

one until we crashed it. We'd apply what we'd learned from the crash to the second. The third was usually kept in the hangar, stripped for parts to keep the second one flying, and finally sent to a museum. But Venture Star is all or nothing, orbit or bust.

Real X projects fly incremental missions. The X-1 didn't break the sound barrier on its first flight. Neither did the X-4. Back in 1986 General Daniel Graham, Max Hunter, and I proposed the SSX spaceship, which was intended to be overbuilt. It would have been a miracle if it made orbit. The idea was to fly it, bring it home, and fly it again. Fly soon, fly often, then higher and faster. Find out where it was overbuilt and lighten it; fly some more, learn some more, and eventually nickel and dime it to orbit. Once that happened, we'd know how to build a real spaceship, like Buck Rogers had, one that flies to space, does things, lands, refuels, and flies again.

We can still do it. It's not too late. But the time to do it is now. Market forces are best for producing prototypes and operational vehicles, but if we want to be sure our grandchildren have the technologies needed to make America a spacefaring nation, we need real X projects. And we need them now.

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THE RACE TO THE MOON

By Charles Murray and Catherine Bly Cox

Whatever its flaws, in its early years the Apollo program did operate far differently from the typical government bureaucracy. Some of the men responsible for that are profiled in Apollo: The Race to the Moon, by Charles Murray and Catherine Bly Cox.

Walt Williams was associate director for Operations of the Space Task Group. He was the "very tough kind of guy" the gentlemanly engineers needed to deal with the Air Force's brand of bureaucratic infighting. By 1959, Williams was already known in the flight-test business as a man who could work, carouse, cuss, or fight as prodigiously as any test pilot at Edwards Air Force Base. He was also tough in the other ways that Operations needed. "He had the ability to walk up to the problem of putting a man on top of one of these Atlas vehicles, which are really just big metal balloons, and not be cowed by it," said his colleague Glynn Lunney. "Williams just walked up and said 'Goddammit this' and 'Goddammit that' and got everybody saluting and doing what they should do." He was a genius of sorts, Lunney reflected, "though if you had to go up against him, he didn't seem like a genius, he seemed like a bull." In those days, he even looked like a bull—over 200 pounds, a powerful man with a square head, dark, close-cropped hair, and heavy brows.

But Williams was too busy negotiating with the Air Force and taking care of the preparation of the Atlas launch vehicle to handle the day-to-day business of flight control, Lunney said. "And then this young Kraft guy came along with a lot of clever technical skills and the charisma to pull it off. Chris made it happen."

His unlikely name was Christopher Columbus Kraft, Jr. As director of Flight Operations Division, he would become the embodiment of Mission Control and slowly shape Flight Operations into a brotherhood.

From 1959 until the mid-1960s, the new Division was continually hiring new people. But whereas other divisions within the Space Task Group hired a mixture of new college graduates and people out of industry, Flight Operations tended to hire predominantly new college graduates. Kraft looked for a particular kind of person. He wasn't worried about grades—a B or sometimes even a C average could be good enough. In fact, the straight-A student wasn't likely to be right for Flight Operations. Kraft wanted people who enjoyed nosing around in many different areas, and who knew that they were going to have to work hard. Most of all, he looked for applicants who were fascinated by space flight.

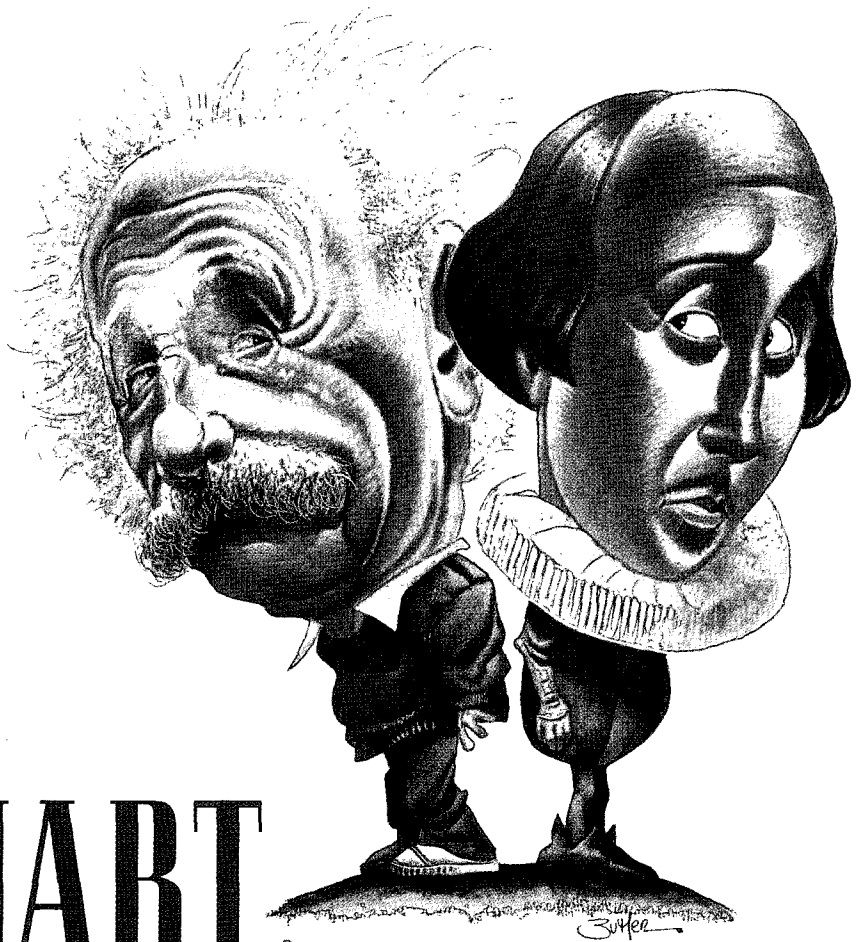
When these youngsters, 21 and 22 years old, came to work, they found themselves in one of the most glamorous jobs in the program. They didn't sit at drafting tables drawing electrical circuits or designs for valves; they were the guardians of the astronauts. They went to exotic places—Hawaii and Bermuda; Carnarvon on the northwest coast of Australia; Kano in the interior of Nigeria; Tananarive in the Indian Ocean; ships and islands throughout the world—to man the remote sites. They had as their leaders the redoubtable Williams, possessing everything to inspire awe in 21-year-old males but a silk scarf around his neck, and Kraft, who became the revered leader.

Kraft was the model for flight-controller cool, taking in bad news without changing expression or tone of voice, making decisions quickly, controlling people and events as the situation demanded. He had the indefinable quality called "presence" as well.

"People idolized Kraft, and wanted to be like him," another controller said. So there they were—young, male, in a high-pressure job, often the only one they'd ever known, many of them single, spending most of their waking hours together, often in remote overseas outposts, led by men they idolized. The result was more or less what one would expect of such a mix of circumstances—male bonding (a phrase no flight controller would be caught dead using) on a grand scale, and a kind of closeness that many of them would never know again. Along with the excitement went the hell-raising that groups of young men are prone to indulge themselves in.

They had their own language. While they were working a mission in the Control Center, they communicated in short bursts of acronyms and abbreviations and code words that made it impossible for an outsider to have any idea what they were talking about. After work, drinking beer at the Flintlock or the Singing Wheel, they would add to the acronyms and the jargon their own figures of speech. A Saturn didn't fly to orbit; it "went up the hill." One didn't make inquiries of someone; one "pulsed" him. Then, for reasons that remained unexplained, the controllers mixed their technological slang with medievalisms—"yea verily," for example, and "it came to pass," and "thou shalt." Sometimes it seemed that the controllers lacked only decoder rings and a treehouse.





SCIENCE for the SMART ENGLISH for the DUMB?

Erin Sharp published a half-dozen poems and several essays before she was graduated from high school. Her English teachers showered her with praise and awards. When she chose to go to Cornell University, her career choice was clear—medicine. “The assumption was that if you were smart enough to get into Cornell, you might as well become a doctor,” she told *TAE*.

For Erin, medicine was a bad choice. She didn’t like her biology and chemistry courses and found herself simply sliding through. After one term in college, she began to fill out an application for a transfer to Rutgers. Had she not met some new friends, she might have left. Good thing she didn’t. By the end of the term, she had improved her academic prospects; her English professors loved her work and gave her As. She decided to major in English.

Although Sharp found a place in the humanities after a not-so-great experience in the sciences, her case is an exception. Many bright, ambitious students find themselves working in the sciences rather than the humanities almost as a matter of fate. More and more teachers and students make the assumption that scientists and the sciences are somehow better than the humanities.

BY ELI LEHRER

As a student in the humanities with a keen interest in science—I did upper-level work in astronomy and edited Cornell’s science magazine—I learned that people expect students who can to go into the sciences. When I told my former cantor at synagogue that I was studying literature, his face turned pale. “I thought you would do something more”—he paused as his mouth began to form the word *useful*—“uh, scientific.”

Indeed, as a result of priorities set by the federal government, the humanities’ academic status has been declining relative to sciences since the end of World War II. Starting in high school, the best American students can look forward to a rich and challenging science curriculum supported by significant opportunities for research, paid summer jobs, and prestige.

High school students in the humanities can look forward to little of this. Even in the most privileged secondary schools the study of the humanities is of far poorer quality than the science instruction available at “second-rate” high schools. A close look at the curricula pursued by some of the country’s best high-school students shows the great pressure they face to forsake the humanities for the sciences.