A LOWBROW'S VIEW OF FEYNMAN

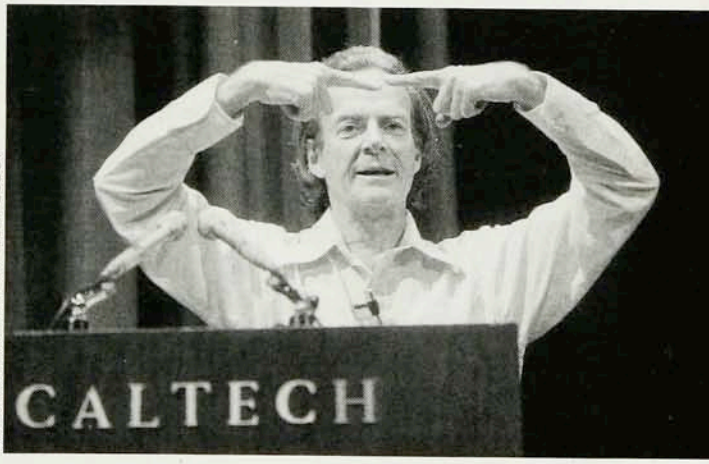
Feynman's theoretical concepts opened up research opportunities for experimenters, and his approach to physics dignified the role played by their work.

Valentine L. Telegdi

I learned by accident that PHYSICS TODAY was preparing a special issue in memory of Richard Feynman, whose death about a year ago shocked his fellow physicists worldwide so deeply. In looking at the tentative list of contributors to the memorial issue, I noticed with surprise that it consisted almost entirely of theoretical physicists. While eminent theorists obviously were best qualified to eulogize Feynman's extraordinary contributions to their own specialty, something essential might have been lost to the readers by this restricted choice. Feynman was not a theorist's theorist, but a physicist's physicist and a teacher's teacher.

What did Feynman do for the experimental physicist? In my experience, two things. First, he gave us (or gave us back?) our dignity. He, who respected no authority, enabled us to respect ourselves. This he did in two ways: He emphasized that physics was an experimental science, and hence would dry up without facts. He understood experiments deeply and could suggest sources of error that had escaped the experimenters themselves. Being questioned by him was a harrowing but deeply rewarding experience. Beyond that, he gave us the assurance, by ripping away the mask of formalism from the face of simple facts, that we too could understand the deeper meaning and significance of our own work. To him, as to Enrico Fermi, the difference between a theorist and an experimenter was one of technique and not primarily one of intellectual competence.

Second, his insight often created experimental opportunities in fields that were barren before. Where would, say, high-energy neutrino physics (a subject of obvious topical interest) be without the parton model? I remember times when only elastic scattering from protons was respectable; Feynman's picture legitimized the scattering from "junk." Similar remarks apply to the study of the hadronic "garbage" that recoils in the scattering act—now a rich source of information as jets.



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With a characteristic gesture, Feynman illustrates a particle collision and thereby emphasizes the essential role of scattering experiments. The photograph was made in 1978 as Feynman delivered a popular lecture at a Caltech alumni seminar.

Had Feynman not reformulated quantum mechanics, had he not invented his diagrams, had he not—with Murray Gell-Mann—laid the cornerstone of weak-interaction theory, he would still be remembered by generations for *The Feynman Lectures on Physics*, his three-volume introductory course (written with Robert Leighton and Matthew Sands). Maybe—Feynman himself often raised this question—that course did not hit the mark as far as the student audience was concerned. But it certainly did and does a lot for the teachers.

To a few of us Dick Feynman was a revered friend, to many of us a unique source of inspiration, and to almost all of us an irreplaceable teacher. His name will remain a household word among experts and beginning students alike. ■

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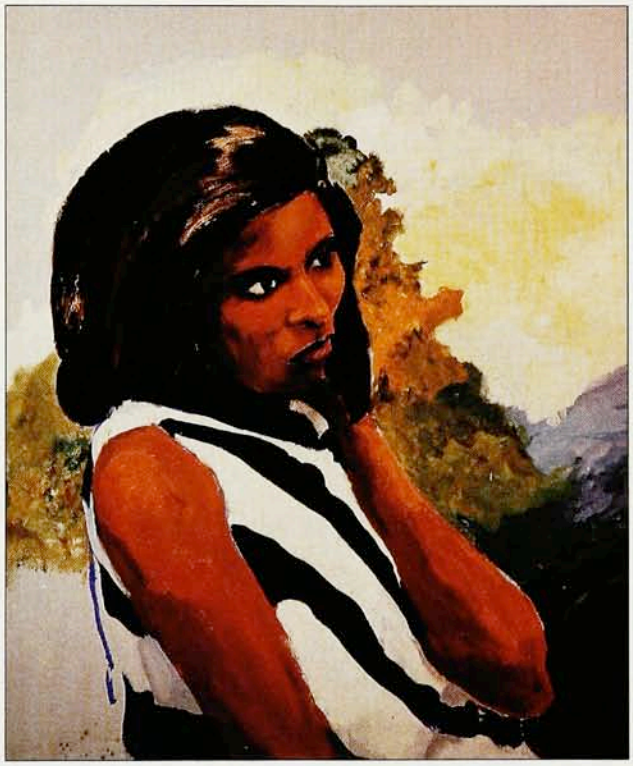
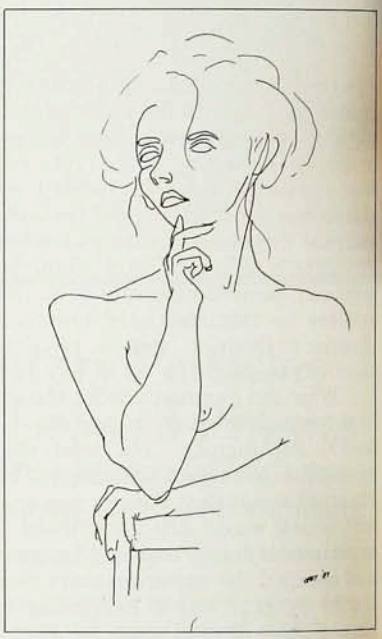
RICHARD FEYNMAN, ARTIST

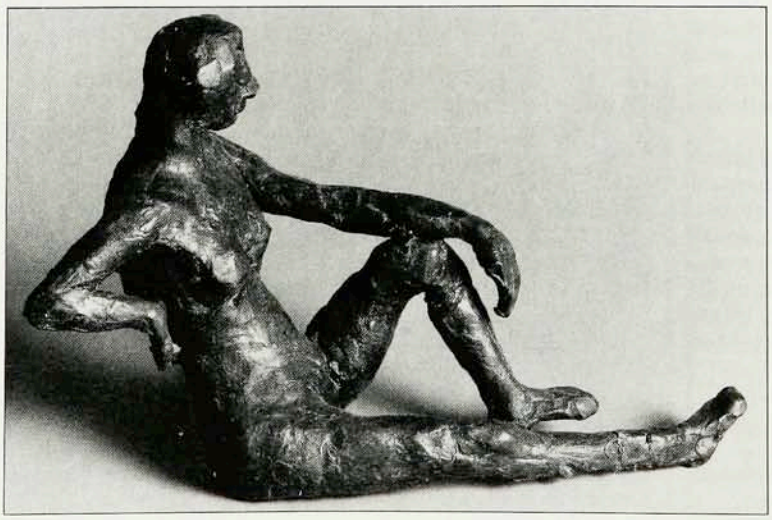
The drawings, paintings and single example of sculpture pictured on these two pages show a different side of Richard Feynman: a strong interest in art he pursued through much of his life. The interest grew in part out of his friendship with artist Jirayr Zorthian; the two men agreed that Feynman would teach quantum mechanics to Zorthian in exchange for lessons in art. Feynman later studied art under Tom Van Sant. The quotations, from *"Surely You're Joking, Mr. Feynman!"* (Norton, 1985), convey in Feynman's own words his feelings about the relations between art and science. The art was photographed by Michelle Feynman, the daughter of Richard and Gweneth.

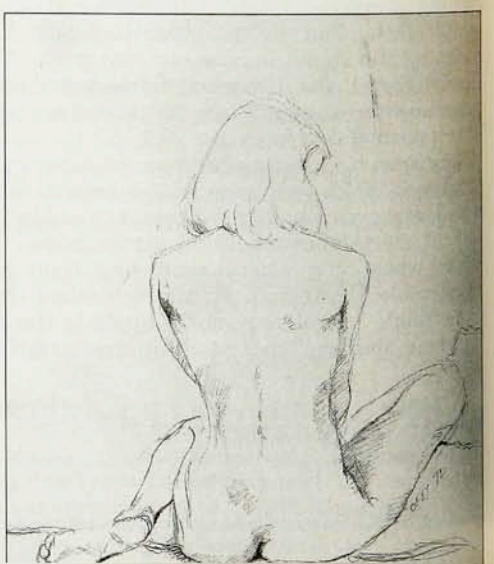


"I wanted very much to learn to draw, for a reason that I kept to myself: I wanted to convey an emotion I have about the beauty of the world. It's difficult to describe because it's an emotion."

"It's analogous to the feeling one has in religion that has to do with a god that controls everything in the whole universe: there's a generality aspect that you feel when you think about how things that appear so different and behave so differently are all run 'behind the scenes' by the same organization, the same physical laws."

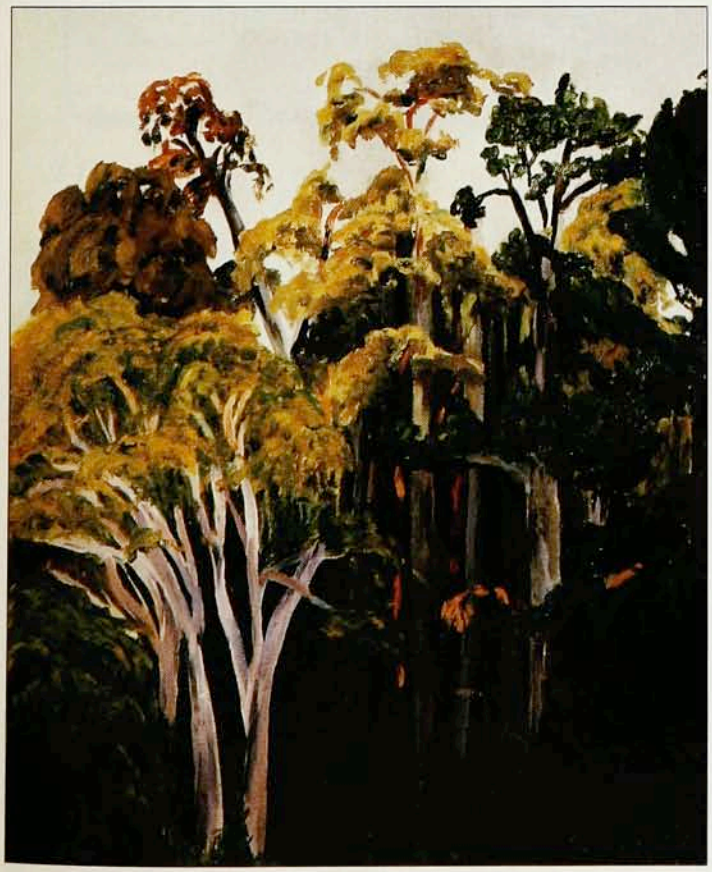






"It's a feeling of awe—of scientific awe—which I felt could be communicated through a drawing to someone who had also had this emotion. It could remind him, for a moment, of this feeling about the glories of the universe."

"It's an appreciation of the mathematical beauty of nature, of how she works inside; a realization that the phenomena we see result from the complexity of the inner workings between atoms; a feeling of how dramatic and wonderful it is."



"I understood at last what art is really for, at least in certain respects. It gives somebody, individually, pleasure. You can make something that somebody likes so much *that they're depressed, or they're happy, on account of that damn thing you made! In science, it's sort of general and large: You don't know the individuals who have appreciated it directly."*

FEYNMAN'S OFFICE: THE LAST BLACKBOARDS

ALL PHOTOS ROBERT PAZ/ARCHIVES, CALIFORNIA INSTITUTE OF TECHNOLOGY