Big History: An Overview

By John Green, adapted by Newsela.

History is an attempt to understand both our insignificance and our significance. To study history is to better understand the world and your place in it.
You are very small. You are one of several billion living members of your species, a species that lives on the fifth largest planet orbiting a star we call the Sun. There are more than a hundred billion such stars in our galaxy, and perhaps a hundred billion galaxies in the Universe. It’s almost impossible to grasp your smallness—there are more stars in the Universe than there are grains of sand on Earth.

And yet, you’re also very large. You’re a member of an extraordinarily powerful species that has dramatically reshaped the biosphere, the first species on Earth to understand the vastness of the Universe around it. Your choices—how to organize your community, what to value, what to battle against—shape not just your life but the lives of those around you and the lives of those still to come. And you are physically vast as well: Your body contains trillions of cells, and is colonized by trillions more microscopic organisms.

What Is History?

History is an attempt to understand both our insignificance and our significance. To study history is to better understand the world and your place in it. You, and the other humans with whom you share this world, are the culmination of the human story.

What Is Big History?

There’s a lot more to history than the human story. Let’s consider the world before humans. If you think of history as the story of life on Earth, almost all of it played out before our species (Homo sapiens) showed up on the scene. After all, we’ve been around only for the last 250,000 or so years—less than 0.01% of the history of life on Earth.

From the very beginning, we’ve had different stories that explain the origins of the Universe, our planet Earth, and life itself. These origin stories, as they’re called, are as varied as the cultures that created them. At its heart, Big History is simply another origin story. However, it differs from all other origin stories because it’s science-based. Big History uses the information we have available—the scientific evidence—to create an understanding of the Universe.

Thresholds of Increasing Complexity

Because the scale of Big History is so vast (remember, it covers the history of the Universe), it would be impossible for this story to include everything. All historians have to make choices about what to include and what to leave out in the stories they tell. So, what does the story of Big History focus on? Big Historians focus on eight turning points in the history of the Universe, which we call thresholds. These are moments when the Universe became significantly more complex than it had been previously.

Threshold 1: The Big Bang

Modern science suggests that the Universe was created in a “big bang” about 13.8 billion years ago.

The Big Bang was a split second in which all matter and energy expanded at tremendous speed and became the Universe. What was there before the Big Bang? It’s mind-bending to think about, but in some ways, there was no “before” the Big Bang, because the Big Bang created not only space as we know it, but also time as we know it. The important thing to know is that around 13.8 billion years ago, very suddenly, the Universe exploded into being. It’s also important to recognize that although scientists know a lot about the Big Bang, there are still many questions about the details that are being researched.
Threshold 2: The Stars Light Up

After the Big Bang, the Universe expanded and cooled. It took some time (about 380,000 years), but eventually it was cool enough for the simplest atoms, hydrogen and helium, to form. The early Universe consisted almost entirely of hydrogen and helium for a very long time. After a few hundred million years, clouds of hydrogen and helium began to collapse, and the increasing heat and pressure generated by collapse led to the creation of the first stars. Stars represent the second threshold of increasing complexity in Big History. Not only are stars more complex than simple atoms, they’re also able to create tremendous energy. Over time, gravity grouped stars into galaxies, which created further complexity in the Universe.

Threshold 3: New Chemical Elements

Stars made the Universe more complex, but the Universe still consisted primarily of hydrogen and helium. This changed when the first generation of stars died. The death of a star can generate high temperatures and pressures like those in the Big Bang, and this makes possible the creation of more complex atoms. A greater variety of atoms is critical to making more complex things like planets and living things, so the death of stars is the third threshold of increasing complexity in Big History.

Threshold 4: Earth and the Solar System

Our Sun is a star, and like all other stars, it was formed from the collapse of a huge cloud of gas and dust particles. More than 99 percent of this material went to make up the Sun, but wisps of matter orbited around it at various distances. Over time, the matter in each orbit was drawn together by gravity. The gravitational pull created violent collisions into lumps of matter that eventually formed the planets. This process, which we call accretion, is how our Earth was formed approximately 4.5 billion years ago.

Threshold 5: Life

Around volcanic vents at the bottom of Earth’s oceans, complex chemicals engaged in ever-changing reactions powered by the heat from these volcanoes. Those reactions led to the formation of complex chemicals that eventually created the first living organisms. The earliest living organisms consisted of single cells, as most living organisms do even today. Like all living organisms, those early single-celled creatures were subject to the laws of evolution. Generation by generation, the average features of species gradually changed, eventually forming entirely new species.

And for a very long time, that was it: single-celled, microscopic organisms. Life first emerged on Earth perhaps three billion years ago; the first multicellular life didn’t show up until around one billion years ago. But slowly, life grew more and more complex, and large, multi-cellular organisms eventually spread, not only in water, but also on land.

One hundred million years ago, the land-based animals that flourished most were the reptiles we call dinosaurs. About 65 million years ago, however, most of them died off.
Now other types of large animals could flourish in their place. Most successful of all in the last 65 million years has been the large class of animals called mammals.

Threshold 6: Collective Learning

The extinction of the dinosaurs allowed mammals and primates to evolve and eventually dominate the Earth.

Our ancestors, the hominins, are primates, and they first appeared between five and seven million years ago in Africa. Over millions of years, hominins evolved in important ways, both physically and socially. About 200,000 years ago, *Homo sapiens*, which means “wise human,” appeared. Modern humans developed language, a method of communication that allows them to share complex ideas and pass on knowledge from generation to generation. This process is known as collective learning. In other species, knowledge dies with the generation that created it. Humans have the ability to build on the accomplishments of previous generations.

Threshold 7: Agriculture

Our ancestors lived by foraging. Foragers survive by gathering plants, hunting animals, and scavenging the remains of animals killed by other predators. Foraging supported early humans for millions of years. About 12,000 years ago, humans began to domesticate plants and animals, in other words, to farm. They began interfering with the natural life cycles of plants and animals in order to control where they grew and promote characteristics in those plants and animals they preferred. Growing food gave humans access to a vast amount of energy created by the Sun through photosynthesis. Because foraging for survival was no longer necessary, tremendous lifestyle changes were possible, like settling down to live in cities, creating political structures, and developing skill and trade specializations. The results of all of these changes define the agrarian civilizations. Farming has had a tremendous impact on the way humans live and how they interact with the Earth.

Threshold 8: Modern Revolution

The adoption of farming led to dramatic changes in the way humans lived. Innovation accelerated dramatically with the Modern Revolution, which began about 300 years ago. Rapid growth of human population and the creation of a highly interconnected world are some of the key features of the modern world. These features make the modern world the eighth and final of Big History’s thresholds.

What’s Next?

The story of the Universe isn’t only about the past. We know that this story doesn’t end with Threshold 8. So, what’s next? What might the next threshold of increasing complexity be? When you reach the end of this course, you’ll get to use your knowledge of the past to speculate about the future. Because Big History isn’t just about knowing what happened when. Big Historians look across the thresholds to understand the connections between past and present. With that understanding, developing a view of what the future might hold becomes more than a random guessing game. It becomes a way of expressing your own point of view about how the future will be the logical outcome of billions of years of the past.

But let’s not get ahead of ourselves. Let’s really dig into the vastness of what got us here. Remember, you are very small, yet very large. In any other story, this might seem like a contradiction—but not here, not in the Big History story!
Articles leveled by Newsela have been adjusted along several dimensions of text complexity including sentence structure, vocabulary and organization. The number followed by L indicates the Lexile measure of the article. For more information on Lexile measures and how they correspond to grade levels: http://www.lexile.com/about-lexile/lexile-overview/

To learn more about Newsela, visit www.newsela.com/about.

The Lexile® Framework for Reading
The Lexile® Framework for Reading evaluates reading ability and text complexity on the same developmental scale. Unlike other measurement systems, the Lexile Framework determines reading ability based on actual assessments, rather than generalized age or grade levels. Recognized as the standard for matching readers with texts, tens of millions of students worldwide receive a Lexile measure that helps them find targeted readings from the more than 100 million articles, books and websites that have been measured. Lexile measures connect learners of all ages with resources at the right level of challenge and monitors their progress toward state and national proficiency standards. More information about the Lexile® Framework can be found at www.Lexile.com.