

AHRC funded project: Diagrams, Figures and the Transformation of Astronomy, 1450–1650

Investigators

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Project description

It is generally acknowledged that astronomy was transformed in the early-modern period through the invention of new instruments and techniques of observation, the introduction of new world systems and the integration of mathematical astronomy with natural philosophy. The aim of this project is to examine the little known roles of visual representations in this well known transformation. This is a five-year project funded by the AHRC, commencing on 1 October 2008.

Our research project will be **source driven**. We shall devote much effort to translation, description and commentary, concentrating on materials from the important holdings of early-modern astronomical works in the Cambridge University Library (c. 500 relevant works), the Wren Library of Trinity College (c. 150), and the Whipple Library at the Department of History and Philosophy of Science (c. 175).

We will start by looking at the uses of images in the basic didactic works of the period, such as Sacrobosco's *Sphaera*, the *Theorica planetarum* and commentaries on the *De caelo*. We shall then explore the imagery of, on the one hand, advanced treatises (e.g. by Johannes Regiomontanus, Georg Peurbach, Nicolaus Copernicus, Nicolaus Raimarus Ursus, Tycho Brahe, Valentin Nabod, Galileo Galilei, Pierre Gassendi) and specialised cosmographical works (e.g. by Peter Apian, Oronce Finé, Johannes Stöffler, Josephus Blancanus), and on the other, of popular tracts and broadsides. Only then shall we explore the exchanges of images between genres.

Our research project will focus especially on **four aspects** of early-modern astronomical figures.

1. Terminology and genre

In books on mathematics and natural philosophy, there occurred in the period 1450–1650 not only a great increase in the use of images, but also a proliferation of new – and to the modern eye often baffling – kinds of images. Works of the period deploy a similarly rich terminology: *schema*, *hypotyposis*, *figura*, *forma*, *pictura*, *tabula*, *configuratio*, *dispositio*, *delineatio*, *imago*, etc. A first series of questions to be addressed concerns the categories of images. How consistent were these terminological distinctions? Is it appropriate to classify the images into genres, analogous to literary genres in their conventions adopted by authors and accepted by readers? How did the types of images change in the period? How did they relate to the genres of astronomical and natural philosophical writing: advanced treatises, compendia, didactic works, esoteric and ritualistic writings (including the *ars notoria*), popular tracts and broadsides?

2. *Production*

When analyzing the functions of images in early printed books, awareness of the copying practices and production methods of the time is critical. What instruments and media were used to make and print images? In the case of diagrams and schematic figures, what precisely were the modes of projection, reduction, simplification and idealisation? How were figures set and distributed in the text?

We shall track changes of figures from manuscript to manuscript, from manuscript to print, and from edition to edition; and we shall examine reception of figures as evidenced by marginalia. We shall also look at the exchange of images between works of different genres, paying particular attention to movement between the popular and the learned domains.

3. *Functions*

Along with the proliferation of types of images, there was a remarkable extension of the functions assigned to them. We shall, for example, look at novel pedagogic roles of images, and at the use of ‘hybrid’ images—that is, part diagram, part relief figure—to convey ‘proofs’ of cosmological ideas. We shall study the uses of diagrams, volvelles and models, some based on astronomical instruments, in representing planetary hypotheses and world systems and, on occasion, in staking priority claims in them; and we shall investigate the new types of celestial maps reproduced in cosmographical treatises. In our enquiries we shall scrutinize the relations between texts and images, and in particular the ways in which some images assumed partially independent persuasive and argumentative functions, and the frequent use of minutely described ‘virtual’ images.

4. *Images and disciplines*

For a properly historical understanding of the functions of images, we shall attend to the ways in which images and their uses were treated in contemporary optics, faculty psychology, emblematics, and discourses on painting and religious imagery.

In seeking to establish the roles of images in the transformation of astronomy, we shall look at the changing parts played by celestial imagery in the disciplines which contributed to that transformation: pure and mixed mathematics, natural philosophy, cartography, cosmography, chronology, meteorology and astrology.

Activities

The project will be organized around:

- weekly seminars
- annual workshops

The project team will produce:

- two volumes of collected essays for a specialist audience
- a project website

Project seminars.

The team will meet for two hours each week during the academic terms (20 weeks a year), alternating between (a) primary source sessions and (b) research seminars.

These seminars will be organised jointly by Professor Jardine and Drs Taub and Kusukawa. The post-doctoral research associate will help, where necessary, with organisation.

(a) Primary source sessions will involve the translation of texts (mostly in Latin) into English, which will form the core of the project members' research papers and the basis of the project website.

(b) Research seminars will involve either a talk by an invited speaker (up to six speakers per year), or research papers presented by a team member.

Project workshops (to be held in Cambridge).

There will be a total of three workshops for the project. Each workshop will have a focus - terminology and typology of astronomical images (year 1); the production and functions of images (year 2); the role of images in relation to disciplinary transformations (year 3). These workshops will be used as springboards for developing and commissioning research papers towards a coherent set of publications. The workshop (maximum 20 people) will consist of the project team members and invited participants, and will also be open to a number of junior scholars in early modern science. Drs Taub and Kusukawa will oversee the organisation of these workshops, assisted by the post-doctoral research associate.

Project publications.

Professor Jardine will act as editor-in-chief for publications, will oversee the planning and commissioning of papers, contacting publishers or journals, and, where necessary, will arrange for copy-editing or camera-ready production. The post-doctoral research associate will assist in this process.

Project website.

The project website, which will be located at the Whipple Museum website, will be a collection of case studies from the research project. Each case study will include an image, transcription, English translation and commentary. This website will make the rare primary sources and the results of our research immediately available to our scholarly colleagues world-wide for further use and research. We envisage use of our website by colleagues who teach undergraduate or graduate-level courses in early modern European science. From our own past experience in developing educational websites, however, it is possible that our website will become a resource for school assignments and projects. Furthermore, this website will be an opportunity to highlight, and make more accessible, the valuable rare books resources from the Cambridge collections. Drs Taub and Kusukawa are in charge of web-site production, and the project PhD student and the post-doctoral research associate will assist in the design, construction, and maintenance of the website.

The first two years of the project are earmarked for designing and developing a pilot website for the project. In order to ensure that that we can meet the needs of a range of audiences (research scholars; university teachers and students; school teachers; rare books librarians), we will conduct a survey of the pilot website in year 3. In light of findings from this survey, the website will be modified and improved, with a view to completion during year 5.