
Off the Beat

Tangerine physics, or the textbook is a frictionless puck

It was about four o'clock Easter Sunday morning. We had all been through two strenuous hours in church and since coming to the party had imbibed rather much champagne. The conversation had skidded from liturgics to sex to analytic geometry when, apropos of an argument over free-standing altars, someone popped the question: "Where do you find a frictionless ladder?"

"Answer is obvious," I replied, quoting a Chinese physics professor of my long departed youth, "in the second chapter of any elementary physics text. Nowhere else in the universe will you find a frictionless ladder."

Such is the world of the physics textbook. It is a place where friction can be turned off at will, where freely falling bodies freely fall. There is an answer to every problem written out in advance in the teacher's edition. The textbook has mathematics for every problem, and it will tell you what mathematics to apply to what problem, but it is often coy about why. It is nice to know that $S = \frac{1}{2}gt^2$, and that it applies to falling bodies provided there is no air resistance, no electrical charges

or electromagnetic forces, no baryonic charges or strong-interaction forces at work on the things. But why $S = \frac{1}{2}gt^2$? Because it's in the middle of the big red box on page 45.

Obviously, as any literary student will tell you, the real world is not like this. Perhaps one reason literary types are turned off by physics is that they like to take life whole, as in a novel, and object to having it pared, julienned and coated with the ever handy frictionless lubricant.

Obviously, too, real physicists don't work that way. Those guys out there in the multimillion-dollar government labs were dealing with the real physics of the real world. They were not climbing around on frictionless ladders.

Therefore we concluded that there was an *Urprinzip*, a way to know how to solve unsolved problems, that would be communicated to us in due time. We tended to fantasize it happening on the night before we got our Ph.D.'s in a ceremony rather like the accolade of knighthood.

Meanwhile we were being drilled. It was rather like parade-ground drill in the army, which has little if any connection to what soldiers do in combat but which continues because it keeps drill sergeants in work.

We accepted the drill. We were docile students—this was before Berkeley got into the news. Solving physics problems was only faintly more absurd than conjugating irregular French verbs or composing *temps surcomposés* (ask your friendly neighborhood French grammarian what those are), and the

world of the textbook fit our expectations. We had been brainwashed. I remember an elementary-school teacher who prophesied every other day that "Arithmetic is an exact science." (There ain't no such thing as an exact science, lady, but that's getting ahead of the story.) And there was another, a gentleman with a slightly Pennsylvanian cast of speech, who kept admonishing us to "folly the book." Folly the book we did. We drilled and waited for *Der Tag*.

Der Tag never came. When I grew older and was professionally licensed to ask of physicists the irreverent questions that students interested in grades never do, I discovered that there is no *Urprinzip*. A real physicist in the real world confronted by an unsolved problem tries something and sees if it fits. He uses a suggestion from previous work, a hunch, an inspired guess (attributed to angels or demons according to his religious persuasion). Or he goes by an unpredictable and totally individual catena of mental connections: from the Eightfold Way of Buddhist philosophy to the eight-member group of Sophus Lie to a theory of the structure of elementary particles. There is no big red box in the sky.

In short, real physics is done by all the arts, crafts and pyrotechnics that make the human mind such a fascinating instrument. It should be one of our most compelling subjects of study, but meanwhile . . . back in the textbooks . . . they are playing hockey with frictionless pucks.

—Dietrick E. Thomsen

Famine . . .

dence from ice and sediment records indicates that weather over the last half century has been the warmest in 1,000 years and that a cycle of colder temperatures can be expected. The effect would be a major shift of rain patterns and deserts, and a shorter growing season for northern latitudes.

The sub-Sahara row of six countries, known collectively as the Sahel region, presents a grim test case of what may happen in more populous areas if droughts spread. There, for the first time in living memory, people walk across the Niger River. The fabled desert outpost of Timbuktu has required airlifts of food. A quarter-million people are estimated to have died from the resulting famine, and 80 percent of the livestock in one country have been killed. Every year that the drought continues, the Sahara desert moves relentlessly southward some 30 miles.

The Indian sub-continent may be next, according to Lester R. Brown, a senior fellow at the Overseas Development Council in Washington and an out-

spoken observer in matters of world food supplies. Even before the energy crisis hit, the world appeared to be at the "bust end of a cycle" in world fertilizer industry. Brown told SCIENCE NEWS, but now with massive fertilizer shortages, Asia may next year face "the largest food deficit of any area in history." If the monsoons should fail again, widespread famine would surely follow.

India appears most vulnerable. Even India's own National Council of Applied Economic Research admits: "Sometimes the very immensity of the problem numbs one's senses and impairs the capacity to deal with it." In some stores serving the poorest classes, rations were cut in half last year. Riots have already occurred in two states. Kerosene for cooking has risen beyond the price reach of many. Inflation gallops along at 25 percent a year, and half of India's total export earnings may have to go to buy oil. A Wall Street Journal article concluded "the next 12 months will make the past 12 look good."

China would be better off, except for the fertilizer problem. That country has, in many ways, worked an economic miracle, almost abolishing malnutrition without substantially raising per capita income. But much of China's foreign exchange goes for fertilizer; it is the world's largest importer, buying mostly from Japan, which has now been severely hit by the energy crisis. China is also the current number one U.S. wheat customer, even in good weather. With an intricate irrigation system, China is better prepared to meet drought than India, but should fertilizer continue scarce, China too could face severe difficulty.

No one knows when the crunch will come, but Lester Brown says that within a year, leaders of the world's developed countries may be faced with the agonizing decision of whether to "cut Asia adrift" or ration food at home to feed starving millions abroad.

On any street in Asia one can smell the pungent aroma of the local, highly spiced cuisine. How hard to believe that too is so terribly fragile. □