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RANDOM AND ARBITRARY CONTINGENCIES IN HISTORY OF SCIENCE AND TECHNOLOGY [7] – THE ESTABLISHMENT OF THE SUN-CENTERED UNIVERSE

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ABSTRACT

Some random and arbitrary historical factors led to the successful establishment of the Sun-centered universe. They were the principle of Occam's razor, the absence of stellar parallax, and the sudden death of Tycho Brahe and Osiander. Without them, a successful establishment of Copernicus' universe would have been impossible.

KEYWORDS: history of science, historical contingency, Copernicus, Osiander, Tycho Brache, stellar parallax, Occam's razor

INTRODUCTION

During the Renaissance, a new technic in painting called perspective achieved 3-dimentional features on a 2-dimensional surface with light and shadow effects. People at the time described the generations before theirs the so-called dark age. In this context, they began to recognize the Sun as the ultimate source of light. At the same time, NeoPlatonism during the Renaissance created a new recognition for the Sun, what is nowadays called, Heliocentrism, which functioned as a basis for the new cosmology of Copernicus.

Thus, the Sun-centered universe by Copernicus in 1543 (Copernicus, 1939) was motivated by some random and arbitrary contingent cultural factors of the time, not a direct outcome of rationality, objectivity, or observational evidence available at the time. On top of the motivation for the Sun-centered universe, its establishment also had several random contingent factors at the time.

Historical Contingencies for the Copernicus Universe

There are several random and arbitrary factors for the successful establishment of the Sun-centered universe. The first contingent factor has something to do with simplicity. During the Medieval time,

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philosopher Occam claims that the simplest explanation is the best one, also known as Occam's razor. According to this principle, Copernicus' Sun-centered universe is preferred to Ptolemy's Earth-centered universe because Copernicus' model is simpler than Ptolemy's counterpart. For example, in Copernicus's simpler model, there is no connection from the centers of Mercury and Venus 's epicycles to the Sun. Also, Copernicus' model has just one epicycle for Mars, compared to Ptolemy's more complicated model in which the centers of Mercury and Venus 's epicycles are directly connected to the Sun with many numbers of epicycles for the motion of Mars. So, for those who favors Occam's razor, Copernicus' model is preferred to that of Ptolemy.

The second contingent factor for the establishment of the Sun-centered universe is the neglect on the absence of stellar parallax. Stellar parallax is a change in an angular position of a nearby star compared to the background stars due to the Earth motion around the Sun. Copernicus' model is expected to have some stellar parallax which is not expected in Ptolemy's model because the Earth is not moving and its location is fixed at the center of the universe in the Earth-centered universe. However, stellar parallax was never observed in 1543 with naked eyes. It was finally detected for the first time in 1830s when a large telescope was eventually available. Fortunately, at the time of Copernicus, the lack of stellar parallax was never taken seriously against the Copernicus model. In fact, it was never seriously discussed either by Copernicus or by Osiander who published the book of Copernicus after Copernicus death. (This is Osiander's unexpected role on the publication of the sun-centered universe.) Therefore, without the most direct evidence for the Sun-centered universe, Copernicus' model was still be pursued and never rejected by the followers, such as Kepler, Galileo, and even Newton.

Nonetheless, it was Tycho Brahe who was serious about the lack of stellar parallax in late 16th century. Tycho's choice was then the Earth-centered universe in which the Sun was going around the Earth with all other planets circling around the Sun. Thus, because the Earth was located at the center of the universe, Tycho could easily explain the lack of stellar parallax which Copernicus' model had a hard to explain. Comparing with Copernicus' and Ptolemy's model, Tycho's model was the simplest of all since Tycho dropped the two-circle combination of epicycle and deferent which were necessary both in Copernicus' and Ptolemy' model. However, Tycho's sudden death at the end of 16th century made his model basically undiscussed during the Copernican revolution, which was a great advantage to the model of Copernicus because Tycho's model was better than that of Copernicus in terms of Occam's razor. Therefore, some random and arbitrary factors of historical contingencies preferred Copernicus' model to Ptolemy's. Without these random and arbitrary contingencies, the successful establishment of Copernicus' universe would have been delayed or even impossible.

CONCLUSION

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Several historically random and arbitrary contingent factors led to the successful establishment of the Sun-centered universe. These are the principle of Occam's razor, neglecting the absence of stellar parallax, and the sudden death of Tycho Brahe. Without these random and arbitrary historical contingencies, the successful establishment of Copernicus' universe would have been impossible.

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