

Single Room,

MODEL

Earth View

Sally Ride

Everyone I've met has a glittering, if vague, mental image of space travel. And naturally enough, people want to hear about it from an astronaut: "How did it feel . . . ?" "What did it look like . . . ?" "Were you scared?"

From these details, you can guess that Ride's **motive** is to describe what space travel feels like.

Sometimes, the questions come from reporters, their pens poised and their tape recorders silently reeling in the words; sometimes, it's wide-eyed, ten-year-old girls who want answers. I find a way to answer all of them, but it's not easy.

Imagine trying to describe an airplane ride to someone who has never flown. An **articulate** traveler could describe the sights but would find it much harder to explain the difference in perspective provided by the new view from a greater distance, along with the feelings, impressions, and insights that go with the new perspective. And the difference is enormous: Spaceflight moves the traveler another giant step farther away. Eight and

Here, Ride states a **main point**: Spaceflight gives the viewer a new perspective, as well as new feelings, impressions, and insights.

one-half thunderous minutes after launch, an astronaut is orbiting high above the Earth, suddenly able to watch typhoons form, volcanoes smolder, and meteors streak through the atmosphere below.

While flying over the Hawaiian Islands, several astronauts have marveled that the islands look just as they do on a map. When people first hear that, they wonder what should be so surprising

about Hawaii looking the way it does in the atlas. Yet, to the astronauts it is an absolutely startling sensation: The islands really do look as if that part of the world has been carpeted with a big page torn out of Rand-McNally,¹ and all we can do is try to convey the **surreal** quality of that scene.

The astronauts' surprised reaction to seeing Hawaii is a **detail** that supports the idea that spaceflight results in new feelings.

In orbit, racing along at five miles per second, the space shuttle circles the Earth once every 90 minutes. I found that at this speed, unless I kept my nose pressed to the window, it was almost impossible to keep track of where we were at any given moment—the world below simply changes too fast. If I turned my concentration away for too long, even just to change film in a camera, I could miss an entire land mass. It's embarrassing to float up to a window, glance outside, and then have to ask a crewmate, "What continent is this?"

We could see smoke rising from fires that dotted the entire east coast of Africa, and in the same orbit only moments later, ice floes jostling for position in the Antarctic. We could see the Ganges River dumping its murky, sediment-laden water into the Indian Ocean and watch

1. **Rand-McNally**: Publishers of atlases.

◆ Build Vocabulary

articulate (är tik' yə lit) *adj.*: Expressing oneself clearly and easily

surreal (sə rē' əl) *adj.*: Strange

ominous hurricane clouds expanding and rising like biscuits in the oven of the Caribbean.

Mountain ranges, volcanoes, and river deltas appeared in salt-and-flour relief, all leading me to assume the role of a **novice** geologist. In such moments, it was easy to imagine the dynamic upheavals that created jutting mountain ranges and the internal wrenchings that created rifts and seas. I also became an instant believer in plate tectonics;² India really is crashing into Asia, and Saudi Arabia and Egypt really are pulling apart, making the Red Sea wider.

Ride's observations of geological formations are **details** that support the **main idea** that viewing the Earth from space results in new insights and understanding.

Even though their respective motion is really no more than mere inches a year, the view from overhead makes theory come alive.

Spectacular as the view is from 200 miles up, the Earth is not the awe-inspiring "blue marble" made famous by the photos from the moon. From space shuttle height, we can't see the en-

marks—colorful outcroppings of rock in Chad, irrigated patches of the Sahara. Then I realized they were obscured by a huge dust storm, a cloud of sand that enveloped the continent from Morocco to the Sudan.

Since the space shuttle flies fairly low (at least by orbital standards; it's more than 22,000 miles lower than a typical TV satellite), we can make out both natural and manmade features in surprising detail. Familiar geographical features like San Francisco Bay, Long Island, and Lake Michigan are easy to recognize, as are many cities, bridges, and airports. The Great Wall of China is *not* the only manmade object visible from space.

The signatures of civilization are usually seen in straight lines (bridges or runways) or sharp delineations (abrupt transitions from desert to irrigated land, as in California's Imperial Valley). A modern city like New York doesn't leap from the canvas of its surroundings, but its straight piers and concrete runways catch the eye—and around them, the city materializes. I found Salina, Kansas (and pleased my in-laws, who live there) by spotting its long runway amid the wheat fields near the city. Over Florida, I could see the launch pad where we had begun our trip, and the landing strip, where we would eventually land.

Some of civilization's more unfortunate effects on the environment are also evident from orbit. Oil slicks glisten on the surface of the Persian

Vary your reading rate to make better use of your reading time. For example, if you want to learn about humans' impact on the Earth, you might skim over passages on dust storms but linger over descriptions of the objects made by humans that can be seen from space.



▲ **Critical Viewing** What do you imagine it would be like to be aboard this shuttle? [**Speculate**]

tire globe at a glance, but we can look down the entire boot of Italy, or up the East Coast of the United States from Cape Hatteras to Cape Cod. The panoramic view inspires an appreciation for the scale of some of nature's phenomena. One day, as I scanned the sandy expanse of Northern Africa, I couldn't find any of the familiar land-

2. **plate tectonics:** Theory that the Earth's surface consists of plates whose constant motion explains continental drift, mountain building, large earthquakes, and so forth.

◆ **Build Vocabulary**

ominous (ām' ə nəʃ) *adj.*: Threatening

novice (nāv' is) *adj.*: Beginner

muted (myōōt' əd) *adj.*: Weaker; less intense

eddies (ed' ēz) *n.*: Circular currents

subtle (sut' əl) *adj.*: Not obvious

eerie (ir' ē) *adj.*: Mysterious

diffused (di fyōōzd') *v.*: Spread out

Ride states the main point of this paragraph in the first sentence, then gives evidence for the point by describing pollution that can be observed from the space shuttle.

Gulf, patches of pollution-damaged trees dot the forests of central Europe. Some cities look out of focus, and their colors muted, when viewed through a pollutant haze. Not surprisingly, the effects are more noticeable

now than they were a decade ago. An astronaut who has flown in both Skylab and the space shuttle reported that the horizon didn't seem quite as sharp, or the colors quite as bright, in 1983 as they had in 1973.

Of course, informal observations by individual astronauts are one thing, but more precise measurements are continually being made from space: The space shuttle has carried infrared film to document damage to citrus trees in Florida and in rain forests along the Amazon. It has carried even more sophisticated sensors in the payload bay. Here is one example: sensors used to measure atmospheric carbon monoxide levels, allowing scientists to study the environmental effects of city emissions and land-clearing fires.

Most of the Earth's surface is covered with water, and at first glance it all looks the same: blue. But with the right lighting conditions and a couple of orbits of practice, it's possible to make out the intricate patterns in the oceans—eddies and spirals become visible because of the subtle differences in water color or reflectivity.

Observations and photographs by astronauts have contributed significantly to the understanding of ocean dynamics, and some of the more intriguing discoveries prompted the National Aeronautics and Space Administration to fly an oceanographic observer for the express purpose of studying the ocean from orbit. Scientists' understanding of the energy balance in the oceans has increased significantly as a result of the discoveries of circular and spiral eddies tens

If your purpose for reading this essay is to learn how a view from space benefits science on Earth, you would slow down your reading rate to make sure you understood how space observations enable oceanographers to see the "big picture."

of kilometers in diameter, of standing waves hundreds of kilometers long, and of spiral eddies that sometimes trail into one another for thousands of kilometers. If a scientist wants to study features on this scale, it's much easier from an orbiting vehicle than from the vantage point of a boat.

Believe it or not, an astronaut can also see the wakes of large ships and the contrails³ of airplanes. The sun angle has to be just right, but when the lighting conditions are perfect, you can follow otherwise invisible oil tankers on the Persian Gulf and trace major shipping lanes through the Mediterranean Sea. Similarly, when atmospheric conditions allow contrail formation, the thousand-mile-long condensation trails let astronauts trace the major air routes across the northern Pacific Ocean.

Part of every orbit takes us to the dark side of the planet. In space, night is very, very black—but that doesn't mean there's nothing to look at. The lights of cities sparkle; on nights when there was no moon, it was difficult for me to tell the Earth from the sky—the twinkling lights could be

By providing vivid details about seeing cities and rivers at night, Ride achieves her purpose of telling what space travel feels like.

stars or they could be small cities. On one nighttime pass from Cuba to Nova Scotia, the entire East Coast of the United States appeared in twinkling outline.

When the moon is full, it casts an eerie light on the Earth. In its light, we see ghostly clouds and bright reflections on the water. One night, the Mississippi River flashed into view, and because of our viewing angle and orbital path, the reflected moonlight seemed to flow downstream—as if Huck Finn⁴ had tied a candle to his raft.

Of all the sights from orbit, the most spectacular may be the magnificent displays of lightning that ignite the clouds at night. On Earth, we see lightning from below the clouds; in orbit, we see it from above. Bolts of lightning are diffused by

3. **contrails** (kän' trälz) *n.*: White trails of condensed water vapor that sometimes form in the wake of aircraft.

4. **Huck Finn**: Hero of Mark Twain's novel *The Adventures of Huckleberry Finn*.

the clouds into bursting balls of light. Sometimes, when a storm extends hundreds of miles, it looks like a transcontinental brigade is tossing fireworks from cloud to cloud.

As the shuttle races the sun around the Earth, we pass from day to night and back again during a single orbit—hurtling into darkness, then

bursting into daylight. The sun's appearance unleashes spectacular blue and orange bands along the horizon, a clockwork miracle that astronauts witness every 90 minutes. But, I really can't describe a sunrise in orbit. The drama set against the black backdrop of space and the magic of the materializ-

The text structure Ride uses is organizing by type. She simply groups related facts and ideas. This type of organization lends itself to an observation or a description in which all points are equally important.

ing colors can't be captured in an astronomer's equations or an astronaut's photographs.

I once heard someone (not an astronaut)

suggest that it's possible to imagine what spaceflight is like by simply extrapolating from the sensations you experience on an airplane. All you have to do, he said, is mentally raise the airplane 200 miles, mentally eliminate the air noise and the turbulence, and you get an accurate mental picture of a trip in the space shuttle.

Not true. And while it's natural to try to liken spaceflight to familiar experiences, it can't be brought "down to Earth"—not in the final sense. The environment is different, the perspective is different. Part of the fascination with space travel is the element of the unknown—the conviction that it's different from earthbound experiences. And it is.

◆ Build Vocabulary

extrapolating (ek strap' ə lāt' in) v.: Arriving at a conclusion by making inferences based on known facts

Guide for Responding

◆ Literature and Your Life

Reader's Response Would you like to be an astronaut like Sally Ride? Why or why not?

Thematic Focus How do spaceflights give us a better appreciation for the world around us?

Questions for Research Suppose that you want to become an astronaut. Generate research questions on how to prepare for and enter the astronaut training program.

✓ Check Your Comprehension

1. How does the view of Earth from the space shuttle differ from the view of Earth from the moon?
2. What does Ride regard as the most spectacular sight from orbit?
3. Name three natural features that Ride saw from orbit.
4. Identify three examples that she observed of humans' effect on the environment.

Beyond Literature

History Connection

The Challenger Tragedy On January 28, 1986, a seven-person crew lifted off at Cape Canaveral, Florida, and thundered toward space aboard the space shuttle *Challenger*. Suddenly, disaster struck. Just 73 seconds into the flight, the *Challenger* broke up in a huge fireball, killing all on board. All future shuttle missions were canceled while a special commission determined the cause of the accident. The culprit turned out to be a faulty O ring, one of a series of circular rubber rings that seal the joints between sections of the shuttle's solid-fuel rocket boosters. After the O rings were redesigned, space shuttles once again zoomed into space. The first flight was that of the shuttle *Discovery*, on September 29, 1988. Do you think space travel is worth the risks involved? Why or why not?