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SpaceX ignites big dreams

The successful launch of the Falcon Heavy rocket was a stunning moment that opens the way for commercial exploration of deep space.

When David Bowie revealed the inspiration for his breakthrough hit ‘Space Oddity’, it came as a surprise to many: not the Apollo missions to the Moon but the film *2001: A Space Odyssey* (Kubrick, 1968). And it’s easy to see why: the film’s ballet of the spinning space station and dark themes about our place in the Universe has a distinct aesthetic appeal.

Does space travel still inspire? The continuing high profile of the International Space Station (ISS) and the welcome early steps of China and others aside, an extraordinary thing has happened. For much of the public, humanity’s adventures in space have become history, something people used to do in the old days. (Exhibit A: the Space Shuttle, once a means to escape the surly bonds of Earth, is now a museum piece.)

But spaceflight suddenly seems futuristic again. How else to explain the reaction to the spectacle of last week’s successful maiden launch of Falcon Heavy, the giant rocket built by Elon Musk and his company SpaceX. The hashtag generation has witnessed its own moment of inspiration writ large in the heavens.

The launch wasn’t perfect, but it still came across as a stunning synchrony of power and control. The 27 Merlin engines blazed to lift their giant cargo towards the sky, accompanied by cheers and whoops on the ground. And then, with exquisite control, the side boosters separated, back-flipped in tandem towards Earth and settled on landing pads at Florida’s Cape Canaveral Air Force Station with a rapid volley of ear-splitting sonic booms.

The Saturn V rocket NASA created in the 1960s for the Apollo missions remains the most powerful rocket ever built. But since Apollo there has been an almost 50-year hiatus in missions to take people beyond low Earth orbit. The successful launch of the Falcon Heavy will surely mark the beginning of the end of this hiatus. It is nothing short of historic, and Musk deserves enormous credit. Yes it was flashy — gimmicky, even — but there was substance behind the style.

Not without his faults, Musk has nevertheless shown himself to be a visionary with verve, can-do grit, a dash of genius and an abundance of hubris. SpaceX has roundly confounded many naysayers and upended the launcher industry. Tesla, Musk’s electric-vehicle company, faces enormous challenges, but has still helped to persuade many in the automotive industry that fossil-fuel engines belong in museums alongside the shuttle.

Musk’s goals for space are characteristically audacious. He intends SpaceX’s Dragon capsule to carry people later this year, and Falcon Heavy’s less powerful sibling — the Falcon 9 workhorse — to ferry astronauts to the ISS.

But it is the void beyond on which all sights are now set. Commercial companies have finally cracked access to deep space. Access to interplanetary trajectories — and the decisions about where to head — is no longer limited to governments. Musk wants to take people to Mars, which still seems a long shot — but space tourism

suddenly feels like a more realistic prospect.

Together, Musk and his rocket are showing what a combination of big ideas and big money can achieve, and so inspiring the next generation to dream big. Still, for all the thrill of the new, it’s worth remembering just how much last week’s launch — like so much in

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science — builds on the achievements of others. Falcon Heavy took off from the historic Launch Complex 39A (LC-39A) at the Kennedy Space Center on Merritt Island in Florida, from where the Apollo Moon landings also began their journeys.

And although Musk’s choice of test payload — his own cherry-red Tesla Roadster with a mannequin at the wheel and playing ‘Space Oddity’ on a loop — received as much attention as the rocket that carried it, SpaceX is not the first to put a car into space. From LC-39A, NASA did the same. Then it landed its car on the Moon. And then it drove it around. Not bad for the old days. ■

Climate conflict

Many studies that link global warming to civil unrest are biased and exacerbate stigma.

The people of Cape Town, South Africa, are enduring a terrible drought, and the resulting water shortages could soon force authorities to turn off the taps. Could civil unrest follow? When southern Brazil experienced a similar shortage in 2015, stories circulated about the authorities running drills to prepare a response to desperate people attacking water infrastructure. And a study published last year of some 1,800 riots in sub-Saharan Africa over 20 years concluded that drought can indeed be a powerful contributor to civil disorder (C. Almer *et al.* *J. Environ. Econ. Manage.* <http://doi.org/ckdj; 2017>).

Such retrospective analyses raise two questions related to cause and effect: did climate change alter the weather? And did the change in the weather provoke the conflict? Only a solid yes to both can justify bold statements that global warming promotes violence — and establishing this answer is difficult, if not impossible, in many cases.

That hasn’t stopped such controversial claims being made. A decade ago, the United Nations went as far as to state that climate warming and desertification were one of the causes of the Darfur conflict in Sudan, which started in 2003 and led to the deaths of up to half a million people over five years of revolt. That daring claim, based on