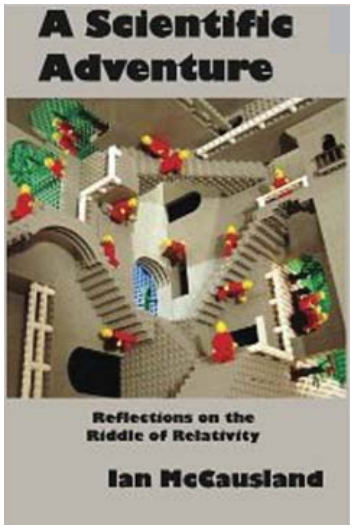
Dingle had been an early proponent of special relativity, but grappling with the twin paradox or clock paradox eventually led him to assert that the theory is inconsistent. Here is the issue:

The special theory deals with uniform relative motion. Two identical synchronized clocks move relative to one another. The theory's mathematics calculates that the faster-moving clock runs slower.

The trouble is that the theory postulates that there is no absolute frame of reference to specify the state of rest, so there is no way to identify the faster-moving clock. Hence the paradox: Each of the clocks runs slower than the other.

A popular attempt at resolution of the paradox is that each clock only appears to the other clock to be running slower; but this contradicts the original Einstein publication as well as asserted experimental proofs that moving clocks *actually* run slower.

Such experimental proofs constitute another common defense of the theory. However, McCausland argues convincingly that experiment is irrelevant to the question of self-consistency of a theory. He adduces much support on this point, for example from Karl Popper: If a theory contains



an inconsistency, then any result at all can be derived from it, and so the theory is useless and uninformative.

Some of the claims of experimental proof refer to situations where forces and accelerations are present, variables specifically excluded by the postulates of the special theory. A similarly unsound defense is the sometime assertion that the special theory is right because the general theory is right; but the two are independent of one another.

Perhaps most striking is that defenders of the special theory have offered a number of different and sometimes mutually incompatible arguments—without actually addressing directly Dingle's question, "Which of those two clocks runs slower?"

As long as I can remember, the special theory has seemed to me too difficult to understand, so Dingle's conclusion is congenial to me: The twin or clock paradox is actually a contradiction, not a paradox. A theory that postulates nothing but symmetry surely cannot lead to an asymmetrical conclusion.

I found helpful here the point that Einstein's formulation is mathematically identical with that of Lorentz. Which of the associated physical interpretations is preferred cannot therefore be decided by experiment. The more general point, all too often neglected by practicing scientists, is this: The ability to make calculations that describe phenomena accurately says nothing about the physical interpretation of the mathematical variables in the given equations. The Newtonian view of gravity—action at a distance—is not proved by the successful calculations that continue to be made with Newton's equations. The success of calculations based on general relativity do not entail that gravity is really a curvature of space or of space–time. The success of quantum-mechanical calculations does not establish any particular physical interpretation of such things as wave functions.

Observers of controversies over anomalies will recognize the generality of the stories related in this book: Journals that reject manuscripts without review, without giving reasons, or giving inappropriate reasons, and which refuse criticized authors the opportunity to respond (see especially Chapter 15 on censorship). In this connection, *Nature* and John Maddox pop up

several times in an unfavorable light (see Chapter 6 in particular). Several defenders of the mainstream refused McCausland permission to publish what they had written in argument against him or against Dingle; as McCausland points out (p. 59), not only does censorship prevent a viewpoint from being presented to the scientific community as a whole, such refusals even make it difficult to describe the censorship.

An important point (pp. 127–128) seldom made is that science lacks the sort of incisive criticism that has long been part of art and literature: Criticism that is substantively insightful yet intellectually independent of those who created the work being considered.

Dissenters from relativity theory are quite often cited by mainstreamers as examples of crackpots. McCausland demonstrates that quite a few of the dissenters are perfectly rational and clearheaded, so this book is likely to be relished and to bring solace to other people who are labeled crackpots, cranks, denialists just because they see flaws in some dogmatically held mainstream belief. Worth remembering is the general point that when the experts disagree among themselves, they cannot all be right but they could all be wrong. Worth quoting and re-quoting is McCausland's insight that "the strongest and most frequently used argument . . . [by mainstream experts], an argument which is singularly difficult to rebut . . . , [is] complete silence" (p. 121).

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