

Quantitative Archaeology and Archaeological Modelling

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Oliver Nakoinz • Daniel Knitter

Modelling Human Behaviour in Landscapes

Basic Concepts and Modelling Elements

 Springer

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ISSN 2366-5998 ISSN 2366-6005 (electronic)
Quantitative Archaeology and Archaeological Modelling
ISBN 978-3-319-29536-7 ISBN 978-3-319-29538-1 (eBook)
DOI 10.1007/978-3-319-29538-1

Library of Congress Control Number: 2016931615

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*This book is dedicated to Peter Haggett and
the memory of David L. Clarke, who
established a prolific interdisciplinary
exchange between geography and
archaeology*

Series Foreword

Quantitative approaches and modelling techniques have played an increasingly significant role in archaeology over the last few decades, as can be seen both by their prominence in published research and in university courses. Despite this popularity, there remains only a limited number of book-length treatments in archaeology on these subjects (with the exception perhaps being general-purpose GIS). ‘Quantitative Archaeology and Archaeological Modelling’ is a book series that therefore responds to this need for (a) basic, methodologically transparent, manuals for teaching at all levels, (b) good practice guides with a series of reproducible case studies, and (c) higher-level extended discussions of bleeding edge problems. This series is also intended to be interdisciplinary in the analytical theory and method it fosters, international in its scope, datasets, contributors and audience, and open to both deliberately novel and well-established approaches. We look forward to developing a series of books, which support and promote a fast growing sub-discipline in archaeology and invite authors to join us. We are grateful to Springer and in particular to Teresa Kraus for making this series possible and would like to thank members of our wider editorial board for their support so far: Caitlin Buck, Dmitry Korobov, Kenneth Kvamme, Laure Nunninger, Silvia Polla, Luke Premo, Karim Sadr and Hai Zhang.

Oliver Nakoinz, Andrew Bevan

Preface

For landscape archaeology, modelling spatial aspects of human behaviour became an essential topic in the recent years. Located at the disciplinary border between geography and archaeology, modelling human behaviour in landscapes attracts contributions from both sides and is based on an integration of both disciplines. Although there is many research published on this topic and both geography and archaeology possess some textbooks, there is no textbook addressing the specific topic of modelling human behaviour in landscapes. This book attempts to fill this gap.

The authors suffered from this lack of a textbook during university courses and summer and winter schools in Kiel and Berlin. This was motivation enough to turn the course scripts into a textbook, which offers some basic techniques and concepts.

The institutions at which we held our courses are an inspiring environment to develop our concept. The Graduate School Human Development in Landscapes (GSHDL) at the Christian-Albrechts-University of Kiel is a multidisciplinary graduate school, focussed on the change of societies in the context of landscape. The GSHDL judges modelling as an important approach for interdisciplinary communication and meta-disciplinary research. The GSHDL aims to intensify quantitative modelling in research as well as in teaching. This concept is well embedded in the Christian-Albrechts-University of Kiel with its extensive expertise in modelling in many disciplines, including the prehistoric archaeology where quantitative modelling is in focus. The expertise in modelling in Kiel is bundled in two areas. The first modelling focus is the GSHDL. The GSHDL approaches will be continued in the Johanna Mestorf Academy of the Christian-Albrechts-University of Kiel. The second one is a group of specialists around Bernd Thalheim from computer sciences which develops a specific discourse, concepts and practices of modelling.

The Excellence Cluster Topoi investigates the transformation of space and knowledge in ancient civilisations. Its research is based on the expertise concentrated in Berlin: besides the two universities Freie Universität Berlin and Humboldt-Universität zu Berlin, the institutions Berlin-Brandenburgische Akademie der Wissenschaften, Deutsches Archäologisches Institut, Max-Planck-

Institut für Wissenschaftsgeschichte and Stiftung Preußischer Kulturbesitz are taking part in the cluster. Different research areas, consisting of a broad range of scientists from physics and geosciences to archaeology, art and philosophy, target the central terms space and knowledge from very different perspectives. In the course of the Excellence Cluster Topoi, the Berliner Antike Kolleg and its graduate school the Berlin Graduate School for Ancient Studies (BerGSAS) were founded. Thanks to the funding of Topoi, it is possible to teach students the topics covered in this book, e.g. in the doctoral programme ‘landscape archaeology and architecture’ of the graduate school.

This volume is designed as a 12-lecture textbook which can serve as a course companion, self-teaching guide and handbook for basic concepts. Each lecture has around 20 pages. The main concepts of the book can be summarised as:

- Focussed on principles and methods.
- Applied: the readers are enabled to execute the case studies themselves. The code for open source software is provided in each chapter. The web page of the book provides a digital version of the code as well as the data for the case studies (<http://dakni.github.io/mhbil/>). While some analyses produce good results, other examples sensitise for common trap falls. This is possible in a textbook, but cannot be provided in research.
- Minimalistic: the content is presented as concise text in short chapters focussing on the main points, with few details but extensive illustrations. This supports an efficient understanding. The book focuses on rather simple methodological concepts and principles which are located between simple statistics and advanced modelling applications. A minimal exemplary data set which the reader gets to know and understand very quickly helps focus on the concepts.
- Sustained and efficient by focusing on principles and methods: the relations between different concepts and methods are described to ensure deeper understanding. Terminology from different traditions, concepts and paradigms helps make connections. By focusing on concepts, we enable the reader to develop more complex models by themselves. The book provides a basic modelling terminology and tool kit to construct coherent modelling concepts. The code is not efficient for computing but for didactic purposes. The text does not get stuck in technical details but tries to convey the concepts with a didactic approach.
- Interdisciplinary: the content derives from different disciplines—mainly archaeology, geography, mathematics and statistics—and is seamlessly integrated in a generalised introduction into spatial modelling. We persistently try to offer an interdisciplinary perspective.

In addition to the didactic concept, we wish to address three points prior to reading the book.

We are dedicated to an *integrative paradigm*. The past decades have been dominated by a discussion about basic scientific paradigms. In archaeology among other terms, ‘processual’ and ‘post-processual’ archaeology are opposed. We believe in the complementarity of both approaches and try to integrate them as much as possible. Although the concepts of modelling stand in a processual tradition, the

introduction of post-processual ideas increases the applicability and consistency of the content considerably. From an analytical point of view, this integration is seamless, but not from a terminological point of view, at least until today.

Proper research has a good *balance of objective, data, theory and method* (ODTM balance). This book has didactic purposes and hence is allowed to focus on methods and concepts only. Valid case studies have to consider data, source criticism and methodological details. Theory and method have to be justified, and methods have to be based on theory. This is neither possible nor required in a textbook. Otherwise, we could not deal with simple methods, but have to adapt methods to objective, data and theory. This would result in more complicated methods, more extensive code and much more text which does not contribute to the understanding of concepts. Please be aware of the different requirements of didactic purposes and research.

The *choice of methods is not arbitrary* and should not be based on scientific fashions. As indicated in the last paragraph, the choice of method has to be based on objective, data and theory. In particular, theory and method have to be tightly connected and adapted. This involves an adjustment to objectives. Let us imagine two methods which produce different results of the same type. Since the two methods produce different results, they solve different problems. If you cannot decide which method is more suitable, the objective is not precise enough. You have to propose a question that can be answered using the appropriate method and which allows specific interpretations. If two methods apply, the question does not allow a specific interpretation.

To make more sense of this, we invite you to read our book and share your thought with us.

Kiel, Schleswig-Holstein, Germany
Berlin, Germany
October 2015

Oliver Nakoinz
Daniel Knitter

Acknowledgements

Oliver Nakoinz is grateful to the DFG for supporting the work on this volume with a Heisenberg fellowship (NA 687/1-1, NA 687/1-2) and for supporting the project *Modellierung und Rekonstruktion ältereisenzeitlicher Interaktions- und Distributionssysteme in Südwest- und Westdeutschland sowie im Elsass* (NA 687/3-1) which contributed to Chap. 10 of this book. Furthermore, he wants to thank the GSHDL for supporting my work on this topic.

Daniel Knitter is grateful to the Excellence Cluster Topoi—The Formation and Transformation of Space and Knowledge in Ancient Civilizations for supporting this study.

The authors also want to thank Michael Meier, Johannes Müller, Brigitta Schütt and Mara Weinelt for enabling us to give the courses, on which this volume is based.

They received some feedback, useful hints and valuable ideas from colleagues, to which we are grateful: Laurie Tremblay Cormier, Clara Filet, Franziska Faupel, Martin Hinz, Kerstin Kowarik, Carsten Lemmen, Undine Lieberwirth, Dominik Lukas, Cătălin Popa, Christoph Rinne, Bernd Thalheim, Urszula Zawadzka and Gabriel Wurzer.

Some participants of the courses also gave us some valuable feedback: Norbert Anselm, Tilman Baum, Elisa Dalla Longa, Helen Dawson, Martine Gussone, Arie Kai-Browne, Katrin Kermas, Jan Kolar, Jan Kolář, Luise Lorenz, Julia Meister, Moritz Menenga, Tina Michel, Moritz Nykamp, René Ohlrau, Mohamed Osman, Georg Roth, Chiara Schoch, Martin Schumacher, Andrea-Fleur Schweigart, Johanna Seidel, Hendaya Serrano Gil, Michael Thelemann, Barbora Weissova and Arne Windler.

For language editing we are grateful to Carl Evers and Richard Forsythe.

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