An Introduction to Big History: Thresholds of Increasing Complexity or Four Movements?

By Bob Bain

The Big History story of the universe – and human's place in it – is told from two perspectives that are outlined in this article. The first, from historian David Christian, is based on thresholds of increasing complexity. The second, from geologist Walter Alvarez, concentrates on four movements: the Cosmos, the Earth, Life, and Humanity.

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Introduction

Everyone and everything on Earth has a history. You have a history, and so does the carpet in your living room. There's a history of the planet and even a history of the entire universe.

Big History describes the history of the entire universe. The Big History story of the universe and humankind has been told from many different perspectives. This article explains two of them.

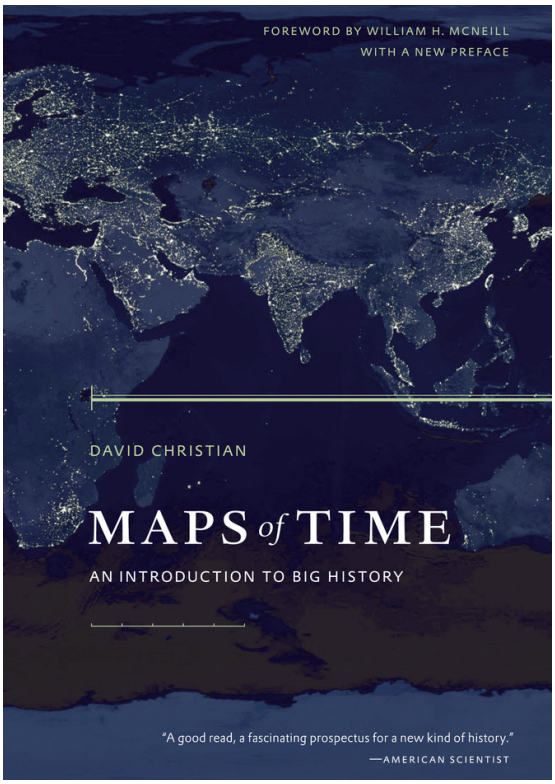
Thresholds of Increasing Complexity: David Christian's Big History

David Christian is a historian who studies the stories people tell about the universe and the history of humankind. Some of these stories are origin stories. They explain where humans came from. The story of Adam and Eve in the Christian and Jewish Bible is an origin story. According to Dr. Christian, every culture had an origin story.

There is no one origin story for all seven billion humans on Earth. However, Christian claims that one has been emerging over the last 50 years. He calls it "Big History."

Christian's story centers around the idea that sometimes completely new and more complex things comes into existence. He calls these things phenomena. The new phenomena are more complex than the old ones because they have more parts. Think of it like building with Legos. The large tower you build is more complex than a few connected Legos. The tower is a more complex phenomena.

At certain important points, phenomena become more complex. The moment your Lego stack reaches a certain height is one such point. Christian identified eight points in the history of the universe. At each point, major changes took hold in the universe and the world. The eight points together tell a Big History of the universe. Christian refers to these points as Thresholds.



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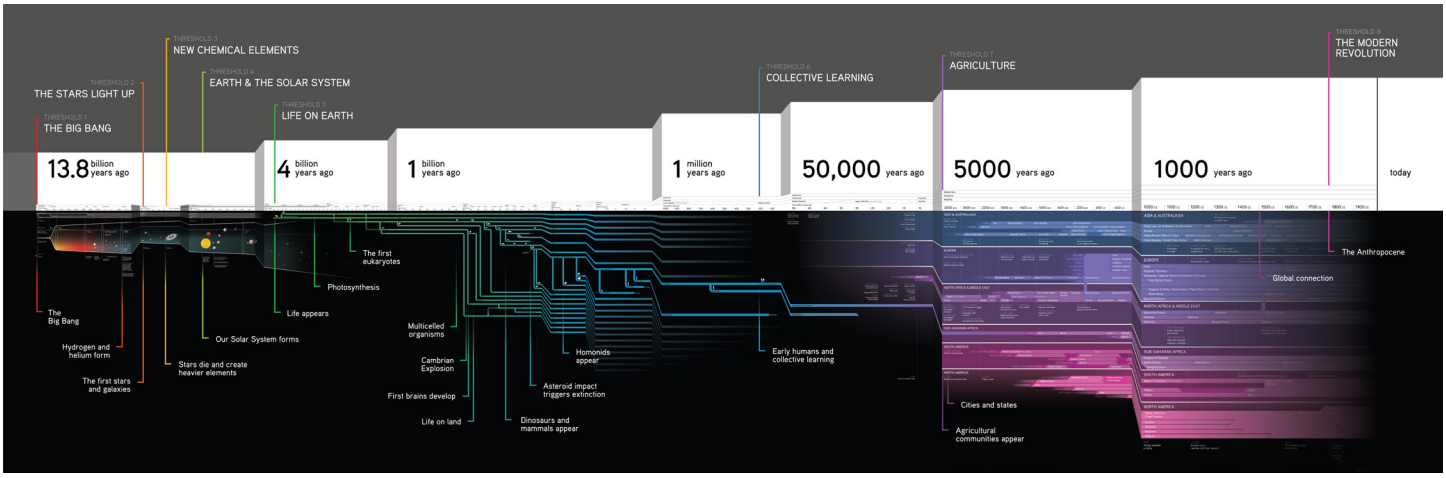
So, what's the story?

The story begins with the beginning of the universe: the Big Bang. This was the moment when the universe first began. Then, stars and galaxies emerged in Threshold 2. This was followed by more complex and heavier elements (Threshold 3). Later our Solar System and Earth (Threshold 4) emerged. About 4.5 billion years ago, our Sun and the moons and planets of the solar system formed. One of those planets was our Earth.

The development of life is Threshold 5. This is another example of complex things emerging from less complex things. The first organisms were single-celled bacteria. More complex life evolved from single-celled organisms. From there, the wide range of organisms that exist on Earth today evolved.

This is not only a story of how the universe became more complex. It is also the story of how humans came to understand the universe we live in.



Quite a Big History, wouldn't you agree?

There are three final thresholds. Threshold 6 is when humans evolved. Threshold 7 is when humans learned how to farm. Threshold 8 is when humans began to use fossil fuels such as coal and oil to produce energy. These thresholds are three major turning points in the history of humanity.

This story covers over 13.82 billion years. It explains how our universe has grown more complex over time.

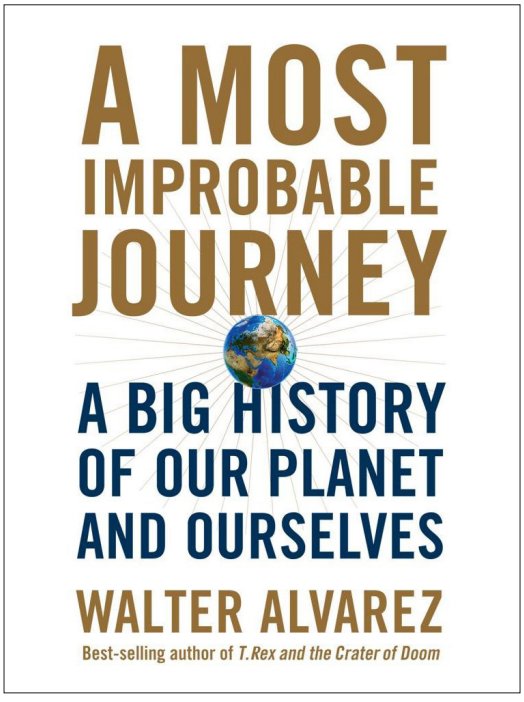
Another Big History story: Walter Alvarez's Improbable Journey in Four Movements

Not all Big Historians use Christian's system. Indeed, not all Big Historians are even historians. Walter Alvarez is a geologist who studies Big History. Geology is the study of the Earth's structure. Alvarez structures his Big History around four periods: the Cosmos, Earth, Life, and Humanity. For Alvarez, every period is a system with consistent patterns over time.

For example, Alvarez says that the Earth has provided "gifts" for humans. These gifts include silicone. Silicone has played an important role in the tools humans have created. This is a pattern that has been seen throughout the entire period of Humanity.

Alvarez's Big History does not focus only on patterns. He also sees rare events that lead to significant changes in history. He calls these rare events contingencies. Dr. Alvarez and his father discovered that a comet or asteroid wiped out the dinosaurs. This was one example of a contingency that shaped human history.

Humans belong to a class of animals called mammals. Other examples of mammals are dogs, horses, and dolphins. During the time of dinosaurs, there were very few mammals on Earth. The mammals that did exist were quite small. Humans could not have evolved if not for the extinction of dinosaurs. Evidence suggests that a huge comet or asteroid hit



Cover of A Most Improbable Journey, *by Walter Alvarez. Fair use.*

Mexico 66 million years ago. This rare event allowed mammals to thrive. Human life depended upon this contingency. Contingencies are essential for Alvarez's Big History.

Alvarez does not create one timeline of Big History. Each of the four periods is separate, but part of a connected story. It is also a story about humans discovering the natural laws of the universe.

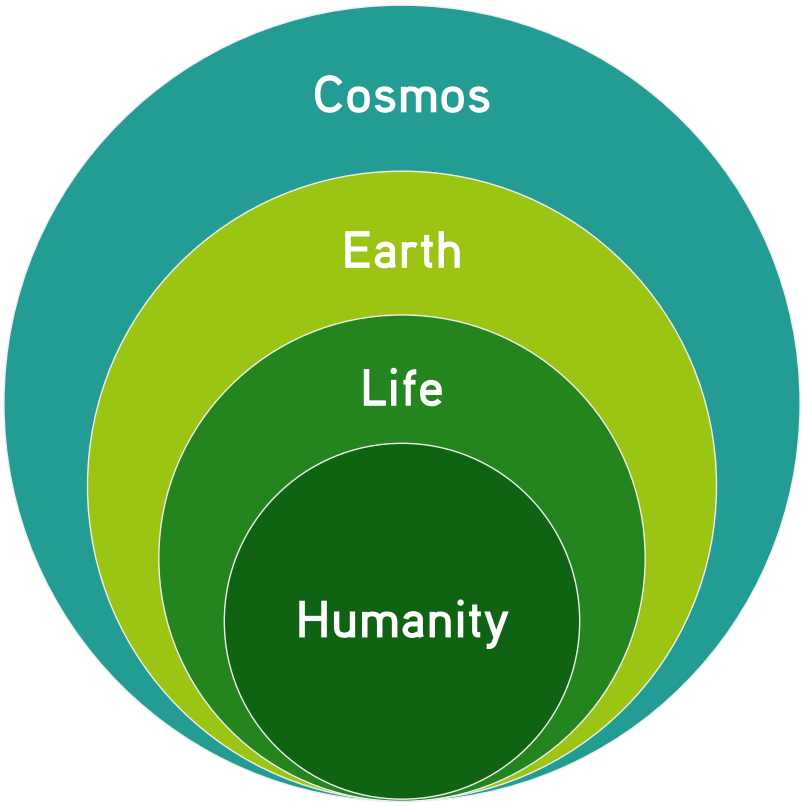


Table 1: Dr. Alvarez's regimes of history.

Alvarez and Christian both place importance on events such as the Big Bang. Alvarez appreciates the path that has led to human existence. It was very unlikely that we would exist right here and right now.

These two versions of Big History help to explain human history. All other events play out on this stage.

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