

INTRODUCTION

by

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The special theory of relativity is “special” in many ways, some not featured in guidebooks of the subject. Its logical status is unique, in that it appears to embody an application of pure reason to two “physical” postulates, relativity and light-speed constancy. The result is a kinematics that, strictly speaking, applies to nothing in the world (because of its limitation to uniform rectilinear motion, which never occurs physically in any exact sense), but, practically speaking, is applied to everything. The theory, in reconciling such professional practice with logical rigor, acquires the aspect of a conjuring trick. The canonical method of performing the trick is as follows: Whenever the kinematics gets into logical hot water—which happens with disturbing frequency—the hapless skeptic is at once referred to another theory, the general theory of relativity, which in turn supports itself by reference back to the special theory (for its kinematic underpinnings), but has the diversionary advantages of (a) introducing a causal factor (gravity) by definition irrelevant to kinematics, and (b) casting the critic into a snakepit of four-index tensor symbols. So successful has this disciplinary technique for enforcing conformity proven itself among physicists and scholars that nowadays to raise any question about the physical validity of the special theory (but, curiously, *not* about the general theory) is to renounce one’s membership in the club. In a society normally quite open to ideas—including those of astrologers—and generally hostile to sacred cattle, to doubt the special theory is the one sure way to be automatically labeled a crackpot.

The special theory has transcended not only “theory” but science itself; for now its subject matter is no longer respectable research material. Indeed, the topic—which deals with the basic mensurational structure of the universe—is only grudgingly admitted into the American Institute of Physics’ *Physical Review* subject index, where it is bracketed with Acoustics. Another AIP journal (*American Journal of Physics*), designed to reach the minds of physics teachers who mold the minds of

future physics teachers, has, in the recent past, editorially announced that it has no interest in publishing papers that question the foundations of _____. (Multiple choice: Fill in special theory, general theory, quantum mechanics, etc.) In other words, certain parts of science are no longer parts of science. (Science, we recall, is that which temporizes, compromises, approximates, and thus “progresses.” The perfect, the eternal, and the unalterable, by contrast, lie in the province of religion.) Foremost and most special among all such special parts of science is, of course, the special theory of relativity.

Not all physicists accept this situation passively. Wallace Kantor, the author of this book—originally a true believer, with publications in general relativity to his nominal credit—at some point began to feel doubts about Einstein’s second postulate (light speed constancy) and turned to experiment to test it. The resulting ingeniously designed interferometric experiment, performed in the early 1960’s, failed to confirm the Einstein postulate, but also failed to end controversy, since its subsequent repetition by other observers led to opposite results. Though I had some personal acquaintance with both the original Kantor experiment and its (somewhat altered) repetition, it is not my intention here to attempt to act as umpire on questions of optical experimental technique which I am not qualified to judge. Suffice it to say that controversy about this experiment will not be ended until an independent repetition is accomplished by knowledgeable experimentalists. The Kantor experiment asks nature a significant question, and it is important that her answer be unambiguously known.

Other questions of a similar purport ought to be put to nature. Yet, if experimentalists were to develop a sudden, widespread urge to experiment (other than on fashionably superficial “frontier” topics, in huge teams, at great government expense), who knows where it might end? There is nothing to fear. As things stand nowadays in the foundations of physics, the resort to experiment is viewed as a defeat for reason; and we have a generation of physicists that has never met defeat . . . nor victory either.

With skepticism sharpened by his own laboratory observations, Kantor turned his attention to the available accounts in the scientific literature of the work of other observers purporting to confirm the special theory. In the present book, he summarizes the results of his survey. They are, in a word, appalling. Everybody alive and active in science today was reared in a state of hushed reverence for the special theory and of unquestioning faith in its multiple experimental confirmations. For myself, I have retained through the years much of the latter

faith, though none of the former reverence. Not so, Kantor. His skepticism is complete. For him, the whole thing is a tissue of wishful thoughts, misunderstandings, and half-truths. The scope of his indictment is breathtaking.

Frankly, I cannot wholly believe nor accept the central message of this book. It seems to exhibit the exquisite self-consistency of paranoia. Things are bad in the experimental foundations of special relativity, no doubt, but surely not that bad, not totally bad. Still, I recognize that what holds me back from acceptance is basically irrational—a vestige of that faith in my fellow man that no fellow man who puts on the garb of experimentalist has a right to demand or expect of me. The reason any honest man goes into a laboratory to observe is that he does *not* have faith; that he is overpowered by a curiosity which would not exist if he unreservedly believed contemporary theory. Why, then, should any such honest man in publishing his experimental results to the world demand or expect faith of any kind from his readers? What Kantor shows in this book, I believe, is not (as a hasty reader might conclude) that virtually all relativity experimentalists, himself aside, are fools or charlatans, but that by their written record—the archive by which history must judge them—they are starkly revealed as such careless expositors that only by an act of faith can any objective reader distinguish them from fools or charlatans.

And what a carnival of folly it is that Kantor lays before our wondering eyes. The scene he reveals seems to call for Hogarth's etchings or the commentaries of Jonathan Swift. No, I cannot bring myself to believe it is a true-to-life portrait of graybeard savants run amok in laboratories all over the world for over half a century. I have faith that it is not so. But faith is all I have. Against faith, as Kantor shows in too many cases, stands the immutable written record.

No established physical theory is ever displaced by demonstrations of its logical, nor even observational, dubiousness; nor should it be. What displaces theories is alternative theories. Why bother, then, merely to stir up discontentment with an apparently serviceable working theory, while offering bare bones to replace it? The reason, to put it brutally, is that one wishes to treat physicists as big boys now, able to get up and down stairs alone, able to recognize problems and take timely action on them, able to manage the affairs of physics *by themselves*, without need for another Cult of Personality, another great Einstein father-figure to come down from the mountain with the New Law all pre-engraved and the Public Relations pre-greased. One dreams of a golden age of democracy in science, in which the dependence on Authority—

and even the psychological need to exert it—would be outgrown. But, alas, boys will be gods, and one has only to open any copy of the *Physical Review* to be inundated by the latest flood of unmotivated, dehumanized oracle-bulletins, surpassed in kid-scholarly opacity only by the Valhallagrams of those even more infantile god-mimics, the mathematicians.

The invariant agenda for “progress” in science—applicable, I have no doubt, to special relativity, as to other human works—consists of three phases: (1) Recognizing the existence of a problem; (2) Pinpointing the trouble; (3) Fixing the trouble. In the case of special relativity it may be hoped that the present book will contribute in some measure to the first and more difficult and time-consuming of these phases. The second will require further experiments—the trick being always to ask nature the right question. The third, though it will involve the most radical reconceptualization, and will thus draw all the attention of publicists, philosophers, and laymen, will in fact be the easiest (because it will merely make explicit that which is implicit in what has gone before). I am prepared for anything to happen in that phase, as it certainly can, the moment one displaces a single brick in the lovely Einstein-Minkowski edifice. For reasons I cannot discuss here, I sense that physics is on the verge of truly exciting things, if only the tragic petrification of science into religion in this area can somehow be undone. What is needed is young thinking applied with old judgment. That is the unlikely combination of vitality and maturity, known as “genius,” that cannot be stopped and that has given us all of what little fundamental science our species has been able to acquire.

What Kantor, the skeptic, herein teaches the perceptive student of physics is that experiment and theory must once more get together in a spirit of mutual respect and honest curiosity about nature, as Francis Bacon thought they should and would do. What I have sought to suggest by these introductory remarks is that science—as long as and wherever it would stay science—must treasure skeptics. They are in all too short supply. If Wallace Kantor did not exist, he would for the health of physics have to be invented. As physicists, let us be grateful that he does exist. We deserve him. By our collective behavior we have earned him. As a first step toward repentance and a better way of life, let us read him. Though many will disagree with him he should be listened to. The extent of Kantor’s scholarship, his knowledge of experiment, and the consistency and scope of his challenge to presuppositions command the respect of all but the most abjectly faithful. If, as I predict, established physicists ignore this book, they will miss an excellent and rare

opportunity to see themselves in a different mirror and from that sobering experience to make of their profession something a cut above what the term “profession” has come to mean in modern science and ancient prostitution.

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