

Modeling, Ordering, Comparing

Mediating Theoretical Frameworks and Empirical Evidence in History

Silke Schwandt

Abstract *This article aims to explore the value of modeling as a research practice in history and its relationship to practices of comparing and ordering, and to make these theoretical frameworks more explicit. It addresses the implicit models present in historical writings and the materials that provide insights into historical actors' practices.*

*Modeling is crucial for sense-making in scientific and humanistic disciplines, such as history. But models are not neutral representations; they are rather restrictive, simplified, and sometimes ideological. The key is to make modeling practices explicit. The article presents two different examples of practices of modeling: (1) Lucas Cranach the Elder's 16th-century painting *Damnation and Redemption*, and (2) modeling practices in digital history. Both examples show that modeling practices are closely linked to practices of comparing.*

History, Theory, and Models

Practices of comparison as a research concept and an analytical framework require a general understanding – in a way, a model – of thinking about the process of comparing. What are the elements that constitute a comparison? How is this linked to (sociological) practice theory? The previous work of the research center on Practices of Comparing has developed a generalizable model for thinking about practices of comparing which highlights that the necessary elements are 'things to be compared (*comparata*)' and a specific regard in which at least two things are compared to each other (*tertium*). In this sense, modeling is an essential part of research practices, not only within the natural sciences where the concept is well established, but also in the social sciences and the humanities. In this article, I will focus on the role that models and modeling practices play in history. By providing different examples, one from history and from history writing, I will make the case that models and modeling practices are inherent in historical thinking.

Thinking about modeling practices in history requires us to think about history practices first. What is it that we do when we do history? While there are many different understandings of history as an academic discipline, I want to focus on two general understandings before focusing on the question of modeling: (1) history is a concept represented by a *collective singular*¹ and (2) history is about narratives.² The first presumption addresses the question what history is on a theoretical level, while the second one combines theoretical presumptions with the questions of how to write history. Both examples have been very influential in history and serve as representations of different kinds of theoretical frameworks present in historical research for the sake of argument in this article.

Reinhart Koselleck coined the concept of *collective singulars* as part of his occupation with conceptual history. On the one hand, *collective singular* serves as term to describe what was later framed as *Grundbegriffe*: terms which denote concepts and can condense many different, historically variable meanings (examples are “state,” “liberty,” or “status”).³ For Koselleck, most of these terms – and others of the same nature – took on this form in the late 18th century and served as concepts that actually create (collective) experiences (*Erfahrungsstiftungsbegriffe*).⁴ History as opposed to histories in the plural, is one of these concepts. It became a term that denoted both the object of historiography and its theory at the same time.

“The history of events and the way they are researched and narrated were thus brought to a common concept. The conditions of action and the conditions of their cognition, or in other words: the extra-linguistic and the linguistic preconditions of every kind of history, were conceptually thought together. If you will, this was a purely transcendental turn anticipated in the history of language: The conditions of reality are at the same time the conditions of its cognition.”⁵

Hence, the way we think about and write history is closely linked to the general understanding of what history actually is, how it proceeds, and how it relates to actions and events as well as the respective understanding of temporality.

1 See Reinhart Koselleck et. al., *Begriffsgeschichten. Studien zur Semantik und Pragmatik der politischen und sozialen Sprache*, Frankfurt am Main 2006, 56–76.

2 See, for example, Hayden V. White, *The Content of the Form: Narrative Discourse and Historical Representation* [Reprint], Baltimore et. al. 1990.

3 Koselleck, *Begriffsgeschichten*, 67, 68.

4 Koselleck, *Begriffsgeschichten*, 67, 68.

5 Koselleck, *Begriffsgeschichten*, 75 (author's translation).

Hayden White is best known for his works on *metahistory*⁶ and the use of narratives in history writing and research.⁷ Adding to what Koselleck said about history being the theoretical concept on the one hand, and the very object of the study of history on the other, White claims that history also serves as a model. For him,

“the basic problem of historical thought [...] is to construct a verbal model of the historical process, or some part of it, which, by virtue of its status as a linguistic artefact, can be broken down into the levels of lexicon, grammar, syntax, and semantic.”⁸

Both Koselleck and White focus on language in their reflections on history, because history has always been told and expressed in language. Both talk about history, or the historical process, as framed by something that is at the same time extra-linguistic and part of the grammar which governs the history-telling of historians. And while White's use of the term *model* might have been mainly metaphorical, modeling is a perfect way to think about the operationalisation of theoretical frameworks and general understandings in the process of historical research. White goes on to describe the way in which the verbal model of the historical process works by saying that to think about the historians' work in this way allows for the assumption that “different historians stress different aspects of the same historical field [...] because they actually *see* different objects in that field”.⁹ Presuppositions and assumptions about a certain historical event or process serve as a framework for the analysis of the historical material. This is by no means a new understanding of the practice of history writing. Michel de Certeau promoted a similar understanding of models in historiography, relating the process of modeling to the “system of interpretation” underlying the historical narrative.¹⁰ Both authors, White and de Certeau, were not actual advocates of modeling but they used both terms, *model* and *modeling*, to describe a common practice in historiography that deals with the underlying frameworks, understandings, assumptions, and presuppositions that are often implicit in history writing. Reflecting on the use of models or modeling – even in a metaphoric sense – to be more explicit about theoretical frameworks in historical research is

6 Hayden V. White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe*, Baltimore 2000.

7 See also Hayden V. White, The Value of Narrativity in the Representation of Reality, in: *Critical Inquiry* 7, Nr. 1 (1980), 5–27.

8 White, *Metahistory*, 274.

9 White, *Metahistory*, 274. [emphasis in the original].

10 Michel de Certeau, *The Writing of History*, New York 1988, 29.

the aim of this article.¹¹ What is the added value of modeling as a research practice in history? And, to take it one step further, what are the models that are implicitly present in historical writings – or even in the material that tells us about the practices of historical actors?

“Models as Mediators between Theory and the Real World”¹²

Models and modeling have been a topic in many academic disciplines. The reflection on the terms and their practical value in the sciences as instruments has been explicitly discussed in the history and philosophy of science with a particular focus on the relevance and practical application of models in the natural sciences. While the differentiation between the natural sciences and the humanities and social sciences has been reimagined many times since its conception in the 19th century, it is still present in the different methodologies. One of the main differences in this respect is the concept of empirical evidence, or empirical science. Empiricism in the natural sciences denotes a basic methodology which focuses on systematic observation and the experimental validation of theories or theoretical assumptions. While the empirical evidence in the natural sciences, and also in some parts of the social sciences, is quantifiable data (e.g., measurements or survey data), the evidence in historical research is the information we have about past events; and this information has usually come down to us in the form of cultural artefacts like texts or images. And while all evidence always has to be interpreted, the way that this interpretation process is framed, can again be very different in the natural sciences and the humanities.

In the natural sciences, the specific function of models has been discussed as mediating between theory and empirical evidence.¹³ Models are understood as something that operationalises theoretical assumptions to make them falsifiable by empirical evidence. Evelyn Fox Keller has suggested to differentiate between “models of” and “models for” to analyse the specific functionality of modeling for scientific research practices.¹⁴ She uses the metaphors of *tools* or *instruments* for

11 A slightly different but related argument has been made in Silke Schwandt, Opening the Black Box of Interpretation: Digital History Practices as Models of Knowledge, in: *History and Theory* 61, Nr. 4 (2022), 77–85. <https://doi.org/10.1111/hith.12281>.

12 The title of the chapter refers to Mary S. Morgan/Margaret Morrison (eds.), *Models as Mediators: Perspectives on Natural and Social Science*, Cambridge 1999, [<https://doi.org/10.1017/CBO9780511660108>].

13 Cf. Morgan/Morrison, *Models as Mediators*, and more recently Bernhard Thalheim/Ivor Nissen (eds.), *Wissenschaft und Kunst der Modellierung: Kieler Zugang zur Definition, Nutzung und Zukunft*. Berlin/Boston 2015, [<https://doi.org/10.1515/9781501501234>].

14 Evelyn Fox Keller, Models of and Models for: Theory and Practice in Contemporary Biology, in: *Philosophy of Science* 67 (3/2000), 72–86, [<https://doi.org/10.1086/392810>].

models, thereby highlighting their role as research facilitators. Following Nancy Cartwright, Keller states that models are “not theoretical claims” but are designed to be “tools for interpreting and/or representing pieces of the world more or less usefully, above all, for making more or less accurate predictions about the behaviour of particular concrete systems.”¹⁵ Here, models are built not only in order to represent something in a specific form, but also to be used in the process of prediction and simulation which might be alien to historical research. But models can also help in the process of interpretation, and the differentiation between *interpreting* and *representing* is crucial to understand the difference between “a model as a noun”, as Keller puts it, and the process of modeling: “a model as a noun [is] an entity that can be employed as a quasi-independent tool for designing new kinds of experiments, for posing new kinds of questions, and for guiding new kinds of manipulation of the system itself.”¹⁶

Apart from the natural sciences, models and modeling have also been widely discussed in the social sciences, especially in economics. Mary S. Morgan has argued that for economists models serve as representations of the world.¹⁷ Models became somewhat different objects of knowledge in economics than in the natural sciences, where models serve as frameworks for experiments and as a basis for the falsification of theories: “they [economists] learnt to create models to represent economic life at many levels, to reason and theorize with them, and to apply that new knowledge to understand their world.”¹⁸ What this perspective adds to the reflection on models and practices of modeling is that models can also serve as a means of structuring and ordering the world; a specific understanding of the “world in a model” as a key to making sense of the world.

Models and Modeling Practices in History

Franziska Loetz has argued that for historians theory, or theory building, is actually the formulation of models (i.e., the practice of modeling).¹⁹ For her, a model is a “defined set of interpretative statements for the description of ‘reality’, which are deemed to be true and have a general character”.²⁰ Loetz uses the concept of *model*

15 Fox Keller, *Models of and Models for*, 74.

16 Fox Keller, *Models of and Models for*, 82.

17 Cf. Mary S. Morgan, *The World in the Model: How Economists Work and Think*. Cambridge 2012, [<https://doi.org/10.1017/CBO9781139026185>].

18 Morgan, *The World in the Model*, 380.

19 Francisca Loetz, *Theorie und Empirie in der Geschichtsschreibung: Eine notwendige Wechselbeziehung*, in: Norbert Paul/Thomas Schlich (eds.), *Medizingeschichte: Aufgaben, Probleme, Perspektiven*, Frankfurt am Main/New York 1998, 22–44.

20 Loetz, *Theorie und Empirie in der Geschichtsschreibung*, 25 [author's translation].

to describe the operationalization necessary to apply theoretical frameworks—like, for example, Koselleck's collective singulars—to the empirical evidence and the historical material. Models provide the parameters of the interpretation thereby representing the general assumptions that guide us in the practice of history writing. And while this has been theorised many times, including, e.g., by Michel de Certeau, there has also been ample critique about the added value of generalisation in historical research in particular and in the humanities in general. Petra Gehring has recently questioned the added value of generalisation in an article focussing on the worth or possible expendability of the concept of collective singulars, since they are “regarded as metaphysical, ideological, or at least as simplifications”.²¹ Using collective singulars as theoretical frameworks and as a basis for modeling historical research questions must be subject to critical reflection. What does a model imply on the level of world views, general understandings, or even ideologies? As historians, we should not only build and use models as heuristic tools, but also identify and historicize models and modeling practices used by historical actors. The following two examples will therefore focus on (1) *models as research objects*, and (2) *modeling as research practices*.

Ordering the World through Practices of Comparing: Lucas Cranach and the concept of *Damnation and Redemption*²²

Lucas Cranach the Elder (1472–1553) worked as a painter at the court of Frederick III, the Wise, Elector of Saxony, starting in 1505. He is one of the first painters of his time to turn his workshop into a lucrative business. Building on his reputation due to his position at court, he even served two terms of office as mayor of Wittenberg. There, he became close friends with Martin Luther, the German Reformer who came to Wittenberg to teach at the university in 1508. Cranach was witness to Luther's marriage to Katharina von Bora in 1525. This close relationship also informed his art and is believed to have inspired the iconographic program presented in one of his most famous paintings: *Damnation and Redemption* (Fig. 1).²³

The painting is divided into two panels with law and damnation represented by the scenes depicted on the left panel and grace and redemption represented on the right. The tree which separates the panels stands at the center of the picture and

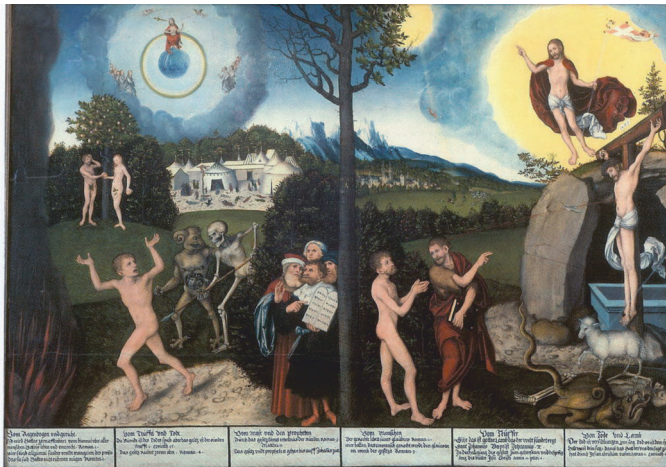
21 Petra Gehring, Wie verzichtbar sind Kollektivsingulare wirklich?, in: *Deutsche Vierteljahrschrift für Literaturwissenschaft und Geistesgeschichte* 97 (1/2023), 65–71; see 65, [<https://doi.org/10.1007/s41245-023-00164-2>].

22 *Damnation and Redemption* refers to an iconographic program conceived and promoted during the Age of Reformation in Germany in the 16th century.

23 The German title of this painting is *Gesetz und Gnade* and it is currently exhibited at the Stiftung Schloss Friedenstein in Gotha, Germany.

has a dried out and dead crown on the left and a green, living crown on the right. Another important element of the picture is a naked figure representing man who is being hoarded towards the flames of hell by two skeletons in the left panel, while he is led towards Christ in the right panel. The other images depict typological scenes from the Old and New Testament. The overall structure of the painting follows the principle of opposition and juxtaposition.

Fig. 1: Lucas Cranach the Elder: *Damnation and Redemption* 1529



Available in the public domain: https://commons.wikimedia.org/wiki/File:Cranach_Gesetz_und_Gnade_Gotha.jpg

Luther and Cranach are believed to have worked on this program together and the text below the picture is often ascribed to the Reformer.²⁴ The text panels contain Bible verses referencing the scenes in the painting.²⁵

- 24 See for the role of Luther and Cranach as mediators of the new faith: Anne-Marie Bonnet et al. (eds.), *Lucas Cranach der Ältere: Meister, Marke, Moderne*. Museum Kunstpalast 2017, especially Daniel Görres. *Der Mönch und der Maler. Luther und Cranach als Vermittler eines neuen Glaubens*, 44–51.
- 25 This is a rough translation by the author of the German transcription: Of the rainbow and judgement. God's wrath is revealed from heaven over the lives and wrongs of all men. Roman. 1./ We are all sinners and lack praise, so that we cannot boast of God. Roman. 1./ Of the cup and death / Sin is the spear of death but the law is the power of sin. 1 Corinth.15. The law judges wrath. Roman. 4./From Moses and the Prophets / By the Law comes knowledge of sins Roman. 3./ Matthew.11./ The Law and the Prophets go down to the time of John / Of Man / The rightful living of his faith Roman.1./ We hold that a man may be justified in the faith / on the basis of the Law Roman.3.Of the death / Behold, the Lamb of God who bears the sin of

Cranach's painting can be read as a model of the new faith that Luther promoted. The message is simple: if you adhere only to the law, there will be damnation. If you orient yourself towards Christ's grace there will be redemption. In this case, the model is highly ideological. It communicates the general assumptions of the Reformation—*sola fide, sola gratia, sola scriptura*—and juxtaposes it against the “old faith,” which should become what we know as Catholicism after a process of confessionalization. Here, we can see how modeling worked in practice in the 16th century. Mary S. Morgan argues that “model-making gives *form* to ideas about the world and in the process gives *formal* rules to reason with.”²⁶ The whole composition of *Damnation and Redemption* works in a similar way: it gives form to the ideas of the Reformation and even provides formal rules to take as a guideline for the personal road to salvation. It also provides a visualisation of the model that is easy to follow, which is another important element of modeling and sense-making pointed to by Bruno Latour.²⁷

As a historical model, *Damnation and Redemption* represents a specific order of the world that the German Reformers wanted to promote and gives it a specific form. The mode in which this order is established is comparative. Different scenes from the Old and New Testament are related to each other typologically. The Brazen Serpent in front of the tents on the left side corresponds to the Crucifix, the Fall of Man corresponds to the risen Christ, and Moses with the Ten Commandments corresponds to John the Baptist, pointing towards Christ. From the perspective of the viewer this model is an invitation to compare themselves to the man depicted in the picture to evaluate their own lives and faith. Hence, practices of comparison are inscribed into the model on different levels: on the one hand they are an integral part of the structure and built into the model itself, and on the other hand they are essential to the affordance to act according to the model.

Analyzing Cranach's *Damnation and Redemption* as a visualized model of the Reformers' world view helps to identify the underlying general assumptions as well as the communicative goals associated with the program. In this sense, the picture truly is a ‘world in a model’.

the world / Saint John the Baptist.2 / In the sanctification of the Spirit to the obedience and praise of the flower of Jesus Christ amen.1.petri.1 / Of death and lamb, death is swallowed up in victory, death where is your spit, light where is your victory, thanks be to God who has given us victory through Jesus Christ our Lord. 1 Corinthians 15

26 Morgan, *The World in a Model*, 92.

27 See Bruno Latour, *Visualization and Cognition: Thinking with Eyes and Hands*, in: *Knowledge and Society* 6 (1986), 1–40.

Modeling as Operationalisation: Comparative Practices and Quantification

As I have argued earlier, historians need to be aware not only of historical actors and their convictions and assumptions, but also of the theoretical assumptions present in their own work – not least in order to avoid anachronisms when imposing their presuppositions to the historical case. Models can serve as a heuristic tool to help identify and explicate theoretical frameworks like in the example above. But engaging in the process of modeling practically, allows us to manage and document our own assumptions. As Loetz pointed out, it is not a novel approach to use modeling practices to mediate theoretical frameworks and empirical evidence. But the explicit discussion of models and modeling has been rather sparse in historical research. In the field of digital history, though, there has been more profound engagement with concepts of modeling over the last 10–15 years.²⁸ Because of its inherent interdisciplinarity, the digital humanities as well as digital history have a specific perspective on modeling as a practice of mediating different disciplinary approaches and interests. Joining any of the humanities' disciplines with computer-science methods puts specific emphasis on processes of modeling in the sense of operationalization.

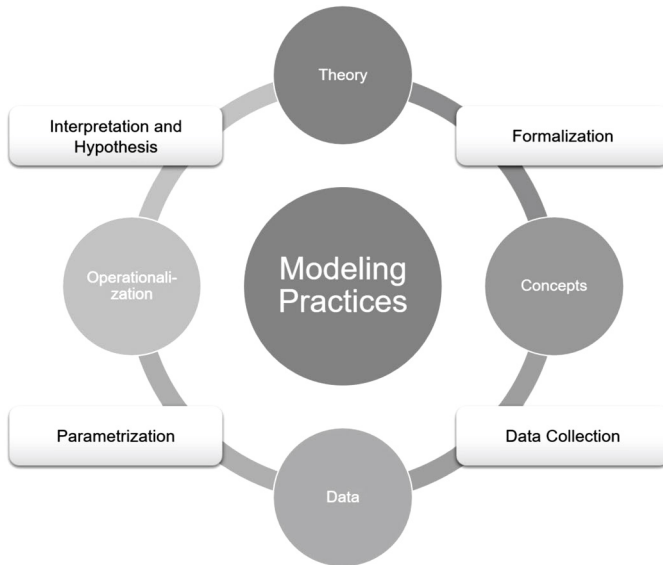
One of the main characteristics of digital history is that because of its implementation of quantitative methods from data science, statistics, and similar fields, it deals with data as its research object instead of (only) texts, images, or artifacts. This means that in the first steps of the process, theories, or theoretical frameworks have to be translated into questions and concepts, which then need to be formalized to make them suitable to quantitative methods. In the context of a project on “Comparative Approaches – Law of Precedent in Late Medieval England” we focus on analyzing medieval court practices as *practice formations* related to practices of comparing. Following a praxeological approach, we want to identify practices of comparing within a set of different practices and ask how these practices shaped the legal order, and legal procedure in particular. Another focus of the project lies with the analyses of the different actors involved in the court sessions conceptualized as *communities of practice*.²⁹ To operationalize these approaches, we need different models which focus on the general assumptions implied by the theoretical frameworks, on the one hand, and, on the other hand, allow us to map these concepts to the available data. Practices of comparing consist of at least two things which are being compared (*comparata*) in a specific regard (*tertia comparationis*) and always involve actors who carry

28 See for an overview of the specific field Fotis Jannidis/Julia Flanders (eds.), *The Shape of Data in Digital Humanities: Modeling Texts and Text-based Resources*. London 2018, [<https://doi.org/10.4324/9781315552941>].

29 See for the project description [<https://www.uni-bielefeld.de/sfb/sfb1288/projektbereiche/d02/>, last access: 18/05/2023].

out a comparison, often for a specific purpose.³⁰ To identify these practices in the context of a digital- history project, we need to conceptualize markers in a way to make them discernible by data-/text mining methods. Once they are discernible, we can then ask how they might be connected to other sets of practices to form *practice formations*. *Communities of practice* are groups of people who share a set of practices as their main moment of cohesion. In most regional medieval courts of the 13th to 15th centuries there were few to no professional legal actors present. The people involved came together for this particular purpose from the local communities and formed a community of practice which lasted only for the moment of the court session.³¹ To analyze these groups of people we need to identify the relevant actors and understand their relationships constituted at court. This might be done by applying computational methods like Named Entity Recognition (the automated identification of person names, and locations, etc.) and network analysis.

Fig. 2: Modeling Practices in Digital History



This image was generated by the author.

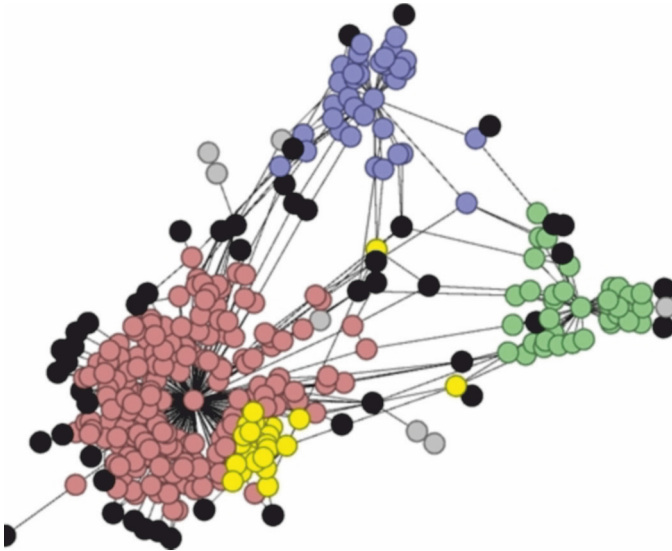
30 See for the conceptual work of the SFB 1288, e.g., Angelika Eppl/Walter Erhart (eds.), *Die Welt beobachten: Praktiken des Vergleichens*. Frankfurt am Main/New York 2015, as well as the Working Paper Series [<https://www.uni-bielefeld.de/sfb/sfb1288/publikationen/>], last access: 18/05/2023].

31 Cf. Silke Schwandt, *Rechtspraxis als soziale Praxis. Das Beispiel der Huntingdonshire Eyre von 1286*, in: *Das Mittelalter* 25, (1/2020), 83–102, [<https://doi.org/10.1515/mial-2020-0007>].

The next step then focuses on the data itself and the necessary modeling and processing of the data. Medieval court records have to be transformed into machine-readable formats and this also is a modeling process.³² Both processes are characterized by formalization, parametrization, and operationalization. Research questions are translated into formal concepts which are in turn associated with specific parameters of the model (which kinds of textual or linguistic information are relevant for the question?). The model is then used to process the data, i.e. the empirical evidence, accordingly and the results will be presented in a way which represents the modeling process.

If we look at the people present in court during the Huntingdonshire Eyre of 1286 and ask for their relationship to each other, we might arrive at a visualization like figure 3.³³

Fig. 3: Visualizing of people interacting at court during the Huntingdonshire Eyre of 1286, realized with Gephi by the author.



32 See for a detailed description of data modeling Piotr Banski/Andreas Witt, Modeling and Annotating Complex Data Structures, in: Jannidis/Flanders (eds.), *The Shape of Data in Digital Humanities*, 217–35, [<https://doi.org/10.4324/9781315552941>].

33 For the edition of the Huntingdonshire Eyre see Anne Reiber DeWindt/Edwin Brezette DeWindt, *Royal Justice and the Medieval English Countryside: The Huntingdonshire Eyre of 1286, the Ramsey Abbey Banlieu Court of 1287 and the Assizes of 1287–88*. Toronto 1981.

Visualizing a community of practice can happen in many different ways depending on the presupposition underlying the modeling process. For this example, the nodes of the network graph represent people who were present at court as litigants. The edges connecting the nodes show which people were part of the same case. The different colours represent the social groups that the people involved were a part of.³⁴ Bringing this information together as parameters for the network model, we can see how the community of practice was constituted. The clusters show that in most cases, the people involved in the same case came from the same social group, thus forming a community within the community. But there are some nodes which break the general pattern and ask for a closer look and a deeper explanation. We can assume that there are some cases where the borders of the social strata were less impervious than we would have expected.

What this example also shows is that the pattern recognition that is at the heart of this kind of modeling practice, is inherently comparative. In order to recognize the pattern, or to find the outliers in a network like the one above, the position, distribution, size, or colour of the nodes is compared and then interpreted within the framework of the general model. Modeling practices, therefore, most often are connected to practices of comparing.

Modeling, Ordering, Comparing – and now?

Let's go back to the beginning: Mauricio Suárez argues that there are two aspects to the slogan 'scientific models mediate between theory and the real world' – one methodological and one epistemological. "Model building is a pervasive feature of the methodology [...] to arrive at theoretical representations of real systems", while at the same time models relate to "issues such as the nature of explanation".³⁵

Modeling is an essential part of the scientific procedures of sense-making – and not only in the natural sciences. On the contrary, the understanding of history as a generalizable model shows that the humanities also productively engage in process of modeling – albeit with a different goal. Historians do not necessarily build 'verbal models' as a result of their research. Such models are rather built at the beginning of a research process to operationalize the mediation between theoretical assumptions and empirical evidence.

And as the example of Cranach's conceptual painting *Damnation and Redemption* has shown, this is not only a scientific or academic practice. Models and modeling

34 The classification follows the bibliographical register in DeWindt, *Royal Justice*.

35 Mauricio Suárez, The Role of Models in the Application of Scientific Theories, in: Morgan/Morrison (eds.), *Models as Mediators*, Cambridge 1999, 168.

practices serve many different purposes and, therefore, are never just neutral representations of the ‘real world’. They are highly restrictive, simplified and manipulative, and sometimes even ideological. The most important thing about modeling is therefore to make it explicit as an integral part of our research practices.

Especially for the research on practices of comparing, thinking about models and modeling practices does offer an added value: not only are comparisons often dependent on models, but the way that we frame our approaches to researching comparisons is as well. By making them explicit, their explanatory power becomes apparent and will help to engage with the presuppositions present in not only historical but also contemporary models of the world.

Bibliography

- BANSKI, Piotr/WITT, Andreas, Modeling and Annotating Complex Data Structures, in: Jannidis Fotis/Julia Flanders (eds.), *The Shape of Data in Digital Humanities. Modeling Texts and Text-based Resources*, London 2018, 217–235.
- BONNET, Anne-Marie et. al. (eds.), *Lucas Cranach der Ältere. Meister, Marke, Moderne*, Düsseldorf 2017.
- CERTEAU, Michel de, *The Writing of History*, New York 1988.
- EPPEL, Angelika/ERHART, Walter (eds.), *Die Welt beobachten. Praktiken des Vergleichens*, Frankfurt am Main/New York 2015.
- GEHRING, Petra, Wie verzichtbar sind Kollektivsingularare wirklich?, in: *Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 97 (1/2023), 65–71.
- GÖRRES, Daniel, Der Mönch und der Maler. Luther und Cranach als Vermittler eines neuen Glaubens, in: Anne-Marie Bonnet et al., *Lucas Cranach der Ältere. Meister, Marke, Moderne*, Düsseldorf 2017, 44–51.
- JANNIDIS, Fotis/FLANDERS, Julia (eds.), *The Shape of Data in Digital Humanities. Modeling Texts and Text-based Resources*, London 2018.
- KELLER, Evelyn Fox, Models of and Models for. Theory and Practice in Contemporary Biology, in: *Philosophy of Science* 67 (3/2000), 72–86.
- KOSELLECK, Reinhart et. al., *Begriffsgeschichten. Studien zur Semantik und Pragmatik der politischen und sozialen Sprache*, Frankfurt am Main 2006.
- LATOUR, Bruno, Visualization and Cognition: Thinking with Eyes and Hands, in: *Knowledge and Society* 6 (1986), 1–40.
- LOETZ, Francisca, Theorie und Empirie in der Geschichtsschreibung. Eine notwendige Wechselbeziehung, in: Norbert Paul/Thomas Schlich (eds.), *Medizingeschichte. Aufgaben, Probleme, Perspektiven*, Frankfurt am Main/New York: Campus, 1998, 22–44.
- MORGAN, Mary S., *The World in the Model. How Economists Work and Think*, Cambridge 2012.

- MORGAN, Mary S./MORRISON, Margaret (eds.), *Models as Mediators. Perspectives on Natural and Social Science*, Cambridge 1999.
- REIBER DEWINDT, Anne Brezette/DEWINDT, Edwin, *Royal Justice and the Medieval English Countryside. The Huntingdonshire Eyre of 1286, the Ramsey Abbey Banlieu Court of 1287 and the Assizes of 1287–1288*, Toronto 1981.
- SFB 1288 Do2 project description, URL: <https://www.uni-bielefeld.de/sfb/sfb1288/projektbereiche/do2/> [last access: 18/05/2023].
- SFB 1288 Working Paper Series, URL: <https://www.uni-bielefeld.de/sfb/sfb1288/publikationen/> [last access: 18/05/2023].
- SCHWANDT, Silke, Opening the Black Box of Interpretation: Digital History Practices as Models of Knowledge, in: *History and Theory* 61 (4/2022), 77–85.
- SCHWANDT, Silke, Rechtspraxis als soziale Praxis. Das Beispiel der Huntingdonshire Eyre von 1286, in: *Das Mittelalter* 25 (1/2020), 83–102.
- SUÁREZ, Mauricio, The Role of Models in the Application of Scientific Theories, in: Mary S. Morgan/Margaret Morrison (eds.), *Models as Mediators. Perspective of Natural and Social Science*, 168–196.
- THALHEIM, Bernhard/NISSEN, Ivor (eds.), *Wissenschaft und Kunst der Modellierung. Kieler Zugang zur Definition, Nutzung und Zukunft*, Berlin/Boston 2015.
- WHITE, Hayden V., *Metahistory: The Historical Imagination in Nineteenth-Century Europe*, Baltimore 2000.
- WHITE, Hayden V., *The Content of the Form: Narrative Discourse and Historical Representation* [Reprint.], Baltimore et. al. 1990.
- WHITE, Hayden V., The Value of Narrativity in the Representation of Reality, in: *Critical Inquiry* 7 (1/1980), 5–27.