

geocentrism to heliocentrism

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Geocentrism to heliocentrism**Introduction**

What does our universe really look like? What is at the centre of it? This question took many years to be answered by astronomers, some arguing in favor of geocentrism (earth-centred) and others in support of heliocentrism (sun-centred). Geocentrism refers to a superseded belief that the earth is the center of the universe. The geocentric theory asserts that the celestial bodies, the moon, planets, and stars orbit stationary earth. This model was used to describe the world in many ancient civilizations, such as Ptolemy in Roman Egypt. This model is mainly associated with the Copernican Principle, which placed the earth in the middle of the solar system. Ancient Roman and Greek philosophers combined geocentrism with a spherical earth. This paper explores the shift from geocentrism to heliocentrism and the impacts of this shift to the cultural.

Historical analysis of the paradigm shift**The functioning of the field of study before the paradigm shift**

Before the paradigm shift, it was agreed that the center of the universe was occupied by the earth with the, stars and all planets moving around it. Geocentrism was mainly supported by ancient Greek and Roman philosophers including Aristotle and Ptolemy. Aristotle believed that planets and stars perfect spheres but the earth was not (Theodossiou, 89). The movement of the

stars and moon was circular. The proponents of geocentrism based their arguments on two observations. First, they observed that the earth was stationary, from a person on earth (Theodossiou, 89). The earth seems to be motionless, stable, and robust. Secondly, they observed that the sun revolved the earth one time per day. Similarly, the planets and the moon seem to revolve around the earth. They, therefore, ⁶concluded that the earth is at the center of the solar system.

Aristotle arguments

Aristotle was a significant contributor and supporter of the geocentrism. He argued strongly in favor of this system. He posited that:

If the earth were to be moving, the apparent position of nearby stars would change in the sky (parallax). He suggested that if the earth were orbiting around the sun, we would see a parallax effect in the stars. Secondly, if the earth were to be moving, we would be conscious of the movement of the ground. The other argument is that the planets display a retrograde motion (moving forward and backwards on the sky). These observations convinced Aristotle that the earth (stationary) was in the middle of the solar system.

Ptolemaic Model

Claudius Ptolemy was another astronomer and mathematician who supported geocentrism. According to Ptolemy, the spherical ¹earth was at the center of the universe. He observed that half there was an equal division of the stars with half of them being above the horizon and the other half below it every time. He argued that if the earth were to be removed from the center, then this division would not be equal (Hübner, 78)

Paradigm shift

Geocentrism to heliocentrism was particularly engineered by three astronomers (Copernicus, Galileo, and Kepler). Heliocentrism started when Nicolaus Copernicus came with a new way of looking at the universe (Hübner, 58). Copernicus came up with the radical heliocentric model that put the sun at the center of the world. Although he was not the first astronomer to come up with this idea (others believed in this idea), he is the one who brought it to the world. He used his observations of the movement of celestial bodies to back up his opinion. Some of his revelations include the fact that the earth rotates on its axis. Galilei Galileo also supported the Copernican system of heliocentrism. According to Hubner, geocentrism was finally replaced by heliocentrism late 16th century (86). Johannes Kepler was another philosopher who supported the heliocentric model. He showed that the orbits were elliptical in his first law of motion. Galileo, on the other hand, used developed a telescope to make observations and prove ⁷ that the sun was indeed the center of the solar system. The three philosophers (Copernicus, Galileo, and Kepler) were the main drivers of the transition from geocentrism to heliocentrism.

Effects of the shift

The replacement of geocentrism with heliocentrism brought many impacts on the field of cosmology. It is now believed that the sun is one of the stars. The force of gravity pulls the objects to the center of the earth. Due to the shift, the sun is used as the reference frame in the solar system. For example, we calculate the distance of the earth from ² the sun (which is the center of the solar system). The concepts of heliocentric velocity and heliocentric angular momentum are used.

Cultural analysis

The reaction of the world

Heliocentrism received rejection and acceptance in equal measures. The opposition mainly came from the church. The Duchess of Christina believed that heliocentrism was contrary to the scripture. This prompted Galileo to write a letter to the Grand Duchess of Christina (Parker, 112). Galileo wrote this letter when he heard that the Grand Duchess Christina had criticized the heliocentric theory that was designed by Copernicus. This theory had been made in attempts to bring diverse opinions on the universe together. The church was mainly inclined to the traditional view of the solar system that placed the earth at the center of it (Cherepashchuk 509). The religious leaders of the time were against science and any inventions. There was a lot of conflict between science and Christianity, and heliocentrism exacerbated the issue. Why did the church reject heliocentrism? The church believed that humans were exceptional God's creatures. Thus, they occupied a special place in the universe. This special place had to be the center of the world. Thus, the earth where humans reside had to be at the cosmological center. Therefore, they did not believe in heliocentric ideas of ¹the sun being the center of the universe.

The Catholic Church rejected heliocentrism on its arrival (Theodossiou, 94). However, due to his excellent relationship with the church, the church respected him as and his astronomical ideas. This was because, during his lifetime, Copernicus was a religious person. This led to the acceptance of the heliocentric theory by the church, contrary to the beliefs of many. However, in the 17th century, Protestant opposition prompted the Church to reject and ban Copernican ideas. The resistance of the heliocentric model by the church is shown when the church burned Giordano Bruno, for supporting Copernicus's idea. The heliocentric model also received criticism from colleagues. It was ridiculed by poets who condemned it of heresy.

What in daily life changed?

Many people who supported the heliocentric model were at the risk of being executed and started fearing for their lives. Galileo was in many occasions summoned in Rome, tried and found guilty of heresy. He was sentenced to house arrest until his death. Most importantly was the execution of Giordano Bruno, who was burned to death by the church for supporting heliocentrism. Thus, many people lived in fear and tensions (Parker, 82).

Reaction from other fields

The other fields such as biology, psychology, economics and computer science, are thought to have followed heliocentrism in diminishing the uniqueness of human beings. Theodosiou, argues that heliocentrism model intentionally or unintentionally introduced the side effect of weakening the special status of human beings (47). The field of biology, led by Charles Darwin suggested that human beings are just like animals only that they are somehow advanced. This insinuates that humans are not unique in any way. In economics, Karl Marx suggested that humans are materialist in nature in his theory of the class struggle for resource ownership (Theodosiou, 51). In psychology, Sigmund Freud portrayed human beings as irrational beings driven by id at the subconscious level. In computer science, there have even been comparisons between human beings and computers. The short-term memory of human beings is equated to the RAM in computers. The long term memory, on the other hand, is compared to the hard drive in computers. This indicates the diminishing concept of human uniqueness, brought about by the heliocentric model.

After heliocentrism, there was a change in thinking about the shape of the earth. In geodesy, the form of the earth is considered to be ellipsoid and not a perfect sphere. The earth bulges at the equator and flattened at the poles, making it an imperfect sphere. This also follows

a series of debates about the shape of the earth. Contrary to the prior belief that the surface was flat, this notion was later superseded by the fact that the earth is spherical.

Conclusion

The shift from geocentrism to heliocentrism was a journey marred with many challenges. This reflects how difficult it can be moving from one belief to another. For many years, people believed that the middle of the universe was the earth. However, this belief was rejected and superseded by the fact ² that the sun is formed the center of the solar system instead. The shift in paradigm shows how religion can be a stabling block to advancement and exploration.

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