

# REFERENCE FRAME

## Why Do They Leave Physics?

Philip W. Anderson



I would like to quote for you from an application letter that one of my students sent to a well-known management consulting firm after completing his second postdoc and contemplating yet another as his most probable next step.

There are several reasons for wanting to leave academia, not the least being the desire for a . . . work environment which . . . rewards those who take appropriate risks. . . . The problems I have been attracted to . . . are motivated by real world data where there is no . . . existing theoretical model. Involvement in such projects . . . requires a desire for new challenges, an appetite for risk, and the ability to be innovative yet humble in the face of . . . data.

You will be pleased to know that the application succeeded and that the writer is now happily earning as much as I did at the end of 50 years in physics. We are experiencing a serious brain drain in physics, with condensed matter theory taking some of the worst hits. Many of my colleagues must have seen similar letters.

The obvious simple answers to the questions raised by this letter do not seem to be viable:

▷ Is it simply that the less able and imaginative are being weeded out? No, quite the opposite, in my experience: Those who leave are in many cases the cream of the crop. I hear this again and again from many different mentors. I find many of those hired for permanent jobs in physics to be among the least creative.

▷ Is there a serious shortage of permanent jobs? Well, to some extent, but I hear again and again of universities that initiate searches at the tenure-track level but postpone the hiring decision indefinitely.

▷ Can we blame Wall Street for seducing our best and brightest with enormous financial temptations? In the first place, the jobs are not exclu-

sively in finance but in a wide variety of fields; in the second, it is my experience that most of our lost physicists—certainly the one I quote above—have been willing to endure considerable hardship to stay in physics if they can be assured of a reasonably permanent job at an acceptable salary.

Frankly, I think that the young writer of this letter has put his finger on the problem. “A work environment which rewards those who take appropriate risks” and the desire for “new challenges” are what thrilled me about science many decades ago, and what we no longer have in much of academic physics.

It would be easy to blame the National Science Foundation and the other funding agencies, or the contraction of fundamental science in industry, for this situation. Both contribute; NSF has become steadily more bureaucratic, requiring more rigidly formatted proposals and more unanimity among referees, and there is a new emphasis in industry on applicable research. But industry is hiring young people, and my impression is that it is doing a better job in pinpointing creativity than are academia or government laboratories.

My own diagnosis is pretty much identical to the ones implied in the letter. The members of our profession—and particularly those who have responsibility for hiring and for funding research—are infected with “Horganism,” the belief that the end of science (or at least of our science) is at hand, and that all that is left to do is to grub away at Kuhnian “normal science” following the accepted paradigms. They believe that there are no more scientific revolutions possible, and that we are

now in pursuit of nothing but the next decimal place—hence, by the way, the funding prejudice in favor of heavy computer use and the existence of the oxymoron “computational physics.”

In such a world, as in all “normal-science” periods, the institutional response that is occurring would make sense. Any proposal, to be funded, should have essentially unanimous peer approval. Any new appointment should have unanimous approbation from all senior figures; any such senior figure who disagrees with the consensus is bound to be a crackpot and may be ignored. When, in fact, it turns out that in the real world, physics, even condensed matter theory, is full of crises and controversies, and reputable senior scientists have deep disagreements, the administrator throws up his hands in bewilderment and postpones filling the slot. Another option is to settle for the most orthodox-seeming appointee, who has the most easily comprehensible (read “simple-minded”) program in mind. Finally and worst of all, the administrator feels constrained to assure himself that the candidate is “fungible”; that is, that he or she can attract the requisite unanimity—five out of six “excellents” from the NSF references. (The flexibility of our funding system is a thing of the past, now, with other agencies tending to follow NSF’s lead rather than to think for themselves; this practice may be as bad as following the idiosyncratic and often fallible judgment of the grant officer himself.)

We must not let *The End of Science* become a self-fulfilling prophecy. The reason that Horgan’s pessimism is so wrong lies in the nature of science itself. Whenever a question receives an answer, science moves on and asks a new kind of question, of which there seem to be an endless supply. The kind of people we most need are not those who are good at answering well-posed old questions, but those who are capable of posing new ones. The best way to prevent the end of science is to provide opportunity in abundance for the most creative and original of our young people. This is not happening. But it needs to. ■

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