

Adult Guidance

Geocentric Versus Heliocentric

Geocentric

The early belief in a Geocentric universe (solar system was conceived of later) was based on the understanding of humans of the world they experienced. Therefore it is understandable that they believed that the Earth did not move and that both the Sun and Moon orbited the Earth. The discovery of planets was only made gradually over time and even then it was restricted to those that could be detected at first by the human eye and later with telescopes.

Aristotle and Ptolemy

While their planetary models are incorrect, it needs to be remembered that they lived in a society where the common belief was that the universe was geocentric and therefore their theories were based on this idea and an attempt to explain it. Even though some toyed with the idea of a heliocentric universe, they were unable to find evidence or did not delve into it as deeply as the two aforementioned philosophers.

In addition, it needs to be borne in mind that in Ancient times the distinction between Astrology and Astronomy did not exist in the same way as it does now. Therefore, most theorists had spiritual beliefs that also guided their work and theories.

Islamic Scholars

The contribution of Islamic Scholars during the Medieval era in Europe has been greatly and unjustifiably underestimated. The general contribution that was made to all fields of study was:

1. The preservation and translation of Greek works which would have been lost.
2. In terms of Astronomy – the development of mathematics, optics and analysis of the Ptolemaic Model made a huge contribution to the development of theories of the solar system and universe.

It needs to be remembered that history and historical writing is not neutral and there are political reasons why the contributions made by scholars at this time were 'forgotten' in more recent history. In many fields missing out the contribution of Islamic Scholars simply creates a problematic narrative when discussing breakthroughs, discoveries or changes in scientific ideas.

The prime example here is that missing out Tusi's contribution would lead to an apparent movement from Ptolemy's model to Copernicus' model without any real explanation for why Copernicus would even challenge Ptolemy's model. Only by telling as much of the whole story as we know it can it make sense why Copernicus questioned Ptolemy's model. He lived in a world where Islamic scholars had already questioned Ptolemy's calculations and model. His application of Tusi's couple to all the planets and trying to make sense of how the planets moved based on different placements of the Sun and Earth that led to his model.

Copernicus

The Catholic Church did know about the Copernicus Model and did not prevent his writing his book or publishing it. However, it needs to be noted that Copernicus himself did fear that reaction of the Church and the implications of his theory. As with his contemporaries, he had been raised on the belief that the Earth was the centre of the universe and that the bible had evidence of this. Nonetheless, his ideas and model of planetary movement were not banned. He did die shortly after the publication of this book and therefore never had a direct confrontation about his theories with senior members of the church.

Galileo

It was not until 1992 that Galileo was pardoned by the Catholic Church for being 'vehemently suspect of heresy', a charge that resulted in his house arrest and prevented him from further developing his ideas and theories about planetary movement.

This is a sensitive area to teach and it needs to be balanced with the fact that at the time there was discussion – as there is now – about the extent to which the Bible is literal or metaphoric. This is a separate discussion but does enlighten why Galileo did not see his ideas as incompatible with his belief in Catholicism. In addition, the Church was dealing with challenges to its authority from other sources which affected its attitude to Galileo, given that Copernicus' ideas were known within the Church and had not led to the same controversy or trial.

Heliocentric Solar System

In the narrative of Copernicus and Galileo, Kepler is overshadowed despite the fact that he devised the theory of the solar system that we still accept now. Copernicus ultimately did not place the Sun at the centre as he believed that the Sun itself was orbiting a central point outside of itself. This central point does exist but as Kepler stated, it is inside the Sun not external to it. Kepler devised the laws of planetary movement but the only thing he could not explain was why the planets stayed in their orbits. It was Newton, with his ideas about gravity that was able to fill in this missing link.

Ultimately, this lesson is to inspire children to understand that changes in scientific thinking take place over time, based on new evidence and understanding, and are the result of the contributions of many different people. No theorist exists in a vacuum and their personalities, place of birth, culture and society at the time did make a difference to what they studied and how.