The Dynamic Range

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Picture this. You look out on a bright morning, where a vast plain spreads before you like a shaken sheet. The sky is clear blue, with a haze fading into a pale horizon. Grass grows in the dust at your feet. You know that if you put your hand on the rocks they will feel warm from the sun, and the gravel will crunch underfoot as you walk ahead. You have never been here before, yet everything is familiar. This is a landscape you can understand.

A new slope rises before you this time. Knots of grass and mineral dust spread up and over it in the usual way, and you know your ankles will roll as you negotiate the rough terrain. This, too, is a predictable surface. At the top of the hill is an abrupt break that forms the ridge of a sharp bluff. The sun is clear and strong. You figure it will take around twenty minutes to walk from here to that white rock over there, and it might take an hour or more to get down into that valley beyond the ridge. Your past experience moving along the earth informs how you view this new place. Something, however, feels odd. There are no birds or insects, and you don’t hear the swish-swish of a breeze ruffling up the grass. In fact, you don’t hear anything at all. The sun casts a crisp light and dark blue shadows stretch out in their usual way, but something is off. It is midday, yet the sky is a clear and deep black. This seemingly ordinary, natural, world might not be your world at all.
The Dynamic Range is an investigation into knowledge, vision, and wonder told through photographic representations of space. The source images for this project were shot in the Badlands of South Dakota, where the terrain has eroded in stark ways that suggest the topography of the moon. I have used simple digital interventions to render landscapes that straddle between earth and space, raising questions about what we know and what we can believe.

The dynamic range is a term that describes the range of perceptible limits of changeable measurements, or the extent of possible quantities of something that is measurable. In photography it identifies the extent of darkest and lightest tones in a given image, and is mapped by a histogram. A histogram is a graph that shows the distribution of data points in a way that resembles a jagged terrain, as if charting the topography of light. I am looking at the limits of human knowledge as depicted in the visual culture of science. What is the dynamic range of our understanding?

Our notion of space seems to place it in the realm of science fiction and away from natural history. Perhaps this comes from the influence of books and movies, but I suspect it arises from the way our knowledge of space isn’t something we can glean from firsthand experience. The pictures we see are, by definition, otherworldly. I aim to look at space for what it really is: an expansive field of ordinary elements. What happens when I approach these foreign surfaces with the eye of an amateur naturalist? Since this is more of a conceptual exercise, I have chosen to photograph
the terrain of the Badlands instead of using officially gathered image data from actual space missions. In effect, I am applying amateur methods to an Earthly landscape to make them appear as if from space. Since I am struck by the familiar feeling I get from officially processed and published extraterrestrial landscape photographs, I hope to make images that can occupy the same level of visual credibility.

Lander, 2014
I have photographed real terrestrial terrains as a way to poke at notions of truth, representation, and the visual culture of scientific discovery. I chose the Badlands because it is an ancient landscape carved by the forces of water yet showing little plant life, and it is a dry, mostly barren place of pinnacles, spires, and crevices that disorient the viewer. It looks like it is from another place and time, and it also resembles the moon.

Photography is a medium of time and light. Photographs are made by adjusting the shutter speed to determine how motion is rendered, and the aperture to control the depth of field, or how much space in front of the lens is within the range of sharpness. Until lenses with advanced optics gave us telescopes, most of what people understood of space came from observing light and motion with the unaided eye. As a histogram charts the dynamic range of measurements that we can perceive, I liken the rough-toothed ridgeline of the Badlands to the set of observable data I draw from to make sense of the universe, the extent of which I cannot otherwise fathom. By altering the effects of light in a way that tricks the logic of perceived time, I can render simple images that suggest space.

What can we believe? Can we believe our eyes? We tend to believe what we see even though we know photos can be manipulated. On the other hand, there are some who still maintain that the moon landings were elaborately staged hoaxes despite the photographic evidence. Recent images constructed from composites of
Hubble Telescope data have been carefully edited, arranged, and colored to “pretty up” the shots for eager civilian audiences hungry for sexy photographs of deep space. For an ordinary person standing on the surface of Earth, which kind of truth really matters?

Scientists make predictions based on current scientific understanding. This can occasionally veer toward the fanciful, such as how we will soon travel by

Datum C3, 2015
jetpacks. In the popular 1959 children’s book *You Will Go to the Moon*, authors Mae and Ira Freeman promised young readers that space travel was imminent for all, right there in the book’s title. Regardless of whether those claims were wildly optimistic or naïve, very few people who were alive in 1959 will ever travel in space. I don’t think such predictions were reckless, however. Rather, I believe they stemmed from a giddy confidence that science was on the cusp of great discoveries that would facilitate such travel. We tend to get a little ahead of ourselves.

Mid-twentieth century popular culture, by way of movies, books, radio, and television, extended the territory available for human travel into space, far beyond charming European capitals and exotic beaches. The television series *Star Trek*, which depicted wildly disparate terrains and climates across the cosmos, opened by identifying space as the “final frontier”. A frontier is the edge of definition, where one thing meets another; the fluid gray area between the literal and the figurative. Like the terminals of a mutable dynamic range, a frontier is both a beginning and an ending. Michel de Certeau described it as a “middle place, composed of interactions and interviews, the frontier is a sort of void, a narrative symbol of exchange and encounters.” (de Certeau 2011, 127). Space was, indeed, our final frontier, as we had already pushed westward to the edge of our continent. The only way left was up.
Dedicated amateurs were propelled by the excitement of the space age and tinkered with rockets and other contraptions for flight. In recent years the internet made it possible for people to participate more actively in space exploration by accessing actual data collected on official missions, which is public information and open to anyone to view. There have always been amateurs in the field of science. From bird watching to botany to physics, people with little or no formal education in a specific area have nonetheless made important contributions. In astronomy, people are encouraged to volunteer as unofficial partners in the processing of visual data.

I am drawn to images of space that have been rendered by such amateurs, who use open-source software and filters to process data gathered from various official missions. I do not have a background in astronomy, so I am attracted to this work for other reasons. These images, which we can call photographs according to current usage of the term, depict real terrains that appear similar to those I have encountered on earth, since they, too, are made of dust, rock, sand, and ice. The difference is that I will never walk on these interstellar surfaces, and it’s possible no one ever will. They may as well be fictional spaces to me, and in fact they occupy that fuzzy region in my understanding that separates fact from fiction. They are second-hand, third-hand, tenth-hand reports of topographies, and are computer-aided composites of mechanically-gathered data. These uncanny spaces are
desolate and barren, straddling day and night in the way their surfaces are brightly lit by the sun or starlight even when their skies are black as our night. When they do show an atmosphere, that sky is a murky yellow haze, and not the clear and jolly blue we see when we look up.

Amateur space photographs take many forms. Some are rendered in the familiar red/blue anaglyph coloration that appears 3-dimensional when viewed with colored lenses. These images show surface textures in that simple yet novel way we have all enjoyed, yet they rarely offer clues to scale. The omission of a reference to scale is one of things I like best, because it removes them from the realms of science and data and lands them in that netherworld of aesthetic experience. Another way to process gathered data is to merge many small images into one larger model. Sometimes these are highly polished products suitable for framing. Official composite images released from Hubble Telescope data show seamless shots of lush and florid space spectacles, where galaxies and nebulae look like solid sculptural forms. Elizabeth A. Kessler picks apart this beautification of scientific data by saying the “appearance of the Hubble images depends on the careful choices of astronomers who assigned colors, adjusted contrast, and composed the images. Although attentive to the data that lie behind the images, through their decisions astronomers encourage a particular way of seeing the cosmos.” (Kessler 2012. 5).
Image data processed by amateurs rarely shows such aesthetic pretense. Instead, they use natural mineral tones and often make no attempt to digitally blend the perimeters between adjoining images. These more humble panoramas are far more exciting to me because they vibrate with that tension between the familiar and the unreachable. They don’t hide the fact that they are real, and this acknowledgement of their ordinariness makes them all the more extraordinary. I have walked on surfaces just like those they depict, and that experience cracks open
a little cognitive door that allows me to think of those rendered terrains as part and parcel of my own natural environment.

When observing the Milky Way on a dark, clear night, it’s common to note how minute we are in relation to all that is out there. But something odd happens when I view the detailed, naturally-hued photographs of humble, everyday landscapes in space. Rather than emphasizing how insignificant I am compared to the vastness of the sky, they make me feel that the universe is suddenly human-scaled and knowable. These depictions of non-Earth landscapes expand, rather than reduce, the dynamic range of my natural world.

Both real and yet unreal, knowable yet unknowable, the terrains depicted in these photographs occupy a hybrid reality. They are not uncanny in the way Sigmund Freud described the term, where fear and discomfort color “that class of the frightening which leads back to what is known of old and long familiar.” (Freud 1955, 220). Rather, they are nearly believable photographs of nearly ordinary landscapes. When we view a landscape photograph, we use knowledge gained from our previous experiences moving through actual environments to make sense of the perspective, light, and ecology that we see in the image. If we consider the difference between the gentle comfort of the beautiful and the passionate tension between grandeur and danger of the sublime, these images fall into a curious middle region where science fiction meets the rustic and picturesque. This is not the
quaintly prescribed picturesque of William Gilpin, or the arms-length non-beauty of Sir Uvedale Price. Rather, it’s that third state, where rough ground can be pleasant enough to be attractive on a human scale without falling into the hyperbolic ecstasies of the beautiful or the sublime.

As we look up at the stars at night, it’s easy to forget we are viewing the distant past rather than the present. By the time that light has reached us, stars died,
nations fell, and babies were born. Beams of light that we observe come from a vast and changing scope of time. Artists and poets aren’t the only ones sensitive to the aesthetic nuances of the universe, and the visual culture of science is more than simple charts, graphs, and diagrams.

Taking cues from recent space imaging missions, I have applied some of the same forms of scientific representation to my images. Scientists composite many image fragments together and adjust tones and colors in order to render larger images that are more like familiar photographs, and easier for ordinary viewers to understand. In a way, I’m doing the opposite by applying the rough and disrupted forms of gathered data to ordinary photographs in order to make them resemble scientifically gathered information. I’m doing this to raise questions about how we make sense of what we see, and how we know what to trust.

I have used simple devices to suggest space, playing with different levels of credibility and clumsiness. In some I have inverted the tones, printing them in the negative rather than positive. These are meant to appear real only at the first glimpse, and are not meant to bear up to any closer scrutiny. Others simply have a blackened sky and retain the natural tones of original color photographs. In another experiment I laid out images that create the idea of a plausible and unified topography, a semblance of surface. Closer inspection reveals things are not as they
first appeared. Adjacent images betray shifts in location and scale, positives are negative, and downs are up. What is real? What do I know?

We tend to think of space as something that happens at night. The sun illuminates our atmosphere during the day and obscures the moon and stars, and we forget they are still out there. When we see photographs of the moon, we see a
daytime, sunlit landscape that we can imagine walking on because it’s close enough to things we have seen on Earth. What’s different is that the sky, free from atmosphere, is black, which we associate with night. This is heightened by the way we rarely see the sun in the sky in any of the actual photographs of lunar landscapes. These little disruptors of logic intrigue me, and by making simple alterations to photographs, I have made images that straddle the edges between fact and fiction, science and art, data and the picturesque.

Along with the effects of the sun on rough terrain, I have also considered how the presence of water might affect these environments. Half of the water on Earth is older than the sun and came from interstellar space. Where else might it exist? By examining erosion patterns on Mars and other solid bodies in space, scientists have wondered at the extent of this water and what happened to it in the distant past. Rather than thinking about the past, I am instead taking a stab at the future, albeit with an eye tainted by a childhood spent reading science fiction novels and watching late-night B movies. I was always more interested in the settings and their descriptions than the actual plots. I was well aware they were fiction, yet I was most excited about sites that were just about believable, and just on the edge of the uncanny.

The surface of Mars shows signs that it once held seas and even waterfalls, yet the loss of the planet’s magnetic field exposed it to solar winds that eroded away
the its atmosphere, and with it the planet’s liquid surface water. In 2009, NASA pummeled the surface of the moon to search for signs of water in the resulting dust. The experiment was a success and water was indeed found, but what changed as a result? For me as an artist, this discovery changed the moon’s entire possible future. I can now wonder about liquid water and irrigation, plant life taking root in the rocky soil, and vapor gathering to form mist and clouds. I am aware that the moon lacks an atmosphere and is subject to extreme temperature and light fluctuations, which means my romantic notions can exist only in the realm of fiction. Fiction, however, is a land on which I comfortably tread.

Perhaps these topographies in space are the simplest of all landscapes. What is the geography of a comet? The Rosetta probe was launched by the European Space Agency to gather information about comet 67P/Churyumov–Gerasimenko. The surprising photographs from this mission reveal a shape that looks like a squeezed clod of mud. Recent images show a brilliant range of sparkling monochrome tones against a rich black void, and I find that I have fallen in love with a comet. This lump of ice and dust appears at once immense and palm-sized. As I am not a scientist, scale doesn’t matter. If I were a vast body, this comet would be small in relative proportion to me. Scale is relative.

Since I am not tethered to accurate depictions of scale, I have shot some small objects against black velvet to try to recreate the tones and surfaces of the
Rosetta probe images. These are not meant to work as proxies for comets. I am instead attempting to make images that elicit the same kind of wonder. A photograph of the surface of a small handheld object can look like a navigable terrain, so does it really matter that it is not? I can no more walk along a comet than I can a pebble. This calls to mind Antoine de Saint-Exupéry’s book *The Little Prince*, where an asteroid the size of a house was a rich yet tiny world.

The Hubble Telescope has been the source of images from the depths of space that are aesthetic marvels, yet the assumption seems to be that the public wants to see bright, mysterious colors or they won’t be interested in photographs of distant objects. I have inverted the colors of photographs of ordinary plants growing in the Badlands, and tweaked these negative images slightly to give them the tones of Hubble-rendered galaxies. While the resulting images are still faithful to the shapes and details of the original subjects, this simple alteration has made them unreadable as plants.

I have also been looking at red/cyan 3-dimensional anaglyph photographs of space topographies. While I certainly love the spectacle of viewing these with 3-D glasses, I am even more attracted to how these images look with the unaided eye. The separations of red and cyan, and the way they are dislocated over the source image makes images that buzz and vibrate. These dislocations hint at multiple-viewpoints, adding to my sense that I am moving through time and space. The visual
surface of these terrains is also important in this work. This is emphasized by light, my chief tool, which I have used it two ways. I manipulated the intensities of light in both positive and negative displays, and I have also chosen a paper that allows black ink to be as deep and non-reflective as possible. This matte surface gives a dimensional appearance to the prints that heightens the confusion of scale and credibility. These are surfaces that beg to be touched, like the photographs of the 67P/ Churyumov-Gerasimenko comet.

Just as my subjects range from the lunar landscape to Hubble recreations to comets, The Dynamic Range grew from wildly disparate sources of inspiration. An interest in garden history and design informed my visual approach, but rather than choosing romantic notions of beauty, or the life/death, wonder/terror tensions of the sublime, I opted for the middle ground. I am positing possible terrains of rustic simplicity, looking at these surfaces as natural ecologies with grasses popping up from the meager, recently-discovered water. Inspired by the romantic landscape paintings of Claude Lorrain, a visual aid called a Claude Glass was employed by amateur artist in the late 18th century. This contraption was a tinted convex mirror that rendered reflections of the landscape in dark, monochrome tones. The Claude glass required the user to turn his or her back on the actual subject, chiefly the landscape, so they could sketch its altered and isolated reflection. I have long been interested in the ways we use photography to mediate our experience of the
environment, and this precursor to a camera is an apt metaphor for our willingness to favor internal experience over actual interaction with the real world.

Other references include the charming wackiness of Jules Verne’s novels *From the Earth to the Moon* (1865) and *Around the Moon* (1870), Georges Méliès’s 1902 silent film *Le Voyage dans la Lune* (A Trip to the Moon), and James Nasmyth and James Carpenter’s lovely book *The Moon: Considered as a Planet, a World, and a Satellite* (1874). I have also looked at the space paintings of Chesley Bonestell,
crater photographs of Stan Gaz, and the vast monochrome landscapes of Tacita Dean, who explores real and conceptual territories through the specific processes of photography. I can even find a place in my visual reference library for that icon of 20th century landscape photography, *Moonrise, Hernandez* by Ansel Adams.

What these influences have in common is a willingness to use the land as subject and not just the setting for something else. Amongst the earliest photographs I ever saw in my childhood were photographs of the moon’s surface. I imagined the bounce of my space boots on the white dust as I explored with other astronauts. I would also lie on my back on the living room floor with my feet in the air, pretending to walk around the ceiling and imagining its popcorn surface through my socks as I stepped over the light fixture and then hopped over the low stile of the door lintel. In both cases the fantasy was enough, and I suppose this is much like the way we quickly acclimate to the everyday realities of an exotic location we have always dreamed about visiting once we actually arrive.

With *The Dynamic Range*, I hope to sustain the love I feel for spaces that straddle the frontier edge of the ordinary and the extraordinary. What kind of life might we one day find in the cosmos? Perhaps it will be a scrubby landscape of rough cacti and dust, or maybe we will see rolling, grassy hills. For now, we have sunlit terrains of dust and rough, craggy rock. My images sit between two realities in
the way ruins do. Are living things beginning to take hold and thrive, or are they failing? Is this a beginning or an ending?

REFERENCES


Freeman, Mae and Ira. 1959. You Will Go to the Moon, New York: Random House
