

## THOUGHT EXPERIMENTS: ME AND DEKE AND THE PARADIGM SHIFT

by Michael Cassutt

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So I popped open a can of Labatt's Blue and said to Deke Slayton, "Deke, old buddy, what was it like being part of that big old Paradigm Shift back in the 1960s?" We were sitting on lawn chairs outside an R.V. parked in front of a hangar at the Reno Air Races. Scott Grissom, Gus's son, was there, too, helping push Deke's Formula One airplane, a Williams 17, out of the hangar. Gordo Cooper had just driven by on his way to the viewing stands; he hadn't stopped to say hello, but maybe he hadn't seen Deke. Or maybe he'd heard the words "Paradigm Shift" floating in the air and decided to be elsewhere.

Or am I thinking of Tom Stafford at the Cape? No, it was Deke who liked Canadian beer and flew Formula One in retirement. On the other hand, you could say "Paradigm Shift" to General Tom without getting one of *those* looks in return.

Either way, this scene of a laid-back, rat-shack-style encounter with the guys who flew Mercury, Gemini, and Apollo is not solely an attempt to drive Allen Steele green with envy ... it's to establish my bona fides. To make you trust me as we consider that moment when sending human beings into space ceased to be Buck Rogers craziness and became the real deal or the Right Stuff.

Also known as the Paradigm Shift.

Without really intending to, I have become an expert on America's astronauts. I have co-authored two autobiographies (Slayton's and Stafford's), written the biographical encyclopedia *Who's Who in Space* (three editions, none of them short) as well as contributing odd bits of journalism and even historical papers. Oh, yes, there are the three novels dealing with manned space flight—*Missing Man* and its sequel, *Tango Midnight*, and *Red Moon*.

In thirty years of ... well, in Hollywood we'd call it schmoozing ... I have met, and, in some cases, talked at length, with eighteen of the twenty-two surviving members of the first three groups of NASA astronauts, as well as an untold number of those who followed, not to mention a good dozen Soviet cosmonauts from that era.

Tom Stafford wanted to title his autobiography *Higher and Faster*; mine would probably be *Closer and More Personal*.

Why this obsession? I was a total child of the Space Age. My first book was *Tom Corbett, Space Cadet*—not the first of the Grosset & Dunlap novel series by “Carey Rockwell,” but a picture book. Nevertheless, it launched me as a consumer of science fiction, especially SF about rocketships and flights to other planets. Further damage was done by the Winston series of juveniles by Lester del Rey (under a variety of names), Andre Norton’s books, and, of course, Robert A. Heinlein’s Scribner novels.

It was my mother who introduced me to the Heinleins, unquestionably the stories most associated with the Paradigm Shift. She was an English teacher at John Glenn Junior High School in Maplewood, Minnesota. After Glenn’s Mercury flight in February 1962, it was the first facility named for him. One wintry Friday in 1965 she brought me *Red Planet*. Reading it, at age ten, was the closest I will ever come to a transcendent experience. Heinlein’s portrayal of colonial life on Mars was so real, so engaging, that it struck me as *more* realistic than *Tom Sawyer* or *Robinson Crusoe*.

On each of the next nine Fridays, she brought me a new book in the series, from *The Star Beast* to *Tunnel in the Sky* to the wonderful *Have Space Suit, Will Travel*. (For some reason, the library didn’t have *Starman Jones*—I didn’t read it until I found a paperback edition a couple of years later.)

Inspired, I began to collect astronaut stories from *Life* magazine and other publications. I built lunar module and Gemini and Saturn V Revell models. (Well, unlike Allen Steele, I never actually *finished* that monster Saturn V.) Having seen the fictional side of space travel, I couldn’t wait to see the reality.

Which was this:

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It was almost forty-eight years ago that seven American military test pilots were put on stage in a house in downtown Washington, D.C., and introduced to the press and the world as “America’s Mercury astronauts.” Not one of the first seven had any idea what was in store—they expected to be treated like Scott Crossfield or Capt. Bob White, the test pilots who had been chosen for the X-15 high-altitude research program a year earlier ... fodder for a day’s worth of newspaper articles, then fading back to happy obscurity while they got on with their jobs.

Not the Mercury Seven. From the day of that press conference, they became household names, as famous as movie stars or baseball players. People wanted their autographs, wanted them to pose for pictures, wanted to have drinks with them, wanted to have more personal encounters.

Scott Carpenter would later describe it as “more fun than you can imagine,” but at another level, it made the men incredibly uncomfortable. As Deke told me, “We hadn’t done anything but show up!”

That's what happens with Paradigm Shifts. You don't get to volunteer for them. You can't escape them. They roll over you like a cultural tsunami.

Prior to Project Mercury, which itself followed closely on Sputnik, space flight was equated with science fiction: Buck Rogers stuff, theoretically possible, but impractical, unlikely, unaffordable.

This attitude wasn't limited to middle-class Americans—President Eisenhower was extremely reluctant to commit the nation to a space program. (To be fair to Ike, this reluctance stemmed more from financial prudence than some lack of vision. He had a pretty good idea of what a space program would cost, and he simply didn't want to burden the next generation with huge bills ... especially knowing that Cold War military needs would force gigantic expenditures.)

Even SF writers like Robert A. Heinlein—author of those inspiring Scribner juveniles—could postulate a grim view of the inevitability of space flight when he wanted. His classic novella, “The Man Who Sold the Moon,” portrayed a near-future world in which “antipodal rockets” routinely made sub-orbital flights with cargo and passengers ... while only one man showed any interest in actually flying to the Moon.

In stories like Ray Bradbury's “R is for Rocket,” it was even suggested that being a “spaceman” was beyond the ability of ordinary humans, that likely prospects would have to be scouted and selected by mysterious great minds by the time they were twenty, or forget it.

The Mercury Seven changed that. They were recognizably the guys from down the next street, from the gas station downtown, or maybe the new junior college. Who could look at the freckled face of John Glenn and not see middle America? If he thought going into space was possible, then who was going to argue the point?

Yes, their lives had been formed by the Depression, by the rise of aviation (both Tom Stafford and Deke Slayton spoke reverently of the magic of standing in their front yards and watching aircraft fly overhead), and by World War II, Korea, and the Cold War. Some of them had become warriors, but, in 1961, so had many American men.

(And, yes, they were all white males. The race-and-gender Paradigm had yet to shift.)

Chosen in 1962, the second group of astronauts—which included Neil Armstrong, Frank Borman, Jim Lovell, Tom Stafford, and John Young—*did* have some idea of their fate. For one thing, they knew they were going to fly missions in Apollo, a program intended to “land a man on the Moon by the end of this decade, and return him safely to Earth.”

Tom Stafford, who, on that September day in 1962, had the pleasure of being

introduced to the press on his thirty-second birthday, says he looked around at the group as the flashbulbs popped, and thought, “One of us is going to be the first guy to walk on the Moon.” (Had history changed slightly, it would have been Stafford, not Armstrong. Had it changed even less, it would have been Borman, or McDivitt, or Conrad.)

In 1963, a third group arrived, chosen, like the first two, from the pool of skilled military and civilian jet pilots, all of them hardened by combat or risk, seemingly more interested in carburetors and cocktails than space medicine or the origin of the Moon.

But only on the surface. Deke admitted to me that even before he’d heard of the Mercury program, he would pick up the odd book or magazine on astronomy. Scott Carpenter grew fascinated by aerospace medicine. Tom Stafford was already a student at the Harvard Business School when NASA grabbed him. Jim Lovell actually built rockets and knew their history as well as anyone. Frank Borman and Jim McDivitt had studied aerospace engineering and helped found an Air Force program specializing in the subject.

Later waves of astronauts included genuine scientists, like Jack Schmitt or Ed Gibson, or men with wide-ranging intellectual curiosity that belied their images as test pilots.

Take Ed Mitchell, for example, the lunar module pilot on Al Shepard’s Apollo 14. If the average American can differentiate Mitchell from the other moon-walkers, it’s that he was the guy who did E.S.P. experiments in space.

He was a Navy pilot who had taken part in tests of the delivery of nuclear weapons from jet aircraft, who had helped develop a manned spy satellite program.

And yet ... he had a Ph.D., he had grown up in America’s land-based Bermuda Triangle—the town of Roswell, New Mexico—where he a) witnessed the detonation of the first atomic bomb at Trinity as a bright light on the northern horizon one July morning in 1945, b) walked home from grade school past the residence of Robert H. Goddard, and c) knew the family whose farm was the location of the supposed “saucer” crash of 1947.

To this day, Mitchell writes and lectures eloquently on any number of subjects, speculative science that could easily be labeled SF.

Buzz Aldrin also had a Ph.D., and in recent years has worked tirelessly for the private space industry.

I suspect there was another flavor to the Paradigm Shift ... that astronauts made it cool to be *smart*. They, and their short-sleeved, white-shirted, pocket-protected colleagues from engineering and mission control (who were also present at those raucous beach bashes) inspired the generation of computer geeks and nerds who currently rule the world from Seattle, San Jose, Bangalore, and

Shanghai.

And yet ... this Paradigm Shift is history. Apollo ended in 1972. As Gene Cernan jokes, with some bitterness, he thought he was the latest man on the Moon, not the last.

Deke and Al and Gus and Gordo are gone. Bill Gates and I are ... well, we're middle-aged. And I can't claim to speak for him, but I often wonder if the vision of humanity's relentless, remorseless expansion into the Solar System ... the inevitability of white-suited figures raising a flag on the slopes of Olympus Mons, or gazing in wonder at mighty Jupiter from the icy surface of Europa ... might not be wrong.

Was the Paradigm Shift personified by astronauts the right one?

Or did it send us into a technological cul-de-sac?

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That's what I've heard over beers at beach parties at the Cape ... at the viewing stand for a launch ... at autograph shows ... at charity dinners ... at lunch in the Johnson Space Center cafeteria ... standing in the cold on a street in Moscow ... via letters, e-mails, phone calls, and plain old conversation.

I've listened to Deke's post-mortem on NASA's first major attempt to cut a clear pathway to the world of Heinlein's Red Planet—at least nine more lunar landings, orbital workshops, a Space Shuttle, and manned Mars mission in 1986. Proposed in August 1969, the program was dead on arrival, throttled in the crib. There was no money (the Vietnam War was then at its peak expense) and, worse yet, there was no clear mission—certainly nothing as clear as Kennedy's "man on the Moon by the end of the decade."

Deke assigned astronauts who expected to fly Apollos 17 and 18, but had to tell them there was a good chance the missions would be canceled.

A second attempt to chart a path to Mars and the Solar System, the Space Exploration Initiative, was floated in 1989 ... and crashed within months. There were numerous other studies on either side of that, including one headed by Tom Stafford. The results? Lots of paper, no hardware.

Now we are almost three years into a third program, the Vision for Space Exploration, which is already being squeezed by the Cold Equations of space flight.

The U.S. operates a Space Shuttle that is at the end of its design life, servicing an International Space Station that is, to put it charitably, under-used. Russia flies the fourth generation of its forty-year-old Soyuz—and very capably—but the vehicle is severely limited in terms of the amount of cargo it can carry.

China has dipped its toe into the piloted space business in the last few years, using their version of Soyuz. With two flights since October 2003 and a third not

scheduled until the summer of 2008, it's a worthwhile program, but hardly ramping up for an assault on the Moon or Mars.

What is on the drawing boards? China talks of a bigger booster and a small manned orbiting station that would be the size of a single ISS module. Russia is looking for the money and will to construct Klipper, a scaled-down Shuttle.

And the U.S. has a program apparently known as Constellation (though you'd never know it from the increasingly confused NASA websites) with a Crew Exploration Vehicle (recently named "Orion") that has been described by no less an authority than NASA Administrator Michael Griffin as "Apollo on steroids."

Orion, will, it is hoped, allow us to duplicate the achievements of Apollo beginning in 2018, returning to the Moon for longer missions (up to a month) with larger crews (four) and more cargo.

All you need is a big new launch vehicle—the Ares I and V—which were supposed to use a lot of Shuttle-derived technology in order to save development time and money (which is actually the same thing). Just this past week NASA announced that instead of a Shuttle main engine, the Ares would use a Russian engine called the RS-68, originally designed in the 1960s. And that Ares's shape would change, because the plant that made the original Saturn V tankage was still available. Fine; it's not Shuttle-derived, it's derived from the 1960s.

The launcher and spacecraft are also supposed to serve as the core of future interplanetary vehicles, capable of making visits to Near Earth Objects or Mars.

This, by the way, follows an earlier decision by NASA to scrap a liquid oxygen-methane upper stage—a key element in any interplanetary vehicle—in order to get Constellation flying sooner, which is to say, more cheaply.

But will Orion/Ares be affordable as the aging Shuttle and unwanted ISS continue to eat up billions of tax dollars every year? It all depends on the American economy and the Federal budget. Look at the projections for Fiscal Year 2009 and get back to me.

Money isn't the only element in the Cold Equations. Space systems seem to grow more complex and unwieldy with every year. Do a Google search on military space programs like SBIRS or AEHF or FIA if you want to see just how little you can get for billions of tax dollars. The engine trade-offs made in CEV are only the beginning of what could be a long siege of technical ... challenges.

Assuming the money and schedules work out, in success, where are we? Humans have proven that they can function in Earth orbit, though anyone who can point to a commercial, medical, or technical breakthrough from the International Space Station should get in touch with NASA and let them know. The Apollo missions demonstrated our ability to get safely to and from the Moon.

Ah, but Mars? With current, non-nuclear propulsion on a mission that would have to last three years? At the moment, NASA medical specialists put the expected death rate from exposure to cosmic rays during such a mission at 5 percent. By comparison, workers in the radiation business face a 3 chance of dying.

While there will be no shortage of volunteers for a mission with those odds—which compare favorably to, say, those of Magellan’s crews—I’m guessing that NASA will have a tough time getting funding for a vehicle that so blatantly violates OSHA standards. The technical fix? Add a few tons of shielding to the vehicle. Of course, that pretty much makes it impossibly heavy.

If the cosmic rays don’t get you, other human factors might. Those are best simulated and studied on the International Space Station ... the same facility that Mike Griffin wants to get out of.

And Mars is the easiest, most-Earthlike planet. To reach Europa, scale up the challenges accordingly.

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Yes, the veterans of the Paradigm Shift have their doubts. There were those like Frank Borman, who years ago expressed skepticism about the claims of the Shuttle program, especially when it came to the fiction that the vehicle was safe enough to fly school teachers and politicians. There are others who will tell you quite frankly, over a beer or three, that no one is going to Mars any time in the next twenty years, and possibly the next fifty or a hundred.

If you think there’s something ironic in the idea of a man who saw the Earth from lunar orbit wondering if the trip was worthwhile—or even possible—well, life is full of ironies.

To be fair, not all former astronauts feel this way. Some, like Buzz Aldrin, are still busy trying to complete the Paradigm Shift—to make human or piloted space travel a reality.

Then there are those like Deke Slayton, who had grown quite disenchanted with NASA by the time he left in 1982, and became one of the pioneers of the Private Space business.

And, let’s face it, a group of retirees is much less likely to be willing to take risks than the same men at the age of thirty.

The younger, Shuttle-era of astronauts, exposed to the same SF I was, remains hopeful. Scott “Doc” Horowitz, a Ph.D. who made four flights, now heads the space agency’s Exploration Systems Directorate. Shuttle, Mir, and ISS veteran Mike Foale is still an active astronaut busy with, among other things, the design of a pressure suit that can be worn for launch and entries, and still used on lunar EVAs. Former Shuttle astronaut Franklin Chang-Diaz—seven missions!—has been working for years on a radical new propulsion system called Vasimr. I could name half a

dozen more who have been members of the Mars Underground, a group of space professionals and enthusiasts using Robert Zubrin's concepts to further the cause of a flight to the Red Planet. Some of these astronauts played a direct role in shaping Orion/Ares.

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No, the skepticism about the standard model as practiced by NASA is not uniform.

And there is an alternative. There is a growing, vibrant, raucous world of privately funded efforts effectively profiled in this magazine ("More than Halfway to Anywhere" by Joe Lazarro, March 2006).

I wish them luck, but my middle-aged sense of reality makes me afraid that some time around the year 2012 I'll be looking at Branson's Virgin Galactic sub-orbital tourist flights the same way one ex-employee looked at Grand Canyon Airways: "Their motto is, 'We don't crash all of them!'"

On a possibly brighter note, know that when I first went to college, I considered majoring in astronomy, either as a career or a way into the space program. It was, in fact, one of the reasons I chose the school I did.

Within a year I had given up the idea.

This was in the mid-1970s. All I missed were the Viking landings on Mars, the Voyager encounters with Jupiter, Saturn, and Neptune, the launch of the Hubble Space Telescope, and a dozen other platforms ... call it the most fruitful and vibrant era of astronomical discovery in the history of the human race, a twenty-five year period when we learned more about the universe than we had in the previous hundred thousand years.

So it's *possible* I could be wrong about the ultimate success of private space.

Nevertheless, it's still a matter of putting human beings on top of rockets. That's the old paradigm.

Maybe it's time for a completely new one.

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SF writer Greg Bear may have pointed the way. Years ago I heard him ask an audience at an SF convention if its members believed that a century from now, humans would still look the way they do now.

"Of course!" "What else?" were the answers, proving that middle-aged SF fans are just as conservative as retired astronauts.

"You're wrong," Bear said, and in the general grumbling, managed to point out that developments in bio-mechanics, genetic engineering, and nano-technology were going to re-shape the human form. (Maybe it's just living and working in



Hollywood, but every day I am confronted with proof that, given the tools, human beings will re-shape themselves.)

Why not imagine future astronauts being bio-engineered humans, as in Frederik Pohl's classic *Man Plus*? What about creating space probes that allow full-sensory links for operators back on earth, as in my own story "More Adventures on Other Planets"?

What about designing post-human astronauts in the womb? This sounds like a logical extrapolation of what Bradbury was writing about in "R is for Rocket" sixty years ago.

This is hardly a comprehensive list. And the ethical problems of womb-design are frightening.

Yet, I find this potential Paradigm Shift strangely hopeful ... I wasn't likely to travel to the Moon, much less Mars. But some version of me—my avatar—might make it, and have a better time of it.

That's good enough for me.

And I owe it to my old buddy Deke to encourage it.

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*AUTHOR'S NOTE: Allen Steele kindly consented to the use of his name. Check out the introduction to his fine collection, Rude Astronauts (Baltimore: Old Earth Books, 1993; New York: Ace, 1995).*