Witnessing the Unwitnessable

Giada Nicole Arney

Against a black canvas glimmer countless particles of light. Some assert themselves as tiny pinpricks while others pool into swirls of color on the ebony backdrop. A cursory glance at these speckles might discern them as nothing but randomness, but a closer examination reveals a certain sense of artistic unity. Their palette is simple – shades of black, white, yellow, blue, red, orange – while their details are elegant. A whirl of gold dances nears a splotch of sapphire; a daub of dainty pink resembles a rose; drops of ivory encircle a void like a pearl necklace; lacy, white tendrils reach toward a spray of amber. These descriptions might hint at a painting, but in this case, the image in question has no artist – it is a photograph of deep space produced by the Hubble Space Telescope known as the Hubble Ultra Deep Field. Taken of a random patch of sky no larger than a grain of sand over a period of three months, this photograph contains an estimated 10,000 galaxies, each of them billions of years old. This single, tiny frame has captured the profound immensities and beautiful harmony of the universe in an image that defies comprehension.

The blackness of the night sky belies the menagerie of color and light hidden from our eyes. Many cosmological objects are too faint to be seen, many emit wavelengths of light our eyes do not know how to respond to, and many (the far side of the moon, for example) are impossible to behold from Earth's surface. Astrophotography, which will here be broadly defined as "the capturing of all images of space," provides a keyhole through which we may view celestial spectacles we would never normally see. Photons,

particles of light, are often the only evidence we have of the existence of the vast majority of the objects in the universe. By committing these photons to photographic plates or pixels, astrophotographers capture an imprint testifying that whatever emitted them exists somewhere in the infinity. Seizing photons gives us the power to transform a remote and unimaginable galaxy into a real and tangible photograph. Even more important, viewing astrophotography raises questions about the fundamental nature of both ourselves and the universe. In capturing images that are at once both alien and fantastic, astrophotography provides evidence of things unseen while allowing its earthbound viewers to ponder the grand scale of the cosmos.

The immediacy of our awe derived from viewing astrophotographs stands in direct opposition to the eons of time contained in them. Just as one need not be a student of astronomy to appreciate these images, it is not always necessary to be a professional astronomer to take them. Robert Gendler is an amateur astrophotograher who images the night sky from his backyard using a collection of telescopes and CCDs (charged-coupled devices, specialized digital astronomical "cameras"). His picture of the Andromeda Galaxy, undoubtedly one of the most beautiful ever taken, displays breathtaking color and clarity. It is almost possible to discern individual stars in his image of this galaxy 2.5 million light years from Earth. This vast distance means that it took the photons emitted by the galaxy 2.5 million years to traverse the gulf of darkness between their galaxy and our own; by the time they struck Gendler's CCD, they could be called truly ancient. When we view Gendler's beautiful image of Andromeda, we are viewing it as it was 2.5 million years ago. Is it possible to fathom the grand sweep of time and unimaginable distances contained in this single snapshot? What does it mean to view the past in real-

time? John Durham Peters of the University of Iowa states in his 2001 article, "Witnessing," that in viewing anything, "if one sees [an event] live, one can claim status as a witness present in time if not in space." Liveness matters to Peters, for it allows the witness to view an event as it is happening; this puts the witness in a unique, privileged position. It is literally impossible, however, to view the universe as it is in the present, for, given the vast distances between stars and galaxies, it takes their light hundreds, thousands, millions, perhaps even billions (as in the case of the Ultra Deep Field image) of years to reach us. Since liveness of the cosmos is inaccessible, are astrophotographs historical? All photographs serve as records of the past, but astrophotographs alone capture events that are ancient even as they occur. Astrophotographs are therefore historical at the moment they are taken. A supernova in the Andromeda Galaxy might first be recorded tomorrow, but it happened, in actuality, millions of years ago. The event, as known to people on Earth, never occurs until the light from it is received. In this sense, we do view celestial events "live," for we collect their trickle of photons in real-time. In another sense, all celestial images serve as a body of evidence that whatever is depicted in them happened in a past more distant than the age of the photographs themselves. Viewing the heavens is the only method by which we may simultaneously act as live and historical witnesses.

Robert Gendler images the sky in his spare time with no expected monetary reward; yet many professional astronomers fight tooth and nail to gain just a few precious hours of imaging time on large, expensive telescopes. Evidently, the heavens are powerfully alluring. Human beings are curious creatures, constantly wanting to glimpse more than is immediately obvious. Drawing conclusions about the universe as viewed

through the eyes alone is analogous to drawing conclusions about a forest after viewing only one type of its myriad trees. To truly know the forest, we must sample it all; to truly know the universe, we must be able to see more. Viewing the Andromeda Galaxy with the naked eye will yield a pale, fuzzy blob at best, nothing at worst. Gendler's photograph, on the other hand, reveals startling indigo and saffron-colored stars. A good CCD camera taking a long exposure photograph with a large telescope is millions, perhaps billions, of times more sensitive than the eye. With specialized equipment, we can view things both tremendously faint and in wavelengths outside the visible. A long exposure transforms the barely-there band of the Milky Way into a great amalgamation of stars. Bouncing radio waves off Venus allows us to view its surface through its impenetrable layer of clouds. Imaging an apparently empty portion of sky in the infrared shows it to have a cluster of thousands of stars obscured by a dark shroud of interstellar dust. Yet even with all of this, we are not quite content. We want to see even more.

To see further, we have sent spacecraft into our solar system, emissaries of our curiosity probing the forest of the universe. These spacecraft have beamed back fantastic pictures we could not possibly capture from our planet. The Mars Exploration Rovers have sent us pictures from the surface of a world both vastly remote and strangely familiar. Cassini, an orbiter sent to Saturn, has given us astonishing close-up pictures of Saturn's rings. The two Voyager probes, both of which departed the Earth in the 1970s, are currently beyond the orbit of Pluto and provided our first close-up looks at the outer planets. As John Peters succinctly puts it in his witnessing essay, pictures such as these are so important to us because they allow for "presence-at-a-distance." When we cannot physically "go there," we send spacecraft to go there for us. The spacecraft in turn beam

back pictures as evidence of their long journeys, providing us a wealth of new information to appease our curiosity, to study, and to admire.

Probes such as the Voyagers and telescopes like Hubble have done wonders for the popularization of astronomy. Outer space is intrinsically fascinating because of its remoteness. People love to view pictures of space because it is entirely outside the familiar. The popular website Astronomy Picture of the Day capitalizes on this fact by providing a new image of an appealingly exotic object every day. When that website put up the Hubble Ultra Deep Field with its 10,000 galaxies, for example, it awoke the imaginations of thousands of people in a way few other things can. Pictures taken by telescopes and spacecraft excite the mind, offering previously undreamt of possibilities. Yet, somehow, the intimately familiar can be just as stirring as the utterly unfamiliar, when viewed from a novel vantage point. When Voyager 1 was 6.4 billion kilometers away, it turned its camera back and took one last picture. That image, an entirely unremarkable, fuzzy frame of darkness, has, in its center, a tenuous speck of turquoise. This speck is profound only with the knowledge of what it is: the Earth. Imagine it – the entire Earth only a fraction of a pixel in size. An image such as this is possible only because of our curiosity – our desire to glimpse untouchable secrets of the universe and to access information from further than is physically possible to reach. Carl Sagan, probably the most famous astronomy popularizer of all time, used this picture to open his book *Pale Blue Dot*, writing, “Look again at that dot. That’s here. That’s home. That’s us.” In looking outward into the cosmos, we inevitably end up looking back on ourselves.

On this note, let us return to the Hubble Ultra Deep Field. Why does it matter to us that this image encompasses far more orders of magnitude than the mind can even begin to comprehend? If we cannot understand the immensities contained in it, why should we care? We care because this image, besides elegantly illustrating the enormity of space, provides us a scale on which we may place ourselves. If the image depicts an unfathomably large arena, then our planet, on the same scale, must be impossibly small. When the size of an image is beyond human comprehension, we do all we can to make it seem more reasonable – by likening the Ultra Deep Field to a painting, for example, we inject the image with a bit of what it means to be human. Galaxies are identified as pearls and roses, Earthly objects that remind of us of the familiar. We cannot help but assert a bit of ourselves whenever we view anything as profound as an image of 10,000 galaxies; this makes it far easier to understand the enormity. E.H. Gombrich homed in on this idea in his book *Art and Illusion*, asking, "Can we compare 'the image on the retina' with the 'image on the mind'?" Gombrich was referring to paintings, but the idea easily translates over to astrophotography – we view astrophotographs in a profoundly subjective way. It is impossible not to. It is important to ponder what, then, happens when elements of an image literally cannot be scaled down to human standards.

Voyager 1 confirmed our place on the scale of the universe in its picture of our infinitesimal Earth drowning in a sea of black. The universe is mostly blackness; in astrophotographs, any source of illumination, be it a planet, a star, or an entire galaxy, immediately catches the eye. We are inclined to pay attention to any light in the void because it helps to mitigate its immensity; the darkness beyond is largely ignored, unless, as in the Voyager picture, it asserts itself in such a way that it carries just as much

significance as the photographic target. The dark is far beyond the scope of the mind. Light, in traveling to Earth, may be ancient, but even ancient is definable; darkness reaches into nameless infinities. In *Pale Blue Dot*, Carl Sagan dubbed this endless blackness "*sacre noir*," French for "sacred black." When we photograph the sky, we are collecting evidence of its emptiness – its darkness – just as much as we are of its sources of light. This darkness is found in the background of all astrophotographs, and it betrays our place on the scale of the cosmos far more than anything else. Astrophotography forces us to infuse images of enormity with a bit of ourselves while still understanding the inescapable full scope of it all. In a fundamental sense, then, with its juxtaposition of light and endless blackness, astrophotography provides us a way to better understand ourselves and who we are in relation to the rest of the universe.

Astrophotographs make it possible to encompass the light of a billion suns in a 3x5 print and to relegate our entire world to a blue speck floating in a void. It is not possible to view the Hubble Ultra Deep Field alongside the Voyager 1 picture of Earth without getting a sense of how incomprehensibly vast the universe is. Viewing astrophotography allows us to see things the eyes cannot perceive and forces us to ponder big questions: Who are we? Why are we here? What is our place in the universe? With astrophotography, we seek to understand the unknowable by witnessing the unwitnessable.

Works Consulted

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