Web Roundup: Lunar Bodies

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By

The past month has been a big one for the moon. There was a total solar eclipse across Chile and Argentina on July 2, a partial lunar eclipse visible nearly everywhere except North America on July 16, and a black supermoon on July 31 over North America. On July 22, India launched its Chandrayaan-2 space probe, marking ISRO's second journey to the moon and first attempted touchdown. If Chandrayaan-2 sticks its soft landing scheduled for September 7, India will become the fourth nation to leave a lunar footprint (technologically speaking) and the first to land on the moon's South Pole. The more likely reason the moon passed through your news cycle, however, is because July 21 marked the 50th anniversary of the first time a human being set foot on the lunar surface.

For me, that meant my news feed was flooded with commemorative essays and think pieces, including articles on the politics of the Cold War, gender discrimination, and the civil rights movement; debates about the ethics of spaceflight and whether the cost, resources, and political attention given to manned missions to the moon and/or Mars is justifiable (this white paper co-authored by a group of astronomers advocating for an anti-imperial and ecoconservationist approach to space exploration is really worth a read); and more giant leap puns than I knew possible. If I had a nickel for every time someone commented on one of these articles with something like, "To argue against [going to the moon] is to argue against humanity reaching its full potential," I could have paid off at least half of my student loans by now.

What flies a little under the radar in these semicentennial articles is the impact of the space race on how Western biomedicine conceptualizes, cares for, and stretches the limits of the human mind/body. In unprecedented ways, spaceflight challenged the very definition of a biomedical body and its physiological, psychological, social, and environmental boundaries. Exposing astronauts to a microgravity spacewalk, a barren lunar surface, or the confined spaces of the shuttle cabin threw into sharp relief what could otherwise be taken for granted as vital "earth normal" conditions of human living, as anthropologist Valerie Olson terms it (2018: 85), such as breathable oxygen, access to food and water, ways to dispose and process human waste, and the effects of gravity on muscle and bone, not to mention mental health. Establishing new "space normal" conditions would require developing new conceptualizations of what counts as a bodily need, a habitable environment, and an existential threat, as well as new attendant management strategies.

Human spaceflight carried with it a high degree of uncertainty, and thus required guesswork at every step; space medicine was no exception. From the outset, astronauts accepted their roles as passive biomedical subjects, and were open and willing to participate in unconventional forms of experimentation, augmentation, and cyborg-ification (not a technical term). While receiving exceptional medical care, astronauts were also routinely subjected to uncomfortable and invasive tests, psychological screenings, fitness exams, and other forms of monitoring and supervision. Moreover, astronauts adopted as a job hazard the possibility that they might die under a variety of extreme and unusual circumstances, sometimes before they ever left the ground (such as during pilot training). The invasive monitoring and surveillance did not end upon return from space, either; long after their missions, astronauts would continue to act as experimental subjects for long-term studies of the effects of space travel on the body.

Zero-gravity, in particular, raised a host of concerns regarding its health effects. Would astronauts still be able to swallow, digest food, and circulate blood? Would zero-gravity disrupt their spatial awareness so much that they would be unable to distinguish between up and down (and potentially crash into the lunar surface in the process)? While most autonomic functions remained intact, microgravity indeed posed some significant challenges to routine bodily processes. "For even the most healthy spacefarers," historian of science Matthew Hersch writes, "blood pooled in places where gravity would normally keep it from collecting (like the head), and vestibular effects eliminated all sense of orientation" (2012: 63). With no gravitational pull, muscles were prone to atrophy, which exercise (such as running on a treadmill) did little to stave off. In later, more long-term missions, such as to the International Space Station, bone density loss also became a concern. While in the shuttle, astronauts experienced claustrophobia, knee pain, eye irritation, fever, vomiting, and diarrhea, among other ailments, which they often failed to disclose to mission control. An inner ear disorder commonly contracted in the first 24 hours of flight came to be called "space adaptation syndrome," and its symptoms included nausea, vomiting, and "stomach awareness" (Hersch 2012: 63). Astronauts were further exposed to frequent doses of radiation, and carried dosimeters to track their "lifetime space 'exposure years'" (Olson 2018: 85). Waste management and hygiene, moreover, posed an additional set of challenges and risks. Astronauts were given catheters and put on "low-residue" diets and drugs to prevent them from defecating, and engineers "sealed the spacecrafts' electronics to keep astronauts from inadvertently urinating on them" (Hersch 2012: 64). Valves were created to allow astronauts to urinate into the vacuum of space; according to Mary Robinette Kowalt in a fun Twitter thread, "apparently, the venting of pee into space is very pretty. It catches the sunlight and sparkles."

While arrival on the lunar surface might have seemed like a relief from these claustrophobic conditions, stepping out of the shuttle in fact meant stepping into an even more narrowly confined container: the spacesuit. As a "body-shaped environmental boundary," in Valerie Olson's words, the spacesuit acted as a protective shield to radiation exposure, extreme temperatures, and other threats present in outer space environments, many of which were unforeseeable. The suits had 21 different layers of fabric alone, ranging from Teflon to Lycra. As Nicholas de Monchaux describes, "Each [layer] solved a specific problem — from durability (the white fiberglass exterior) to restraining the balloonlike pressure bladder against the astronaut's body (brassiere-grade nylon). The suit was a literal patchwork of improvisations and adaptations." Stitched together, the original Apollo suits could weigh nearly 300 lbs (~50 lbs on the moon). The spacesuit was not only meant to serve as an additional layer of protection between the delicate, biotic human interior and the hostile, lifeless extraterrestrial environment. It also constituted the outer boundary for a new microenvironment, produced in the between spaces of skin and suit. The suits had to be airtight and pressurized, and maintain their own internal "artificial atmosphere," complete with its own air conditioning system. Like in the shuttle, space suits also had to contend with waste management. In the early days of spaceflight, this meant peeing into a condom-like "sheath" (which often leaked) and pooping into a bag; later spacesuits came fitted with a "maximum absorption garment" (i.e., a diaper; notably, these arrived after women were introduced into the astronaut force).

Even in these heavy, pressurized suits, astronauts still somehow needed to be able to walk around, grasp objects, and climb stairs with relative ease. This need for flexibility led an unexpected corporation, Playtex – a women's underwear company – to land the contract to make the suits in 1969. To convince NASA that their suits would give astronauts the mobility they need, the company had a suit-testing technician play football for three hours in full garb and attached to two hoses. Apparently it did the trick. Of course, the fact that a women's underwear company scored the contract for the spacesuit is ironic, considering that in 1969 "astronaut" was yet another profession from which women were fully excluded. As Kowal writes in a recent New York Times article, by the time women were admitted in the 1970s, the space program "was already built around male bodies." And the problem wasn't just confined to condom catheters; even as recent as April, the first all-female spacewalk was cancelled because the ISS only had a single suit sized for women.

Much more can be said about the ways human spaceflight intersected with, challenged, and undermined ideologies and practices of 20th century Western biomedicine and the normalized biomedical body. For instance, we haven't even broached some of the more iconic tech products and commodities that came out of trying to adapt to a very anti-human environment, such as Tang, freeze-dried food, and memory foam. Further, there is much to be said about the deeply racialized, classed, and gendered "Right Stuff" astronaut selection process that gave us the white, male, able-bodied, adventure-seeking Christian astronaut as a kind of perfected human prototype (at a time when "Man" was still a common turn of phrase), as well as the grand narratives NASA attempted to harness through the space race regarding their role in realizing "humanity's destiny" as a space-faring (read: space-colonizing) species.

But for now, I'll have to leave it here. Evidently, this fiftieth anniversary of the lunar landing holds a lot of weight for biomedical ideas about the human body, its boundaries, its possible (and impossible) environments, and its possibly posthuman futures. And with ESA's evolving plans of establishing a permanent lunar habitat, as well as Trump's professed zeal for spaceflight and lofty goals for a lunar return trip, a perennial human presence on the moon is something we may need to contend with sooner rather than later.

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