LETTERS TO THE EDITOR

Letters are selected for their expected interest for our readers. Some letters are sent to reviewers for advice; some are accepted or declined by the editor without review. Letters must be brief and may be edited, subject to the author's approval of significant changes. Although some comments on published articles and notes may be appropriate as letters, most such comments are reviewed according to a special procedure and appear, if accepted, in the Notes and Discussions section. (See the "Statement of Editorial Policy" in the January issue.) Running controversies among letter writers will not be published.

WEIGHTFUL VERSUS WEIGHTLESS

Robert Ehrlich, in his excellent recent article[1] on thirty-four demonstrations in "ruler physics," which I shall certainly recommend to my students, says, towards the end of his description of demonstration number ten, that "the pennies are weightless while in free fall." But I have always told my students that, while an object is in free fall, the *only* force acting on it is its weight, so it should really be called "weightful" rather than "weightless."

It is interesting how the incorrect term "weightless" has crept, during the astronaut era, into public speech and news articles, and is now appearing in our introductory physics texts; see, for example, Ref. 2. I believe that the origin of the error lies in the little-publicized fact that we cannot feel our own weight, and are aware of our weight only when we feel "weight-balancing" forces, for example, the forces exerted on us by the ground when we are standing on it. That we cannot feel our own weight follows from the Equivalence Principle of relativity, which tells us that our experiences while we are moving in free fall in a nonzero gravitational field (when we are weightful) are the same as our experiences would be if we were moving at constant velocity in zero field (when we would be weightless).

Oh well, at least this will give the students food for thought! The demonstrations are great, by the way.

Frank O. Goodman
Department of Applied Mathematics
Department of Physics
University of Waterloo
Waterloo, Ontario N2L 3G1
21 February 1994

[1]R. Ehrlich, "Ruler physics: Thirty-four demonstrations using a plastic ruler," Am. J. Phys. **62**, 111–120 (1994).
[2]P. A. Tipler, *Physics* (Worth, New York, 1976), Sec. 4-4, pp. 88–89.

WHY OPTICAL DIFFRACTION IS "SEMICLASSICAL"

The reviewer of *Diffraction Effects in Semiclassical Scattering* by H. M. Nussenzveig[1] is puzzled why "some kind of marriage of geometrical optics with wave optics" is called "semiclassical." The point is that the approximation of waves by particles plus perturbative corrections can be applied not only to the Schrödinger equation (where it has a direct physical meaning) but to *any* linear differential equation (where the "particles" may be fictitious). It is a wonderful example of how a mathematical insight achieved in one application can be exploited in totally different situations that share similar mathematics. "La Physique ne nous donne pas seulement l'occasion de résoudre des problèmes..., elle nous fait presentir la solution." [2]

S. A. Fulling
Mathematics Department
Texas A&M University
College Station, Texas 77843-3368
28 March 1994

[1]Craig F. Bohren, Am. J. Phys. **62** (4), 383–384 (1994).
[2]H. Poincaré, as quoted by M. Kac, "Can one hear the shape of a drum?," Am. Math. Monthly **73** (4), Part II, 1–23 (1966).

TEACHING OF SPECIAL RELATIVITY

We agree with N. D. Mermin,[1] commenting on Mallinckrodt,[2] that the Lorentz transformation does not belong in a first exposure to special relativity. Our own exposition[3] develops the subject using Bondi's rather transparent approach via the k calculus,[4] and then arrives at the Lorentz transformation at a fairly late stage, presented as a powerful summary of what has been learned up to that point. We believe this is a viable way to go; and that it also meet's Mermin's point[1] about relating three reference frames as a key element in the development, for in terms of the k calculus the relation of three-frames is easily derived (see pp. 68–70 of Ref. 3).

However, in our experience the physics community is not ready for such an approach; for example, several people have told us we take too long to get to the Lorentz transformation in our presentation. Nevertheless, we think this is the correct approach for the majority of students—a building up of understanding of what is going on first, particularly as regards the relativity of simultaneity, until the usual kinematic effects are clearly understood; the more formal Lorentz transformation derivation of these effects being left until much later, towards the end of the course.

George F. R. Ellis
Ruth M. Williams
Department of Applied Mathematics
University of Cape Town
Private Bag
7700 Rondebosch
Capetown, South Africa
17 February 1994

[1]N. D. Mermin, "Lapses in relativistic pedagogy," Am. J. Phys. **62**(1), 11 (1994).
[2]A. J. Mallinckrodt, "Relativity theory versus the Lorentz transformations," Am. J. Phys. **61**(8), 760 (1993).
[3]G. F. R. Ellis and R. M. Williams, *Flat and Curved Space–Times* (Oxford University, 1988).
[4]Hermann Bondi, *Relativity and Common Sense* (Doubleday, New York, 1964; reprinted by Dover, New York, 1980).

THE JERK REDUX

In his May letter to the editor,[1] Morris W. Leen states that he has never seen an account of the effects on the passengers in a vehicle that has "jerk." He can find such an account in a recent issue of The Physics Teacher.[2] (I only request that he not take the article's title to be the caption for the author photograph.) A footnote added in proof to that article gives a paper published