

# Space Odysseys *and* Time Dilation

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**W**hat is time? What is space? All events that we observe are located in space and time, and Albert Einstein helped us understand that when we observe something traveling close to the speed of light, we find its time dilated and its length contracted in the direction of motion. Two events that we observe occurring simultaneously in different locations would be seen by an observer traveling close to the speed of light to happen at different times.

One of the early observations that confirmed Einstein's model was the existence of very short-lived cosmic rays on the surface of Earth. These cosmic rays were produced at the top of the atmosphere and their lifetime was so short that, even if traveling close to the speed of light, they would not have been expected to exist at ground level. Their existence at the surface was consistent with Einstein's proposal. This example illustrates time dilation, which specifies that, for objects we observe traveling close to the speed of light, all physical processes occur more slowly than they would if the same objects were at rest on Earth.

Many people seem to view these implications of relativity only as elements of science fiction. However, the scientific validity of such concepts as time dilation, length contraction, and the relativity of simultaneity is well established. A personal example comes to mind while considering these concepts.

## Spaceship Eden

In the early years of my teaching, I looked for a good example of time dilation while discussing relativity. I decided to use my experience with a homework problem to construct what I came to call a "Spaceship Eden" model. I had recently listened to Jack Provonsha suggest the possibility that some of what is found in the geologic column could be the result of demonically directed genetic engineering. Combining his suggestion with my homework problem on time dilation, I suggested to my students that our traditional short-chronology approach to Earth origins could be combined with the best scientific models.

We assumed the complete traditional understanding of the creation week. Adam represented this earth on the heavenly council. The Creator called a meeting to introduce him to the other members. Since it was a significant trip, God instructed Adam to take Eve along. Of course, they needed a vehicle in which to travel. It is commonly held in some Seventh-day Adventist circles that the Garden of Eden was transported to heaven at the time of Noah's Flood, so we assumed that they used a transportable Garden of Eden as a spaceship.

Not knowing where the council meeting might have been held, we assumed that the destination was perhaps one-tenth the distance across the universe and that Adam and Eve traveled at speeds that approached the speed of light. We then assumed that the meeting took place and that perhaps it lasted a couple weeks. During the meeting, all representatives were able to tour the Garden of Eden and meet Adam and Eve. At the end of the meeting, Spaceship Eden took off for the return trip to Earth.

Meanwhile, back on Earth, at least a few microbes had been left around the perimeter of the garden when the Garden of Eden left. With this raw material, the devil was assumed to have begun an intensive genetic engineering program immediately upon the departure of Adam and Eve. His aim was to reproduce the flora and fauna that God had created in the garden. In time, it appears that he succeeded amazingly. Due to time dilation, a short trip of a few years in Spaceship Eden would have corresponded to a period on Earth of a few billion years.

After Spaceship Eden arrived back on Earth, Adam and Eve found that the flora and fauna on Earth approximated the kind originally in the garden. Some time passed, and the fall occurred. For Adam and Eve, the time from creation to the fall would have been very short, perhaps a few years. However, on Earth that same interval would have been several billion years.

## Science Fiction and Time

This model is technological fiction in much the same way as some science fiction, such as Mary Doria Russell's two-part story of Emilio Sandoz's journeys into space, as told in *The Sparrow* and *Children of God* (See pp. 32-33, below). As with the Spaceship Earth model, it is important for readers of such literature to distinguish between the fiction and the science.

In the *Children of God*, Sandoz finds himself

immensely wealthy because a modest investment made prior to his departure forty years earlier has grown exponentially and turned him into a multimillionaire. He has made a round-trip to the planet Rakhat, which according to clocks on Earth took thirty-four years. However, according to the story, only one year has passed for Sandoz. In addition, he spent about four years on Rakhat and by the time he learned about his wealth he had spent at least a couple years back on Earth. Thus, he was about thirty-three years younger than he would have been had he stayed on Earth the entire time.

There is nothing fictional about the physical principles involved in these stories. The extent of time dilation is exaggerated under the circumstances, but time dilation would nevertheless be involved. Part of the fictitious part appears in the description of the space station, a suitable asteroid outfitted with life-support systems that breaks down silicates for fuel and is supposedly capable of accelerating so that the force exerted on an individual will be constantly equal to the weight of that person on Earth for almost the duration of the trip. To achieve the relativistic time dilation effects described in the story, acceleration would need to be considerably more rapid than the story indicates.

Technological fiction is one way to bring effects observed on a microscopic scale in the laboratory into the realm of experience in the human dimension. In this way, it assists those seeking to relate to otherwise esoteric phenomena. Stories of this kind are especially useful in communicating the impact that time dilation would have on humans. Although they make interesting fiction, however, our technology is simply not capable of creating conditions where major time dilation occurs for human beings, and it is highly unlikely that such a capability will be developed in the future. Readers would be wise to remember these differences as they read these stories and consider the nature of time.

Time stories help us better understand the limitations that exist within the chunk of time that we are each given. Time is relative to our experience.

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