Metaphor in the Astronomical Science of the *Timaeus*

This presentation provides the first application of modern metaphor theory on the science of Ancient Greece and Rome by analyzing the metaphors used to explain astronomical concepts in Plato's *Timaeus* and how both the scientific concepts and the metaphors themselves were translated into Latin during different points in Roman history. This analysis identifies how metaphor use changes as scientific understanding and cultural practices change and demonstrates how an analysis of the changing metaphors can describe changing cultural values and scientific literacy. The application of such metaphor theory to Ancient Greek and Latin texts therefore contributes to our understanding of scientific worldviews in antiquity and validates the application of modern scientific metaphor theory in the classical era.

This analysis specifically focuses on the idea of the conceptual metaphor, or understanding knowledge within one domain in terms of another. Conceptual metaphor theory and its method for mapping a well-understood or common source domain to a less-understood target domain is therefore also presented (Lakoff and Johnson, 2003). In fact, such mappings can be used to describe analogies in addition to metaphors, and the distinction between the two is less important when they are built out of this same mapping concept than it was when understanding literary terms in middle school. Conceptual metaphor theory also provides a method for analyzing metaphors used outside of the traditional literary environment. Therefore, applications to scientific metaphors and their impact on interpretation and dissemination of scientific research will also be introduced.

Conceptual metaphor theory has helped to define the role the metaphor plays in scientific understanding as well, especially at the point of discovery or paradigm shift. By definition, new concepts are less familiar, suggesting an area where metaphor can be applied to contribute to

understanding. By describing new ideas in terms of old information, metaphor enables the scientist (or audience) to better understand new content or new theories (Whitworth, 1990; Kittay, 1990). In this sense, as scientific understanding of the universe increases, old understanding is the only recourse for representing and describing the previously unknown (Pulaczevska, 1999). Reliance on metaphor may seem at odds with the traditional conception of scientific language as somehow precise. Instead, extending the meanings and usage of terms and concepts is necessary for the production of new scientific theories that are explanatory and intelligible (MacCormak, 1978).

This presentation examines three versions of the *Timaeus* for metaphors used to describe astronomical concepts associated with the movement of the stars and the rotation of the earth. Predominantly, these metaphors fall into well defined categories, associating these astronomical concepts with biology, military, craftsmen, and child-rearing. Examination of how these scientific metaphors changed as Plato's *Timaeus* was translated from Greek into Latin has identified interesting cultural changes. Cicero provides the earliest remaining translation of the *Timaeus* into Latin, localized to the first century B.C.E. changes that Cicero made while translating Plato's metaphor may provide insight into ways in which the culture and scientific understanding have changed from fifth century Athens to first century Rome. The *Timaeus* was also translated by Calcidius into fourth century Rome in a translation that became closely associated with the Christian church and faith. The differences between his translation of Plato's metaphors and the Greek originals as well as Cicero's initial Latin translation may indicate further changes to the culture and state of scientific knowledge. Like Cicero, Calcidius changed very little of Plato's overarching living being metaphor, making use of the same Latin translation as Cicero that has direct ties to the original word used by Plato. As with Republican Rome,

Calcidius' Rome (or Cordoba) seemed to still resonate with such biological comparisons and therefore little work was needed to translate Plato's metaphor itself.

The fact that these changes can be observed and identified through changes in scientific metaphor supports the theory that these metaphors are a product of the sociocultural environment in which they were created but more importantly also supports the value of their study. This analysis has already identified that scientific metaphor theory can be applied to the natural philosophy of ancient writers, and in examination of how these metaphors change this analysis suggests the possible value of such an application.

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