

How Ancient Civilizations Studied Eclipses and Helped Create Astronomy

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The Hinode satellite observing our sun captured images of the moon traversing the face of the sun during a solar eclipse. On July 22, 2009, a total eclipse of the sun was visible from within a narrow corridor that traverses half of Earth. The path of the moon's shadow began in India and crossed through Nepal, Bangladesh, Bhutan, Myanmar and China. After leaving mainland Asia, the path curved southeast through the Pacific Ocean.

On August 21, a total solar eclipse will move across America for the first time since 1918. Tourists are expected to flood the states along the eclipse's path. The government is worried this will lead to illegal camping, wildfires and even porta-potty shortages. A total solar eclipse happens when the moon passes between the sun and the Earth. For a few breathtaking minutes, day turns to night. Stars may even appear.

Eclipses present no real dangers, aside from looking straight into the sun which can cause blindness. However, there is a long history of people believing eclipses are omens that bad things will follow.

However, eclipse anxiety has led to a deeper scientific understanding of the workings of the universe. It also helped create astronomy, the study of the planets and stars.

The idea of an eclipse comes from believing that the heavens and the Earth are connected. It is a sign that the universe is swinging out of balance. “When anything extraordinary happens in nature ... it stimulates a discussion about instability in the universe,” says astronomer Anthony Aveni. Even the Bible story of Jesus connects his birth to a star. His death takes place during an eclipse.

Monitoring eclipse patterns out of fear

Ancient civilizations feared eclipses, so they created ways to predict their coming. They carefully monitored the movements of the sun, moon and stars to create their calendars. From these records, many groups — the Babylonians, the Greek, the Chinese, the Maya and others — began to see patterns that could predict when an eclipse would happen.

About 2,800 years ago, the Babylonians of Mesopotamia in the Middle East were among the first. In the eighth century B.C., they described the Saros cycle. It was a period of 18 years, 11 days and 8 hours, when sets of eclipses repeat. Every 18 years, the sun, Earth and moon return to about the same geometry, a nearly straight line, and a nearly identical eclipse will occur. The moon will have the same phase and be at the same distance from the Earth.

Babylonians believed that an eclipse was a sign that their king would die. So they chose a fake king to replace their real king just before the eclipse. The real king was returned to power after the fake king was killed during the eclipse.

It was all done on the basis of cycles. It wasn't until 1687, when Isaac Newton published the theory of universal gravitation, which led to the ideas that the planets moved around the sun.

Predicting the future by reading the skies

Chinese records, going back 3,600 years, chart what was happening in the skies. Chinese star-gazers read the skies and predicted the future using magical bones, called oracle bones. They would carve questions on a piece of tortoiseshell or oxen bone, and then heat them until they cracked, which is similar to reading tea leaves today.

The sun was a symbol of the emperor, so when an eclipse was coming, the emperor would prepare himself by eating vegetarian meals, while the Chinese people would bang pots and drums to scare off the sky dragon that would eat the sun. These practices continue in China today.

Close to 1,600 years later, the Chinese were predicting eclipses with fair accuracy using what is known as the Tritos cycle: a period of eclipse repetitions that happen every 11 years. Eclipse historian John Dvorak writes that Babylonian knowledge of eclipses spread to India, China and Japan, and then around the world.

The legend of the demon Swarbhanu

In India, the story is told of the mythical demon Swarbhanu, who stole a magic drink that would make him immortal. The sun and moon gods saw what he had done and told the supreme god Vishnu, who beheaded Swarbhanu. But since Swarbhanu had already become immortal, the head and body lived on.

Today, according to the legend, the head and body continue to chase the sun and the moon for revenge and occasionally swallow them, but they slide down his throat and return to their places in the sky.

Along with the sun, moon and five brightest planets, they tracked Swarbhanu's head and body movement through the sky. In 499 A.D., Indian mathematician and astronomer Aryabhata called them “dark planets,” in his accurate description of how eclipses occur. He described their positions in the sky in which the paths of sun and moon cross to produce a lunar or solar eclipse.

An eclipse or just bad luck?

Eclipse fears aren't just limited to ancient times, for today astrologists note that Princess Diana's fatal car crash occurred in the same year as a solar eclipse. An eclipse darkened England two days before the British King Henry I departed for Normandy in France and never returned to England. In 1918, the last time an eclipse swept from coast to coast across the United States, an outbreak of influenza killed up to 50 million people worldwide and proved one of the deadliest pandemics in history.

Of course, there is no scientific evidence that the eclipse had anything to do with the outbreak, nor the other events. Thousands of people are born and die every day — and solar and lunar eclipses are far from rare. In any year, up to four solar and three lunar eclipses darken the surface of the Earth — but since the planet is mostly water, they aren't usually visible from land.

Today, astronomers still use these extensive databases of ancient eclipses from Babylon, Greece, China and India to better understand Earth's movements through the ages.

So if you feel a little uneasy when the sun goes dark on August 21st, you're not alone. Just remember: It was this same unease that helped create modern astronomy as we know it.

Quiz

- 1 Which of these statements would be MOST important to include in an objective summary of the article?
- (A) It's exciting that a total solar eclipse is about to occur and will be visible in the United States.
 - (B) Ancient cultures used misguided and unsuccessful means to better understand what causes eclipses.
 - (C) Fear about eclipses prevented people from truly understanding what caused them.
 - (D) The desire to predict when eclipses would happen helped develop astronomy.
- 2 Which of the following sentences from the section "Monitoring eclipse patterns out of fear" BEST develops a central idea of the article?
- (A) Ancient civilizations feared eclipses, so they created ways to predict their coming.
 - (B) Every 18 years, the sun, Earth and moon return to about the same geometry, a nearly straight line, and a nearly identical eclipse will occur.
 - (C) Babylonians believed that an eclipse was a sign that their king would die.
 - (D) It wasn't until 1687, when Isaac Newton published the theory of universal gravitation, which led to the ideas that the planets moved around the sun.
- 3 Which of the following answer choices would BEST describe ancient Babylonians' reactions to solar eclipses?
- (A) They saw eclipses as signs of doom and developed religious practices to prevent their occurrence.
 - (B) They interpreted eclipses as a warning of impending misfortune and sought ways to foresee them in order to better prepare.
 - (C) They saw eclipses as threats to their political leaders and developed strategies to prevent bad omens from coming true.
 - (D) They saw eclipses as signs of change and unrest and developed ways to change public beliefs about what they meant.

- 4 How are ancient beliefs about eclipses contrasted with the modern understanding of eclipses?
- (A) Ancient peoples understood nothing about how solar eclipses worked; modern scientists understand everything about eclipses.
 - (B) Ancient peoples were very afraid of eclipses; modern people have no fear about celestial events.
 - (C) Ancient peoples sometimes thought bad events were caused by eclipses; today science shows that there is no such connection.
 - (D) Ancient peoples developed sophisticated myths about eclipses; modern people no longer believe in myths.