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Koen Vermeir · Jonathan Regier
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Boundaries, Extents and Circulations

Space and Spatiality in Early Modern
Natural Philosophy

 Springer

Editors

Koen Vermeir
SPHERE UMR 7219, CNRS
Université Paris Diderot
Paris
France

Jonathan Regier
Institute for Advanced Study
The Hong Kong University of Science
and Technology
Kowloon
Hong Kong

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Introduction: Early Modern Ideas of Space and Spatiality

O God, I could be bounded in a nutshell and count myself
a king of infinite space, were it not that I have bad dreams.

—Hamlet

The subject of this book is concepts of space and spatiality in the European late Renaissance and early modern period, in particular in natural philosophy and related fields. We wish to show their richness, fluidity, and variety. These can be vast spaces of elemental circulation and cosmography, but also spaces of vision and microscopic interstices. Frequently, these spaces are mathematical; they may *be* mathematics itself. Sometimes, these spaces are powerful; they may even seem magical. Why is their history so fascinating? Space is a crucial concept for natural philosophy, but also the most mundane aspects of daily life are filled with references to space. We are constantly giving and taking directions by describing spaces: spaces around certain objects or locations, and spaces that determine certain objects or locations. Linguistically, this is the realm of prepositions: in, on, around, over, and through. Our local spaces can grow and grow to uncertain dimension. We all live *in* the universe, for whatever that means. To bring the scale down, we are all *on* the surface of the earth, the space of maps, and GPS. We are simultaneously operating with spaces that are different not only in scale but also quality. Yet most of the readers of this book will agree that space is a unity. Where a strict Aristotelian might have seen a nesting of diverse spaces, we effortlessly intuit and see a single space running through all objects, independent of those objects. This is an extraordinary feat of abstraction and, arguably, of sensory abnegation. And herein lies a major interest in the history of space. A homogenous “Euclidean” space partly filled with matter feels, to put it naively, like the mind’s factory-setting experience of the world. Yet traditional histories of space, those of Jammer and Koyré, showed that it was not and is not.¹ What passes for Newtonian

¹Two “traditional” accounts can be found in Jammer (1954) and Koyré (1957). For a sampling of classical texts, see, e.g., Capek (1976).

space is a construct. In the history of Western natural philosophy, it was a late arrival and after two centuries was replaced, at a fundamental level, by relativistic space-time. But it remains supremely useful for conceptualizing the mechanics of daily life—the low-velocity physics of home and office, as it were.

The late Renaissance and early modern period stand out because Newtonian space seems to be either the seed or flower of classic mechanics, either a necessary precondition or the most elegant conclusion. This necessity is, at least in part, a historiographical illusion. The traditional narrative of Jammer or Koyré stretches from Cusa to Copernicus, then onward to Newton, and then, in the most ambitious accounts, to Einstein. It keeps its disciplinary focus very tight: astronomy, natural philosophy, and a sort of purified metaphysics whose highest production was the Newton–Leibniz controversy. There were, however, many strange but important conceptualizations of space and place which stand in need of reevaluation and study. The traditional story also smacks of teleology. In Koyré's account, the warring visions of Newton and Leibniz are the background and precondition for the ensuing most durable synthesis: the cosmos where absolute and absolutely mathematical space and time (Newton) are suffused with a perfection of law and self-perpetuity (Leibniz).² It is important, however, for a historian to look at early modern spaces without the Newtonian hindsight. On the one hand, the traditional narrative has proved its usefulness and resilience. It was picked up and much improved by later historians such as Edward Grant and Amos Funkenstein.³ On the other hand, its continuing authority should provoke us to question its presuppositions and methodology.

In the current volume, to counterbalance familiarity, we will not shy away from the strangeness of early modern ideas of space and place. Instead of promoting a potted history, we prefer to explode boundaries and open up the historiography to a wider scope of disciplines. We are especially interested in the *uses* of spatial concepts, including those outside explicit theorizations of space. In bringing together the different studies of this volume, we show our preference for a variety of perspectives on early modern space, over and above any artificially created unity of storyline. At this moment, the historiography of spatial concepts will be better served by a disunity and variety in contributions than by a forced synthetic effort.

But how many spaces were there in the late Renaissance and early modern period? Let us first stress that this collective volume is a contribution in cultural and intellectual history: The authors will focus on actors' categories and on the explicit and implicit uses of concepts of spatiality; they will not analyze the actual

²See Koyré (1957, 273–276).

³Grant (1981) and Funkenstein (1986). Their work played down the discontinuity of the early modern period, even if in Grant's case he maintained that a rupture had occurred at the level of space. See Grant (1981, 264).

spaces in which the historical actors moved, debated, and conducted experiments.⁴ Even then, if we looked at all the spaces our historical actors were interested in, we could expand the number of spaces indefinitely. We could discuss how early modern savants conceptualized political spaces, urban spaces, spaces of the *beaux arts*, memory spaces, spaces of commerce and pilgrimage, and agricultural and animal spaces.⁵ The possibilities are limitless. We will allude to some of these spaces, but they will not be the focus of this book. Because we want to promote a critical discussion with the traditional historiography, we will remain relatively close to its field of interest. We will look at the conceptualization of geometrical, geographical, cosmographical, perceptual, and elemental spaces, from a different point of view or by focusing on uncharted authors.

A tacit conception of space is hard to do without, and it is present in disciplines that do not treat the issue head-on. An astrologer or chemist's conception of space probably does not fit into a purified Aristotelian, Cartesian, or Newtonian framework. A Leibniz puzzling over fossil formation might give us a new perspective on "Leibnizean" ideas of space and place. A Cartesian in the laboratory might work on making and breaking vacuums even if Descartes denied the existence of vacuums. Of course, we do not have to see the word *spatium* in order to detect a notion of space. The authors in this volume pay particular attention to actors' terminologies, but they cast their nets wider than a history of the words "space" or "*spatium*."⁶ In doing so,

⁴For this kind of work, see the "spatial turn" in the history of science. Cf. Livingstone (1995, 2003). For a specific focus on urban spaces, see Van Damme (2005a), and Romano and Van Damme (2008). For a focus on Parisian spaces of science, see, e.g., Belhoste (2011) and Van Damme (2005b). Of course, the spaces a scientist moves in are not independent of the spaces that he or she thinks with and thinks about. As Henri Lefebvre put it, "*le mode de production organise – produit – en même temps que certains rapports sociaux – son espace et son temps. C'est ainsi qu'il s'accomplit.*" Lefebvre (1974). Every society produces its own space, spatiality, and awareness of spatiality. If space is a social production, it is also an instrument of thought and action, including domination and power.

⁵To be clear: Our authors do not study actions in space; they do study space-related practices to a limited extent, but they focus especially on concepts and epistemologies of space. Of course, space-related epistemic practices, such as map making, also have a material aspect. See, e.g., Gordon and Klein (2010), which analyzes the material practice behind the concept of mapping, as well as the impact of cartography on the shaping of social and political identities in early modern Britain. In the present book, the focus will rather be on the conceptual aspects of space-related practices.

⁶Focusing on actor's categories has been a long accepted methodology in a historical study of concepts. As Quentin Skinner puts it: "the surest sign that a group or society has entered into the self-conscious possession of a new concept is that a corresponding vocabulary will be developed, a vocabulary which can then be used to pick out and discuss the concept with consistency." (Skinner 1980). According to Skinner, however, words do not track concepts perfectly. He gives the example of John Milton (1608–1674), who found it important to be original, even if the word 'originality' did not exist before the Romantic era. Skinner claims that Milton possessed the concept of originality, but not the word. We may argue against Skinner that Romantic "originality" was a quite different concept to the one supposedly endorsed by Milton, but this does not mean that there were no relevant similarities. A focus on the word "space" and "*spatium*" is thus legitimate, as is a broader approach that aims at detecting relevant spatial concepts and practices not necessarily expressed in terms of "space" and "*spatium*."

they welcome a larger corpus of texts and disciplines, a corpus encompassing both classical *novatores* and authors outside the historiographical mainstream.

This book is the result of cooperation within the framework of the project *PNEUMA. The Space of Spirit: Theories of Space, Pneumatology and Physico-Theology in the Newtonian Age*, directed by Laurent Jaffro and Philippe Hamou and financed by the French *Agence Nationale de la Recherche*. This partnership led to an international conference, *Spaces, Knots and Bonds: At the crossroads between early modern “magic” and “science,”* held on 21–23 June 2012 at the *Observatoire de Paris* and at the *Université Paris Diderot*, organized by Jonathan Regier and Koen Vermeir.⁷ We would like to thank the participants of this conference, Roger Ariew, Delphine Bellis, Jean-Marc Besse, Michel Blay, Brian Copenhaver, Vincenzo de Risi, Ofer Gal, Philippe Hamou, Hiro Hirai, Laurent Jaffro, Michela Malpangotto, Thibaut Maus de Rolley, Luc Peterschmitt, Claire Schwartz, and Jean Seidengart for their rich contributions and stimulating discussions. Special recognition is due to the project PNEUMA for financing the conference, and to the Research Unit SPHERE (UMR 7219: CNRS/Université Paris Diderot) and the Research Unit SYRTE (UMR 8630: CNRS/Observatoire de Paris/Université Pierre & Marie Curie) for hosting the conference. We would also like to thank Nad Fachard and Virginie Maouchi for their help with logistics.

The idea of a volume on space going beyond the traditional authors and narratives grew out of the interdisciplinary discussions at this conference. Some of the conference participants have contributed to the present volume, but we also invited other scholars to write chapters based on their specific expertise. We are very grateful that they decided to join us in this exciting project. The preparation of this volume has led to a close collaboration between the two editors, working and commenting on the different chapters and writing the introduction together. We are much obliged to Volny Fages, Sebastian Grevsmuehl, and Isabelle Sourbès-Verger for giving us the opportunity to present a version of the introduction at the *Centre Alexandre Koyré*, Paris, in the seminar “Cosmos, histoires, représentations, politiques et techniques.”

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⁷Many of the chapters have been prepared for the 2012 conference and have been revised in the light of comments by referees and editors. Because of the publication timeline, the authors have not been able to take into account scholarship that has been published in the last few months, such as Giovannozzi and Veneziani (2014) (proceedings of a 2013 conference) or De Risi (2015).

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Paris, France

Koen Vermeir
Jonathan Regier

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