

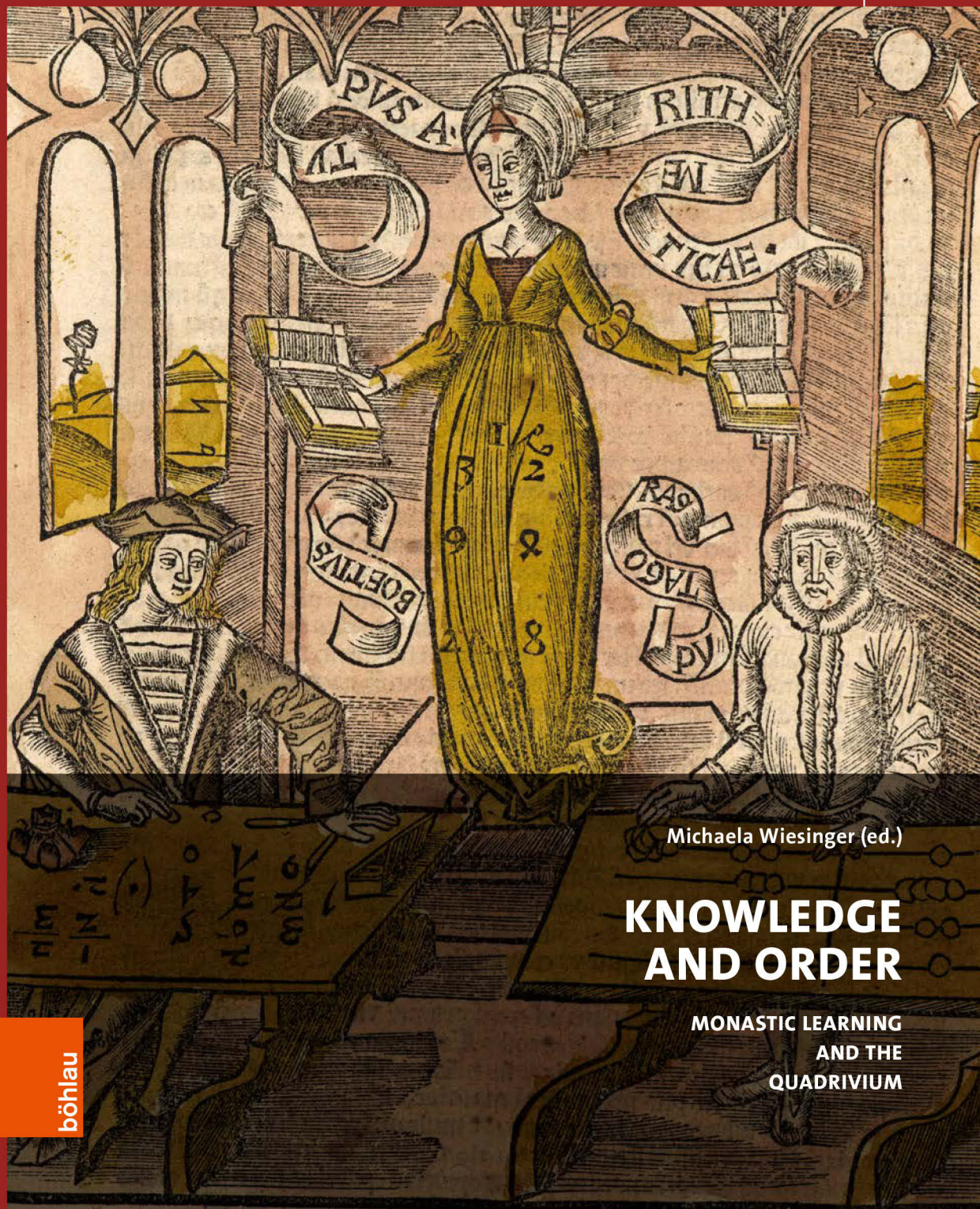


STIFT
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FoKuS Kloster

Lebens- und Wissensräume religiöser Kulturen

Band 3



Michaela Wiesinger (ed.)

KNOWLEDGE AND ORDER

MONASTIC LEARNING
AND THE
QUADRIVIUM

böhlau





STIFT
KLOSTERNEUBURG

Forschungsstelle für **Kulturwissenschaftliche Studien**

FoKuS Kloster

Lebens- und Wissensräume religiöser Kulturen

Herausgegeben von

Martin Haltrich und **Christina Jackel**

3. Band

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INTRODUCTION

Michaela Wiesinger

The monastic environment distinguishes itself by its difference to and its withdrawal from the “outside”-world. Be that as it may, not every order is and functions the same. Some are strictly focused on their relationship to God and on achieving a state of contemplation, while others engage more openly with their surroundings where their brothers and sisters serve as teachers, healers, or missionaries, and, more broadly, seek connections beyond the monastery walls. Yet whether engaged solely within or beyond its own boundaries, the monastic life is always a life of learning. The main difference lies in what kind of knowledge can be accessed. This depends on the rule of the order as well as the financial situation of the individual monastery, not to mention the background and proclivities of individual brothers or sisters. So, what individual members of a monastic order can know is a mixture of what their education allows them to ask about, what the resources they can access allow them to learn, and how connected an order is to its vicinity on an economic, academic, and pastoral level. Managing properties, land, and (wine-)trade, as the canons of Klosterneuburg have done for centuries, requires specific knowledge from various fields; running monastic schools needs educated teachers in the fields of theology, philosophy and the liberal arts. But there is a difference between a necessary education depending on what an order needs to function and go about its day to day business and a learned curiosity that goes beyond the essential. This book wants to explore these tensions by focussing on a specific field that continuously meanders between necessity and academic curiosity: mathematics and its connected arts, namely accounting, surveying and the art of perspective.

This collection begins with a contribution that underscores my initial point: what we can know correlates with what is presented to us and whether we, as the learners, are able to access and find the knowledge we wish to gain. It is a given that a library functions as a repository of knowledge, but as important as the actual books held in a library are the principles by which they are organised and who can access the information. Furthermore, the collected knowledge is not static but changes over time and reflects evolving interests, new discoveries, and the influence of other discourses on the monastic environment. In their article, Edith Kapeller and Christina Jackel focus on an exemplary corpus of medieval manuscripts held in the library at Klosterneuburg Abbey and enquire how they were organised and reorganised over time. They are looking for historical shelf marks and traces of how the books were stored and presented. Their preliminary findings reveal not only when certain books were acquired but also how access to these books was managed over time. In

particular, their findings regarding a chain library in the abbey are supported by research on the material, by old catalogues, and by cross-referencing the corresponding account books documenting the acquisition of books and library materials.

Accounting is also at the heart of Elisabeth Gruber's contribution, which revolves around the connection between account books, material objects, and services and goods. In Gruber's research, the single object is not an isolated thing in a monastic setting, but rather an entity with value within the institution as a whole. Her primary sources are the monastic account books of Klosterneuburg Abbey that show an interconnectedness of spiritual and institutional life. Gruber traces this connection by focussing on the involved actors and the corresponding objects.

Another approach to mathematics and numbers in an ecclesiastical environment is presented by Norbert Orbán. His source is the handwritten reckoning book by the Swiss pastor Clemens Hör, who writes at a time of religious conflict when Catholics and Protestants settle their differences by warfare and mutual exclusion. Nevertheless, Orbán argues, trade needs to continue and overcoming religious convictions is a prerequisite of economic prosperity. Hör writes for students of mathematics and produces an explicitly non-religious text he also intends to have printed one day – a wish that ultimately went unfulfilled. In his book, we hardly see any explicit mentions of the Reformation or the ongoing wars taking place around Hör in spite of competing belief systems. But occasionally the underlying conflicts, the religious convictions, and the clerical connection still seep through in certain phrases, examples, and in the paratexts.

Even though we know that monks were expected to understand mathematics and to learn how to calculate for trade, bookkeeping, and teaching purposes, the mathematical collections within monastery libraries differ significantly, especially regarding textbooks on how to calculate with pen and paper using Hindu-Arabic numerals. Yet one group of texts has thrived everywhere since the early 13th century: the Algorithm-treatises. Within these, two versions are most prevalent, the Algorithm-treatise "De arte numerandi" by Johannes de Sacrobosco, which is an early translation of Al-Khwarizmi's introduction to the Hindu-Arabic numerals, and the "Carmen de Algorismo" by Alexander de Villa Dei, a versification of the educational text that gained popularity in the 13th and 14th century. We have hundreds of text witnesses, several of which evince a strong connection to a monastic environment. Aaron Schwarz's contribution focusses on three case studies in which the Algorithm-treatises and their connection to a specific monastery are analysed over time. He investigates the overall use and usefulness of these texts in the monastic sphere while touching upon the interaction between the monastery and the secular world.

One specific mathematical work is in the centre of the next two articles in this volume and serves at the same time as an anchor point for several different historical, philological, and editorial questions: my colleague Julia Bruch and I investigate the early modern scribe, printer, editor, historian, and reckoning master Jakob Köbel (1460-1533) from the city of Oppenheim. The library at Klosterneuburg Abbey holds one print under the shelf mark G I 92 of a later edition of Köbel's very famous and very popular reckoning book as part of a collection of several of his texts that also includes a second reckoning book by Heinrich Gülfferich. Bruch provides a detailed account on the contents of the book, tracing each text in it back to its roots. We learn about the different editions and where we can find them, Köbel's connection to Egenolff, and the environment in which these editions were produced. I have sought to build upon Bruch's contribution by focussing on the content of the book in an attempt to understand how reckoning books relate to entertainment: why are they always described as entertaining in their forewords, and how is this entertainment actually implemented throughout the whole book? In an attempt to provide an initial assessment of the reckoning book as a source for philological studies, I seek to define the reckoning example as a "Simple Form," as André Jolles describes it, and to explore the function of the list as a narratological tool while enquiring about the connection between image and text. Lastly, I try to figure out whether and how much this specific book was used at Klosterneuburg by studying the handwritten notes in the margins throughout the print.

While Franziska Putz also draws from Jakob Köbel's reckoning book, her chief focus lies on the paratexts of two reckoning books: Köbel's reckoning book and the "Arithmetica Historica" written by Sigismund Suevus in 1593. She investigates the relevance of the paratexts with special attention to the forewords. Both of the books under analysis were highly successful at the time they were published, and both were written by men who, ironically, were not proficient mathematicians. Suevus was a reformed pastor and very interested in spreading his teachings, while Köbel was a smart entrepreneur and his books demonstrate high production values. Direct messages to their readers, information on why and how the books were made can be found in the paratexts. Therefore, the foreword is the perfect place to study the development and the relevance of the paratext through time, the necessity of a foreword for the author, and the connection between paratext and the teachings of the reckoning book. How do they interact, overlap, and even contradict one another?

The next contribution in our book comes from Bernhard Bauer, who is interested in a brief phrase that appears in functional texts with mathematical content. He investigates the development of a terminology about the art of subtraction that is similar in Latin, insular Celtic, and German texts. All texts refer to "throwing" or "putting" something away, showing that the development of a mathematical language and the implementation of certain terms and phrases might be more closely connected throughout Europe than is evident at first glance. By comparing the process of lexicalisation in the field of mathematics of

different languages, we can trace connections and deviations, which leads to further conclusions concerning the role of language and how it shapes and develops mathematical thought. This could amount to a first step to understanding how the development of a formalised mathematical language took shape.

The last two articles deal with the art of perspective but from two very different angles. The philologist Jan Habermehl takes us on several small journeys with his paper: His study revolves around the “Geometrie” by the cleric Christoph Puehler, a book about the art of surveying written in 1563 in a monastery. Habermehl is not only interested in the circumstances that guide the production of the book but also in the elaborated and at times highly fictional stories that accompany the examples given in the “Geometrie”. He argues that Puehler’s book was conceived to fulfil neither a financial nor a pedagogical need. It is rather a product of pleasure that introduces technical terminology, complements existing treatises from the field of surveying, and does something very new: Habermehl defines the purpose of the book as “buchgestützte Wissensunterhaltung”, as a form of entertainment by knowledge that heavily relies on book learning. He shows that several stories, even though they focus on known regions and places and therefore read as if the author had experienced everything firsthand, are highly fictional and are exclusively there to entertain.

The last contribution of this volume was written by Kristian Faschingeder and Anna Reisenbichler. They focus on two books held by Klosterneuburg Abbey library that teach the art of perspective. One is the famous work by Albrecht Dürer in a first edition from 1525, the second is a book that functions as a direct answer to Dürer’s book and was produced in 1530 by Hieronymus Rodler. It is an introduction to the art of measurement and is explicitly made for painters, sculptors, goldsmiths, carpenters, and other tradesmen that need to understand and use the art of perspective. Rodler’s print serves as an addendum to Dürer’s book and aims to explain and simplify his work. A beautifully crafted piece of art that showcases expert printing and woodcutting skills, the book exemplifies what the reader will learn while studying it. Faschingeder and Reisenbichler make the argument that the material, the rather slim and easily portable book, especially in contrast to the sturdy and very sizable Dürer print, points toward the mobility and the practicality of the knowledge within it.

The nine contributions to this volume all revolve around the arts of the quadrivium. They all display an affinity for numbers in a monastic environment and therefore highlight a connection that might be less intuitive at first glance: the necessity of mathematical skill on a theoretical and a practical level within the monastery. The articles in this volume all revolve around one pivotal point, the monastic world as either the collector, producer or distributor of mathematically relevant works. What we find is that contrary to a university environment it is not mainly the theoretically relevant geometrical and arithmetical teachings that are collected and studied, but the practical texts. Therefore, all contributions to this

volume have practice and application at their heart, asking about who, why, and when these texts were studied and used. Of course, mathematical texts could have been collected in a monastic environment solely because of a collection policy or to complete a library without any intention for use. Yet the books and texts studied in this volume show signs of usage, and they were relevant in practice within the monastery walls and very likely also outside of them. They show the accessibility and the tangibility of mathematical knowledge in a monastic setting very clearly and lead to a better understanding of the connected knowledge environment.

TRACING SHELFMARKS IN MANUSCRIPTS AND EARLY PRINTS OF KLOSTERNEUBURG ABBAY LIBRARY

Edith Kapeller and Christina Jackel

INTRODUCTION

The library of the Augustinian Canon's Monastery in Klosterneuburg was founded in the early 12th century (with the abbey church's foundation taking place in 1114 and the Augustinian Canons and Canonesses entering in 1133). Today, the collection comprises approximately 300,000 printed books, 1,200 medieval manuscripts, 830 incunabula, and 350 modern manuscripts. Since the mid-19th century, the library has been located within the upper floor of the entrance dome and in the adjacent rooms. The library's location prior to this period is difficult to determine, and within the Middle Ages it is especially unclear where the library was located, and indeed how many libraries existed within the monastery. It can be assumed that: the respective provost had his own library; liturgical books were kept in the sacristy and the church; books for table readings were probably stored in the refectory; and the chapter house had a book for the current chapter office. Additional books were presumably stored in various locations according to functional needs. Furthermore, many canons will have owned books privately, likely kept in their cells, and there may have also been a school library. The women's convent, which existed until 1568, also maintained a collection of books.¹ The canonesses needed literature for their daily liturgical services, table readings, medical care, private reading, as well as for the school they ran. Although there is no evidence that the women maintained their own convent library, they were probably provided with books from the men's convent, with the so-called *custos dominarum* serving as a likely intermediary in this arrangement, as within this role he would have assumed the responsibility for overseeing the affairs of the women's convent. In at least two cases, there is evidence that the offices of the *custos dominarum* and the *custos librorum* (librarian) were held by the same person.² Furthermore, surviving ownership notes provide strong

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- 1 Cf. Sarah DEICHSTETTER, Der Bücherschatz der Chorfrauen, in: Wir Schwestern. Die vergessenen Chorfrauen von Klosterneuburg, ed. by Eva SCHLOTHEUBER–Jeffrey F. HAMBURGER–Christina JACKEL, Vienna 2024, pp. 141–149.
 - 2 Cf. Cristina ANDENNA, Ein Leib, ein Herz und eine Seele. Klosterneuburg und das Setting einer Doppelgemeinschaft, in: Wir Schwestern. Die vergessenen Chorfrauen von Klosterneuburg, ed. by Eva SCHLOTHEUBER–Jeffrey F. HAMBURGER–Christina JACKEL, Vienna 2024, pp. 57–66, p. 63.

evidence that some of the women owned books privately, most of which were small-format prayer books. An inventory drawn up during the dissolution of the convent in March 1568 also mentions twenty books that were still in the room of the *magistra* of the women's convent, but no titles are given.³ All of these holdings were later incorporated into the current library, where they were categorised thematically as well as by size, so that nowadays the different smaller collections are no longer easily distinguishable.

Currently, the library holds 1.205 manuscripts from before 1500 and 836 incunabula. Additionally, there are 740 so-called *Altdrucke* (old prints), which are relevant for the research discussed in this paper. In Klosterneuburg, *Altdrucke* are defined as books printed between 1501 and 1520 and are listed in a separate catalogue.⁴ Eleven manuscripts date from the 9th–11th centuries, thereby predating the monastery itself, and as to be expected, the collection grew with each passing century with 135 manuscripts written in the 13th century, 390 in the 14th, and 546 in the 15th century.⁵ Furthermore, the Abbey Library now holds around 350 modern manuscripts dating from the 16th to the 20th century, as well as around 2.000 fragments.⁶

In their current location, in which the manuscripts and incunabula have resided since 1837, they have been organised according to size: large folio and folio as one combined group, quarto and octavo. Within these size groups, a systematic order exists, although the sequence is not always clear, as Franz Lackner noted in the introduction to his manuscript catalogue:

- Bible and Bible commentaries
- Patristics
- Scholasticism
- Sermons
- Liturgy
- Law
- Encyclopaedias
- Medicine
- History
- Hagiography
- Artes⁷

However, today's shelfmarks do not include a size reference, but follow a simple *numerus currentens*-system, with no indication of where a new size begins. Today's manuscripts only have a

³ Cf. DEICHSTETTER, *Bücherschatz* (2024), p. 141.

⁴ Cf. Vinzenz Oskar LUDWIG, *Klosterneuburger Altdrucke (1501–1520)*. *Jahrbuch des Stiftes Klosterneuburg* 8/1 (1917), pp. 1–224.

⁵ Not all of these manuscripts were written directly in Klosterneuburg; some were purchased later. Due to a lack of data on the purchase of manuscripts, it is not possible to specify exactly how many manuscripts were added to the library in which century.

⁶ Data collection by Martin HALTRICH, head of the Center for Cultural Studies of Stift Klosterneuburg.

⁷ Cf. Franz LACKNER, *Katalog der Handschriften des Augustiner Chorherrenstiftes Klosterneuburg*, Cod. 201–300, with the collaboration of Alois HAIDINGER–Martin HALTRICH–Maria STIEGLECKER (*Österreichische Akademie der Wissenschaften, phil.-hist. Klasse, Denkschriften* 434; *Veröffentlichungen zum Schrift- und Buchwesen des Mittelalters* II,2,3; Vienna 2012), p. 7, n. 1.

number as a shelfmark, ranging from 1 to around 1450, usually preceded by 'CCL' for 'Codex Claustroneoburgensis'. Some manuscripts have an existing shelfmark with the addition of 'a' or 'b', for example CCL 626a placed next to CCL 626. This occurs either because a related manuscript entered the collection later or because a volume was divided into two during the Early Modern Period. Each of the subject groups mentioned above appears three times in the manuscript collection, once for each size. Consequently, the subject group 'Bible' begins

- 1) in large folio/folio format with CCL 1
- 2) in quarto format with CCL 141
- 3) in octavo format with the now lost CCL 1109.

The other subject groups follow consecutively. The current arrangement of the manuscripts must have been established by the beginning of the 19th century as Maximilian Fischer's catalogue of manuscripts, which itself dates back to 1808, references this order.⁸ When the library was moved to its new premises in the mid-19th century, it is unlikely that anything was changed. Maximilian Fischer's abbey chronicle for the beginning of the 19th century also describes how the books were moved to the newly created rooms in 1837 – the cupola hall, the manuscript room, and what is now 'Zimmer 7' – which are still used today. For moving, the books were bound together in fascicles

... und nach ihrer systematischen Ordnung auf dem Fußboden ausgelegt worden. Um sie nicht durch die Träger etwa in Verwirrung kommen zu lassen, wurden eigene zu verschließende Tragkästen verfertigt, und dort von einem die Aufsicht dabey führenden Geistlichen erschlossen, und in der neuen Bibliothek oder in einem Nebenzimmer, gleichfalls auf dem Fußboden, in möglichster Folgereihe gelegt.⁹

(... and laid out on the floor according to their systematic order. To prevent them from being mixed up by the carriers, lockable carrying cases were made and opened by a clergyman who was supervising the process. They were then laid out in the new library or an adjoining room, again on the floor, in as continuous an order as possible.)

⁸ Cf. Maximilian FISCHER, *Catalogus bibliothecae Claustroneoburgensis I: Codices manuscripti qui extant in bibliotheca Claustroneoburgensi, Klosterneuburg 1808* (handwritten).

⁹ *Stiftschronik Maximilian Fischers, StiAKI, Hs. 119, fol. 144r–144v*. Many thanks to Stephanie Zima, who is writing an article on this chronicle. It will appear in one of the following 'Jahrbücher des Stiftes Klosterneuburg'.

Therefore, the organisation of the books in the new library rooms must have been (and probably still is) largely comparable to the previous arrangement. However, as stated, it remains unclear when this system was originally introduced.

RESEARCH OBJECTIVES AND METHOD

The history of Klosterneuburg's medieval library (or libraries) remains largely unknown. Although the manuscripts bear various earlier shelfmarks,¹⁰ these have not yet been analysed in terms of their systematics. Knowledge about the existing manuscripts is continually expanding,¹¹ but the specific organisation and arrangement of the medieval library have thus far not been properly examined. Furthermore, information about the location and building history of the medieval and early modern library remains sparse. Consequently, it is not possible to draw conclusions concerning the organisation and presentation of the collection, or indeed the library situation in general.

In this article, as well as in subsequent publications within the framework of the research project, we examine the Klosterneuburg Abbey Library of the 15th and early 16th centuries in greater detail. Unfortunately, no catalogues from this period have survived, and as such our current research focuses on the periods that were particularly significant for the monastery library in terms of cataloguing, organising, or reordering, and tracing the number of changes in the system. It is important to note that many bindings were produced in Klosterneuburg itself, and the materials needed to appear in the account books. These records thus became useful for dating initiatives that aimed to reorganise the book collection. This additionally led to the possibility of reconstructing an earlier order from the existing shelfmarks. The physical characteristics of the books will also be explored, to determine whether any conclusions can be drawn about the arrangement of the medieval library. This ultimately raised the question of whether the shelfmarks were connected to the presence of book chains which were found on many of the Klosterneuburg manuscripts.

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- 10** Cf. Alois HAIDINGER, *Katalog der Handschriften des Augustiner Chorherrenstiftes Klosterneuburg*. Cod. 1–100 (Österreichische Akademie der Wissenschaften, phil.-hist. Klasse, Denkschriften 168; Veröffentlichungen der Kommission für Schrift- und Buchwesen des Mittelalters II,2,1; Wien 1983), p. XVII, Fig. 48–52.
- 11** The main responsibility for this lies with the long-term project of the Department for Codicology and Palaeography at the Institute for Medieval Research of the Austrian Academy of Sciences: *Manuscripta Mediaevalia Austriaca*, <https://www.oeaw.ac.at/imafo/forschung/schrift-buchwesen/manuscripta-mediaevalia-austriaca> [4.7.2025], as well as other research projects involving the library's manuscript collection. For example the Project: Ancient Book Crafts (ABC = FWF I 5884-G Weave-Project), <https://www.oeaw.ac.at/imafo/forschung/schrift-buchwesen/materialanalysen/einbandforschung> [4.7.2025] and <https://www.akbild.ac.at/de/forschung/projekte/forschungsprojekte/2022/abc-altes-buchhandwerk> [4.7.2025]; Scribe ID AI, Active Machine Learning for automatic identification of handwriting in 12th century manuscripts <https://research.fhstp.ac.at/en/projects/scribe-id-ai> [4.7.2025].

To answer these questions, we started by analysing the collection as it could be found in the Klosterneuburg Abbey Library up until the 1520 – including manuscripts, incunabula, and old prints – for *olim*-shelfmarks.¹² The collected data is recorded in a table, which, in addition to information on shelfmarks, includes information concerning the following questions: Has the book been rebound, and if so, when? Do the binding or the last few leaves show a chain or traces of one? Are there any medieval ownership or provenance entries from the monastery library, such as *Iste liber est St. Marie in Newenburga claustrali* (15th century), or notes from Albertus Saxo, a 14th-century librarian who wrote his abbreviated name *Al Saxo* or an ownership note in most of the then-existing manuscripts?¹³ Are there any other indications of provenance? Are there any other special features that provide insight into the organisation of the late medieval and early modern library?

Like most historical book collections, the one found in the Abbey of Klosterneuburg has certain unique characteristics that complicate research. Most of the manuscripts were rebound around 1840 when the library moved to its new premises.¹⁴ During this process, some flyleaves were removed or added, and former paste-downs of the newly bound manuscripts were only rarely preserved. Some of these removed leaves are probably still in the fragment collection today, yet there are only a few cases in which these leaves can be definitively assigned to a corresponding binding or codex. However, it is most likely that many of them have certainly been lost. Furthermore, many old shelfmarks were almost undoubtedly noted on these leaves, as well as on the title labels of the lost bindings. Additionally, it seems that the flyleaves of the manuscripts were partially interchanged or reversed – either within a single manuscript (this could be an explanation for the upside-down shelfmarks found in some books, e.g., CCl 835, fol. Ir; CCl 677, flyleaf), or between different codices, which is difficult to trace today. Likewise, we are unable to state with absolute certainty if the flyleaves of the newly bound manuscripts were also found earlier in the same book. This is an important distinction as it means there is an element of uncertainty regarding almost all of the statements made in this text, and while this uncertainty will not always be explicitly mentioned, the reader is asked to bear this aspect in mind.

This project outline is based on 409 books that were analysed and recorded before June 2025 – equating to approximately one-sixth of the entire corpus. While most of the books examined were medieval manuscripts, some incunabula were also consulted to determine whether they contained *olim*-shelfmarks. In an attempt to represent a cross-section of the

¹² We record all numbers that have been entered in typical places in the books. Whether these were actually shelfmarks or, for example, inventory numbers will be clarified in the course of the project.

¹³ For the provenance notes of the Abbey Library cf. HAIDINGER, *Katalog Cod. 1–100* (1983), p. XVI, n. 25 and Fig. 42–47; Edit Anna LUKÁCS, *Medizinische Rezepte in von Albertus Saxo signierten Handschriften des Stiftes Klosterneuburg*, in: *Quelle & Deutung VII, Beiträge der Tagung Quelle und Deutung VII am 18. Oktober 2022*, ed. by Balázs SÁRA (*Antiquitas – Byzantium – Renascentia LIII; EC Beiträge zur Erforschung deutschsprachiger Handschriften des Mittelalters und der Frühen Neuzeit I.VII*, Budapest 2023), pp. 53–69, pp. 60–61.

¹⁴ Dating from HAIDINGER, *Katalog Cod. 1–100* (1983), p. XIII.

collection, we partly proceeded according to current shelfmark or format, but also looked at individual thematic groups in all three formats. This small selection is, of course, only of limited significance, but it does allow us to derive a number of hypotheses that can serve as a basis for the ongoing work.

THE KLOSTERNEUBURG BOOK COLLECTION IN THE 15TH CENTURY

Despite the difficult economic and political circumstances during the 15th century, especially at the beginning, this period marks a productive time for the library. Many new books were added, books that were produced in or for the house, until the growing size of the collection made organising systems increasingly important. However, two periods are of particular interest for our investigation, as they coincide with changes in personnel, both in the provosts and the librarians:

- 1) Georg Muestinger was elected provost in 1418 and remained in office until 1442. Muestinger was particularly interested in cartography and astronomy. He was well acquainted with important scholars of his time, above all his teacher Johannes von Gmunden, who worked in Vienna. Provost Georg wrote astronomical manuscripts himself and commissioned several others, as well as a world map, which is now lost.¹⁵ Many of the canons copied books for the Abbey Library, but professional scribes from outside were also employed. Hartmann Zeibig has identified 19 manuscripts for this period that were copied for the monastery by known external scribes. Most of them contain sermons, but some others transmit natural philosophical and astronomical texts.¹⁶ In contrast to the professional external scribes, the canons compiled, glossed, and wrote liturgical books.¹⁷ Illuminators from the so-called 'Wiener Hofwerkstätte' were hired to decorate several newly written high-quality manuscripts.¹⁸ Books were not only read by

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- 15 Cf. Karl HOLUBAR (ed.), *Das Augustiner-Chorherrenstift Klosterneuburg. Geschichtliche und statistische Daten. Klosterneuburg* 2014, p. 279; Dana BENETT DURAND, *The Vienna-Klosterneuburg Map Corpus of the Fifteenth Century. A Study in the Transition from Medieval to Modern Science*, Leiden 1952, pp. 56–66.
 - 16 Cf. Hartmann ZEIBIG (ed.), *Urkundenbuch des Stiftes Klosterneuburg bis zum Ende des vierzehnten Jahrhunderts*, I. Teil (FRA 2,10,1; Vienna 1859), p. LI, n. 4; Berthold ČERNÍK, *Die Wissenschaft und das Augustiner-Chorherrenstift Klosterneuburg. Ein Beitrag zur österr. Literaturgeschichte*, Vienna 1900, pp. 56–57.
 - 17 Cf. Berthold ČERNÍK, *Das Schrift- und Buchwesen im Stifte Klosterneuburg während des 15. Jahrhunderts. Jahrbuch des Stiftes Klosterneuburg* 5 (1913), pp. 97–176, at p. 112.
 - 18 Cf. Alois HAIDINGER, *Verborgene Schönheit. Die Buchkunst im Stift Klosterneuburg*, Katalog zur Sonderausstellung 1998 des Stiftsmuseums Klosterneuburg, Klosterneuburg–Vienna 1998, p. 37.

the canons, but also used for teaching. According to the visitation statute of 26 May 1419, the school for secular pupils and the canons was required to be separate. In addition, there was a school for canonesses, in which girls from the household as well as secular girls were taught together.¹⁹ During Muestinger's term in office, Caspar Perman took over the post of Abbey Librarian in 1432 and held it until 1454.²⁰ The chain library appears to have been established during his tenure as this coincides with the only entry concerning the acquisition of chains within the abbey's account books.²¹ Perman also had a catalogue of books drawn up, which, unfortunately, is no longer extant; however, there is evidence of this catalogue in an account book from 1439/40, in which the purchase of materials for a *registrum librorum* is recorded.²²

- 2) Another register of the library's holdings, now also lost, was compiled at the beginning of Provost Georg Hausmanstetter's (1509–1541) tenure. There is no documented Abbey Librarian for this period; however, the last recorded officeholder, Philipp Weydenhofer, served until 1499.²³ Nevertheless, the dean of the Abbey, Vinzenz Weißenberger, probably had the Abbey Library organised and catalogued immediately after Hausmannstetter's appointment, as recorded: *Item circa illud tempus institui tres magistros et alios ad componendum ornate libros omnes in libraria nostra et desuper scribere contenta librorum.*²⁴ Weißenberger's emphasis on recording the contents of the books suggests that a thematic catalogue was compiled. This raises the question of whether the two lost catalogues listed the existing shelfmarks or whether the creation of the catalogues itself prompted the expansion or replacement of the system that was in use.

¹⁹ Cf. Eva SCHLOTHEUBER, Die Frauen von Klosterneuburg. Der Klostereintritt, in: Wir Schwestern. Die vergessenen Chorfrauen von Klosterneuburg, ed. by Eva SCHLOTHEUBER–Jeffrey F. HAMBURGER–Christina JACKEL, Vienna 2024, pp. 123–130, p. 124.

²⁰ Cf. ČERNÍK, Wissenschaft (1900), p. 58. List of librarians in Vinzenz Oskar LUDWIG, Klosterneuburg. Kulturgeschichte eines Österreichischen Stiftes, Vienna 1951, pp. 174–175.

²¹ See below.

²² Cf. ČERNÍK, Schrift- und Buchwesen (1913), p. 159.

²³ List of librarians in Vinzenz Oskar Ludwig, Klosterneuburg. Kulturgeschichte eines Österreichischen Stiftes (Vienna 1951), pp. 174–175.

²⁴ At about that time I had three scholars [canons] and others record all the books in our library and write the contents of the books above it. Cf. StiAKI, Chartularium Archiv VI, quoted from: ČERNÍK, Wissenschaft (1900), p. 58, translation by the authors.

SHELFMARKS OF THE 15TH AND EARLY 16TH CENTURY

The manuscripts (and incunabula) in the Abbey Library show several shelfmark systems originating in the late Middle Ages and Early Modern Period side by side. Three distinct types can be identified:

'Fol. 4- Signatur': Shelfmark in the lower left corner of folio 4r; a combination of letter and number

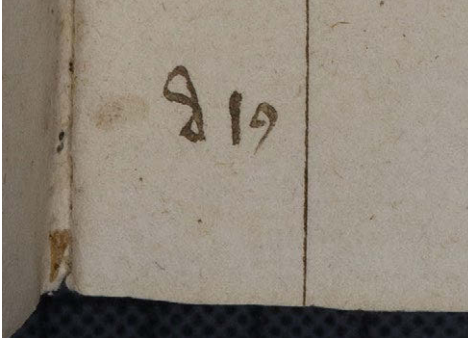


Fig. 1
'Fol. 4-Signatur', Klosterneuburg,
Stiftsbibliothek, CCL 768, fol. 4r

A shelfmark that is easily overlooked can be found on the lower edge of folio 4r or the surrounding leaves and is therefore referred to as 'Fol. 4-Signatur' (Shelfmark on Fol. 4). It is the oldest 15th-century shelfmark and was still in use in the 1420s, but does not appear in any manuscripts dated after 1430.²⁵ Given the dating of this shelfmark, it is, of course, absent from the incunabula. This shelfmark is written in a relatively small size. It is not ideal for ordering purposes as it is neither visible from the outside nor can it be read by quickly opening the book.

In CCL 768 on fol. 4r the shelfmark *d 19* – or *d 1(us)* for *primus* can be found (Fig. 1). Due to the small sample, it is not entirely clear whether the last character is a 'us'-abbreviation or the number 9.

According to the current state of the examination, the letters A–L (currently without I/J) are used for the 'Fol. 4- Signatur'. The meaning of these letters has not yet been determined.

'Signatur Schwarz': Black ink shelfmark; a combination of letter and number

'Signatur Schwarz', a somewhat larger black ink shelfmark found in Klosterneuburg manuscripts and incunabula, follows the 'Fol. 4-Signatur' chronologically. It is usually found on one of the first leaves or the front cover – the exact location varies – and consists of a letter, which can be a capital or a lowercase letter, followed by a one- or two-digit number. In rare cases, two different black ink shelfmarks can be found in the same book: CCL 768, for

²⁵ Cf. HAIDINGER, *Katalog Cod.* 1–100 (1983), p. XVII.

example, bears the shelfmark *d 23* in the lower right-hand corner of fol. 1r (Fig. 2).

It can also be found on some of the few surviving title labels, where it occupies a prominent position in the centre below the title of the text (Fig. 3 and 4).

In some cases, ‘Signatur Schwarz’ is supplemented by a *s(ubtus)* or *subt(us)*, such as in CCl 798: *E · 4 · Subt(us)* on fol. 3r²⁶ (Fig. 5). This *subtus*, standing for ‘under’, presumably refers to a physical spatial criterion – the library having now grown to such an extent that it was no longer possible to fit all the books on the available desks themselves, thus prompting new means of categorisation. The shelfmark addition now refers to the space under an existing desk on which another book – the same shelfmark without *subtus* – was located. This space under the desk could be a board or shelf, as captured in paintings in the middle or second half of the 15th century (Fig. 6).

Alois Haidinger dates ‘Signatur Schwarz’ to the period between 1430 and the end of the 15th century.²⁷ It was therefore used immediately after the ‘Fol. 4-Signatur’. An incunabulum (now Ct 13) may provide a clue as to how long this shelfmark was used: Provost Jacob Paperl († 1509) purchased the book in 1488, and it only contains a red shelfmark (‘Signatur Rot’, the shelfmark following ‘Signatur Schwarz’, see below). If this incunabulum was brought directly to the convent library, this would provide a *terminus ante quem* for the change from red to black in 1488. However, if Paperl

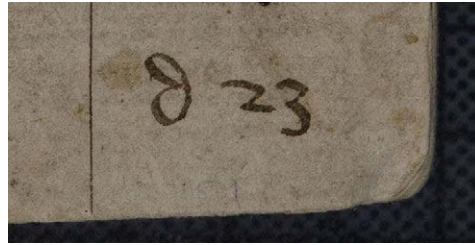


Fig. 2
‘Signatur Schwarz’, Klosterneuburg,
Stiftsbibliothek, CCl 768, fol. 1r



Fig. 3
‘Signatur Schwarz’, Klosterneuburg,
Stiftsbibliothek, CCl 813, title label



Fig. 4
‘Signatur Schwarz’, Klosterneuburg,
Stiftsbibliothek, CCl 129, title label

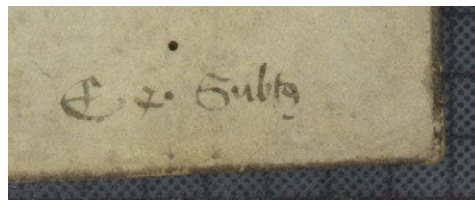


Fig. 5
‘Signatur Schwarz’ with *Subtus*, Klosterneuburg,
Stiftsbibliothek, CCl 798, fol. 3r

²⁶ The same shelfmark can be found on the former paste-down of the upper board as an addendum.

²⁷ Cf. HAIDINGER, *Katalog Cod. 1–100* (1983), p. XVII.



Fig. 6

Leonhard von Brixen: Annunciation, South Tyrol, 1455–1465, Bolzano, Museo Civico

kept the book in his private library, the latest date for the change would be around 1509, after his death, when his private collection was dissolved.

‘Signatur Schwarz’ is often relatively close to the ‘Fol. 4-Signatur’ and has, for example, the same letter²⁸ but a slightly higher number. According to the results so far, the two shelfmarks are only identical if there are two different entries of ‘Signatur Schwarz’. In such cases, one of them is the same as the ‘Fol. 4-Signatur’, while the other deviates from it.²⁹ The current state of research shows that the letters A–O were used for ‘Signatur Schwarz’.

28 E. g. StiBkl, CCl 808: ‘Fol. 4-Signatur’: d 41, ‘Signatur Schwarz’: d 45; CCl 809: ‘Fol. 4-Signatur’: d 42, ‘Signatur Schwarz’: d 46; CCl 139: ‘Fol. 4-Signatur’: g 13, ‘Signatur Schwarz’: g 23.

29 E. g. StiBkl, CCl 818: ‘Fol. 4-Signatur’: k 5; ‘Signatur Schwarz’: k 5 and k 26.

‘Signatur Rot’: Red ink shelfmark; a combination of letter and number

A shelfmark very similar to ‘Signatur Schwarz’, but written in red ink, can also be found on the first leaves of manuscripts and incunabula and in some cases, on surviving title labels: ‘Signatur Rot’. Like ‘Signatur Schwarz’, it consists of a capital or lowercase letter, a one- or two-digit number, and possibly a *subtus* (Fig. 7 and 8). These shelfmarks date back to around 1500.³⁰



Fig. 7
‘Signatur Rot’ d 27, Klosterneuburg,
Stiftsbibliothek, CCL 768, flyleaf

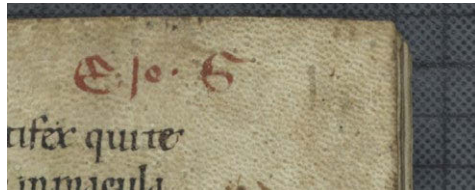


Fig. 8
‘Signatur Rot’ E · 10 · S, Klosterneuburg,
Stiftsbibliothek, CCL 798, fol. 1r

Three specific phenomena indicate that ‘Signatur Rot’ is younger than ‘Signatur Schwarz’:

- 1) On title plates, the red shelfmark tends to be off-centred or partially covers other text – including ‘Signatur Schwarz’ (Fig. 9).³¹
- 2) In the limited number of manuscripts examined to date, ‘Signatur Rot’ corrects ‘Signatur Schwarz’. The red ink is visibly written on an erased part and overwrites parts of the ‘Signatur Schwarz’, or emphasises them with a red stroke to reinforce the respective part (Fig. 10).³²
- 3) ‘Signatur Rot’ has the widest range of letters: The current state of research shows shelfmarks with the letters A–R (currently without Q).

Despite certain similarities, no systematic trend is observable for the numbers to increase or decrease from ‘Signatur Schwarz’ to ‘Signatur Rot’. It seems as if the collection has been completely reorganised, although naturally some of the books have remained within their subject area. Occasionally, a close relationship between the black and red shelfmarks is visible.³³

³⁰ Cf. HAIDINGER, *Katalog Cod. 1–100* (1983), p. XVII.

³¹ Cf. StIBKI, CCL 813, CCL 826.

³² Cf. StIBKI, CCL 783 (Fig. 10) and CCL 643b, fol. IIIr: From the former ‘Signatur Schwarz’ J 28 *subtus*, the scribe of ‘Signatur Rot’ erases only the number and corrects it to 15. He merely marks out the framing elements of the shelfmark in red ink to show that they are still valid.

³³ Cf. StIBKI, CCL 646: ‘Signatur Schwarz’: h 29, ‘Signatur Rot’: h 24; CCL 649: ‘Signatur Schwarz’: i 32, ‘Signatur Rot’: i 31; CCL 133: ‘Signatur Schwarz’: g 5; ‘Signatur Rot’: h 15; CCL 134: ‘Signatur Schwarz’: g 6; ‘Signatur Rot’: h 16; CCL 121: ‘Signatur Schwarz’: i 29; ‘Signatur Rot’: i 32.



Fig. 9
'Signatur Schwarz' (hardly visible) and 'Signatur Rot',
Klosterneuburg, Stiftsbibliothek, CCL 826, title label

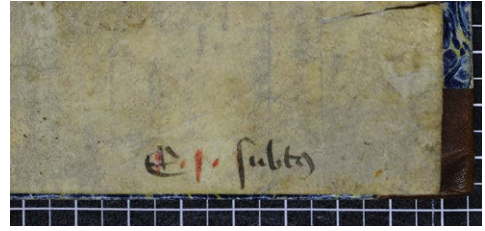


Fig. 10
'Signatur Rot' on rasure of 'Signatur Schwarz',
Klosterneuburg, Stiftsbibliothek, CCL 783, fol. 1r

OBSERVATIONS ON MODERN SHELFMARKS

The manuscripts in the library reveal other shelfmark systems that were used after the 15th century. Initial observations on these are given below.

Early modern numbers

On the first few leaves of some manuscripts, at the top centre or top right, there is a number written in black ink. At first glance, two distinct types are apparent, some evidently later than others. However, it is difficult to give a definitive statement before the entire collection has been examined, as it may be that the system was in use for a longer period of time, in which case the hands or palaeographic findings would change.

Hardly any of the manuscripts bearing the older type of these numbers (Fig. 11) also have a 'Signatur Rot', and only a few have a 'Signatur Schwarz'. Notably, this modern numbering

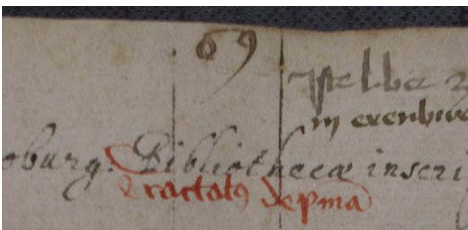


Fig. 11
69 in a manuscript containing texts of Nikolaus
von Dinkelsbühl, Klosterneuburg,
Stiftsbibliothek, CCL 416, fol. 1r



Fig. 12
135 on the flyleaf of a manuscript containing
the *Almagestum* of Claudius Ptolemäus,
Klosterneuburg, Stiftsbibliothek, CCL 682

system was primarily used for sermon manuscripts or those containing texts by Thomas Ebendorfer or Nikolaus von Dinkelsbühl.

Numbers that appear younger (Fig. 12) tend to occur in manuscripts that usually have both a ‘Signatur Schwarz’ and a ‘Signatur Rot’. These numbers are more likely to be found in manuscripts with mixed subjects, such as dictionaries, encyclopaedias, natural science, and canon law.

Pencil number

Numerous manuscripts in the library bear a fairly recent (18th century) number written in pencil on the (former) paste-down of the front cover (Fig. 13 und 14).³⁴ (Fig. 13 and 14) Generally measuring ca. 2–4 cm in height, these numbers are occasionally rendered illegible by abrasion; even manuscripts without the previously mentioned shelfmarks may carry a pencil number.³⁵ Within our research sample, the lowest pencil number recorded to date is 39, and the highest 1404.

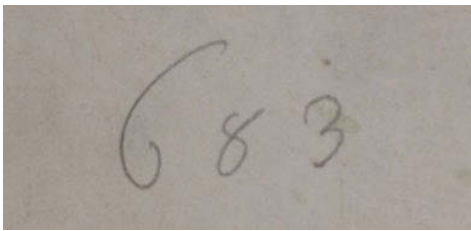


Fig. 13
Pencil number, Klosterneuburg,
Stiftsbibliothek, CCl 120, flyleaf

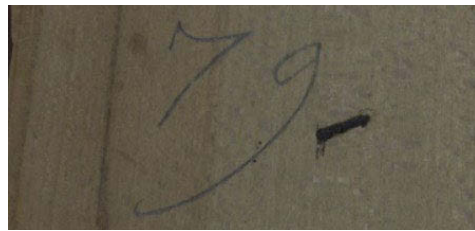


Fig. 14
Pencil number, Klosterneuburg,
Stiftsbibliothek, CCl 305, paste down front

BOOK CHAINS

Many of the medieval manuscripts and incunabula in Klosterneuburg were chained books. Evidence of this can be seen in the surviving bindings, some of which still have chain links attached. A few books still have complete chains, but the vast majority of the fittings have been removed, as they obstructed the placement of the books in cabinets.³⁶ Nevertheless, the holes and marks they left are usually clearly visible on the historical leather book covers (Fig. 15). Since most of the bindings in the collection were renewed in the 19th century, the former presence of such fittings can only be determined by the traces that survive on

³⁴ On the dating cf. HAIDINGER, *Katalog Cod. 1–100* (1983), p. 219.

³⁵ Cf. StibKI, CCl 1206 and CCl 1207 with the pencil numbers 1353 and 1354.

³⁶ Cf. HAIDINGER, *Katalog Cod. 1–100* (1983), p. XIII.

the endpapers or last folios. Likewise, corresponding rust stains can be documented and indicate the position of absent nails (Fig. 16). This allows conclusions to be drawn regarding the shape of the fittings. This line of research is also being conducted by the Academy of Fine Arts in Vienna (Akademie der bildenden Künste with the “Ancient Book Craft”-project that deals with medieval bindings from Klosterneuburg Abbey Library.³⁷

Existing remains and traces of book chains indicate that they were attached to the centre of the upper edge of the lower board. The books were therefore most likely placed next to each other on desks. This also correlates with the numerous parchment title labels found on the upper boards of surviving medieval book bindings, which often bear a shelfmark as well as the title. According to an account book from 1453,³⁸ two large desks were purchased for the provost’s library that year. However, there is no contemporary evidence for these furnishings in the convent library.³⁹

The two documented desks for the provost’s library alone show that his book collection must have been extensive and likely used for representative purposes. It is not yet possible, however, to determine which codices were stored there. There are only a few mentions of provosts in the corpus examined so far. As discussed above, Jacob I Paperl (1485–1509)⁴⁰ bought an edition of Pliny’s work in 1488, itself printed in 1472 (today Ct 13). According to the entry on fol. Ir, this edition has both a ‘Signatur Rot’ (G 21) and chain traces. The later provost, Johannes Hechtel (1465–1485), signed a miscellany containing works by Thomas



Fig. 15

Traces of a chain on the lower board of Klosterneuburg, Stiftsbibliothek, CCl 813



Fig. 16

Rust stains on the last leaf of Klosterneuburg, Stiftsbibliothek, CCl 330

37 Ancient Book Crafts (ABC = FWF I 5884-G Weave-Project), <https://www.oeaw.ac.at/imafo/forschung/schrift-buchwesen/einbandforschung> [4.7.2025] and <https://www.akbild.ac.at/de/forschung/projekte/forschungsprojekte/2022/abc-altes-buchhandwerk> [4.7.2025].

38 Cf. ČERNÍK, *Schrift- und Buchwesen* (1913), p. 165: *Item 2 grosse pulpiden in meins heren librey in der silberkamer per I tal., facit II tal.*

39 For the different storage locations within the abbey buildings, see above.

40 List of provosts of Klosterneuburg Abbey on *sacra.wiki*: https://sacra.wiki/index.php/Liste_der_Pröpste_des_Stiftes_Klosterneuburg [4.7.2025].

Ebendorfer (CCL 403) in 1454. This book also shows traces of chains and the ‘Signatur Schwarz’ L 42. Provost Georg Muestinger (1418–1442) commissioned nine astronomical manuscripts, five of which remain in the Abbey Library to this day; the others are now in the Austrian National Library and have not yet been consulted as part of the project preparation.⁴¹ None of Muestinger’s manuscripts in Klosterneuburg contain any medieval shelfmarks or show traces of former chains. Although these few examples do not yet allow any major conclusions, the group of astronomical manuscripts seems to be the most significant. Muestinger, himself a scholar of natural sciences, had texts copied that were of particular interest to him. It therefore seems plausible that he kept these for his private studies and/or as showpieces in his private library. This would mean that the books on the desks in the provost’s library were neither numbered nor chained. The incunabulum purchased by Jacob Paperl during his time as provost bears only a ‘Signatur Rot’, the most recent of the medieval shelfmarks. Therefore, it is quite possible that Paperl also kept the print in the provost’s library without a shelfmark or chain, and that it was added to the convent’s chained library only after his death in 1509 – a finding that shall be investigated further.

Reliable numbers or percentages indicating how many books were chained in the 15th century library are not yet available. However, the account books in the Abbey Archive provide information about the installation of a chained library in Klosterneuburg. The first invoices for the purchase of book chains date back to 1431/1432, which may have coincided with the introduction of ‘Signatur Schwarz’. Another significant purchase of 60 book chains is recorded for 1452.⁴² This could again be related to the second-oldest shelfmark, ‘Signatur Schwarz’, if one assumes a fundamental connection between the book chains and the shelfmarks.

CONCLUSION AND FIRST HYPOTHESES

Of the 409 books analysed so far, a ‘Fol. 4-Signatur’ was found in 47 of them. ‘Fol. 4-Signatur’, the oldest of the medieval shelfmarks, is always written at the bottom edge of the page, close to the fold. In some cases, it is only partially visible as the book blocks were clearly trimmed during rebinding. ‘Signatur Schwarz’ appears in 139 books and was in use for the longest time. It is often found on folio 1r, which was likely to be preserved during a possible rebinding. Finally, the most recent shelfmark of the three, ‘Signatur Rot’, appears in 119 books and is also often found on folio 1r, though in some cases it occurs only on the flyleaf or on the surviving medieval title label. The impression that ‘Signatur Rot’ was significantly less used than ‘Signatur Schwarz’ is misleading. Examining the shelfmark systems reveals

⁴¹ Cf. HAIDINGER, *Schönheit* (1998), p. 43.

⁴² Cf. ČERNÍK, *Schrift- und Buchwesen* (1913), p. 164.

that the number of letters assigned increases in each system ('Fol. 4-Signatur' A–L; 'Signatur Schwarz' A–O; 'Signatur Rot' A–R). It must also be taken into account that some books have only one of the three shelfmarks, while others show two or all three. A total of 155 books out of the sample of 409 have so far been found to have chains or traces of chains.

A large part of the 409 books does not show any medieval shelfmarks at all, although some of them still have their historical binding, which means that their flyleaves and endpapers have been preserved. Groups can be identified among these. Firstly, there are the manuscripts that can be assigned to the canonesses, including the two German regula manuscripts, CCl 954 and 955, as well as the numerous liturgica and prayer books. However, these are also the precise groups that had no shelfmarks in the canons' book collection. These books were not kept in the convent library, but rather in the chapter house (rules and necrologies as part of chapter office books), the sacristy (liturgica), the choir (liturgica), or the cells or dormitories for private reading (prayer books). Additionally, some of the canons and canonesses probably owned several private books, as they were exempt from the non-possession rule. These probably also included books used for study. There is evidence of many canons studying at the University of Vienna in the 15th century, in particular.⁴³ Their handwritten lecture notes and textbooks were mobile. However, of those that have been examined thus far, none have shelfmarks or references to book chains.

The books in the provost's library stored on desks lacked shelfmarks or chains similar to the *magistra's* books mentioned in the introduction. The *magistra's* books, however, are particularly difficult to assess in terms of content, making their study more challenging. The shelfmarks on some of the analysed manuscripts show that they have been kept next to each other since they were incorporated into the library. CCl 808 and 809, for example, both contain texts by John Cassian and bear all types of 15th century shelfmarks. While the rest of the collection has been reorganised elsewhere, these two manuscripts have remained neighbours ever since:

Current shelfmark	'Fol. 4-Signatur'	'Signatur Schwarz'	'Signatur Rot'
CCl 808	d 41	d 45	e 53
CCl 809	d 42	d 46	e 54

All three 15th century types of shelfmarks consist of a combination of letters and numbers. The letters are in chronological order and increase from the oldest to the youngest system. What exactly the letters stand for is not yet clear. It is possible that they indicate a specific location, such as a desk or a shelf, or that they refer to thematic areas.⁴⁴ The most likely

⁴³ Cf. ČERNÍK, *Schrift- und Buchwesen* (1913), p. 103.

⁴⁴ Similar observations were also made in Kremsmünster: Cf. Christina JACKEL, *Die Bibliothek lesen. Funktion und Dynamik des deutschsprachigen mittelalterlichen Textbestands im Stift Kremsmünster Philologica*

scenario is a combination of the two: a specific subject was located on one or more desks, and the letters denote either the subject or the desk. If this was indeed the case for the Klosterneuburg library during the 15th and early 16th century, it is quite plausible that the collection expanded between 1420 and 1520, with more subject groups being added; the former subject groups being refined and split up, in conjunction with more book desks being purchased. While some books, such as CCl 808 and 809, always remained next to each other, others were undoubtedly reorganised differently.

To test the hypothesis that the letters correspond to specific subject areas, it would be necessary to identify subject clusters sharing the same shelfmark letter, which is not yet feasible during this stage of the project. Nevertheless, we conducted a preliminary examination of a selection of books bearing the ‘Signatur Schwarz’. Could thematic clusters be recognised? The evidence is inconclusive. While there are indications that the letters denote thematic groups, definitive conclusions cannot be drawn from our relatively small sample. Under shelfmark letter *A*, we find Bible texts and general texts on biblical exegesis,⁴⁵ whereas under shelfmark letter *B*, we find Old Testament texts, especially from the Books of Solomon, and commentaries on them.⁴⁶ While this supports our initial thesis, the letter *C* currently paints a different picture. So far, we have only found ‘Signatur Schwarz’ with the letter *C* in two manuscripts,⁴⁷ one of which contains a commentary by Thomas Ebendorfer on the Gospel of John, and the other contains the Council Acts of the Council of Basel, which do not necessarily fit together. The texts under the letter *D* are also eclectic, but can be roughly summarised as sermons, Bible texts, and ‘Bible-related’ texts.⁴⁸ However, as stated, for more precise conclusions, a larger sample is needed.

We can already make some tentative hypotheses regarding the timeframe of the introduction of new shelfmark systems:

Caspar Perman was appointed abbey librarian in 1432 under Provost Georg Muestinger, the same year in which the first book chain purchase is recorded. His reorganisation of the library probably resulted in the now-lost 1439 book catalogue and the replacement of the ‘Fol. 4-Signatur’ by ‘Signatur Schwarz’.

The latter must have been in use for a considerable amount of time. Presumably at one point, the available space to store and display books was exhausted, and the desks, both above and possibly in the compartments below (see *subtus* additions to the signatures), were full.

Every new shelfmark system advances further into the alphabet, not only due to new thematic groups, but also because of the need for more desks.

Germanica 40, Vienna 2021), pp. 215–216.

45 StIBKl, CCl 141, CCl 839, CCl 1075, CCl 1078, CCl 1113, CCl 1158.

46 StIBKl, CCl 164, CCl 759, CCl 815, CCl 1114, CCl 1115, CCl 1122.

47 StIBKl, CCl 413, CCl 637b.

48 StIBKl, CCl 152, CCl 808, CCl 809, CCl 817, CCl 881, CCl 890, CCl 898, CCl 1049, CCl 1094, CCl 1112a, CCl 1127.

Assuming that a fundamental revision of the inventory is necessary for the introduction of new shelfmark systems, a possible date for the introduction of 'Signatur Rot' can be determined. When Provost Jakob Paperl died in 1509, the post of Abbey Librarian had presumably been vacant for at least ten years. When the new provost, Georg Hausmanstetter, assumed office, his dean, Vinzenz Weißenberger, took charge of the library. He ordered a thorough inspection of the collection and, at the same time, initiated the creation of a new library catalogue, which no longer exists today. But it is quite likely that the books' shelfmarks were recorded there in red.

The hypotheses put forward in this essay are based on just one-sixth of the analysed corpus. It will therefore be necessary to establish which hypotheses can be substantiated by a larger data set and which cannot, or whether new insights will emerge (as the project continues). We aim to complete this study by 2027 and present the results in an upcoming volume of this series, which will focus on the Klosterneuburg collections.

ACCOUNT BOOKS AS PRACTICE

TRACING MATERIAL CULTURE IN MONASTIC COMMUNITIES

Elisabeth Gruber

INTRODUCTION

In recent years, scholarly interest in medieval accounting has grown substantially, particularly within the fields of financial administration and institutional history. Both secular and ecclesiastical entities have come under closer scrutiny as research increasingly addresses income structures, expenditure patterns, and modes of resource management. This renewed focus mirrors broader historiographical trends that emphasise the constitutive role of written records in shaping, regulating, and visualising administrative practices. Accounting documents, ranging from rent rolls and monastic accounts to merchant ledgers are now valued not merely as administrative artefacts, but as complex historical sources. They illuminate the organisation of institutional life, the flow of goods and services, and the social relationships underpinning economic exchange. These records detail revenues in money and kind, distributions of provisions, payments for labour, and the ongoing negotiation of obligations. The entries in such accounts shed light on the individuals involved in financial administration – both those within the institution and those in the surrounding economic environment. They name clerics, lay staff, merchants, craftsmen, and labourers, indicating the roles they played in the acquisition, processing, and distribution of resources. Accounting records thus offer evidence of personnel structures and of the broader networks through which institutions interacted with local and regional economies.¹

Objects, materials, and services listed in financial records provide valuable information on consumption patterns, built structures, and symbolic investments.² These include

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- 1 In selection: *Wirtschafts- und Rechnungsbücher des Mittelalters und der Frühen Neuzeit. Formen und Methoden der Rechnungslegung: Städte, Klöster, Kaufleute*, ed. by Gudrun GLEBA–Niels PETERSON, Göttingen 2015; *Mittelalterliche und frühneuzeitliche Rechnungen als Quellen der landesgeschichtlichen Forschung*, ed. by Stefan PÄTZOLD–Marcus STUMPF (Westfälische Quellen und Archivpublikationen 30, Münster 2016); *Accounts and accountability in late medieval Europe: records, procedures, and social-political impact*, ed. by Ionut EPURESCU-PASCOVICI (Utrecht Studies in medieval literacy 50, Turnhout 2020); *Monastic finance: studies on the economy of Benedictines, military orders, and mendicants = Klösterliche Finanzverwaltung: Studien zur Wirtschaftsführung der Benediktiner, Ritterorden und Bettelorden*, ed. by Jens RÖHRKASTEN–Jürgen SARNOWSKY (Vita regularis 81, Berlin 2022).
 - 2 Elisabeth GRUBER, 'Umb ain polsterziechen in das rathaus darauf der burgermaister sitzet'. Dinge und Objekte in der städtischen Rechnungsüberlieferung, in: *Die materielle Kultur der Stadt in Spätmittelalter und*

provisions such as: grain, wine, and fish; liturgical items like vestments, candles, and books; and construction materials for buildings and repairs. The listing of specific goods and their prices allows for analysis of economic value, resource allocation, and the practicalities of institutional maintenance. Written accounting practices reveal patterns of spatial and temporal organisation within institutions. They structure financial information annually or seasonally, link expenditures to liturgical calendars or agricultural cycles, and define specific spaces as units of economic action. As such, they not only mirror, but also shape institutional logic and memory.³ Yet, normative frameworks governing the form and content of medieval accounting records were often minimal.⁴ In institutional contexts – particularly monastic ones – accounting practices remained rooted in custom and embedded within their administrative cultures. Although the statutes of religious orders occasionally mandated regular audits, they seldom provided detailed instructions on how records were to be kept or structured. As a result, medieval accounting evolved largely within the realm of applied, situational knowledge, rather than through formalised regulation.

Drawing on the potential of monastic account books, this paper explores how they can inform material culture studies. It contends that these records offer a unique perspective through which material objects within their functional and relational contexts can be examined. Goods, tools, furnishings, and raw materials are recorded alongside services and transactions, embedded in a textual logic oriented toward accountability and oversight. The value of objects is not treated symbolically, but presented through measurable indicators, like quantities, units, prices, and occasionally quality markers, especially where such information justified expenditure or clarified economic decisions. Objects, in other words, appear not in isolation, but as elements within systems of valuation and institutional need.

In the first section of the paper the context is set out by surveying the key research on monastic accounting and highlighting how sources from Austrian monasteries have been used to study material culture. The second section examines accounting as a monastic practice and asks how notions of accountability, both secular and sacred, are made visible in the

Früher Neuzeit, ed. by Sabine von HEUSINGER–Susanne WITTEKIND (Städteforschung A/100, Wien–Köln 2019), pp. 39–50; Christina LUTTER, Methodische Zugänge zur materiellen Kultur bei der Erforschung geistlicher Frauengemeinschaften, in: *Mittelalterliche Zisterziensnerinnenklöster im südwestlichen Ostseeraum, Materielles Gut zwischen Alltag und Spiritualität*, ed. by Felix Paul BIERMANN–Katrin FREY–Gudrun GLEBA (ed.), Wünsdorf 2020, pp. 176–191.

- 3 Elisabeth GRUBER, Klösterliche Sachkultur revisited: Materielle Kultur und soziale Praxis in den Rechnungsbüchern des Stifts Göttweig, in: *Jahrbuch des Stiftes Klosterneuburg*, in press. For an example related to urban context see: Elisabeth GRUBER, Kelche, Pelze und Korallen. Pfandobjekte als soziale Marker im städtischen Gefüge Wiens im 15. Jahrhundert, in: *Die Materialität von Kredit. Sachüberlieferungen mittelalterlicher Schuld- und Kreditbeziehungen*, ed. by Stephan NICOLUSSI-KÖHLER–Tanja SKAMBRACKS–Sebastian STEINBACH. *Das Mittelalter* 27/2 (2022), pp. 410–429. DOI: 10.17885/heiup.mial.2022.2.24665.
- 4 The rapid increase in written guidelines in the form of instructions can be traced back to the early 16th century. For Klosterneuburg cf. Josef LÖFFLER (ed.), *Instruktionen und Ordnungen der Stiftsherrschaft Klosterneuburg. Quellen zur Verwaltung sowie zur Land- und Forstwirtschaft einer geistlichen Grundherrschaft in der Frühen Neuzeit*. (Fontes Rerum Austriacarum III/Fontes Iuris 21, Wien–Köln–Weimar 2021).

records. It explores the ways in which financial documentation reflects not only administrative obligations, but also spiritual responsibilities embedded in institutional life. By analysing specific indicators such as the structure of account books, the roles of officeholders, and the forms of approval or release, considerations on how accountability was conceptualised and performed can be made. These practices must therefore be interpreted in relation to the specific actors involved, as well as the political and institutional frameworks in which they emerged. The third section thus focuses on the actors involved in record production and validation, the practices of bookkeeping, and the classificatory and descriptive strategies applied to material entries. The fourth and last section of this article provides a case study that illustrates the perspectives opened up by material culture studies. Using a concrete example, it demonstrates how monastic account books can be read, not only as administrative tools, but also as rich sources for understanding the material world and value systems of religious communities. The selected case highlights how objects were described, categorised, and associated with specific individuals and functions, revealing much about institutional priorities and cultural meanings. The conclusion will draw attention to the broader significance of accounting records for assessing the social, economic, and symbolic dimensions of monastic life.

This approach is illustrated by presenting selected examples from the Klosterneuburg Augustinian canons' monastery's source material, including both charters and account books. These sources offer valuable insights into the institutional practices of record-keeping and resource management within a religious community. The article does not aim for an exhaustive analysis but rather presents a series of case-based observations that highlight the potential of such documents for research within the framework of material culture studies.

RESEARCH ON MONASTIC ACCOUNT BOOKS IN AUSTRIA

One of the first major attempts to analyse monastic account books was Alfons Pribram's study on prices and wages in Austria, published in the early 20th century. Monastic account books from Klosterneuburg provided essential data for compiling these price series, particularly for grain, meat, and fish, as well as information on wages paid within agricultural production.⁵ To date, the account books of Austrian monasteries have become key sources

5 Alfred Francis PRIBRAM, *Materialien zur Geschichte der Preise und Löhne in Österreich*, Wien 1938. PRIBRAM's work demonstrated the value of medieval and early modern accounting materials for economic history, especially in reconstructing long-term trends in subsistence costs and labor compensation. His study remains a significant reference point for subsequent research on historical economic conditions in the Austrian and Central European context.

for exploring material culture, providing a valuable glimpse into the economic and historical practices of these institutions. Gerhard Jaritz published an edition of the account books of the Cistercian Abbey of Rein, analysing them with a focus on material culture and the documentation of everyday objects, expenses, and provisioning practices.⁶ His work underscored the value of such sources, particularly in reconstructing aspects of daily life, economic organisation, and monastic consumption patterns. Floridus Röhrig, by contrast, explored the account books of Klosterneuburg with particular attention to the commission of art-historically significant materials.⁷ His research traced the financial transactions associated with the procurement of artworks and liturgical objects, offering transcriptions of selected passages of accounts. Susanne Fritsch engaged with the Klosterneuburg material in more detail, carrying out an analysis of the so-called *Küchenrechnungen*, accounts related to the monastery's provisions to study food provisioning and dietary habits, but also took into account guests from monastic, courtly, and urban communities who were present on various occasions. Andreas Zajic has examined the account books of the Benedictine Abbey of Göttweig with a particular focus on architectural history and the furnishing of monastic interiors.⁸ His research sheds light on construction activities and the acquisition of materials and objects related to the spatial organisation of the monastery. Through careful analysis of financial records, Zajic was able to reconstruct both the chronology and material dimensions of building projects, as well as the networks of craftsmen and suppliers involved in the execution of such work. Moreover, the account books provided valuable evidence regarding the aesthetic and functional aspects of interior spaces ranging from furniture and wall treatments to heating systems and lighting.

More recently, increased attention has been given to the financial administration of female religious communities. In addressing questions related to the architectural history of the women's convent at Klosterneuburg, Barbara Schedl and Isabella Schmid have analysed surviving account books.⁹ By contextualising these entries, they were able to reconstruct phases of construction, maintenance, and modification, shedding light on the spatial

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- 6 Gerhard JARITZ, *Die Reiner Rechnungsbücher (1399–1477) als Quellen zur klösterlichen Sachkultur des Spätmittelalters*, in: *Die Funktion der schriftlichen Quellen in der Sachkulturforschung (Veröffentlichungen des Instituts für Mittelalterliche Realienkunde Österreichs 1; Sitzungsberichte. Akademie der Wissenschaften in Wien, Philosophisch-Historische Klasse 3, Wien 1976)*, pp. 145–149, pp. 259–271.
- 7 Floridus RÖHRIG, *Das kunstgeschichtliche Material aus den Klosterneuburger Rechnungsbüchern des 14. und 15. Jahrhunderts. Jahrbuch des Stiftes Klosterneuburg NF/6 (1966)*, pp. 137–178; *id.*, *Die materielle Kultur des Chorherrenstiftes Klosterneuburg unter besonderer Berücksichtigung der Aussage von Rechnungsbüchern*, in: *Klösterliche Sachkultur des Spätmittelalters. Internationaler Kongreß, Krems an der Donau, 18.–21. 9. 1978 (Sitzungsberichte. Akademie der Wissenschaften in Wien, Philosophisch-Historische Klasse 367, Veröffentlichungen des Instituts für Mittelalterliche Realienkunde Österreichs 3; Wien 1980)*, pp. 217–224.
- 8 Andreas Hermenegild ZAJIC, *Stift Göttweig – Anmerkungen zur mittelalterlichen Bau- und Ausstattungsgeschichte. Studien und Mitteilungen zur Geschichte des Benediktinerordens und seiner Zweige 120 (2009)*, pp. 391–424.
- 9 Barbara SCHEDL, *Die Räume der Augustiner Chorfrauen am Klosterneuburger Stiftsareal*, in: *Wir Schwestern. Die vergessenen Chorfrauen von Klosterneuburg*, ed. by Eva SCHLOTHEUBER–Jeffrey F. HAMBURGER–Christina JACKEL,

development of the convent. Magdalena Rückert and Annette Kehnel¹⁰, as well as Sabine Miesgang and Sarah Deichstetter¹¹, have examined the accounting practices of the canonesses at Klosterneuburg from different perspectives. Their research has brought gender-specific aspects of financial administration to light, revealing how religious women managed income, commissioned goods, and documented their economic responsibilities. These studies highlight the administrative competence of women in religious life, in addition the potential of account books as a source for studying the gendered dimensions of labour, agency and institutional structure. As such, this topic still requires further research.

ACCOUNTING AS MONASTIC PRACTICE

The practice of accounting in medieval monastic institutions was shaped by a complex interplay between administrative necessity, social hierarchy, and deeply embedded moral-religious values. As Dobie (2021) argues, monastic financial recordkeeping was not merely a bureaucratic exercise but a multidimensional practice encompassing notions of accountability, personal responsibility, and spiritual obligation.¹² This ambivalence is evident in the very language of accounting: the Latin term *computus* could refer both to the technical process of reckoning and to a broader moral act of taking responsibility for one's conduct in office. Thus, the rendering of accounts (*reddere rationem*) was not only a matter of tallying incomes and expenses but also invoked the Christian eschatological expectation of a final judgment – a symbolic reckoning before God.

Despite its observable presence in Western Europe from at least the 12th century onward, accounting developed largely in the absence of clearly articulated normative regulations governing its form, content, or implementation. Within ecclesiastical and monastic contexts in particular, accounting practices seem to have developed through pragmatic usage rather than prescriptive frameworks. Explicit references to the obligation of annual account rendering are rare, and even more seldom are detailed instructions concerning how such accounts were to be produced. When such directives do appear, they tend to be embedded

Wien 2024, pp. 75–88; Isabella SCHMID, *Die Rechnungsbücher des Stiftes Klosterneuburg. Architektur und Ausstattung von 1371 bis 1425*, Masterarbeit Univ. Wien, Wien 2016.

- 10 Magdalena RÜCKERT–Annette KEHNEL, *Die Rechnungsführung der Klosterneuburger Chorfrauen im 15. Jahrhundert*, in: *The Ladies on the Hill. The female monastic communities at the aristocratic monasteries of Klosterneuburg and St. George's in Prague*, ed. by Jeffrey F. HAMBURGER–Eva SCHLOTHEUBER (Fokus Kloster 2, Vienna 2024), pp. 147–150.
- 11 Sarah DEICHSTETTER–Sabine MIESGANG, *Die Augustiner-Chorfrauen von Klosterneuburg: ein Forschungsüberblick zur Geschichte und dem Wirtschafts- und Rechnungswesen von 1445 bis 1533*, in: HAMBURGER–SCHLOTHEUBER, *The Ladies on the Hill* (2024), pp. 119–145.
- 12 Alisdair DOBIE, *Medieval Monastic Accounting Records: Potentials and Pitfalls for Statistical Analysis*, in: *Medieval Statistics. Accounting, Record-Keeping and Financial Management, 1066–1525*, ed. by Mark CASSON–John S. LEE, Cham 2024, pp. 37–67.

in specific situational contexts; for instance, during episcopal visitations, such as that of Durham Cathedral Priory in 1235, which provides rare insight into 13th-century accounting procedures.¹³ Cistercian monastic communities articulated more explicit expectations regarding the autonomous and self-sufficient maintenance of their institutions, which had a significant impact on their economic administration. As early as 1190, the General Chapter of the Cistercians mandated all affiliated monasteries to compile a comprehensive inventory of their assets to be presented to the visiting abbot. These principles of economic oversight were also incorporated into the statutes drawn up in the early 13th century. A notable example is the *Conductus domus sapienter saturate*, a financial ordinance formulated by Abbot Stephen of Lexington for the Abbey of Savigny in Normandy. This document provides an idealised model for economic management, emphasising that all income and expenditures should be recorded in writing with precision and care. The rationale behind this was to ensure that “[...] abbati et Consilio domus cum computabitur, plenius liqueat status domus et eorum diligentia apud Deum et fratres suos merito commendetur”¹⁴. The monks of the Cistercian abbey of Stams in Tyrol played a significant role in the development of the princely account books of Tyrol, as Lienhard Thaler has demonstrated in detail. Their involvement reflects the deep entanglement of monastic administrative expertise with emerging forms of territorial governance. The methods and practices developed within monastic institutions – such as record-keeping, auditing, and financial accountability – contributed to the formation of more structured, standardised accounting systems at the level of secular lordship.¹⁵

CLERICS, STEWARDS, AND RECORD-KEEPERS

By the later Middle Ages, an official’s loyalty to his lord or superior was increasingly expressed through meticulous recordkeeping and responsiveness to written directives. As Dobie notes, the expression of loyalty has been extended to include financial accountability: accurate ledgers, timely responses to memoranda, and transparent procedures became integral components of institutional trust and social cohesion.¹⁶ Such assumptions shed

13 For further details cf. DOBIE, *Medieval Monastic Accounting* (2024), p. 39; Bernhard LÜBBERS, Überlegungen zum Rechnungswesen der Zisterzienser im Mittelalter. Zugleich ein Versuch der Typologie spätmittelalterlicher Klosterrechnungen, dargelegt am Beispiel der Aldersbacher, Heilsbronner sowie Kaisheimer Rechnungen. *Archiv für Diplomatik* 53 (2007), pp. 323–352, esp. pp. 326–331.

14 Cited after LÜBBERS, *Überlegungen zum Rechnungswesen* (2007), p. 329, n. 23. [...] the abbot and the consilium of the house could gain a clear understanding of the financial condition during audits and thereby demonstrate their diligence before god and their brethren. [translation EG].

15 Lienhard THALER, Weiße Mönche, schwarze Zahlen. Die Stamser Zisterzienser und die Entstehung der ältesten Tiroler Rechnungsbücher. *Mitteilungen des Instituts für Österreichische Geschichtsforschung* 128 (2020), pp. 22–48.

16 Ionut EPURESCU-PASCOVICI, From the Auditing of Accounts to Institutional Accountability in Late Medieval Europe, in: *Accounts and accountability in late medieval Europe: records, procedures, and social-political*

light on the work of monastery officials. The Rule of Saint Benedict, foundational to Western monasticism, indicates that, in a monastic context, an account was not merely a balance sheet, but also a moral statement. It requires that the abbot be prepared to account for his actions and the souls under his care (“rationem redditurus est”).

“He must care for the sick, children, guests, and the poor with all diligence, knowing, without doubt, that he will have to render an account for all of these on the Day of Judgment. He should regard all the monastery’s vessels and property as if they were sacred vessels of the altar. He should neglect nothing. He must not be greedy nor wasteful, nor destroy the monastery’s property, but manage all things with measure and according to the instructions of the abbot.”¹⁷

This moral imperative was extended to other administrative officials, cellarers, bursars, and obedientiaries, who managed income and expenditures. Their diligence in accounting became a measure not only of their competence but of their devotion and fidelity to both abbot and God.

This dual character of accounting as financial and moral duty is also reflected in the expectations placed on women in religious houses. For instance, the “magistra” of the Chorfrauen in Klosterneuburg bore similar responsibility for the welfare of the canonesses, and her accountability was expressed in financial terms and spiritual oversight alike. In the seventh chapter of the statutes for the canonesses, the relationship between the “magistra” and the community is framed in explicitly spiritual terms. The “magistra” is reminded that she must ultimately render an account (“raittung”) to God not only for herself but also for the canonesses entrusted to her care. This spiritual responsibility underscores her role as both guide and guardian of the community’s moral and religious conduct.

However, the fourth chapter of the same statutes articulates this accountability in broader and more concrete terms. Here, the prioress is held responsible for both the spiritual and temporal aspects of monastic life.¹⁸ She is explicitly required to give an account before Christ for all her actions in both domains. This dual emphasis indicates that spiritual

impact, ed. by Ionut EPURESCU-PASCOVICI (Utrecht Studies in medieval literacy 50, Turnhout 2020) pp. 1–19, p. 6.

17 “Cellarius monasterii elegatur de congregatione sapiens, maturis moribus, sobrius, non multum edax, non elatus, non turbulentus, non iniuriosus, non tardus, non prodigus, sed timens Deum; qui omni congregationi sit sicut pater. Curam gerat de omnibus. Sine iussione abbatis nihil faciat. Quæ iubentur custodiat. Fratres non contristet. Si quis frater ab eo foret aliqua inrationabiliter postulat, non spernendo eum contristet, sed rationabiliter cum humilitate male petenti denegat. Animam suam custodiat, memor semper illud apostolicum, quia: Qui bene ministraverit, gradum bonum sibi acquirit. Infirmorum, infantum, hospitem pauperumque cum omni sollicitudine curam gerat, sciens sine dubio, quia pro his omnibus in die iudicii rationem redditurus est. Omnia vasa monasterii cunctamque substantiam ac si altaris vasa sacra conspiciat. Nihil ducat neglegendum. Neque avaritiæ studeat neque prodigus sit et stirpator substantiæ monasterii, sed omnia mensurate faciat et secundum iussionem abbatis.” Text: The Rule of St. Benedict, Chapter 31: What the Cellarer of the Monastery Should Be Like, cited in: The Rule of St. Benedict, <https://www.thelatinlibrary.com/benedict.html> [30.7.2025].

18 Klosterneuburg, Augustiner-Chorherrenstift, Cod. 955; Cornelia PEKA, Reformstatuten für die Chorfrauen von Klosterneuburg, in: SCHLOTHEUBER–HAMBURGER–JACKEL, *Wir Schwestern* (2024), pp. 135–140.

leadership was inseparable from administrative and material oversight. The governance of property, provisions, and daily routines was seen as integral to the fulfilment of religious duty. Accountability in a monastic context was thus not limited to the soul's salvation but extended to the management of communal resources and the overall well-being of the house. This passage reveals how the moral economy of the monastery was structured around both divine judgment and earthly responsibility.

In monastic financial records of the late medieval period, particular attention is paid to the individuals involved in the production and authentication of written accounts. The actors responsible for accounting processes emerge most clearly in the introductory and concluding sections of the records, where formulaic expressions often name officeholders and outline their responsibilities. Typically, these were the stewards or cellarers ("cellaria") of specific offices, such as the kitchen, cellar, or guest quarters, who bore the primary responsibility for maintaining and submitting annual financial accounts. Their names, along with the duration of their tenure, can often be reconstructed directly from the account entries themselves, making these documents valuable sources for institutional prosopography.

Annual account submission was a regularised practice, usually carried out before an authoritative figure such as the abbot or provost ("praepositus"), who functioned as the institutional superior to whom accountability was owed. Witnesses, often fellow nuns, monks or clerics, were regularly present and named in these contexts, reinforcing both the procedural legitimacy of the account and the internal hierarchical structure of the monastery.

These records not only document income and expenditure but also reflect the hierarchical organisation and responsibility structures within the monastic community. The act of accounting thus served not merely as an economic function but also affirmed institutional order and individual responsibility. Furthermore, the presence of open claims or outstanding debts, noted within the accounts, sheds light on financial relations between different actors, most notably between the account-givers and their superiors. The relationships between those providing funds (e.g., the "praepositus") and those managing and spending them were made visible and formalised through the process of written accounting. As such, medieval monastic accounting documents serve as a rich source for analysing administrative practice, interpersonal relations, and the codification of economic behaviour in written form.

In the monastic context of Klosterneuburg, the responsibility for accounting was assigned to several offices, the cellarer ("supremus cellerarius"), the chamberlain ("camerarius") and the churchwarden ("custos"). They all kept accounts for their own areas of responsibility and were obliged to present their accounts to the dean ("decanus"). However, systematic consolidation took place only to a limited extent within the framework of the provost's accounts (Propstrechnungen). Since there are no clear descriptions of the offices, both the hierarchical structures and the functions must be reconstructed from their designated titles, if this is

possible at all.¹⁹ Due to the frequent use of the term ‘Ober’ (senior) in titles such as Oberkellner (senior cellarer) and Oberkämmerer (senior chamberlain), further sub-hierarchies can be assumed here as well. Particularly in the later Middle Ages, the individuals holding this office can be traced primarily through references in charters and account books, records that document them in the course of their official duties. For example, the senior chamberlain of Klosterneuburg was granted the right to claim hospitality at the monastery’s expense and to reside in its urban estates (Stadthöfe) in Enns and St. Pölten while travelling on official business.²⁰

By the mid-14th century, chamberlains began to be named explicitly in documents, particularly in contexts related to the rendering of their accounts. A charter issued in 1339 mentions the chamberlain Hartmann in the context of settling the financial affairs of his office.²¹ Other charters refer to chamberlains in their role as witnesses to the sale or donation of monastic property. These documents not only affirm the chamberlains’ active participation in legal and financial matters but also provide a means to reconstruct the succession of officeholders for periods in which direct accounting records are missing. While Hartmann held both offices simultaneously, evidence suggests that these roles were later divided into two distinct positions. Hartmann is referred to as both senior cellarer and senior chamberlain in the records from 1339 and 1341, indicating the dual nature of his responsibilities at the time. However, from the mid-14th century onwards, the offices appear to have been separated. A series of documents lists individuals serving as senior cellarers, without reference to their specific duties. These include Peter der Freisinger (1346), Pilgram der Würfel (1353–1359), Marchart von Rust (1370), and Peter Lenhofer (1375–1391).²² The chronological succession of names allows us to reconstruct a partial office-holding timeline even in periods where accounting records are missing. This differentiation in titles also suggests a gradual specialisation and formalisation of administrative functions within the monastery, reflecting broader shifts in monastic governance and economic organisation during the later Middle Ages.

The case of Hartmann further illustrates how the formal process of annual accounting evolved over time. Initially, the discharge of responsibility was documented through sealed

19 RÖHRIG, *Das kunstgeschichtliche Material* (1966), pp. 144–145.

20 Stiftsarchiv Klosterneuburg, Charters, 1309 März 12, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1309_III_12/charter; Stiftsarchiv Klosterneuburg, Charters, 1314 Mai 4, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1314_V_04/charter [20.10.2025].

21 Stiftsarchiv Klosterneuburg, Charters, 1339, <https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1339/charter> [20.10.2025].

22 Cf. Peter der Freisinger: Stiftsarchiv Klosterneuburg, Charters, 1346 März 26, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1346_III_26/charter; Pilgram der Würfel: Stiftsarchiv Klosterneuburg, Charters, 1353 Dezember 6, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1353_XII_06/charter; Marchart von Rust: Stiftsarchiv Klosterneuburg, Charters, 1370, September 1, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1370_IX_01/charter; Peter der Lenhofer: Stiftsarchiv Klosterneuburg, Charters, 1375 Juni 24, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1375_VI_24/charter [20.10.2025].

charters, authenticated by a notary.²³ However, as the practice of recordkeeping developed, this form of release transitioned to written entries in account ledgers. This shift reflects broader changes in the documentary culture of monastic institutions, including increasing reliance on written records as both administrative tools and instruments of institutional memory. The chamberlain's role, situated at the intersection of economic management, legal witnessing, and administrative accountability, thus offers a valuable lens through which to explore the material dimensions of monastic governance.

Ultimately, financial responsibility for the monastery remained with the provost, as illustrated by an entry in the 1371 account book.²⁴ Following the election of the provost Koloman von Laa on the feast of St. Mark the Evangelist, the record notes that the house had been left with only 55 barrels of very sour wine, all of which had been consumed to supply the prebendaries, domestic staff, the duke, and other guests. No wheat, fodder, or hay remained, and all needs of the household and vineyard had to be covered through credit until after the next harvest.

OBJECTS AND PRACTICES

Monastic account books are a rich source for reconstructing practices and routines that have left no other trace but their financial documentation. Architectural history, for example, has long used payment entries to trace building phases and spatial development. Similarly, studies of diet and provisioning have drawn on monastic accounts to understand consumption patterns, seasonal variation, and systems of hospitality. Yet these records also offer a broader potential: they allow us to explore how the material world of the monastery was documented, perceived, and managed. Objects recorded in account books are not merely quantified or assigned monetary value. Many are described in ways that allow for a detailed analysis of terminology, categorisation, and attributed qualities. This opens up questions about the kinds of value – economic, functional, or symbolic – ascribed to different types of material goods. What do such descriptions reveal about institutional priorities and perceptions? In what contexts were particular items mentioned, and which individuals or offices were associated with them?

Sacred objects offer a particularly instructive case. Drawing on examples compiled by Floridus Röhrig from 14th- and 15th-century accounts, we see that liturgical implements were often documented with care. Entries include not only prices or repair costs, but also

²³ Stiftsarchiv Klosterneuburg, Charters, 1341 September 10, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1341_IX_10/charter [1.8.2025].

²⁴ Stiftsarchiv Klosterneuburg, Account Books, Rb 1/1a, cited in Stiftsarchiv Klosterneuburg, Charters, 1371 April 25, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1371_IV_25/charter [1.8.2025].

remarks on materials, ornamentation, and craftsmanship. Such records speak to a broader logic in which objects were not only economic items but components of a maintained sacred materiality – objects whose properties and treatment reflected their liturgical function. An object-centred perspective allows for examining how relationships between people and things were articulated in monastic account books. Rather than tracing narrative events or institutional change, it turns our attention to the descriptions of objects themselves: how they were classified, what attributes were highlighted, and how value was expressed. By doing so, it becomes possible to identify patterns of relation that extend beyond the transactional – embedded in language, measurement, and administrative attention. This potential becomes especially evident in the case of sacred objects. Entries often record not only the costs associated with their acquisition or repair, but also descriptions of material composition, ornamentation, and perceived quality. These details provide insight not only into economic practices, but also into how sacred materiality was understood, maintained, and integrated into the rhythms of monastic life.

The case of Klosterneuburg highlights the practice of accounting reports, providing a reliable overview of expenditures and revenues. These reports serve as crucial tools for accountability, enabling a comprehensive assessment of economic activities and ensuring transparency within the administrative framework of the monastery.

This becomes evident in a charter issued in 1340, a charter sealed and authenticated by a notary, offers vivid insight into the practical realities of financial discharge within a monastic context. In the small room of the provost (*in parva Stubella*), probably his personal office, a group of canons assembled to witness the formal act of approval for their fellow canon Hartmann, who at the time held three offices: cellarer, and head of both the upper and lower chambers.²⁵ This setting illustrates that accounting was not merely an administrative formality but a performative act involving communal oversight and collective recognition of responsibility. During the proceedings, Hartmann presented a detailed account of the expenditures he had made in the course of his duties. The document then proceeds to list, one by one, the objects and materials acquired with the assets entrusted to him. These included a wide range of goods – items for daily monastic life, liturgical objects, provisions, and possibly materials for maintenance and construction – each recorded in such a way as to render the use of financial resources transparent and justifiable.

The account compiled by canon Hartmann in the mid-14th century offers a rare glimpse into the material culture of a late medieval monastery. Rather than functioning as a simple financial record, the list reveals a complex world of sacred objects, furnishings, books,

25 For the spatial location and purpose of the rooms used by ecclesiastical officials for writing, cf. Ingrid MATSCHINEGG, *Inventarisierte Objekte verlinken: Schreibzeug, Schreibtisch, Schreibstube. Objekte und Orte des Schreibens auf Burgen (15. und 16. Jahrhundert)*, in: *Object Links. Dinge in Beziehung*, ed. by INSTITUT FÜR REALIENKUNDE DES MITTELALTERS UND DER FRÜHEN NEUZEIT (Formate – Forschungen zur Materiellen Kultur 1, Wien 2019), pp. 75–94, esp. p. 87.

buildings, and personal and communal provisions, all of which shaped daily life in the monastic community. Each item is documented not just as an expenditure, but as an element within a broader religious and institutional framework.

The acquisition of liturgical vestments – at least six complete sets, some with accessories – speaks to the continual renewal of the visual and symbolic order of the liturgy. Vestments were not only costly, but also richly symbolic, embodying the monastery's identity and its ritual presence. Similarly, the multiple chalices, ampullae, and censers (*thuribula*) reflect the diversity of sacred vessels required to support an active liturgical schedule, and their varying values suggest differences in material quality, function, or prestige.

The list is equally rich in liturgical and theological books, including missals, psalters, antiphonaries, epistolaries, and breviaries – some designated for the female community of Klosterneuburg.²⁶ These books formed the intellectual and spiritual infrastructure of monastic life, enabling the proper performance of the Divine Office and the transmission of doctrine. The monastery's devotional life also extended into visual culture: the panel painting of St. Michael, the gold decorations of St. Giles, and the monstrance illustrate how images and precious materials were central to the representation and experience of sanctity.

Beyond the sacred, the account book documents significant investments in buildings and furnishings: the renovation work in the dormitory, masonry works, and even three bath-houses for the canons and nuns, which point to the importance of comfort, hygiene, and regulated communal life.

The expenditures related to the apartment within the dormitory point to the personal living comfort of the officeholder. It was situated within the dormitory and underwent substantial renovation and furnishing. These entries indicate a differentiated spatial arrangement comprising multiple rooms – at least a personal chamber, a larger heated room (*stuba*), and a smaller adjacent room equipped with some form of added comfort.²⁷ The considerable sums involved suggest both the high status of the officeholder and the importance attributed to well-appointed private quarters within the communal setting of the monastery. They also reflect broader trends in the architectural differentiation of space in late medieval clerical residences. Other entries mention a house in Vienna, and large-scale, unspecified spending on the cellary and treasury – critical nodes of institutional self-maintenance. Taken together, this account represents more than financial stewardship. It underscores the hybrid nature of early accounting practices, blending elements of narrative, performance, and legal validation. Rather than being abstracted into a ledger format,

26 “Item pro alio Epistolario ad Dominas XVIII talenta.” Stiftsarchiv Klosterneuburg, Charters, 1341 September 10, https://www.monasterium.net/mom/AT-StiAK/KlosterneuburgCanReg/1341_IX_10/charter [1.8.2025].

27 For more information on the function and significance of the parlour, see most recently: Elisabeth GRUBER–Peter FÄRBERBÖCK, ITEM: Eine Schnittstelle realienkundlicher Daten aus historischen Textquellen, in: Schnittstelle Mediävistik. Kollaborationen der Mittelalterforschung im digitalen Zeitalter, ed. by Luise BOREK–Katharina ZEPPEZAUER–WACHAUER–Karoline DÖRING, *Das Mittelalter* 30/1 (2025), pp. 113–129.

the account is embedded within a notarised text that emphasises legal responsibility, institutional oversight, and the moral economy of monastic administration. The detailed inventory not only reflects financial transactions, but also serves as a material testimony to the priorities, values, and logistical realities of communal life within the monastery.

Finally, this example illustrates that written accounting practices did not necessarily require the formal structure of a ledger. In their earlier forms, such records often resemble narrative accounts more than tabular or systematic overviews. Rather than prioritising clarity or standardisation, these early texts reflect a practice of recounting and documenting financial responsibility through prose-like entries. This narrative mode suggests that the act of accounting was initially less about abstract calculation and more about constructing a coherent and plausible account of economic activity, one shaped by context, audience, and rhetorical intent, rather than by formalised bookkeeping conventions.

In this way, account books become more than instruments of financial control. They offer insights into how material culture was integrated into monastic life, how things were seen, used, and made meaningful. This approach supports a more nuanced understanding of pre-modern economies, not only in terms of goods and services, but in terms of the symbolic and social life of objects within religious institutions. Thus, monastic account books can serve as key sources not only for institutional history but also for a nuanced reconstruction of the material and symbolic world of the premodern monastery.

CONCLUSION

In monastic settings, financial records were regularly produced to document the activities of key administrative offices. These accounts record goods received and issued, purchases made on behalf of the community, and payments for services or deliveries. More than transactional records, they reflect systems of internal oversight, norms of accountability, and institutional expectations for transparency. Written accounting practices reveal patterns of spatial and temporal organisation within institutions. They structure financial information annually or seasonally, link expenditures to liturgical calendars or agricultural cycles, and define specific spaces – bathrooms, kitchens, dormitories – as units of economic action. As such, they not only mirror but also shape institutional logic and memory. Overall, financial records constitute a crucial corpus for understanding the economic, administrative, and social dynamics of medieval communities. They allow historians to reconstruct not only what was spent or received, but also how premodern societies structured economic responsibility, formalised exchange, and negotiated value through writing.

FAITH IN TRADE

THE RECKONING BOOK OF CLEMENS HÖR (1515–1572) AND THE SWISS REFORMATION CRISIS

Norbert Hunor Orbán

INTRODUCTION

In 1545, the Bernese City Council issued a decree addressed to its subjects living in Waadt, which read as follows:

Noch einmal weisen wir alle Väter, Mütter und Vormunde an, jene Kinder, die imstande sind, das Vaterunser, das Glaubensbekenntnis und die Zehn Gebote zu lernen, zu jener Zeit in die Kirche zu schicken, in der die Pfarrer den Katechismusunterricht halten. Nichtbeachtung wird die ersten drei Mal mit Inhaftierung und beim vierten Mal mit Verbannung aus den Berner Gebieten geahndet.¹

This decree was issued entirely in the spirit of the Reformation, and in keeping with the early stages of this new church reform, one thing was promoted above all else – education for the masses. Not only were the spiritual leaders of the Reformation themselves academically trained,² but they also agreed that the long-term success of this movement could only be guaranteed if educational and pedagogical measures were taken.³ It was therefore

- 1 “Once again we instruct all fathers, mothers and guardians to send those children who are able to learn the Lord’s Prayer, the Creed and the Ten Commandments to church at the time when the pastors are giving catechism lessons. Non-compliance will be penalised, the first three times with imprisonment, and the fourth time with banishment from the Bernese territories.” Cited from: Karin MAAG, *Das Schul- und Bildungswesen zwischen 1500 und 1600*, in: *Die schweizerische Reformation. Ein Handbuch*, ed. by Amy Nelson BURNETTE–Emilio CAMPI, Leiden–Boston 2016, pp. 527–548, p. 532.
- 2 For example the humanist Joachim von Watt, also known as Vadian (1483/1484–1551), who played a pivotal role in the development of the city of St. Gallen, both economically and religiously. Cf. *Die Reformation in der Ostschweiz. Eine Landschaft im kirchenpolitischen Umbruch*, Teil 1: *Auf der Suche nach einem gnädigen Gott*, ed. by STADT ST. GALLEN, St. Gallen 2017; Rudolf GAMPER, *Die Bibliothek Joachim Vadians (1483/1484–1551) und die Anfänge der Reformation in St. Gallen*, in: Johannes Block, *Der pommersche Reformator*, ed. by Jürgen GEISS–WUNDERLICH–Volker GUMMELT, Leipzig 2017, pp. 91–108; or Joachim Vadian – 1483/1484–1551: *Humanist, Arzt, Reformator, Politiker*, ed. by Rudolf GAMPER–Rezia KRAUER–Clemens MÜLLER, Zürich 2017.
- 3 Marcel MÜLLER, *Lernorte und Wissensstand der St. Galler Bevölkerung an der Schwelle zur Reformationszeit*. *Neujahrsblatt/Historischer Verein des Kantons St. Gallen* 157 (2017), pp. 36–45, p. 36.

Catechism classes that were the key to ensuring that the population learned the basics of the faith. Furthermore, they also had an identity-building aspect, especially in the confessionally heterogeneous regions of present-day Switzerland.⁴ The city of St. Gallen introduced catechism classes very early on, in 1527, making it the second city after Zurich, which was the centre of the Swiss Reformation.⁵ St. Gallen was also the second city in today's Swiss territory to adopt the Reformation movement.⁶ Although the reformation spread rapidly, it should not be forgotten that St. Gallen was still a catholic stronghold at the beginning of the 16th century. The foundation of the prince abbey of St. Gallen dates back to the 7th century and is thus one of the oldest religious centres of catholic monasticism in Europe. Of course, at the beginning of the reformation, these circumstances provided fertile ground for a variety of confrontations, not just religious ones.⁷ In these turbulent times, characterised by religious disputes and military conflicts, Clemens Hör, a protestant pastor and teacher originating from St. Gallen, authored a reckoning book in the year 1546. His work was intended not only to instruct young men but also to provide practical use for merchants.⁸ The specific aim of this paper is to analyse whether the arithmetic examples included in Hör's reckoning book are in any way affected by contemporary political, economic, and religious developments.⁹ This includes the confessional and political unrest at the time. Furthermore, I am concerned with the question of whether reckoning books serve as a medium

4 MAAG, *Das Schul- und Bildungswesen* (2016), pp. 531–533.

5 *Ibid.*, p. 532.

6 Erich BRYNER, *Die Reformation in St. Gallen und Appenzell*, in: *Die schweizerische Reformation. Ein Handbuch*, ed. by Amy Nelson BURNETTE–Emilio CAMPI, Leiden–Boston 2016, pp. 245–269, p. 245.

7 *Ibid.*

8 “Ain schon unnd nutzlichs Rechenbüchlin ainem yeden anhebenden Junger leerhafft und leicht zu ergreifen, sampt vil und schöner Reglen, griff vortail, so zu disen getzeiten im gang und seer brüchlich, in allerlay koffmanshendlen dienst dienstlich, vast uff unser Statt S. gallen, Müntz, gwicht, maß und werung. Durch mich Clemens Horen burger und Lermaister daselbs verordnet und gestelt.” [Translation: A beautiful and useful reckoning book, for every young man, instructive and easy to use with many beautiful rules, which offer an advantage in these difficult times and are useful for all kinds of merchant trade, written with the coins, weights, measures and currencies of our city S. Gallen. Prescribed and written by me, Clemens Hör, citizen and schoolmaster of the same city.] St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. II’.

9 The ERC Starting Grant project ARITHMETIC (www.arithmetic-project.org) aims to analyse German-language arithmetic manuscripts from the 15th and 16th centuries and to evaluate the sources from a linguistic and cultural-historical perspective. Cf. Michaela WIESINGER, *Warum Würste und Unterhosen beim Rechnen helfen. Zu den Zahlzeichen 0 und 4 im spätmittelalterlichen Merkspruch Vnum dat vinger*. *MEMO – Medieval and Early Modern Material Culture Online* (2024), pp. 20–39, doi: 10.25536/20241103 [27.5.2025]; Christina JACKEL, *Krücken, Schweineschwänze und eine Menge kleiner Zettel. Ein Merkspruch und seine Überlieferung als Beispiel spätmittelalterlicher Wissenszirkulation*. *MEMO – Medieval and Early Modern Material Culture Online* (2024), pp. 5–19, doi: 10.25536/20241102 [27.5.2025]; Norbert Hunor ORBÁN–Michaela WIESINGER, *Zwischen den Zeilen gerechnet. Rechenbeispiele als Spiegel sozialhistorischer Entwicklungen im 15. und 16. Jahrhundert*. *MEMO – Medieval and Early Modern Material Culture Online* (2024), pp. 40–62, doi: 10.25536/20241104 [27.5.2025]; Michaela WIESINGER–Christina JACKEL–Norbert Hunor ORBÁN, *Handwritten Arithmetic Treatises in German (1400–1550)*. *Medieval Worlds 18* (2023), pp. 72–107, doi: 10.1553/medievalworlds_no18_2023s7 [27.5.2025].

for the construction and consolidation of identity, similar to the function of catechism classes in the context of religious education. The history of the Reformation in Switzerland is a vast and complex subject, and as such, I will only touch upon the most important events relevant to this paper.

CLEMENS HÖR AND THE CITY OF ST. GALLEN

Clemens Hör was a member of a patrician family of the same name.¹⁰ The Hör family first appears in historical records in 1350 and was notably involved in the canvas trade in St. Gallen;¹¹ their trade relations extended as far as Nuremberg, Vienna and Breslau.¹² The analysis of the reckoning book shows that his family's canvas business had a substantial impact on Hör's text.¹³ However, there is a lack of information about Clemens Hör himself. His father, who bore the same name, was chaplain at the parish church of St. Laurenz in St. Gallen, as well as a schoolmaster. In this respect, the son followed his father as he also became a (protestant) pastor and schoolmaster. His mother was most likely called Ursula Schorant.¹⁴ From a correspondence with the city council, we know that he had at least one son who was suffering from an illness at the time the message was written.¹⁵ Due to the fact that, until 1553, he was obliged to dedicate himself exclusively to the parish of Trogen on weekends and was expected to fulfil his duties as a teacher during the week, he submitted a request in the same year to relocate to Trogen without forfeiting his citizenship in St. Gallen.¹⁶ In addition, he

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- 10** Tabea ADINA-MOSCHETTINI wrote her Bachelor's and Master's thesis on Clemens Hör, his reckoning book and the education in the city of St. Gallen. Cf. Tabea ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister Clemens Hör. Eine Untersuchung seiner Fähigkeiten anhand seines ersten Rechenbuchs* (Bacc. Univ. Zürich 2021). I would like to take this opportunity to thank Tabea ADINA-MOSCHETTINI for providing me with her final theses.
- 11** Paul OBERHOLZER, Art. Hör. *Historisches Lexikon der Schweiz (HLS)* (2008), <https://hls-dhs-dss.ch/de/articles/022791/2008-01-15/> [17.2.2025].
- 12** Around the middle of the 15th century, disputes between the Nuremberg merchant Wilhelm Löffelholz (1424–1475) and the merchant Clemens Hör are recorded. Cf. [RI XIII] H. 28 n. 152, in: *Regesta Imperii Online*, http://www.regesta-imperii.de/id/1458-12-02_2_0_13_28_0_152_152 [27.5.2025] or cf. [RI XIII] H. 28 n. 378, in: *Regesta Imperii Online*, www.regesta-imperii.de/id/1462-10-01_2_0_13_28_0_378_378 [27.5.2025]. On Wilhelm Löffelholz cf. Constantin GROTH, *Wilhelm Löffelholz (1424–1475). Patrizisches Leben und politisches Handeln im Nürnberg des 15. Jahrhunderts* (Nürnberger Werkstücke zur Stadt- und Landesgeschichte 76, Nürnberg 2017).
- 13** This issue will be explored in greater depth at a subsequent point. Cf. p. 51.
- 14** Georg Leonhard HARTMANN, *Beyträge zu den Lebensgeschichten aller Geistlichen, die Bürger der Stadt St. Gallen waren oder daselbst in Diensten standen und von der Reformation bis in das Jahr 1750 in den Synodus aufgenommen wurden*, s.l. 1826, Nr. 14. Cited from ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister* (2021), p. 7.
- 15** St. Gallen, Stadtarchiv St. Gallen, Missive 1546/3. Transcription after ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister* (2021), p. 46. This son might also have been named Clemens, since Clemens Hör refers to himself as “the Elder” (“der Elter”) in his second reckoning book of 1569. Other possibilities include that he had another son or a younger brother named Clemens. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 419, fol. III^r.
- 16** Johann Caspar ZELLWEGER, *Geschichte des Appenzellischen Volkes*, St. Gallen 1842, pp. 345–346.

carried out further clerical duties at the hospital in St. Gallen in 1569 and at Arbon in 1568 and then again from 1570 to 1572. He passed away in Arbon in 1572.¹⁷

From 1535 to 1553, he is listed as a schoolmaster at Linsenbühl¹⁸ in St. Gallen. Because of his extensive knowledge in mathematics, astronomy, and music he was perfectly qualified to work in a German speaking school, owing to the fact that these schools taught basic reading, writing and arithmetic skills in the common vernacular.¹⁹ His broad knowledge is also reflected in his works. Apart from the aforementioned reckoning book (1546), he also made: astrolabe tables (1556);²⁰ a series of Almanacs in 1558,²¹ 1566,²² and 1567;²³ a “Tabulae astronomicae” (ca. 1560)²⁴; and a “pocket book” (“Handbüchlein”) for merchants (1569).²⁵ The work “De compositione aut fabrica astrolabii” by Johannes Stöffler (1452–1531) was copied

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- 17 Huldreich Gustav SULZBERGER, *Biographisches Verzeichnis der Geistlichen aller evangelischen Gemeinden des Kantons Thurgau von der frühesten Zeit bis auf die Gegenwart*, Frauenfeld 1863, p. 199.
- 18 The Linsenbühl is situated east of the city walls of St. Gallen. The construction of a hospital in this location is believed to have occurred as early as the 13th century, potentially accompanied by the presence of a chapel. The conversion of this chapel into a church is believed to have taken place in the 15th century, with protestant services being conducted from 1526 onwards. The beginning of his career as a schoolmaster in 1535 can be derived from a missive written by Clemens Hör in 1546, in which he stated that he had already been working as a teacher for eleven (“ayloff”) years. St. Gallen, Stadtarchiv St. Gallen, Missive 1546/2. Transcription after ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister* (2021), p. 44.
- 19 MÜLLER, *Lernorte* (2017), p. 37. We learn that Clemens Hör teaches reading, arithmetic and writing from the previously quoted missive: “nit alain mit leren, schreiben, lesen, sonder och rechnen nebend anderem lernen [...]” St. Gallen, Stadtarchiv St. Gallen, Missive 1546/2. Transcription after ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister* (2021), p. 44. Simultaneously with the composition of the reckoning book, Clemens Hör was engaged in a dispute with another schoolmaster, Jörg (Georg) Walch, who, according to the available sources, threatened the very existence of Hör. St. Gallen, Stadtarchiv St. Gallen, Missive 1546/1 and 1546/2. Transcription after ADINA-MOSCHETTINI, *Der sankt-gallische Lehrmeister* (2021), pp. 43–45.
- 20 In the preface to the work, Clemens Hör states that he composed it in Trogen whilst fulfilling the role of an administrator (“verweser”) of the local church. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 421, fol. VII^r.
- 21 This work is dedicated to the mayor and the city of St. Gallen. Clemens Hör himself added an addendum, in which he expressed his hope that this work would be printed (“Und so ferr ewer weyshait sollich exemplar in den druck verwilligen”). St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 414, fol. 1r.
- 22 According to the title, the work is dedicated to the mayor and the city of St. Gallen. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 416, fol. XIII^r. The book ended up in the possession of Sebastian Schobinger (1579–1652), himself the son of a mathematician and later mayor of the city of St. Gallen.
- 23 This book was also in the possession of Sebastian Schobinger. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 417, fol. V^r.
- 24 St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 420.
- 25 Clemens Hör also wanted to have this work printed and again asked for the support of the city government (“und so ferr es Ewer Ersam wyßhait für gut ansehen, und druckwirdig erkennen, will ich das aller mencklichem zu nutz in offenen druck verschaffen und außßon lassen.”). St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 419, fol. III^r.

by Clemens Hör in 1547.²⁶ He also collected a four-volume work on compositions for sacred and secular songs.²⁷

To best understand the cultural and historical influence of Clemens Hör's reckoning book, it is prudent to contextualise St. Gallen as an emerging protestant city in the time of the Reformation, as well as its relationship to the inflection catholic Benedictine Monastery of St. Gallen.

“Wie ein Pfahl im Fleisch lag das Kloster St. Gallen innerhalb der Stadtmauern und schloss mit seinem grossen Territorialbesitz die Reichsstadt völlig ein.”²⁸

In terms of social, economic and religious policy, there has been a close dependency between the town and the monastery in St. Gallen since the High Middle Ages.²⁹ The origins of the monastery can be traced back to a hermitage in the 7th century, which was established by the Iro-Scottish monk Gallus in 612.³⁰ In the 8th century, the transformation of this hermitage into a Benedictine monastery was finally realised. The monastery then developed into a significant cultural centre over the centuries.³¹ Due to the success of the canvas trade, a town developed and grew around the monastery, which then resided at its centre. Noticeably in the 15th century, the town experienced a period of significant economic growth,³²

²⁶ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 422.

²⁷ Zurich, Zentralbibliothek, Handschriftenabteilung, Ms Car V 169 a–d. The manuscript was dated 1553 and he dedicated it to the famous reformer and schoolmaster in Zurich Johannes Fries (1505–1565).

²⁸ “Like a stake in the flesh, the monastery of St. Gallen was located within the city walls and completely enclosed the imperial city with its large territorial possessions.” Theodor MÜLLER, *Die St. gallische Glaubensbewegung zur Zeit der Fürststäbte Franz und Killian (1520–1530)*, St. Gallen 1910, p. 13. Cited from: Stefan SONDEREGGER, *Geschieden und trotzdem nicht getrennt. Auswirkungen der Reformation auf das politische und wirtschaftliche Verhältnis von Kloster und Stadt St. Gallen*, in: *Die Reformation bricht durch. Phänomene und Folgen*, ed. by der STADT ST. GALLEN, St. Gallen 2018, pp. 213–225, p. 224.

²⁹ Stefan SONDEREGGER has dedicated a substantial article to this phenomenon, cf. SONDEREGGER, *Geschieden* (2018), pp. 213–225. Cf. also to this matter Bettina BRAUN–Wolfgang DOBRAS, *St. Gallen: eine Stadtrepublik zwischen Reich und Eidgenossenschaft*, in: *Recht und Reich im Zeitalter der Reformation. Festschrift für Horst RABE*, ed. by Christine ROLL, Frankfurt a. M. 1996, pp. 397–416.

³⁰ BRYNER, *Die Reformation* (2016), p. 245.

³¹ Some current works on the prince abbey of St. Gallen cf. Johanna JEBE, *Gutes Mönchtum in St. Gallen und Fulda: Diskussion und Correctio im Spiegel karolingischer Klosterbibliotheken*, München 2024; *Potentia Monastica: kulturelle Handlungsmacht im mittelalterlichen Kloster St. Gallen*: Festschrift Ernst TREMP zu seinem 75. Geburtstag ed. by Cornelia DORA–Ursula KUNDERT, St. Gallen 2023; Rudolf GAMPER, “... dieselb statt kain rychstatt nie gesin ist.” Politische Argumentation der Fürststabe und der Reichsstadt St. Gallen im Spätmittelalter und in der frühen Neuzeit, in: *Reichsstadt als Argument: 6. Tagung des Mühlhäuser Arbeitskreises für Reichsstadtgeschichte, Mühlhausen 12. bis 14. Februar 2018*, ed. by Mathias KÄLBLE–Helge WITTMANN, Petersberg 2019, pp. 109–128; Philipp LENZ, *Reichsabtei und Klosterreform. Das Kloster St. Gallen unter dem Pfleger und Abt Ulrich Rösch 1457–1491*, St. Gallen 2014.

³² BRAUN–DOBRAS, *St. Gallen* (1996), p. 404. Stefan SONDEREGGER has published extensively on the economic activities of St. Gallen and the Eastern Swiss region in medieval and Early Modern times: Stefan SONDEREGGER, *Schreiben, Rechnen, Buch führen. Handlungswissen als Schlüssel zum beruflichen Erfolg in einer internationalen Handelsstadt. St. Gallen im Übergang vom Mittelalter in die Frühe Neuzeit*, in: *Bildung und Region*.

which led to the establishment of two noteworthy political institutions: the prince abbey of St. Gallen, which encompassed extensive dominions; and the town of St. Gallen itself, situated within and surrounded by these dominions.³³ The significance of St. Gallen was further strengthened by the flourishing of the canvas trade, as it succeeded in replacing Constance as the preeminent centre, and thus emerged as the dominant textile hub within the Lake Constance region. This resulted in a trading network developing between cities like Nuremberg, Augsburg, Vienna, Poznań, and Krakow.³⁴ Clemens Hör's ancestors also traded in these cities.³⁵ In the year 1500, the population of the town is estimated to have consisted of between 3,000 and 4,000 individuals, a considerable proportion of whom were likely to have been financially wealthy.³⁶

Despite the conflicts between the town and the abbey that had already occurred during the 13th and 14th centuries,³⁷ the potential for future conflict increased substantially in the 15th century.³⁸ This stemmed from the fact that in the late 15th century, St. Gallen was still not – and would not be until 1803 – part of the Confederation of Swiss Confederates. Since the economic interests of the city were paramount, the city employed a strategic approach, achieving a balanced relationship between the Holy Roman Empire and the Confederation. In this manner, the city was able to leverage the most lucrative economic relationships from both parties. In order to strengthen the political ties to the geographical closer Confederation, the princely abbey became an ‘associated place’ (zugewandter Ort) to the old Swiss Confederation as early as 1451, and the town followed in 1454.³⁹ In 1457 the town of St. Gallen was able to reach emancipation from the prince abbey's jurisdiction. St. Gallen became de facto a free imperial city and was politically independent, thus further fuelling the disputes. Nevertheless, St. Gallen was entirely surrounded by the prince abbot's dominion and

Wissenstransfer und Institutionen in Schwaben und im Alpenraum vom 15. bis ins 20. Jahrhundert, ed. by Wolfgang SCHEFFKNECHT–Dietmar SCHIERSNER–Anke SCZESNY, München 2023, pp. 21–54; Stefan SONDEREGGER, Aushandeln, festlegen, abrechnen, kontrollieren – Zur Finanzierung und schriftlichen Administration des Spitals der Reichsstadt St. Gallen im Spätmittelalter, in: Spital und Wirtschaft in der Vormoderne. Sozialkaritative Institutionen und ihre Rechnungslegung, ed. by Artur DIRMEIER–Mark SPOERER, Regensburg 2020, pp. 65–101; Stefan SONDEREGGER, Landwirtschaftliche Spezialisierungen in der Region Ostschweiz und ihre Bedeutung für den interregionalen Austausch zwischen Oberschwaben und der Ostschweiz, in: Herrschaft, Markt und Umwelt. Wirtschaft in Oberschwaben 1300–1600, ed. by Sigird HIRBODIAN–Rolf KIESSLING–Edwin Ernst WEBER, Stuttgart 2019, pp. 159–182.

33 BRYNER, *Die Reformation* (2016), p. 245.

34 Ibid.

35 Cf. n. 12.

36 BRYNER, *Die Reformation* (2016), p. 245.

37 In this period there was an agreement between the abbey and the town, wherein the abbot allowed the town to oversee the newly established town school. In return the pupils had to take part in Latin choral singing and cathedral services. Cf. MÜLLER, *Lernorte* (2017), p. 39.

38 Ibid.

39 Ibid.

therefore maintained a profound economic interdependence which required a balancing act inside the city walls.⁴⁰

At the beginning of the 16th century, the conflicts between the town and the abbey intensified. This can be attributed to the dissemination of the teachings of the Augustinian monk Martin Luther (1483–1546), whose ideas concerning the church were instrumental in the development of the new reforming doctrines. These teachings, today known as the Reformation, were rapidly disseminated throughout the territory that is now Switzerland.⁴¹ The first reformatory writings began to circulate in St. Gallen as early as 1520, and were most likely first read in secret.⁴² The church of St. Laurenz in St. Gallen is considered the symbolic centre of the Reformation in the city. From as early as 1524 onwards, Protestant sermons were being read in this church. Johannes Kessler,⁴³ another important figure in the Reformation in the city, regularly organised Protestant readings in St. Laurenz Church from February 1525 onwards.⁴⁴ The significance of the church's patron saint is also evident in Clemens Hör's reckoning book: He declared his book officially finished on 10 August 1546, which happens to be St. Laurence's Day.⁴⁵

Yet, amid these socio-political and religious upheavals was the princely abbey of St. Gallen, a bastion and centre of Catholicism. Starting in 1527, the city began to systematically

⁴⁰ An example: The city was dependent on grain, wood, wine and livestock. However, to obtain these necessary goods, the town was required to do business with suppliers of the Fürstenland, the prince abbot's dominion. Cf. SONDEREGGER, *Geschieden* (2018), pp. 213–214.

⁴¹ There is a vast amount of literature on the Reformation and the Reformation in Switzerland. For the Reformation in present-day Switzerland cf. Peter OPITZ, *Die Beziehungen der Päpste zur Eidgenossenschaft in der Zeit der Reformation*. *Schweizerische Zeitschrift für Religions- und Kulturgeschichte* 117 (2023), pp. 35–51; *Wirkungen und Wurzeln der Schweizer Reformation: Festschrift für Peter OPITZ*, ed. by Gergely CSUKÁS–Ariane ALBISSER, Zürich 2022; *Die Zürcher Reformation in Europa. Beiträge der Tagung des Instituts für Schweizerische Reformationsgeschichte 6.–8. Februar 2019 in Zürich*, ed. by Ariane ALBISSER–Peter OPITZ, Zürich 2021.

⁴² Alfred EHRENSPERGER, *Der Gottesdienst in der Stadt St. Gallen, im Kloster und in den fürstbischöflichen Gebieten vor, während und nach der Reformation*, Zürich 2012, p. 141.

⁴³ Evidently, a closer relationship was observed between Clemens Hör and Johannes Kessler. For instance, a consultation has been preserved in which Clemens Hör writes to Kessler on a legal matter during his time in Arbon. Cf. St. Gallen, St. Gallen KB Vadiana, Vadianische Briefsammlung, VadSlg Ms 39:33 and Ms 40:284; cf. Kessler's answer to Hör Ms 39:34. Clemens Hör also seems to have been in close contact with another famous figure of the Swiss Reformation, namely Johannes Fries. Clemens Hör dedicated his compositions (cf. n. 27) to Johannes Fries, who was at that time teacher and schoolmaster in Zurich.

⁴⁴ Beginning in May 1525, mass was not celebrated in St. Gallen anymore. Already a year prior to that, all paintings had been removed from St. Laurence's Church. The first recorded instance of a Protestant communion being celebrated in this church occurred on 21 April 1527, in the presence of the mayor and town councillors. Cf. EHRENSPERGER, *Der Gottesdienst* (2012), pp. 146–147 and BRYNER, *Die Reformation* (2016), pp. 251–254.

⁴⁵ "S. Laurentzen tag, des 10. Tag Augstmonatz dess 1546 Jares." St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 245r. It appears that reckoning masters did not always choose arbitrary dates to officially complete their reckoning books. As a Protestant pastor, the Church of St. Laurenz likely played a bigger role in Clemens Hör's life; thus, the selection of this particular date may not be coincidental. Furthermore, Franziska PUTZ has noted that the renowned reckoning master Jacob Köbel also concluded his reckoning book "Rechenbuch / Auff Linien und Ziffern. Mit einem Visir Büchlin / Klar und verstandlich fürgeben. Gerechnet

dissolve monasteries and confraternities, which also resulted in the dissolution of the influential Benedictine abbey in 1529, the expulsion of the abbot, and the closure of the convent.⁴⁶ Relations with the emperor and the Holy Roman Empire were directly affected by the expulsion of the abbot and the introduction of the Zurich Reformation in St. Gallen. The city increasingly turned towards the Confederation centres and in particular towards the cities of Zurich and Bern; however, St. Gallen nevertheless continued to maintain contacts with the Empire for economic reasons.⁴⁷ In the 1520s, the city of Constance also adopted the teachings of the Reformation which led to a close religious and political exchange between St. Gallen and Constance, from which the canvas trade also benefited enormously.⁴⁸

Confessional turmoil in the Confederation escalated in the late 1520s and 1530s. The so-called First Kappel War⁴⁹ ended with a diplomatic solution without bloodshed, but the peace did not last long. Just two years later, the protestant army declared war on the catholic centres again, but this time, the protestant army was fully defeated during the Second Kappel War⁵⁰ and Huldrych Zwingli (1484–1531), the spokesman and leader⁵¹ of the Swiss

Büchlin / auf alle wahr vnd Kauffmannschaft” on 20 February 1531 – the feast day of St. Corona. St. Corona is considered the patron saint of money, and her name, which means “crown” in German, may also symbolically reference various currencies. Given that Köbel’s reckoning book was explicitly addressed to merchants and tradespeople, the choice of this specific date appears especially meaningful. Cf. in this book: Franziska PUTZ, *Counting on paratext: Calculating the success of reckoning books in early modern prints*.

46 EHRENSPERGER, *Der Gottesdienst* (2012), p. 148.

47 For example, the city’s delegates also continued to attend the Imperial Diet, although this was mainly due to the presence of the exiled abbot, whom they wished to observe on spot. Cf. BRAUN–DOBRAS, *St. Gallen* (1996), pp. 406–407.

48 *Ibid.*, p. 404, also cf. Stefan SONDEREGGER, *Handel über den Bodensee: Getreide für die Schweiz, Textilien für den Weltmarkt*, in: *Der Bodensee – Natur und Geschichte aus 150 Perspektiven*, ed. by Harald Rainer DERSCHKA–Jürgen KLÖCKLER, Ostfildern 2018, pp. 104–105 or Stefan SONDEREGGER, *Austausch über den Bodensee im Spätmittelalter und in der Frühen Neuzeit: Perspektiven einer Edition von Missiven der ehemaligen Reichsstadt St. Gallen*, in: *Konstanz und der Südwesten des Reiches im hohen und späten Mittelalter: Festschrift für Helmut MAURER zum 80. Geburtstag*, ed. by Harald Rainer DERSCHKA–Jürgen KLÖCKLER–Thomas ZOTZ, Ostfildern 2017, pp. 171–187.

49 On 8 June 1529, the protestant city of Zurich declared war on the Catholic cities of Uri, Schwyz, Lucerne, Upper and Lower Walden, and Zug. The city of Bern acted as an important ally of the city of Zurich. EHRENSPERGER, *Der Gottesdienst* (2012), p. 148, also cf. BRYNER, *Die Reformation* (2016), p. 257.

50 On 9 October 1531, Zurich declared war on the Catholic centres again. At the Battle of Kappel on 11 October 1531, the protestant troops suffered a heavy defeat and Zwingli died. The protestant army was fully defeated on 24 October 1531. Cf. Bruce GORDON, *The Swiss Reformation*, Manchester 2002, p. 133.

51 As Bruce GORDON asserts, Zwingli played a pivotal role in the Reformation in Switzerland: “Without his vision, his preaching, his theological profundity and dexterity, and his political acumen, there would have been no Reformation in the Swiss Confederation. It would be impossible to sustain that Zwingli himself was the author of the Reformations in Berne, Basle, or Schaffhausen; events in these states were dictated by local events and characters, and had their own logic, but he was responsible for what happened in Zurich, and without Zurich there would have been no other Reformations.” GORDON, *The Swiss Reformation* (2002), p. 143.

Reformation was killed in the battle.⁵² Due to the ‘Christian Burgrecht’,⁵³ St. Gallen was obliged to send troops for the protestant army. The protestant army’s defeat in 1531 had far-reaching consequences that were also felt in St. Gallen. Although cities such as St. Gallen, who followed the ‘Christian Burgrecht’, were allowed to retain and practise the new faith, their political position within the Confederation was substantially weakened. The princely abbey was returned to the abbot, and the city had to pay reparations. On 1 March 1532, the abbot and his monks returned to their old home and Catholic masses were reintroduced. The city and the princely abbey were now once again two separate actors in the political and religious spheres.⁵⁴ Even though the political prerequisites had changed, the unwanted dependence on each other remained, just as it had in the past. The continuing rivalries after the Second Peace of Kappel culminated in a physical border between the town and the abbey, and in 1558, a wall was built within the walls of the city to separate those two areas of authority. The princely abbey (Catholic) and St. Laurence (Protestant) churches, only 50 metres apart, were separated by a stone wall, which is still partly visible today. A separate entrance was even built for the city’s Catholics, allowing them to enter the monastery grounds unmolested.⁵⁵

THE RECKONING BOOK

It is this time of political and religious upheaval that serves as the backdrop for Clemens Hör’s reckoning book. The book follows the ‘classical’⁵⁶ conventions of contemporary reckoning books; it starts with the title (fol. IIr), a general preface (fol. IIv–IVv), and an index (fol. Vr–VIIv). After the register, Clemens Hör wrote a direct preface to the reader (fol. VIIv–VIIIv). On fol. IXr–IXv he added a list of currencies and conversions. The following first part of the actual reckoning book consists of an introduction to Hindu-Arabic numerals and basic arithmetic operations with integers (fol. 1r–44r), the second part deals with fractions (fol.

52 Huldrych Zwingli was posthumously quartered and burned. Johannes STUMPF (1500–1577/78) reports on Zwingli’s last day in his chronicle. Cf. Johannes STUMPF, *Chronica vom Leben und Wirken des Ulrich Zwingli*, Zürich 1932, pp. 171–178. Overall, Zwingli’s supporters lost about 500 men out of a contingent of 2000, while the Catholics suffered only 80 casualties out of an army of 7000 to 8000. Cf. GORDON, *The Swiss Reformation* (2002), p. 133.

53 The ‘Christian Burgrecht’ (Christliches Burgrecht) was a protestant association of towns part of the Confederation or ‘associated places’ (Zugewandte Orte) like Zurich, Bern, St. Gallen Basel or Schaffhausen, to name a few. Cf. BRYNER, *Die Reformation* (2016), p. 256.

54 BRYNER, *Die Reformation* (2016), p. 257, and cf. GORDON, *The Swiss Reformation* (2002), pp. 133, 149, 161–162.

55 GORDON, *The Swiss Reformation* (2002), p. 168.

56 Barbara GÄRTNER, Johannes Widmanns “Behende und hubsche Rechenung”: Die Textsorte „Rechenbuch“ in der Frühen Neuzeit, Berlin 2000, pp. 12, 112, 250; also cf. ORBÁN–WIESINGER, *Zwischen den Zeilen* (2024), pp. 40–62, p. 41. Regarding the innovative potential of researching reckoning books in an interdisciplinary manner cf. WIESINGER–JACKEL–ORBÁN, *Handwritten* (2023), pp. 72–107.

44v–77r). The third and final part consists of practical reckoning examples and is called “*practica*” (fol. 77v–246r).

Clemens Hör’s practical examples can be sorted into three main categories: the trading and bartering of commercial goods; calculations of coinage units, measurements and weights; and all kinds of wage plus labour calculations. Most of the tasks presented within the text relate to the trading or bartering⁵⁷ of commercial goods, such as textiles and spices.⁵⁸ The focus on cloth as a commodity is crucial for the reckoning examples. A total of 79 distinct goods are referenced – encompassing both trade goods and consumer goods, including knives and similar utensils. Of these items, 16 pertain to cloth, like velvet, silk or satin. Of the 220 consumer and trade goods referenced in the complete reckoning book, a total of 66 goods⁵⁹ documented relate to the cloth trade or production. In terms of how frequently a commodity is mentioned, cloth is then followed by spices (e.g., pepper, saffron, and cloves) and metals (e.g., gold, silver, and copper), each of which are mentioned 30 times. This data thus indicates a clear focus on the cloth trade.

When we look at the examples in more detail, those concerning cloth are dominated by calculations of ells⁶⁰ of unspecified fabric (26 times), furthermore specific fabrics, such as velvet or hem (10 times), and finally the acquisition of certain ells of fine linen (5 times). Region-specific fabrics are also mentioned, such as cloth from Bern,⁶¹ Mechelen,⁶² or London.⁶³ When we look at bartering examples, we witness that even here, in this category, the cloth trade dominates the examples in the reckoning book.⁶⁴ However, the cloth trade also dominates other aspects of cultural history in the reckoning book. In a total of fourteen examples wherein direct reference is made to various European trading cities, ten different cities

57 Bartering with trade goods is defined as a task in which two parties, often referred to by specific job titles, exchange goods with each other. The objective of this exchange is to ensure that neither party experiences a financial deficit as a result of the transaction. For example: “Item ainer hat duch / dz will er verstecken umb wein / und gilt 1 Eln bar 3/4 gulden / am stich setzt ers für 1 gulden. Der ander gibt 1 aymer bar umb 2 1/2 gulden. Nun ist die frag wie sol er den aymer in stich setzen / das der stich gleich werde.” [Translation: Item one has cloth and wants to barter it with wine. 1 Ell is 3/4 guilders. At the barter he wants 1 guilder. The other one gives pail for 2 1/2 guilders. The question is how he should barter the wine that the barter is the same [with cloth and wine]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 183v.

58 A bartering example on fol. 184v involves pepper and canvas. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 184v.

59 For example, there are six different reckoning examples with wool. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 99r–v, 179v, 188v, 190r–v.

60 A St. Gallen wool ell measured 61.131 cm, and a St. Gallen linen ell measured 73.500 cm. In comparison, a Nuremberg ell measured 65.65 cm. Cf. Richard KLIMPERT, *Lexikon der Münzen, Maße, Gewichte, Zählarten und Zeitgrößen aller Länder der Erde*, Berlin 1896, p. 91.

61 St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 64v.

62 St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 73v, fol. 80v.

63 St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 101v. You find another example with London cloth, this time a barter calculation with saffron, on fol. 189v.

64 Clemens Hör gives a total of nine barter calculations, in seven at least one cloth related good is mentioned. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSgl Ms. 418, fol. 183v, 184v–190r.

associated with the cloth trade are mentioned within the context of these exercises. These cities include St. Gallen, Nuremberg, Regensburg, Leipzig, Ghent, Bruges, Venice, Vienna, Buda, and Bratislava. The examples are highly similar in terms of their written content. Typically, a merchant will purchase cloth in location A and subsequently transport it to location B.⁶⁵ Exports from St. Gallen were recorded in Northern Italy, France, Spain, Germany and Poland.⁶⁶ In Hör's second reckoning book, published in 1569, he even justifies the focus on the canvas trade in his arithmetic examples as follows: "Die will der Leinwat kouff by uns, den meisten bruch hat, hab ich meinem vatterland zu nutz darnach gemaine deutschland zu guten von wie die Eln, stuck oder pfund namen habind, erstlich und vorallen dingen setzen wellen [...]."⁶⁷

The emphasis on "vatterland" and "gemaine deutschland" is not exclusive to the second reckoning book. A total of 15 different towns were mentioned on 32 occasions in Hör's 1546 reckoning book. The imperial city of Nuremberg features most frequently, with a total of eight mentions in his examples. This phenomenon can be explained based on two factors. On the one hand, Nuremberg was among the most significant commercial hubs on the European continent. On the other, St. Gallen maintained particularly intensive economic contacts with Nuremberg, as another centre for cloth trade, as previously mentioned.⁶⁸ After Nuremberg, Venice and St. Gallen are the cities that are most frequently mentioned in the book, with four mentions in total each.⁶⁹ Leipzig is mentioned on three occasions. The presence of practical examples pertaining to Leipzig is unsurprising, given that St. Gallen not only engaged in economic relationship with Leipzig, but also established an educational exchange.⁷⁰ Vienna and Cologne are each mentioned twice. The cities of Ghent, Bruges, Metz, Padua, Regensburg, Augsburg, Buda, Bratislava and Eger (cz. Cheb) once each. If Hör's reckoning book can be taken as a reliable source of information, the focus of St. Gallen's trade

65 For instance, one individual purchases canvas in Ghent (fol. 88r); another purchases cloth in Nuremberg and delivers it to Regensburg (fol. 175r). The purchase and delivery of velvet from Vienna to Buda is also documented (fol. 175v), as is the purchase of hem in England and its delivery to St. Gallen (fol. 179v).

66 BRYNER, *Die Reformation* (2016), p. 245. A comparative analysis of other reckoning books is also recommended. For instance, in the reckoning book of the Viennese reckoning master Christoph RUDOLFF, St. Gallen is explicitly associated with the canvas trade. Christoph RUDOLFF, *Künstliche rechnung mit der Ziffer und mit den Zalpfenningen, sampt der Wellischen Practica, und allerley forteyl auff die Regel de Tri*, Wien 1540, unfol. [pp. 124, 146]. Regarding Christoph RUDOLFF and his practical examples as a reflection of socio-historical developments of the 16th century in comparison with other reckoning books cf. ORBÁN-WIESINGER, *Zwischen den Zeilen* (2024), pp. 40–62.

67 "Because the canvas trade has the greatest tradition for us, I wanted to treat those ells, pieces and pounds first and foremost, and before all other things, for the benefit of my fatherland, then for common Germany [...]."
St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 419, fol. XI'.

68 Also, Hör's reckoning examples prove that. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 146r, 147v, 173v, 174v, 175r, 177v, 221r, 222r.

69 For instance, someone buys velvet in Venice. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 178r.

70 MÜLLER, *Lernorte* (2017), p. 40.

relations was evidently on the Holy Roman Empire. The practical examples demonstrate this clearly. What is particularly exciting is that Clemens Hör, like other reckoning masters of his time, uses ‘traditional’ reckoning examples that had been circulating for centuries;⁷¹ however, the cities, currencies, and units were adapted to the time, region, and the contemporary value of the raw material, such as the ‘tin purchase in Eger’⁷² or the ‘hem purchase in Cologne’ examples.⁷³ It is evident that the arithmetic book fulfils its intended purpose; specifically, its function as a tool for the training of prospective merchants and tradesmen in St. Gallen. It also serves as a mirror for contemporary issues, as the historical importance of the cloth trade in St. Gallen is clearly portrayed within the reckoning book. Indeed, many other examples that are concerned with goods from that region highlight this historical reality. Moreover, even the fact that St. Gallen needed a larger trading network than just the reformed cities becomes evident when simply looking at the reckoning book. The Holy Roman Empire and its cities plays an important role in Hör’s text, as is likewise documented

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- 71** It seems evident that the purchase of tin in Eger, with subsequent delivery to Nuremberg, and the acquisition of hem in Cologne, with subsequent delivery to Vienna, Bratislava or Buda, can be considered as ‘traditional’ examples. Similar examples can be found with modified units in prevalent German-language reckoning books of the 15th century. Just a few examples in German reckoning books regarding the purchase of tin in Eger: the “*Algorismus Ratisbonensis*”, cf. Kurt VOGEL, *Die Practica des Algorismus Ratisbonensis*, München 1954, p. 153; the “*Bamberger Rechenbuch*”, cf. Eberhard SCHRÖDER (ed.), Ulrich Wagner. *Das Bamberger Rechenbuch von 1483*, Berlin 1988, p. 191; the reckoning book of Johannes Wiedmann, cf. Barbara GÄRTNER, Johannes Widmanns (2000), p. 449; cf. Vienna, Nationalbibliothek, Cod. 3029, fol. 33r and in cf. Berlin, Staatsbibliothek, Ms. Germ. Octav. 375, fol. 66r. The units of the examples from the 15th century are identical. In each of the examples, 371 hundredweights of tin are bought in Eger. 1 hundredweight costs 10 3/4 guilders. With toll and duty from Eger to Nuremberg 121 guilders and in Nuremberg 1 hundredweight costs 8 1/2 guilders.
- 72** The ‘tin purchase in Eger’ in Clemens Hör’s reckoning book: “Item ain kouff zu Eger 124 Zentner Zin. 1 Zentner umb 16 Gulden 1/2 gestadt mit furlon bis gen Nürenberg 34 Gulden und 3 Zentner von Eger thund 4 Zentner zu Nürenberg, da gibt 42. 1 Zentner umb 10 Gulden 1 1/2 ort, wieviel hat er gwunnen oder verlor.” [Translation: Item one buys 124 hundredweights of tin. 1 hundredweight cost 16 guilders 1/2 with toll to Nuremberg 34 guilders and 3 hundredweights in Eger are 4 hundredweights in Nuremberg, there you get 42. 1 hundredweight for 10 guilders 1 1/2 ort [quarters]. How much did he win or lose.]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 222r. Further examples from the 16th century: Gießen, Universitätsbibliothek, Hs 600, fol. 27v; Einsiedeln, Stiftsbibliothek, Cod. 772, fol. 265v; Augsburg, Stadt- und Staatsbibliothek, Cod. 4° 138, fol. 35v; München, Universitätsbibliothek, 4°Cod.ms.718, fol. 40r. In some of the examples from the 16th century (e. g., Augsburg and Einsiedeln), the purchase of 371 hundredweights of tin is still used, while in others (Gießen with 125 hundredweights; München with 387 hundredweights), units have been adapted, just as in Clemens Hör’s reckoning book.
- 73** Clemens Hör adapts this example and moves the purchase of the hem from Cologne to Bruges. “Item ainer kaufft zwen Som gewand zu Brugk in Flandern / und kost ain duch 13 Gulden 1/2 und halt 1 Som 22 Duch / die kostend mit Furlon bis gen Breßburg in Ungern 34 Gulden. Daselbst gibt er 1 Duch umb 12 Gulden 3 1/2 ort ungrisch und 100 ungrisch thund 136 Gulden 1 ort Reinisch.” [Translation: One buys two hems of cloth in Bruges in Flanders, and one cloth costs 13 guilders 1/2 and 1 hem has 22 cloths, which cost 34 guilders with carriage to Bratislava in Hungary. There he pays 12 guilders 3 1/2 ort [quarters] Hungarian for 1 cloth and 100 Hungarian are 136 guilders 1 ort [quarters] Reinisch.]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 219v. An analogous example is found in Christoph RUDOLFF’s reckoning book, which features modified units of measure. There the purchase happens in Bruges, and it is delivered to Buda. RUDOLFF, *Künstliche rechnung* (1540), unfol. [p. 148].

in our historical sources. The necessity of maintaining these commercial contacts, despite the religious and political unrest that engulfed the area during the 16th century, was crucial to ensure the economic prosperity of the city, and it is exactly that historic reality that is depicted in Hör's reckoning book.

Apart from that, Clemens Hör's reckoning book demonstrates that a reckoning book can also be utilised as a medium for the creation and affirmation of an identity. This already starts with the title of the reckoning book that places a clear focus on "our city of St. Gallen" ("vast uff unser Statt S. gallen, Müntz, gwicht, maß und werung").⁷⁴ The direct preface to the reader emphasises both "our city of St. Gallen and our citizenry"⁷⁵ ("unser Statt unnd burgerschafft") and "our city and its currency" ("unser Statt und Werung").⁷⁶ Furthermore, in the preface of his second reckoning book from 1569, Clemens Hör explains that he wrote this work for posterity, and, before his death, he wished to leave a "testament of his love for his fatherland" ("hab ich vor minem end ain gedencck zaichen der liebe meins Vaterlands hinder mir lassen wellen.") as well as for the "promotion of our trade" ("zur fürderung unsers Gewerbs").⁷⁷ In the examples of the 1546 reckoning book, the emphasis is repeatedly placed on "merchants from my land" ("koffleut menner lond"),⁷⁸ the "wages of our town S. G." ("Müntz unser Statt S. G."),⁷⁹ or "official of our town S. G." ("amptman unser Statt S. G.").⁸⁰ As previously mentioned, in his second reckoning book, Clemens emphasises, that "the canvas trade has the greatest tradition for us" ("der Leinwat kouff by uns, den meisten bruch hat") and, for "the benefit of my fatherland" ("hab ich meinem vatterland zu nutz"), he prioritised these ells, pieces, and pounds above all else.⁸¹ These individual examples demonstrate that late medieval and early modern reckoning books can serve as an instrument for building identity which is so much more than just simply facilitating mathematical learning. However, Clemens Hör is not an isolated case; on the contrary, he is a representative of a more general phenomenon. A similar observation can be made regarding other reckoning masters, for example Johann Podtler, who included specific narratives on the Ottomans as arch-enemies within his own arithmetic compendium.⁸²

When it comes to the political and religious troubles of the time, we can also look into Hör's reckoning book. He makes an oblique reference to an unspecified state of unrest in the

⁷⁴ Cf. n. 8.

⁷⁵ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. VIIv.

⁷⁶ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. VIIIr.

⁷⁷ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 419, fol. IIr.

⁷⁸ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 30r.

⁷⁹ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 31v.

⁸⁰ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 8v.

⁸¹ Cf. n. 67.

⁸² Christoph RUDOLFF reports in his reckoning book about recent wars in Hungary ("jungsten Ungerischen Kriegßlauffen") right before the Battle of Mohács in 1526. RUDOLFF, *Künstliche rechnung* (1540), unfol. [p. 236]. The reckoning master Johann PODTLER provides his addressees with certain narratives about the Ottomans: "Item 20000 Kriegßmänner / haben mit dem Erbfeind dem Türcken ein Schlacht gethan / Alß nun die

title⁸³ and his preface: “Und wie wol ich E. W. hiemit nit bemüyen solt / zu disen schweren leuffen / und kumberhafften getzeiten / so hab doch sollichs by friedens zeiten angefangen / und dasselb so ferr gebracht / das mich die arbeit geruwen hat / das sy vergeblich sein solt.”⁸⁴ The question that thus arises is what turbulent times Clemens Hör means. During the period in which this reckoning book was written, there were repeated conflicts in and around St. Gallen that affected the city.⁸⁵ Yet, it is likely possible that Clemens Hör is referring to the Schmalkaldic War. Following the conclusion of the Peace of Crépy in 1544, which brought a short-term end to the hostilities between Emperor Charles V (1500–1558) and the French King Francis I (1494–1547), the Emperor focused his attention towards the Reformation.⁸⁶ The Schmalkaldic War between the Schmalkaldic League, a Protestant alliance, and the Catholic Emperor culminated in 1546.⁸⁷ Additionally, the Confederates were also directly impacted by the war, both due to the relationship with Constance, which was part of the Schmalkaldic League, and, despite official neutrality, thousands of Swiss soldiers crossed the Rhine and joined the Protestant army. When Clemens Hör officially finished his reckoning book on 10 August 1546 the Schmalkaldic War was already in progress. These crises, especially the military conflicts at the time, are partly reflected in his reckoning book, which becomes evident when we look at his reckoning examples in more detail: The “*practica*” gives a substantial number of examples that have a military narrative.

Item vor yaren was ain schloß belegert das man kain liferung mer darinn hatt / und es waren 120 kriegsher darinn / die hatten liferung uff / 4 monat / Nun bsorgten sy sich wo sy lenger belegert soleind werden / müßtend sy not liden / Dem aber zu fürkomen woltend sy etlich knecht ziehen lassen / und nit mer behalten / dann daz sich die ubrigen ains yar mit speißbehelffen möchten.

Schlacht sich geendet / sein noch 11903 Kriegßmänner bey leben bliben. Ist die frag / wieviel ihr im streit umbkommen seind?” [Translation: 20000 soldiers fought against the arch-enemy, the Ottomans, in a battle. When the battle was over, 11903 soldiers were still alive. How many died in the battle?]. Johann PODTLER, *Rechenbuech für die anfahenden Rechner auff Oesterreichische, Passawerisch, Böhmische, Ungarische, Schwarze, Nürnbergische, und Venedische Müntz, Gewicht und Maß gerechnet sampt der Welschen Practica neben andern nothwendigen Regeln auff mancherlay Kauffmanshändel und Gewerb, alles schön, lustig und nützlich, ordenlich auff ein neue Art und weiß, Gemacht und in Truck verfertigt durch Johannem Podtler Burger zu Passaw, Passau 1582, fol. 19r.*

83 Cf. n. 8.

84 “And even though I should not have endeavoured to do this in these difficult circumstances and sorrowful times, I started it in times of peace and completed it to such an extent that I would have regretted it if the work had been in vain.” St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. IV^v.

85 These include the influence of the Second Peace of Kappel; the disputes between the prince abbey and the city council; the Anabaptist movement in St. Gallen and inner-Protestant disputes. Cf. BRYNER, *Die Reformation* (2016), pp. 252–253 and GORDON, *The Swiss Reformation* (2002), p. 159.

86 GORDON, *The Swiss Reformation* (2002), pp. 161–162.

87 The Schmalkaldic League was conceived as a defensive alliance among several Protestant princes and cities. In more detail cf. also Gabriele HAUG-MORITZ, *The Holy Roman Empire, the Schmalkaldic League, and the Idea of Confessional Nation-Building. Proceedings of the American Philosophical Society* 152 (2008), pp. 427–439.

Ist die frag wie vil knecht müssend im schlos beleiben / daz sy sich ain yar behelffen mögen. Daz yar fur 12 monat gerechnet.⁸⁸

Furthermore, a total of four examples are exclusively concerned with the matter of soldier payment. In one example the responsibility for remunerating the soldiers falls upon a prince.⁸⁹ In another example this task falls upon three peasants.⁹⁰ The remaining two examples pose questions regarding the amount of financial resources available for the procurement of a specified number of troops,⁹¹ or the number of servants that can be acquired with a given budget of one million guilders.⁹² In a further example regarding the division of goods and monetary compensation among soldiers, loot of a specified value is distributed between them.⁹³ Another fascinating example concerns the equipping and deployment of a contingent of troops:

Item 1188 kriegßknecht / sind also gerüst / nemlich 1/3 mit hellparten 1/4 mit halben hagken / 1/6 mit handtroren / und 3/8 mit spiessen. Nun wirt verordnet / dz die so lang spieß tragen / samptlich gerüst / und all uff sin sollend / und mit in nehmen ain tail deren so helbarten / halbhacken / und ain tail so handror tragen / das yeder ain ußerstgemelten dryen taylen / by im hab.

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- 88** “Years ago, a castle was under siege and no more supplies could be received. There were 120 soldiers in the castle. They still had rations for 4 months. Now they were worried that if they were besieged any longer, they would suffer hardship. To prevent this, they wanted to let some soldiers go so that the rations would last a whole year. The question is, how many warriors could stay in the castle so that their food last for another year? The year is calculated for 12 months.” St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 111r.
- 89** “Item ain Fürst hat kriegßslüt / und gibt 32 Knechten 9 Monat 532 Gulden. Was habend 365 knecht / 3 / monat.” [Translation: A lord has soldiers and gives 32 soldiers 532 guilders for 9 months. How much do 365 soldiers get in three months?]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 117v.
- 90** “Item drey puwren müssend ain kriegßman versolden 10 monat der xell will habe 40 Pfund. So sind die bauwren nit ains vermögens. Darumb gibt der erst 1/4 der ander 1/5 der drit 1/6 des geltz an der zal gebtz wz gibt yeder ist die frag.” [Translation: Three peasants have to pay soldiers for 10 months and the soldier wants 40 pounds. The farmers don’t have that much money. So the first gives 1/4 of the money, the second 1/5, and the third 1/6. The question is how much does each give in total?]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 128v.
- 91** “Item wenn man einen kriegßman zu Monat sold gibt 5 Gulden was gadt uff 2000 man 7 monat lang.” [Translation: If you give one soldier 5 guilders a month, how much do you give 2000 soldiers for 7 months?]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 121v.
- 92** “Item wie vil dusend knecht erhalt man mit ainer Million guldin (ist 1000000 Gulden) ain gantz yar / so man ainem yeden knecht gibt 1 monat 5 Gulden / dz yar für 12 monatt verrechnet.” [Translation: How many 1000 soldiers do you get with a million guilders for a year if you give each soldier 5 guilders per month?]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 121v.
- 93** “Item 3 krieger hand in ainr peut erobert 549 gulden / darvon will der erst 2/3 haben der ander 3/5 der drit 4/7. Nun ist die frag wie vil yedem gebür.” [Translation: Item 3 soldiers have captured loot worth 549 guilders. The first shall have 2/3, the second 3/5, and the third 4/7. The question is how much is due to each.]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 135v.

Ist die frag / wie vil der mit den hellenbarten / halbenhagken / handroren / und langen spiessen yeder part in sonderhait gsin / und wieviel yr / so helbarten / hagken / handror getragen / in furgenommen zug nit mitgezogen.⁹⁴

Towards the end of the reckoning book an example is given which concerns a specific battle order: "Item es ligt ain gewaltiger huffen knecht im feld / da will man ain viereckete schlachtordnung machen / deren sind 45000 man. Ist die frag wievil muß man in ain glid stellen / dz die ordnung gefiert sige."⁹⁵

Clemens Hör's primary audience are the citizens of St. Gallen, as evidenced by his paratexts.⁹⁶ However, the reckoning book is also intended for use outside of St. Gallen. Therefore, one example also deals with the Turkish tax,⁹⁷ although the city of St. Gallen had already ceased to pay the Turkish tax after its separation from the Holy Roman Empire at the Diet of Speyer in 1542.⁹⁸

As with the narratives included in reckoning books that shape and strengthen identity, Clemens Hör is not an exception in this context either. There is a recurring tendency employing various examples to assist students in the calculation of military compensation.⁹⁹ Nonetheless, the sheer number of tasks related to war in Clemens Hör's work is astonishing. These

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- 94 "1188 soldiers are armed as follows: 1/3 with halberds, 1/4 with half-axes, 1/6 with hand cannons and 3/8 with spears. Now it is decreed that those who carry long spears shall be fully armed and all armed in one way, and that they shall have with them one part of those who carry halberds, one of half-axes and one of hand cannons, so that each of them shall have with him one of the said three parts. The question arises as to how many of those with halberds, half-axes, hand-cannons and long spears are each separately and how many of those carrying halberds, axes and hand cannons are in the priority platoon." St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 139r–v.
- 95 "Item there are a bunch of (Lands-)Knecht in the field and you want a square battle order with 45000 men. The question is how many you have to put in line to get a square order." St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 243r.
- 96 For instance, in the preface, the target audience is described in detail (merchants and students), with great emphasis placed on the accessibility of the reckoning book to all individuals, irrespective if they are attending school or not. Cf. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. III^r–v.
- 97 St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 225v.
- 98 BRAUN–DOBRAS, St. Gallen (1996), p. 415.
- 99 For example: "Item 4 Stet sollen 6 Monat lanng Samentlich besoldenn 300 Reiter / 700 Fueßknecht / Gibt ainem Reiter 1 Monat 12 Gulden / einem Fueßknecht 4 Gulden / unnd als offt die erst stat gibt 1 Gulden / soll die ander 2 Gulden gebenn / die drit 3 Gulden / die vierdt 4 Gulden. Wievil soll yede in Suma geben." [Translation: Four cities shall pay 300 horsemen and 700 soldiers by feet for 6 months. A horseman receives 12 guilders and a soldier by foot 5 guilders for one month. The first city should pay 1 guilder, the second city 2 guilders, the third city 3 guilders and the fourth city 4 guilders. How much should each town give in total?]. Herzogenburg, Stiftsbibliothek, Cod. 178, fol. 114v. Another example would be: "Item Wann man ainem landtsknecht Zu monat sold gibt 4 Gulden was gadt 12000 mann 6 Monat Lanng." [Translation: If you give a Landsknecht 4 guilders a month, how much do 1000 men get for 6 months?]. This example is followed by another one, which is very similar to one of Hör's examples: "Item so man ainem Landtsknecht gibt 4 Gulden Wievil knecht erheltt man ain gantz Jar mit einer Müllion." [Translation: If you give a Landsknecht 4 guilders a month, how many soldiers do you get for a year with a million guilders?]. Stuttgart, Württembergische Landesbibliothek, HB XI 23, fol. 49v–50r.

extend beyond merely calculating the salaries of the Landsknechte. The examples, which go on to regale the equipment, armament and formation of troop contingents in specific (battle) orders, definitively distinguish Clemens Hör's text from the works of his contemporaries. The density of the war-related examples may reflect the sorrowful times ("kumberhafften zeiten")¹⁰⁰ experienced by the author during the composition of his reckoning book.

CONCLUSION

Even though Clemens Hör was not a revolutionary mathematician, who influenced the art of arithmetic during his time, his reckoning book serves as a highly exciting source that elicits cultural-historical questions, as it absorbed real external influences, processed them and reflected them within a fictional framework of arithmetic examples. For example, the Swiss Reformation is represented in Hör's reckoning book on many occasions: Irrespective of the nature of the elements with which Clemens Hör is working (be it raw materials, spices, wages or supplies for a castle), all the goods and all the stories he mentions and regales in his text reflect, in addition to the fictional elements, the historical backdrop on which all these elements are arranged.¹⁰¹ The focus on the cloth trade, especially with trading cities in the Holy Roman Empire, is intended to demonstrate the city's economic need for good relations outside St. Gallen, which must not be disrupted by turmoil and military confrontations as the city's survival depended on it. These circumstances also influenced Hör's reckoning examples, as we can observe by the vast number of tasks pertaining to warfare. Moreover, throughout the entire reckoning book, Clemens Hör frequently emphasises a 'sense of unity', which was repeatedly narrated by him as one of the city's schoolmasters and citizens, who also maintained contacts with important figures of the Swiss Reformation.¹⁰² Clemens Hör's self-image as the creator of a foundational work for the next generation of businessmen is emphasised not only by the request for print (which never happened),¹⁰³ but also by a personally created monogram on the last page of the reckoning book.¹⁰⁴ All external influences,

¹⁰⁰ Cf. n. 84.

¹⁰¹ In regard to this phenomenon cf. also the term "cultural background" by SEARLE. Cf. John R. SEARLE, *Intentionality: an essay in the philosophy of mind*, Cambridge 1983.

¹⁰² Cf. n. 43.

¹⁰³ "Und so dise mein arbeit E. W. fur / gut ansehen welt / daß solchs gemainer burgerschafft und yrer ingennd nutz sein wurde / mag das E. W. wol in den druck verfertigen [...]." [Translation: And therefore, if my work is considered good and that the citizens and you can benefit from it, I ask E. W. to put it into print.]. St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. IV^v. This is not the first time he requests printing one of his works, cf. n. 21 and 25.

¹⁰⁴ St. Gallen, Kantonsbibliothek, Vadianische Sammlung, VadSlg Ms. 418, fol. 246r.

which Clemens Hör himself regarded as being of importance for the teaching of mathematics to merchants, were included in his reckoning book.

As was stated initially, the economic and political relations of the city of St. Gallen were largely unaffected by the predominantly confessional disputes. The cloth trade was of particular significance to the city, and it was important that relations with trading partners in the Empire remained stable.¹⁰⁵ The crisis only becomes visible in passing in the title, the preface, in paratexts, and in the unusually high density of war-related reckoning examples. In the absence of any reference to a particular crisis in the calculations, the overall focus was clearly on the economic activity. In order to ensure a good economic performance between the protestant town and the princely abbey, these parties had no choice but to cooperate, no matter how intense the economic, political, and confessional disputes were.¹⁰⁶ Ultimately, economic survival proved to be of greater importance than religious and political debates; a fact that was illustrated by a proverb often cited by the Venetians in the event of repeated conflicts between the papal curia and the city republic, which was: “prima veneziani e poi cristiani!”

105 BRAUN–DOBRAS, *St. Gallen* (1996), p. 404.

106 In more detail cf. SONDEREGGER, *Geschieden* (2018), pp. 213–225.

MONASTIC MATHEMATICS?

THE MEDIEVAL ALGORISMUS AND ITS TRADITION IN GERMANY, AUSTRIA AND SWITZERLAND

Aaron Schwarz

INTRODUCTION

Omnia quae a primaeva rerum origine processerunt, ratione numerorum formata sunt – thus begins one of the most famous Medieval treatises in the elements of mathematics. It is how the so-called *Algorismus (vulgaris)* or *De arte numerandi* by Johann of Sacrobosco starts.¹ This treatise has a reputation for being a difficult read, which does not present clear argument. However, it is quoted as a basic text for learning and teaching mathematics, and more precisely, for the new system of calculating with the Hindu-Arabic numerals that had arrived in Western Europe around 1200.² Indeed the extant manuscript tradition supports this assumption. There are still at least nearly 400 manuscripts which contain the Latin text or even fragments of it,³ many of which can be traced to universities which came into

- 1 “Everything that took its course from the very beginning of things has been established by the calculation of numbers”. The quotation is taken from the edition of Fritz S. PEDERSEN (ed.), *Petri Philomenae de Dacia et Petri de S. Audomaro opera quadrivialia*, vol. 1 (*Corpus philosophorum Danicorum Medii Aevi X/1*, Kopenhagen 1983), pp. 167–201, p. 174 (as the following ones, if not differently indicated).
- 2 Cf. for *algorismus* and Hindu-Arabic numerals Gottfried FRIEDELIN, *Die Zahlzeichen und das elementare Rechnen der Griechen und Römer und des christlichen Abendlandes vom 7. bis 13. Jahrhundert*, Erlangen 1869, pp. 125–126; Karl FINK, *Kurzer Abriß einer Geschichte der Elementar-Mathematik*, Tübingen 1890, pp. 57–58 (the actual system of the Arabs); Hieronymus G. ZEUTHEN, *Geschichte der Mathematik im Altertum und im Mittelalter*, Kopenhagen 1896, pp. 316–332 (taking up arithmetic in the West – Sacrobosco und de Villa Dei are missing). Cf. for a definition of *algorismus* and a brief overview over the tradition Silvia TONIATO, *Le lexique mathématique au Moyen Âge entre latin et langues vernaculaires. Quelques problèmes posés par les traductions*, in: Michèle GOYENS–Pieter DE LEEEMANS–An SMETS (ed.), *Science Translated. Latin and Vernacular Translations of Scientific Treatises in Medieval Europe (Mediaevalia Lovaniensia 40, Leuven 2008)*, pp. 243–262, pp. 243–245, on the treatise itself pp. 247–248.
- 3 The exact number for now is 390 mss. The following databases were used: Menso FOLKERTS (ed.), *Jordanus. An International Catalogue of Medieval Scientific Manuscripts*, Bayrische Akademie der Wissenschaften, <https://ptolemaeus.badw.de/jordanus/start> [20.7.2025]; Staatsbibliothek zu Berlin–Universitätsbibliothek Leipzig–Bayerische Staatsbibliothek in München–Herzog August Bibliothek Wolfenbüttel–Institut für Bibliotheks- und Informationswissenschaft (IBI) der Humboldt-Universität zu Berlin (ed.), *Handschriftenportal*, <https://handschriftenportal.de/> [20.7.2025]; Österreichische Akademie der Wissenschaften (ed.), *manuscripta.at. Mittelalterliche Handschriften in Österreich*, <https://manuscripta.at/> [20.7.2025]; e-codices. Virtuelle Handschriftenbibliothek der Schweiz, <http://e-codices.unifr.ch/de> [20.7.2025]; Società Internazionale per

existence during the 13th century, in particular those in Paris, Bologna, and some in England.⁴ There is one other text – the *Carmen de Algorismo*, an algorithmic versification in hexameters – which is often considered to be part of this Parisian university ‘hemisphere’, although it is not clear if its author, Alexander de Villa Dei, ever taught in Paris himself.⁵ There are currently 161 extant manuscripts for this text to be found in Europe.⁶ Nevertheless, both texts played an important role in the university context of Paris. They were distributed from there throughout the whole of the Western world, together with methods and innovations which originated in the far East. Often, manuscript traditions illuminate how these two texts (12th and early 13th centuries) refer to each other by being part of the same codex; sometimes they were even used as literal commentaries to explain the other one.

lo Studio del Medioevo Latino–Fondazione Ezio Franceschini (ed.), *Mirabile*. Archivio digitale della cultura medievale. Digital Archives for Medieval Culture, <https://www.mirabileweb.it/home> [20.7.2025].

- 4 That had an impact on the manuscript tradition which is very strong in Italy, especially the Vatican Library, in Paris, Bibliothèque Nationale (BNF), as well as in London, British Library et al., Oxford and Cambridge. Cf. on the *algorismus* in early universities Carl I. GERHARDT, *Geschichte der Mathematik in Deutschland* (*Geschichte der Wissenschaften in Deutschland* 17, München 1877), p. 4 (Sacrobosco as a textbook in the early phase of the University of Vienna and University of Paris); Hermann HANKEL, *Zur Geschichte der Mathematik in Altertum und Mittelalter*, Leipzig 1874, repr. Hildesheim 1965, p. 356 (Sacrobosco only mentioned with his *Spaera*, in *Algorismus* p. 256–259 neither he nor de Villa Dei; just as little in mathematics at universities, pp. 354–359 *Tractatus* and *Carmen*); Dietmar HERRMANN, *Mathematik im Mittelalter. Die Geschichte der Mathematik des Abendlands mit ihren Quellen in China, Indien und im Islam*, Berlin–Heidelberg 2016, p. 421 (Sacrobosco in the context of the early universities, e.g. course catalogue of the University of Prague from 1367) and p. 272 (Sacrobosco as part of the *Algorismus Ratisbonensis*, 1450 to 1465); Louis Ch. KARPINSKI, *The History of Arithmetic*, Chicago 1925, p. 54: “The *Algorismus Vulgaris* (common algorism) of John of Holywood or Halifax or Sacrobosco was the most widely used of these three treatises, and copies of it written by students of mathematics in the thirteenth to fifteenth centuries are found in many European libraries.”, as a fundamental statement on dissemination; Louis Ch. KARPINSKI–Charles N. STAUBACH, *An Anglo-Norman Algorism of the Fourteenth Century*. *Isis* 23 (1935), pp. 121–152, p. 123; Edwin G. R. WATERS–Louis Ch. KARPINSKI, *A Thirteenth Century Algorism in French Verse*. *Isis* 11 (1928), pp. 45–84, pp. 45–46; Louis Ch. KARPINSKI, *The Algorism of John Killingworth*. *The English Historical Review* 29 (1914), pp. 707–716, pp. 708–710 (on the reception of Sacrobosco and De Villa Dei); Martin LEVEY, *Abraham Savasorda and His Algorism. A Study in Early European Logistic*. *Osiris* 11 (1954), pp. 50–64, pp. 54, 56, 60 (reception of Sacrobosco) and p. 57 (comparative terminology, including Alexander de Villa Dei); Edwin G. R. WATERS, *A Fifteenth Century French Algorism from Liège*. *Isis* 12 (1929), pp. 194–236, uses Sacrobosco as a terminological reference to explain the French terminology of his text (cf. p. 196), because the following applies to his text: “The plan of the work agrees fairly closely with that of the well-known treatise written about 1250 by John of Hollywood (or Halifax).” (p. 195).
- 5 There is no critical edition at the moment. One can find approaches in TONIATO, *Le lexique* (2008), pp. 260–262 who collated three different older editions. The authorship of Alexander de Villa Dei has, however, been called into question. Cf. Nadia AMBROSETTI, *Algorithmic in the 12th Century. The Carmen de Algorismo by Alexander de Villa Dei*, in: Fabio GADDUCCI–Mirko TAVOSANIS (ed.), *History and Philosophy of Computing. Third International Conference (HaPoC 2015)*, Pisa, Italy, October 8–11, 2015. Revised Selected Papers (IFIP Advances in Information and Communication Technology 487, Heidelberg 2016), pp. 71–86, p. 85.
- 6 AMBROSETTI, *Algorithmic* (2016), p. 77 mentions this number of manuscripts including those attributed to Alexander without incipit; cf. *ibid.* the graph of the distribution of manuscripts in western Europe which makes clear, that England, France, Spain and Germany hold the strongest tradition. I myself found at least only 127 mss. so far, but especially these ones without incipit have to be studied in detail as often a wrong attribution appears in older catalogues.

One can easily understand the importance of such texts in the context of ‘higher education’, i.e., academic studies, but what does it mean to monasteries who (partly) practiced the same ‘academic’ programme of the *artes liberales*, especially the quadrivium where the *algorismus* had its proper place? Why can we find them in the context of monastic libraries? And, based on that fact, how can we imagine the role of individual monasteries participating in a very recent and specific knowledge in their own time? What does it say about their connections to the world outside the convent walls?

With such documents, questions arise concerning the provenance of manuscripts, the conditions of their production (inside or outside the monastery which owns or owned it), the performance or even existence of teaching in the particular monastery and about mobility and transfer of people, manuscripts, and (mathematical) knowledge. The following pages are meant to shed the first light on the phenomenon of the *algorismus* with respect to Sacrobosco’s and de Villa Dei’s works in monastic contexts. It will become apparent that, given the current state of research, this will mainly involve highlighting a wide range of desiderata. I will focus on the tradition in German-speaking countries where manuscripts can be found today and only on the Latin versions of the texts.⁷

THE ALGORISMUS IN EUROPE

There is a need for a critical edition for both texts, the Sacrobosco *Algorismus* and the *Carmen de Algorismo* by Alexander de Villa Dei. Pedersen’s edition of Sacrobosco’s *Algorismus* is based on eleven manuscripts only and focuses on the commentary of Petrus de Dacia,⁸ whereas for Alexander de Villa Dei we have no modern critical edition. Silvia Toniato offers something like a reading text by collating some older prints which can be used provisionally at best.⁹ She addresses the urgent need for an edition herself.¹⁰ Apart from that, the *Algorismus* of Sacrobosco and de Villa Dei attracted much less attention than one might expect. Of course, the texts play a role in the great studies on the history of mathematics and mathematical, especially arithmetical, teaching but specific studies are rare, except for a few of them that deal with these two works explicitly. In the case of Alexander de Villa Dei, research is focused more on his other works, e.g. the *Doctrinale*;¹¹ for Sacrobosco, his astro-

7 There is great potential for the history of reception in the translations into German. Sometimes (Low) German glossaries are also handed down in the manuscripts. It remains to be seen whether a reference to the algorism texts can be established.

8 PEDERSEN, *Petri Philomenae opera* (1983).

9 TONIATO, *Le lexique* (2008), pp. 260–262.

10 TONIATO, *Le lexique* (2008), p. 260.

11 Cf. the two most recent articles on Alexander de Villa Dei: Rijcklof H. F. HOFMANN, Thomas a Kempis’s *De imitatione Christi* and Alexander de Villa Dei’s *Doctrinale*. *Ons geestelijk erf* 91 (2021), pp. 327–351; Anette LÖFFLER, *Makulatur aus dem Doctrinale des Alexander de Villa Dei im Geheimen Staatsarchiv Berlin PK*, in:

nomical treatise *De Sphaera* attracted much more interest.¹² Apart from studies on the biography of its authors, Sacrobosco and de Villa Dei,¹³ both works are mentioned and discussed (usually briefly) in the context of medieval mathematics in general.¹⁴ Nadia Ambrosetti submitted the most recent contribution to Alexander de Villa Dei's *Carmen de Algorismo*.¹⁵

The phenomenon of *algorimus* in general attracted much more attention during the last years. Michaela Wiesinger treated it in terms of the German version of the so called *Geometria Culmensis* which was written in North East Germany during the time of the Teutonic Order in the early 15th century.¹⁶ Wiesinger's academic perspective on this work is one of interdisciplinary cultural studies in a wider sense, connecting, amongst others, the history of mathematics with German philological studies. Various other texts in vernacular languages which are quite similar to Sacrobosco and de Ville Dei concerning content and structure are studied and edited. There are, on the one hand, Old English and French *carmina* which were edited, translated, and made accessible for further research by very useful French/English glossaries.¹⁷ On the other hand, there are studies about the tradition and use of algorithmic texts, especially in the Late Middle Ages, in such important practical contexts as trade and industry in Italy and Southern

Iter Austriacum (2016), url: <http://www.iter-austriacum.at/fragmenta/makulatur-aus-dem-doctrinale-des-alexander-de-villa-dei-im-geheimen-staatsarchiv-berlin-pk/> [20.7.2025]. Léopold DELISLE, Alexandre de Villedieu et Guillaume le Moine, de Villedieu. *Bibliothèque de l'école des chartes* 55 (1894), pp. 488–508 also focuses on the *Doctrinale* and does not mention the *Carmen*.

- 12 Cf. Jürgen HAMEL, Studien zur "Sphaera" des Johannes de Sacrobosco (Acta historica astronomiae 51, Leipzig 2014); Matteo VALLERIANI (ed.), *De Sphaera* of Johannes de Sacrobosco in the Early Modern Period. The Authors of the Commentaries, Cham 2020; Matteo VALLERIANI–Andrea OTTONE (ed.), *Publishing Sacrobosco's De Sphaera* in Early Modern Europe. Modes of Material and Scientific Exchange, Cham 2022.
- 13 Cf. Olaf PEDERSEN, In Quest of Sacrobosco. *Journal for the History of Astronomy* 16 (1985), pp. 175–221, pp. 182–183 on Algorismus; on the persistently discussed question of the origin of Sacrobosco cf. John BUTLER, The Birthplace of Johannes de Sacrobosco. *The Journal of the Royal Society of Antiquaries of Ireland* 144/145 (2014–2015), pp. 77–86.
- 14 Cf. Moritz CANTOR, *Vorlesungen über Geschichte der Mathematik*, vol. 2: 1200–1668, Leipzig 1892, pp. 80–82 (Sacrobosco), p. 82 (de Villa Dei); Moritz CANTOR, *Mathematische Beiträge zum Kulturleben der Völker*, Halle 1863, p. 339 (brief mention of Sacrobosco among the 'algoritmic'); Arthur ARNETH, *Geschichte der reinen Mathematik*, Stuttgart 1852, p. 219 (Sacrobosco); Jean Étienne MONTUCLA, *Histoire des mathématiques*, vol. 1, Paris 1758, p. 377 (wrongly assigns the *Carmen* to Sacrobosco), p. 381 (on *Algorismus vulgaris*); Johannes TROPFKE, *Geschichte der Elementar-Mathematik in systematischer Darstellung*, vol. 1: Rechnen und Algebra, Leipzig 1902, p. 17 (Illustration from mss. 'Numbers of Sacrobosco' ["Ziffern des Sacrobosco"]!), p. 7 (for categorising larger numbers into six groups, recommendation in the *Algorismus vulgaris*).
- 15 AMBROSETTI, *Algorithmic* (2016).
- 16 Michaela WIESINGER, "Als der algoritmus spricht...". Indisch-arabische Zahlen und der Algorismus in der *Geometria Culmensis*. *Berichte zur Wissenschaftsgeschichte* 44 (2021), pp. 7–25.
- 17 WATERS, *A Fifteenth Century French Algorism from Liège* (1929), the wordlist pp. 234–236; WATERS–KARPINSKI, *A Thirteenth Century Algorism in French* (1928), the wordlist pp. 81–84; Edwin G. R. WATERS, *A Fifteenth Century French Algorism from Liège*. *Isis* 12 (1929), pp. 194–236; furthermore, KARPINSKI–STAUBACH, *An Anglo-Norman Algorism* (1935); KARPINSKI, *The Algorism of John Killingworth* (1914), pp. 707–716.

France.¹⁸ Within these texts the importance of learning from Sacrobosco, de Villa Dei and other “algorithmics” for the merchants in Southern France are also mentioned.¹⁹ The connection with monasteries and monastic teaching and learning has not been made yet. There are only some remarks in the context of the *Algorismus Ratisbonensis*, for instance.²⁰ In this case, it is important whether the manuscripts were produced in the individual monastery at the time or brought to the monastic libraries (where some of them are still extant today) from other places and scriptoria.

MANUSCRIPT TRADITION IN MODERN-DAY GERMANY, AUSTRIA AND SWITZERLAND

The manuscript traditions in German-speaking countries have a lot in common structurally. While we can also see regional and structural differences, one must differentiate between the structure of tradition (monasteries, state libraries) and the structure of manuscripts (compiled, university use, *pecia*; with/without commentaries and margins). Are there traditions with commentaries or just the text itself? Sometimes one text appears together with the other text, for instance – mostly Sacrobosco – as a commentary on the *Carmen*.²¹ I will not discuss the rich and difficult commentary tradition in this article but rather focus on my case study that tries to shed light on three different text witnesses in three monastery environments as examples. The status of the commentaries is too complex and requires further research.²² However, for context, I offer a short overview of the *Algorismus*-tradition in contemporary German-speaking countries. This focus naturally stems from the scope of the project in which this study is embedded.²³

In Germany, most of the manuscripts are held in state or university libraries today. This is due to the process of secularisation that mainly took place in the early 19th century. The

¹⁸ Romain FAUCONNIER, L’“algorismo secondo la costumanza delli Arabi”. Des traditions mathématiques enseignées à de futurs marchands à Montpellier aux XIV^e et XV^e siècles, in: Lucie GALANO (ed.), *Montpellier au Moyen Âge. Bilan et approches nouvelles* (Studies in European Urban History 40, Turnhout 2017), pp. 169–189; Lucia TRAVAINI, *Monete, mercanti e matematica. La storia della matematica per le monete medievali*, in: Giuseppe ZANETTO–Stefano TEMPESTA MARTINELLI–Massimiliano ORNAGHI (ed.), *Vestigia antiquitatis. Atti dei seminari del Dipartimento di Scienze dell’Antichità dell’Università degli Studi di Milano* (2003–2005) (Acme. Quaderni 89, Milano 2007), pp. 49–74.

¹⁹ FAUCONNIER, L’“algorismo” (2017), p. 176 (with special reference to BNF, ms. latin 7420 A, which contains both Sacrobosco and de Villa Dei; cf. *ibid.* with note 51 for further reading).

²⁰ HERRMANN, *Mathematik* (2016), p. 272.

²¹ Cf. for example Darmstadt, Hessische Landes- und Hochschulbibliothek, 2640, 102r–125v and München, Bayerische Staatsbibliothek, Lat. 14770, 59r–68v.

²² Cf. as a first approach PEDERSEN, *Petri Philomenae opera* (1983), pp. 167–172.

²³ ERC-Starting Grant “ARITHMETIC”, University of Innsbruck, Institute for German Studies, head: Michaela Wiesinger, <https://www.arithmetic-project.org/> [28.8.2025].

provenance has to be checked for each case to learn whether there is any indication of monastic contexts. A lot of the extant manuscripts are kept in the State Libraries of Munich and Berlin; other text witnesses can be found in Darmstadt, Erfurt, Erlangen and Leipzig.²⁴ In Austria, we are confronted with the special situation that in many cases we can find manuscripts still in situ. Apart from the Austrian State Library in Vienna, which has the largest collection of Sacrobosco's *Algorismus* in Austria (10 mss.)²⁵, manuscripts can be found in the monastic libraries of St Peter in Salzburg, Michaelbeuern Abbey, Schlägl Abbey, the Abbey of Kremsmünster, Wilhering Abbey (all Upper Austria), the Abbey of Göttweig, the Abbey of Melk (both Lower Austria) and the Abbey of Stams (Tyrol).²⁶ In Switzerland, only one manuscript of the *Algorismus* is still in situ in St Gallen. So, in Austria, the situation is exceptional. Similar to Germany, Switzerland also organises most of their manuscripts through state or university libraries. Important to note, however, is that text witnesses can, among others, be found in Basel, Luzern, or Solothurn.²⁷ The overall number of manuscripts surviving in Switzerland today is, however, comparatively small.

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- 24 The institutions are (number of manuscripts, full and fragmented): Augsburg, Universitätsbibliothek (1 Sacrobosco); Augsburg, Staats- und Stadtbibliothek (1 de Villa Dei); Bamberg, Staatsbibliothek (1 Sacrobosco); Berlin, Staatsbibliothek zu Berlin (at least 23 Sacrobosco, 4 de Villa Dei); Darmstadt, Universitäts- und Landesbibliothek (6 Sacrobosco, 2 de Villa Dei); Dessau, Stadtbibliothek (1 Sacrobosco); Dresden, Sächsische Landesbibliothek – Staats- und Universitätsbibliothek Dresden (2 Sacrobosco); Eichstätt, Universitätsbibliothek (2 Sacrobosco, 2 de Villa Dei); Erfurt, Stadt- und Regionalbibliothek Erfurt (9 Sacrobosco, 4 de Villa Dei); Erfurt, Universitätsbibliothek (2 Sacrobosco); Erlangen, Universitätsbibliothek (4 Sacrobosco, 2 de Villa Dei); Frankfurt, Universitätsbibliothek (1 Sacrobosco); Freiburg, Universitätsbibliothek (1 Sacrobosco); Göttingen, Niedersächsische Staats- und Universitätsbibliothek (1 Sacrobosco, 1 de Villa Dei); Goslar, Stadtarchiv (1 Sacrobosco); Gotha, Forschungs- und Landesbibliothek (1 Sacrobosco); Leipzig, Universitätsbibliothek (5 Sacrobosco, 1 de Villa Dei); Lübeck, Stadtbibliothek (1 Sacrobosco); Lüneburg, Ratsbücherei Lüneburg (2 Sacrobosco); Mainz, Stadtbibliothek (3 Sacrobosco); Michelstadt, Kirchenbibliothek (1 Sacrobosco); Mühlhausen in Thüringen, Stadtarchiv Mühlhausen (1 Sacrobosco); München, Bayerische Staatsbibliothek (at least 33 Sacrobosco, 3 de Villa Dei); München, Universitätsbibliothek (1 Sacrobosco); Nürnberg, Stadtbibliothek (at least 2 Sacrobosco); Trier, Stadtbibliothek (4 Sacrobosco); Weimar, Herzogin Anna Amalia Bibliothek (1 Sacrobosco); Bad Windsheim, Stadtbibliothek (1 Sacrobosco); Wolfenbüttel, Herzog August Bibliothek (at least 7 Sacrobosco, at least 2 de Villa Dei).
- 25 In Austrian public libraries, except of the National Library, there are: Graz, Universitätsbibliothek (1 Sacrobosco); Innsbruck, Universitäts- und Landesbibliothek Tirol (1 Sacrobosco); Klagenfurt, Bischöfliche Bibliothek (1 Sacrobosco); Klagenfurt, Universitätsbibliothek (1 Sacrobosco).
- 26 Salzburg, Stiftsbibliothek Sankt Peter, b VI 35, fol. 69v–79r (de Villa Dei) and fol. 83v–96v (Sacrobosco); Salzburg, Stiftsbibliothek Sankt Peter, b III 32, fol. 249v–254v (Sacrobosco); Salzburg, Stiftsbibliothek Sankt Peter, b IV 16, fol. 57r–74v; Salzburg, Stiftsbibliothek Sankt Peter, b IX 14, fol. 78r–82v; Michaelbeuern, Benediktinerstift, Man. cart. 81, fol. 16r–20r; Schlägl, Stiftsbibliothek, Cpl. (824).236, fol. 101–129v; Kremsmünster, Stiftsbibliothek, CC 89, fol. 109r–119r; Wilhering, Zisterzienserstift IX 69, fol. 282v–304v; Göttweig, Benediktinerstift, Cod. 170 (rot) / 189 (schwarz), fol. 1r–10v; Melk, Benediktinerstift, Cod. 873 (711, –), 71–122; Melk, Benediktinerstift 967 (550; K. 22), fol. ?; Melk, Benediktinerstift, Cod. 1221 (662, L 92), 124v–142v; Melk, Stiftsbibliothek, 951, fol. 2ra–12r (all Sacrobosco); Stams, Zisterzienserkloster, Cod. 13, fol. 1ra–8va.
- 27 Basel, Universitätsbibliothek, F.IV.25, 11ra–13vb; Basel, Universitätsbibliothek, F.IV.50, fol. 87r–106v; Basel, Universitätsbibliothek, F.VII 12, 130r–145r; Basel, Universitätsbibliothek, F.VIII.16, fol. 2r–12v; Basel, Universitätsbibliothek, O.II.7, 1ra–5va; Basel, Universitätsbibliothek, A.X.73, fol. 111r–119v (all Sacrobosco); Basel, Universitätsbibliothek, O.IV.37, fol. 1ra–58rb (Sacrobosco) and 81r–84v (de Villa Dei); Luzern,

THE ALGORISMUS IN THE QUADRIVIVIUM AND THE MONASTIC CLASSROOM

After looking into the text tradition a little more closely, the question arises whether the *Algorismus* of Sacrobosco was really used as a schoolbook to teach elements of mathematics or not. The very popular Donatus, which was used for didactic purposes, is also not easy to handle, but its users obviously had a different view on him. His *Ars minor* was used as the basic text for learning Latin in elementary classes in Europe for at least a thousand years!²⁸

Comparing both texts, Sacrobosco's treatise seems to be rather dry. As the *Carmen* presents its content in versified form, it is mnemotechnically relevant and thereby easier to work with at first glance.²⁹ But there are significantly less manuscripts which hold evidence of the *Carmen* compared to the Sacrobosco. This may be caused by a different understanding of its value due to the genre of poetics.³⁰ Moritz Cantor, however, sees the sobriety of the *Algorismus vulgaris* without mathematical proof as an ideal basis for creating teaching material in the classroom when teachers are producing examples by themselves.³¹ However, it is difficult to say what the actual teaching situation looked like. We can look for indications in the marginalia and personal comments by (potential) teachers in the manuscripts, but for the question of monastic mathematical teaching and learning we firstly have to ask whether there is any evidence of convent schools or an involvement of the monasteries in local or urban school education.

Zentral- und Hochschulbibliothek, P 19 4^o, fol. 1ra–6va; Solothurn, Zentralbibliothek (olim Kantonsbibliothek) S I 167, fol. 33r–44v (both Sacrobosco).

- 28** Donat was the undisputed school author until well into the early modern period, although he has his didactic pitfalls (from today's perspective). Keeping in mind that the *artes liberales* were part of monastic teaching, Thomas FRENZ, Eine Klosterschule von innen, in: Nathalie KRUPPA (ed.), Kloster und Bildung im Mittelalter (Veröffentlichungen des Max-Planck-Instituts für Geschichte 218. Studien zur Germania Sacra 28, Göttingen 2006), pp. 49–57, p. 52, is more pessimistic in case of the real output of medieval learning in monastery schools.
- 29** Cf. to verses as mnemotechnical instruments in teaching and learning AMBROSETTI, *Algorithmic* (2016), p. 80.
- 30** Another reason could be that the argument of the *Carmen* is not so clear as it works without any precise definitions or examples. Cf. AMBROSETTI, *Algorithmic* (2016), p. 72. In contrast, this is more likely to be the case for Sacrobosco. Cf. TONIATO, *Le lexique* (2008), p. 246.
- 31** CANTOR, *Vorlesungen* (1892), p. 81: "Es ist eine Sammlung von Regeln ohne den geringsten Beweis, ohne Zahlenbeispiel, ohne Erwähnung einer Quelle, aus welcher der Verfasser schöpfte. Aber in dieser Nüchternheit, in dieser Kürze eignete es sich vortrefflich dazu, den Grundriss zu einem die zahlreichen Lücken mündlich ergänzenden Unterrichte zu bilden, und wurde es Jahrhunderte lang in solcher Weise benutzt." ("It is a collection of rules without the slightest proof, without numerical examples, without mention of a source from which the author drew. But in this sobriety, in this brevity, it was excellently suited to form the outline of an oral teaching that supplemented the numerous gaps, and it was used in this way for centuries").

CASE STUDY

This case study is based on the tradition of manuscripts from three different monasteries in the area of modern-day Germany: the Cistercian abbey in Heilsbronn (Bavaria), the Benedictine monastery (and so called “Reichskloster”) St Maximin in Trier, as well as St Michael’s, another Benedictine monastery in the city of Luneburg in Lower Saxony. These three monasteries differ not only concerning their order but also in their geographical, legal, and regional or international status. For every one of them we have evidence for an existing school or monastic teaching.

Firstly, I will focus on the manuscript provenance. This can tell us something about the connection of the individual monastery and the context of (university) learning. Studying the structure of the manuscripts, its composition, and the signs of use we can also ask about their use or performance in a situation of monastic teaching. Using these three German monasteries as a case study, I will try to extrapolate information on the use of the *Algorismus* manuscripts and the practice of teaching in monasteries, which will also create a European perspective.

HEILSBRONN

The Abbey of Heilsbronn, founded in 1132 by Otto I, bishop of Bamberg, has been studied extensively from the perspective of regional entanglement by Miriam Montag-Erlwein.³² In this context, she also deals with the medieval library of the monastery.³³ Apart from connections to regional powers like the diocese of Bamberg with its cathedral library and the abbey of Michelsberg as partners in the foundation of the Heilsbronn library, the monastery maintained close relations with Philipp of Rathsamhausen, bishop of Eichstätt, as far as the exchange of academic knowledge was concerned.³⁴

The specific character of the Cistercian Order was important. The rule of the Cistercian Order explicitly stipulates that a basic stock of specific books must be available when a new monastery is founded. These were usually provided by the monastery from which the foundation originated. Alternatively, they came through the supra-regional involvement of other monasteries.³⁵ Due to the annual general chapter of the order in Cîteaux, the individual abbeys had strong connections between each other. Likewise, they are also connected to the

32 Miriam MONTAG-ERLWEIN, Heilsbronn von der Gründung 1132 bis 1321. Das Beziehungsgeflecht eines Zisterzienserklosters im Spiegel seiner Quellenüberlieferungen (Studien zur Germania Sacra NF 1, Berlin–Boston 2011).

33 MONTAG-ERLWEIN, Heilsbronn (2011), pp. 555–579.

34 MONTAG-ERLWEIN, Heilsbronn (2011), pp. 555.

35 Cf. Elke GOEZ, Zur Bedeutung der Schriftlichkeit im Zisterzienserorden, in: Tom GRABER–Martina SCHATTKOWSKY (ed.), Die Zisterzienser und ihre Bibliotheken. Buchbesitz und Schriftgebrauch des Klosters Altzelle im

discourse outside the abbey walls.³⁶ The manuscript transmission cannot be fully traced due to some gaps in our knowledge, but on the basis of the contemporary library catalogues of Heilsbronn, we know that in the 12th- and 14th- century mainly liturgical and biblical texts, as well as the works of the church fathers, were acquired.³⁷ An interesting aspect is the fact that Heilsbronn had its own scriptorium from at least the 13th century, in which many of the surviving manuscripts had been copied from templates which, in most cases, cannot be identified.³⁸ The two manuscripts I want to focus on in this article obviously do not belong to this group. Both of them are kept at the University Library of Erlangen today,³⁹ and are: Erlangen, Universitätsbibliothek 394 and Erlangen, Universitätsbibliothek 436.

Around 1300, the library of Heilsbronn became an indicator for the wealth of the abbey.⁴⁰ Neither of the mentioned manuscripts are part of the older catalogue of the library from the end of the 13th century.⁴¹ Ms. 436 is dated by Hans Fischer to the 13th/14th century⁴², Ms. 394 seems to originate from the 14th century,⁴³ but it is striking that the older catalogue does not mention any mathematical or astronomical texts at all. The inventory thus focuses on purely theology and additional texts.⁴⁴ As a caveat, one has to take into account that the catalogue only lists the first text of a manuscript if it is a compiled one.⁴⁵ Therefore, some texts might be missing due to the fact that most of the shorter treatises, as with Sacrobosco and de Villa Dei, are usually part of a composite codex.

europäischen Vergleich (Schriften zur sächsischen Geschichte und Volkskunde 28, Leipzig 2008), pp. 17–44, pp. 35–36.

36 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), p. 556.

37 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), pp. 556–557. Nothing is known about books as part of the foundation equipment in 1132. Hans-Otto KEUNECKE, Die Heilsbronner Klosterbibliothek in der Universitätsbibliothek Erlangen. *Bibliotheksforum Bayern* 19 (1991), pp. 274–286, p. 274.

38 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), p. 558.

39 Cf. on the transfer from Heilsbronn to the university library of Erlangen Hans-Otto KEUNECKE, Die Klosterbibliothek verlässt Heilsbronn, in: Svetozar SPRUSANSKY (ed.), Das Zisterzienserkloster Heilsbronn und seine Bibliothek. Ausstellung des Landeskirchlichen Archivs im Evangelischen Gemeindehaus in Heilsbronn, 28. April–30. Juni 1991 und in der Universitätsbibliothek in Erlangen, 15. November–7. Dezember 1991 (Ausstellungskataloge des Landeskirchlichen Archivs in Nürnberg 15, Heilsbronn 1991), pp. 27–32.

40 MONTAG-ERLWEIN, Heilsbronn (2011), p. 561.

41 The medieval catalogues are printed in Hans FISCHER, Katalog der Handschriften der Universitätsbibliothek Erlangen, vol. 1: Die Lateinischen Pergamenthandschriften, Erlangen 1928, pp. 563–569.

42 FISCHER, Katalog (1928), pp. 526–528, n. 436.

43 *Ibid.*, pp. 468–470, n. 394.

44 This had an impact on research on the library as well which deals mostly with the theological/philosophical manuscripts. Cf. SPRUSANSKY, Die Bibliothek (1991), p. 20 who differentiate a bit anachronistically between science and arts; KEUNECKE, Die Heilsbronner Klosterbibliothek (1991), p. 274 "Insgesamt läßt sich feststellen, daß in Heilsbronn eine wissenschaftlich höchst beachtliche Büchersammlung zusammengetragen wurde, die der Rolle der Abtei als der führenden in der Diözese Eichstätt entsprach." ("All in all, it can be said that Heilsbronn amassed a collection of books of considerable scholarly merit, corresponding to the role of the leading abbey in the diocese of Eichstätt.")

45 Cf. FISCHER, Katalog (1928), p. 571 (overview of the catalogue and the new mss. numbers).

A large number of codices have been added to the library under abbot Heinrich von Hirschlach (1282–1302 and 1306–1317).⁴⁶ Many of which came from France and were produced at a time when the University in Paris was founded, in addition to when the system of *pecia*, a specific kind of copying manuscripts for university purposes, was likewise founded.⁴⁷ I will start with the older manuscript: For Ms. 436 Hans Fischer supposes that the rear parts were probably acquired at the University of Paris.⁴⁸ There was the opportunity to buy leaves or entire codices in Paris. The owner's mark on fol. 1r, *Liber beatissime virginis inn Hailsbrun(n)* is in a 15th century hand.⁴⁹ This manuscript contains both texts, starting with de Villa Dei's *Carmen* (fol. 1ra–2vb), followed by Sacrobosco's *Algorismus* (fol. 2vb–5va). The last one ends with the half-sentence *tam in numeris quadratis quam cubitis*, and a passage from a different text written by the same hand that continues within the same line.⁵⁰

A major problem is the identification of the works in the catalogues.⁵¹ Although the *Algorismus*-texts might stem from the second half of the 13th century, the whole codex seems to be a later composition of individual layers (according to the catalogue) without precise details as to when it was compiled.⁵² However, the notice of ownership makes it clear that the codex existed in this form in the abbey in the 15th century. It is remarkable that Fischer already identified a note on fol. 35r at the upper edge as evidence for a Parisian origin of at least this specific layer: *de(be?)tur pro XIII sol. dn. (solidis denariis)*.⁵³ Nevertheless, neither manuscripts are part of the corpus of *pecia* manuscripts studied by Nikolaus Weichselbaumer, although this mark does seem to be a clear indicator for this kind of manuscript production.⁵⁴ This is quite important since there is evidence that, since the first half of the 14th century, monks

46 MONTAG-ERLWEIN, Heilsbronn (2011), pp. 561–564.

47 MONTAG-ERLWEIN, Heilsbronn (2011), p. 563. Cf. on this practice Nikolaus WEICHSELBAUMER, Die Pecienhandschriften des Zisterzienserklosters Heilsbronn. *Archiv für Geschichte des Buchwesens* 65 (2010), pp. 1–87, esp. pp. 7–29 with special reference to France pp. 16–21.

48 FISCHER, Katalog (1928), p. 528.

49 Cf. *ibid.*, p. 528 who reads *liber beatissime virginis inn hailsbrun*. It is not clear if the tick above the “n” in the last word is meant as an abbreviation mark as it seems to me. Cf. for a late use of this notice of ownership (16th century) Karel Adriaan DE MEYER, Un Priscien de Heilsbronn à Erlangen et Leyde. *Scriptorium* 1 (1946–1947), p. 159–160, p. 159. The abbey is – as all Cistercian abbeys – dedicated to St Mary.

50 Ms. 436, fol. 5va. This passage, beginning with *Nota unam regulam tribus progressionum generibus continent ...*, cf. also FISCHER, Katalog (1928), p. 527, is not part of the edition of PEDERSEN, *Petri Philomenae opera* (1983), which ends, p. 201 with the quoted half-sentence.

51 FISCHER does not name Alexander but put it based on the older research (Moritz Cantor) as metrical *Algorismus* attributed to Sacrobosco. FISCHER, Katalog (1928), p. 526. But with the incipit he quotes (*Hec algorismus ars presens dicitur in qua*) and after checking the manuscript it becomes clear that he meant Alexander's *Carmen*. The Ptolemaeus-Database becomes a bit confusing at this point because linking different catalogues together: https://ptolemaeus.badw.de/jordanus/ms/1365#3_58 [17.7.2025].

52 FISCHER, Katalog (1928), p. 527.

53 *Ibid.*, pp. 527–528. On the same folium one can find change of hands and red underlining in the text.

54 The problem is that WEICHSELBAUMER relies on codices previously identified by others as *pecia* manuscripts. There is therefore a risk that not everything has been recorded here. Cf. WEICHSELBAUMER, *Die Pecienhandschriften* (2010), p. 54.

from Heilsbronn were studying at the college of St Bernhard in Paris and thus had access to the Parisian book market around the university.⁵⁵ It is possible that parts of the codex were written in Paris and transferred to Heilsbronn by monks who had studied there. The later parts of the codex, where the *pecia*-mark can be found, shows a lot of abbreviations. This is a specific feature for (scholastic) manuscripts in a university context. But so is the first part containing the *Algorismus*-text full of such abbreviations. It can therefore be argued, as Fischer likewise did, that the different parts of the manuscript, including its first part (fol. 1–7), which contains the *Algorismus* and a fragment of Sacrobosco's *De Sphaera*, came to Heilsbronn at different times and were compiled as a schoolbook or study book at a later date. For the later Middle Ages we have evidence of a bookbinding workshop in Heilsbronn.⁵⁶ The fact that in Ms. 436 the text that follows Sacrobosco's *Algorismus* is Sacrobosco's *De Sphaera* and is also written with the same hand could very well indicate that it was produced within the framework of the *pecia* system.⁵⁷ If the *Algorismus* part of the codex also came from Paris during the late 13th or beginning of the 14th century, this would coincide with a significant growth of the library under abbot Heinrich of Hirschlach.⁵⁸

Looking at the characteristics of manuscripts that are supposed to be part of a university setting, one has to differentiate between their original (intended) use in 'higher education' and their secondary use in a monastic context. For the latter, it is important to note that our codex of interest is a *liber catenatus*. This makes it clear that the manuscript was intended for regular, hands-on use.⁵⁹ The actual use, especially in a school context, is much more difficult to trace. There is evidence that since the 13th century a kind of home studies ("Hausstudium") in Heilsbronn has existed. The convent taught its own members, especially at the stage of elementary instruction, which is quite important for my argument: When this "Hausstudium" started, it seemed to be focused just on theology, but by at least the 14th century other subjects had entered the scene.⁶⁰ In 1282, a college ("Studienkolleg") of the Cistercians was founded in Sunderhofen near Würzburg which also included some kind of 'natural science'.⁶¹ After the closure of the college in 1295, the "Hausstudium" at Heilsbronn

55 MONTAG-ERLWEIN, Heilsbronn (2011), pp. 565–566. Between 1391 and 1522, 57 monks from Heilsbronn also studied in Heidelberg. Cf. SPRUSANSKY, Die Bibliothek (1991), p. 20.

56 Cf. Max Joseph HUSUNG, Die Universitätsbibliothek zu Erlangen und die Einbände aus dem Kloster Heilsbronn. *Sankt Wiborada* 3 (1936), pp. 132–137, p. 132 who, referring to Ernst Kyriß, identifies three binding workshops in Heilsbronn between 1467 and c. 1528. An inventory of 1512 holds evidence of bookbinding-equipment. Cf. SPRUSANSKY, Die Bibliothek (1991), p. 23.

57 In this case, the scribe (in Paris?) might have had a defective text template. Cf. on this problem WEICHELBAUMER, Die Pecienhandschriften (2010), p. 7.

58 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), pp. 571–574.

59 Cf. Philippe CORDEZ, Le lieu du texte. Les livres enchaînés au Moyen Âge. *Revue Mabillon* 78, 2006, pp. 75–103 also on the cultural aspects of the use of *libri catenati*.

60 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), pp. 572–573. She mentions (p. 573) as a possible subject philosophy which could include also mathematical training. Cf. to medieval understanding of philosophy Joachim RITTER–Karlfried GRÜNDER (ed.), *Historisches Wörterbuch der Philosophie*, vol. 7: P–Q, Darmstadt 1989, col. 633–656.

61 MONTAG-ERLWEIN, Heilsbronn (2011), p. 572.

became more important for the abbey because of the high education costs that came with studying in foreign countries, especially France.⁶² Surely, this must have been the case for quite some time; therefore, elementary teaching, including mathematics, could have taken on a new significance for the monastery. Unfortunately, in comparison to the other texts in the codex, there are no margins in the *Algorismus*-part which could give hints at its physical use.⁶³ The manuscript contains astronomy (Aristotle) followed by the comment of Boethius and a dialectic treatise. In this context, one can find the *Algorismus* of Sacrobosco and de Villa Dei. The type of compilation of the manuscript rather refers to a university context as opposed to a monastic one. At universities, this kind of basic text was frequently in use.

The other manuscript from Heilsbronn, Ms. 394, contains again a Sacrobosco *Algorismus* (121vb–127ra) as well as a de Villa Dei *Carmen de Algorismo* (fol. 127ra–129va) and is also a *liber catenatus*.⁶⁴ Compared to the first one, Ms. 436, it is not a compiled manuscript but written as a single book.⁶⁵ There is also an ownership note from the 15th century.⁶⁶ Fischer describes the codex as a school book which was used at the *Studium Parisiense* but was probably not created there⁶⁷ – in terms of content, this is very likely; apart from the *Algorismus*, it contains authors and texts that are quite typical for the high and late medieval classroom.⁶⁸ Concerning its use in a classroom, more evidence is provided by the few annotations in the *Algorismus* (fol. 125rv).⁶⁹ However, while these are essentially corrections of, and additions to, the text, and no explanations on the level of content are provided, it is difficult to say whether they are related to a teaching situation.⁷⁰

What these manuscripts can tell us is that at least in the later Middle Ages there were specific interests in algorithmic and comparable texts in Heilsbronn. Thereby, the monks in

62 Cf. MONTAG-ERLWEIN, Heilsbronn (2011), p. 574.

63 The whole part is at least less artistic than the Aristoteles part, cf. initials, e. g. fol. 11r (color and different hand). For Aristoteles, there are annotation in margins, so one can say that it was used, collated and/or corrected which coincide to its *pecia* context, cf. fol. 11r script in bottom of the page: *No(t)u(m) hic secundum al(ia)*. Cf. also different hand in annotations and different kind of annotations (textual criticism and comments) on fol. 12v in the bottom of the page (calculation?), fol. 21r, 22v dito, 25rv (huge annotations at the bottom of the page).

64 Cf. FISCHER, Katalog (1928), pp. 468–470, n. 394.

65 On the different hands cf. also *ibid.*, p. 469.

66 Cf. *ibid.*, p. 470. Ms. 394, flyleaf: *Hic liber beate virginis inn haylsbrun.*

67 *Ibid.*, p. 469

68 These are among others: Donatus' *De VIII partibus orationis* (i. e. *Ars minor*); Alexander's de Villa Dei, *Doctrinale*; Priscianus minor; *Flores grammaticae*; *Theoduli Ecloga*. Cf. to these as classical school texts Hugo von Trimberg, *Registrum multorum auctorum. Ein Quellenbuch zur lateinischen Literaturgeschichte des Mittelalters*, ed. by Johann HUEMER, Wien 1888, pp. 6 (Alexander de Villa Dei), 18 (Donatus), 22 (Priscianus) and 34 (Theodulus).

69 In other parts of the codex one can find fol. 3v: annotations, later more often (different hands) and in the later part corrections (fol. 131r).

70 Fol. 125rb there is, for example, *sua* corrected to *summa*, fol. 125va *semper* is corrected to *sequens*.

Heilbronn were quite up to date⁷¹ and not only focused on theology and philosophy within the monastery walls. Through their provenance, the manuscripts from Heilbronn show a wide network of learning and knowledge exchange, especially for an order founded to be secluded from the world – and in this case, due to strong connections to regional monastic networks, being locally rooted ‘outside the walls’. With regard to the *Algorismus*, Montag-Erlwein can confirm that there is at least a connection to the outside world with regard to the acquisition of the manuscripts. In all likelihood, there existed a “supra-regional intellectual horizon” in Heilsbronn abbey;⁷² the extent to which the *Algorismus* could have had a “regional” or “inward” effect in a school context still requiring further detailed study.

ST MAXIMIN IN TRIER

Let us now take a closer look at a monastery in the far West of the Holy Roman Empire, the “Reichsabtei” St Maximin in Trier.⁷³ As Heilsbronn St Maximin, which was founded, at the latest, in the 6th century, held its own scriptorium, but the library was probably not well equipped at all times although its holdings date back to the early Middle Ages.⁷⁴ The codex, which is of interest here is now located at the Staatsbibliothek in Berlin, holding the

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- 71** Cf. Alfred WENDEHORST, Die Zisterzienser in Heilsbronn, in: Svetozar SPRUSANSKY (ed.), Das Zisterzienserkloster Heilsbronn und seine Bibliothek. Ausstellung des Landeskirchlichen Archivs im Evangelischen Gemeindehaus in Heilsbronn, 28. April–30. Juni 1991 und in der Universitätsbibliothek in Erlangen, 15. November–7. Dezember 1991 (Ausstellungskataloge des Landeskirchlichen Archivs in Nürnberg 15, Heilsbronn 1991), pp. 11–17, p. 14: “Der Zisterzienserorden, gegründet um Weltabgewandtheit zu institutionalisieren, hat sich wie andere Orden der Entwicklung von Gesellschaft und Umwelt manchmal mit Phasenverspätung, meist ohne sie, angepasst.” (“Like other religious orders, the Cistercian order, founded to institutionalise secularism, has adapted to the development of society and the environment, sometimes with a time lag, usually without it.”).
- 72** MONTAG-ERLWEIN, Heilsbronn (2011), p. 579: “[...] so ist zumindest aus unserer heutigen Sicht zu konstatieren, dass es Heilsbronn gelang, sich mittels seiner Verbindungen innerhalb des Ordens offen für geistige und wissenschaftliche Strömungen außerhalb der eigenen Klostergrenzen zu zeigen und damit in geistiger Hinsicht der Regionalisierung entgegenzuwirken.” (“[...] it can be stated, at least from our current perspective, that Heilsbronn succeeded in using its connections within the order to show itself open to intellectual and scientific currents outside its own monastery boundaries and thus to counteract regionalisation in intellectual terms.”).
- 73** Cf. basically Bertram RESMINI, Das Erzbistum Trier, vol. 13: Die Benediktinerabtei St. Maximin vor Trier (Germania Sacra. Folge III/13, Berlin–Boston 2016); Michael EMBACH–Bernhard SIMON (ed.), Die Abtei Trier-St. Maximin von der späten Antike bis zur Frühen Neuzeit (Quellen und Abhandlungen zur mittelrheinischen Kirchengeschichte 142, Mainz 2018). This status as a ‘Reichsabtei’, Heilsbronn abbey never achieved. MONTAG-ERLWEIN, Heilsbronn (2011), p. 90.
- 74** Cf. the most detailed examination in Isabel KNOBLICH, Die Bibliothek des Klosters St. Maximin bei Trier bis zum 12. Jahrhundert, Trier 1996; ID., Handschriften aus St. Maximin. Eine Ergänzung, in: Michael EMBACH–Bernhard SIMON (ed.), Die Abtei Trier-St. Maximin von der späten Antike bis zur Frühen Neuzeit (Quellen und Abhandlungen zur mittelrheinischen Kirchengeschichte 142, Mainz 2018), pp. 155–162; Reiner NOLDEN, Maximiniana in Stadtbibliothek und Stadtarchiv Trier, in: *ibid.*, pp. 143–153.

shelfmark Ms. lat. fol. 192. It contains a full Sacrobosco on fol. 9v–12rb⁷⁵ and is accompanied by texts on mathematics, astronomy and computistic.⁷⁶ According to the modern catalogue, the whole manuscript was compiled and bound in the 15th century.⁷⁷ There is no further note to whether it was bound in St Maximin or not, even though it is likely the case. There is evidence for a bookbinding workshop in the abbey, at the very latest, in the 15th and 16th century and again between 1674 and 1750 which we know because of different embossing stamps.⁷⁸ In the case of the Sacrobosco manuscript, further study has to be done to be sure. For the 15th century, Bertram Resmini stated that there was a great production of manuscripts in the abbey.⁷⁹ At the same time economic prosperity allowed the acquisition of many early prints, some of which were explicitly decreed to be used in the classroom.⁸⁰

In general, the abbey was strongly oriented towards the West⁸¹, which means strong connections to the scholastic and university context in Paris in the 13th century. The history of the library has so far mainly been studied for the period of the Early Middle Ages.⁸² The same applies to the scriptorium, for which broader studies for the period after 1000 AD represent a research desideratum.⁸³ At present, around 260 surviving manuscripts can be assigned to the library, which are now distributed across different libraries.⁸⁴ One problem is, that there is a lack of information on the manuscripts in medieval catalogues or inventories making research dependent on ownership notes in the codices.⁸⁵ For the Sacrobosco text there is a 15th century ownership note on the cover connected to St Maximin: *Codex mo(na)sterii sci. maxi(mini) prope trever(ens)i*,⁸⁶ meaning that the codex would have been physically present in the abbey in the 15th century. This is also the time when the library grew significantly and different topics were added to the collection⁸⁷. A period in which perhaps mathemat-

75 Cf. Valentin ROSE, Verzeichniss der lateinischen Handschriften der Königlichen Bibliothek zu Berlin, vol. II/3: Die Handschriften der Kurfürstlichen Bibliothek und der Kurfürstlichen Lande (Die Handschriften-Verzeichnisse der Königlichen Bibliothek zu Berlin 13, Berlin 1905), pp. 1199–1209, n. 963; KNOBLICH, Die Bibliothek (1996), p. 132, n. 33. Many of the St. Maximin manuscripts are extant in Berlin today. Cf. on the organisation of the library of St. Maximin until the early modern period KNOBLICH, Die Bibliothek (1996), pp. 10–16.

76 Cf. in detail ROSE, Verzeichniss (1905), pp. 1199–1209.

77 Ibid., p. 1199.

78 RESMINI, Das Erzbistum Trier (2016), pp. 154–155; cf. 156 on the older decoration of the book bindings.

79 Ibid., p. 163.

80 Ibid., pp. 170–171.

81 Ibid., p. 209.

82 Cf. esp. KNOBLICH, Die Bibliothek (1996). During the whole Middle Ages there was no *officium* especially dedicated to the library. It was always supervised on a part-time basis. RESMINI, Das Erzbistum Trier (2016), p. 174.

83 RESMINI, Das Erzbistum Trier (2016), p. 161.

84 Ibid., p. 146.

85 Ibid., pp. 149–152. Older library catalogue from 1125, edited by KNOBLICH, Die Bibliothek (1996), pp. 120–124, contains no references to mathematical, astronomical or geometrical manuscripts.

86 Citation follows ROSE, Verzeichniss (1905), p. 1199 (abbreviations are extended by me).

87 RESMINI, Das Erzbistum Trier (2016), p. 162.

ics was also added. To figure out whether there is any evidence for its use within a school context we would have to study the manuscript in detail. As St Maximin was a Benedictine monastery, one could ask if there were any differences in dealing with mathematical texts in comparison to other orders, and in particular to the Cistercian monastery of Heilsbronn.

ST MICHAELS IN LUNEBURG

In contrast to the two examples discussed so far, the monastery of St Michael, founded in the middle of the 10th century by Hermann Billung, was situated in the city of Lüneburg which was part of the Hanse in the later Middle Ages.⁸⁸ The origins of the library are unclear. The destruction of the monastery in the Lüneburg War of Succession in 1371 may have had a significant impact on the book collection; shifts in focus within the collection were caused by the Bursfeld Congregation and later on by Lutheranism. In the middle of the 19th century, after the “Ritterakademie” which succeeded the monastery once it had been dissolved, a lot of the manuscripts were transferred to Göttingen.⁸⁹ 95 manuscripts in total can be assigned to St Michael, with the majority focusing on the great authors of the High and Late Middle Ages. In many cases these texts can be allocated to a school or university environment. It is striking that there are hardly any vernacular texts among them.⁹⁰

The library received several large donations of books in the late Middle Ages, although their specific content remains unclear.⁹¹ This shall be examined more closely for the two manuscripts currently held at the University and State Library of Göttingen: Göttingen, Niedersächsische Staats- und Universitätsbibliothek, 2° Lüneb. 1 and Göttingen, Niedersächsische Staats- und Universitätsbibliothek, 8° Lüneb. 68. The first codex contains a rather late testimony of Sacrobosco on fol. 192r–200v (around 1500; the whole codex 15th/16th century)⁹²; the second one, a codex from the 14th century, holds Alexander’s *Carmen* on fol. 25r–29ra.⁹³

For the history of the library, archival sources are available in addition to the books themselves. However, the late medieval registers and account books have hardly been analysed.⁹⁴

⁸⁸ Cf. basically the papers in Hansjörg RÜMELIN (ed.): *Das Benediktinerkloster St. Michaelis in Lüneburg. Bau – Kunst – Geschichte*, Berlin 2018.

⁸⁹ Lukas WOLFINGER, *Hort des Wissens. Die alte Bibliothek des Klosters St. Michaelis in Lüneburg im Lauf der Jahrhunderte*, in: Hansjörg RÜMELIN (ed.), *Das Benediktinerkloster St. Michaelis in Lüneburg. Bau – Kunst – Geschichte*, Berlin 2018, pp. 100–113, p. 101. Cf. for the other public libraries that hold codices from St Michael today, *ibid.*, p. 103.

⁹⁰ WOLFINGER, *Hort des Wissens* (2018), p. 103.

⁹¹ *Ibid.*, pp. 100–101.

⁹² (Wilhelm MEYER), *Die Handschriften in Göttingen*, vol. 2: *Universitätsbibliothek. Geschichte, Karten, Naturwissenschaften, Theologie, Handschriften aus Lüneburg* (*Verzeichniss der Handschriften im Preussischen Staate 1, Hannover 2*, Berlin 1893), pp. 491–493, p. 491.

⁹³ *Ibid.*, pp. 524–525, p. 524.

⁹⁴ WOLFINGER, *Hort des Wissens* (2018), pp. 103–104.

The provenance of our manuscripts could be found in these sources.⁹⁵ In addition, there are library catalogues from the 17th and 18th century, the earliest surviving one dating to the 1695 as a *terminus ante quem* for the existence of the manuscripts mentioned in there. In general, a large proportion of the manuscripts were written by scribes or previous owners from the abbot's or abbey's immediate circle.⁹⁶ A remarkably large number of codices, though, were not produced within the monastery but were acquired or donated by members of the convent. Nevertheless, there seems to be an absence of extensive book production in the monastery at the end of the 15th century; however, this may have been due to the social structure, as many monks within the order came from wealthy families and it is therefore likely that their possessions, including books, were passed on outside the monastery. Additionally, they were probably less active as the scribes themselves.⁹⁷

We begin with the older manuscript, 8° Luneb. 68, holding Sacrobosco, which seems to have existed as this specific codex at least since the 14th century.⁹⁸ The general context is grammar, but the text following the *Algorismus* deals with computation.⁹⁹ It is remarkable that this *computus* includes verses that were very likely added for the purpose of learning the content of the *computus* by heart. Both texts have a colophon which mentions two different 'authors' while, according to Wilhelm Meyer, both texts should be from the same hand. For Sacrobosco it is as stated (fol. 29ra): *Expl. algorismus finitus per manus scholaris de Pattensen* ("Here ends the *algorismus*, finished by the hand of a scholar/student [?!]¹⁰⁰ of Pattensen"). There are also marginal notes that need to be examined more closely.¹⁰¹ This seems quite important because we might get more information on a text witness that could have been used it for teaching and/or learning purposes well before the 18th century. So far, no evidence of any mathematic teaching in Luneburg earlier than that has been noted.¹⁰²

The second and later codex contains didactic matters, such as Johannes Reuchlin's comments on Vergil, but also a computistic text.¹⁰³ Most of the texts in the manuscript are poetic in nature and the vast majority are accompanied by commentaries.¹⁰⁴ This could also be an

⁹⁵ It would have to be checked whether one of the two texts mentioned in an invoice from a late Medieval register under the name of Alexander de Villa Dei is the *Carmen*. Cf. the passage quoted in WOLFINGER, Hort des Wissens (2018), p. 112, n. 70.

⁹⁶ *Ibid.*, p. 104.

⁹⁷ *Ibid.*, p. 105.

⁹⁸ (MEYER), *Die Handschriften in Göttingen* (1893), p. 525 also dates the cover to the 14th century.

⁹⁹ *Ibid.*, pp. 524–525.

¹⁰⁰ *Scholaris* can mean both, student or magister. Cf. Richard ASHDOWNE–David R. HOWLETT–Ronald E. LATHAM (ed.), *Dictionary of Medieval Latin from British Sources*, 3 vol., Oxford 2018 (first ed. in individual fascicles 1975–2013), s. v. *scholaris* (which is also valuable for other parts of Medieval Europe).

¹⁰¹ (MEYER), *Die Handschriften in Göttingen* (1893), p. 524. The same applies to the feather tests with Low-German notes on the cover. Cf. *ibid.*, p. 525.

¹⁰² Cf. Dieter RÜDEBUSCH, *Die Schulen von St. Michaelis in Lüneburg*, in: Hansjörg RÜMELIN (ed.), *Das Benediktinerkloster St. Michaelis in Lüneburg. Bau – Kunst – Geschichte*, Berlin 2018, pp. 114–124, p. 119.

¹⁰³ (MEYER), *Die Handschriften in Göttingen* (1893), pp. 491–492.

¹⁰⁴ Cf. *ibid.*, p. 491 (some may have been copied from prints?).

indication of its use in teaching situations. The octavo format of the manuscript and the *copert* binding would fit this finding: “While a number of school texts are only known from references in the monastery’s account books, several library manuscripts (mostly in octavo format and often with *copert* bindings) can be proven or most probably originate from the context of the monastery school(s) providing insights into both the reading canon as well as the teaching and textual practices at St. Michael’s”.¹⁰⁵

Both manuscripts seem to fit well to a classroom situation. It is important to note that a remarkably large proportion of those manuscripts whose scribes are known were written by secular clergymen.¹⁰⁶ These also acted as teachers in the small and large monastery schools. Secular clergy played an important role (a kind of substitute for the book market) for the monastery: “Their hands are everywhere”.¹⁰⁷ The school lessons were, by all accounts, quite conventional. Among the school authors, Lukas Wolfinger also explicitly mentions Alexander de Villa Dei and especially the codex 8° Luneb. 68.¹⁰⁸ Little is known about the spatial conditions of medieval schools there;¹⁰⁹ however, for the later Middle Ages it is remarkable that there was a connection between the library and the classroom.¹¹⁰

The schools of St Michael were quite important for merchants and the Hanseatic city of Luneburg overall, and can be considered a centre of learning and education.¹¹¹ In the 10th century a school of the monastery is mentioned, supposedly the very first school in Luneburg. Duke Otto III. (†1352) gave the monastery a school outside the castle: “The establishment of another school in or outside the city was prohibited. This made the ‘Michaelisschule’ a privileged educational institution for the sons of the town’s citizens”.¹¹² In the 14th century

105 “Während eine Reihe von Schultexten nur aus Erwähnungen in den Rechnungsbüchern des Klosters bekannt ist, geben mehrere Bibliothekshandschriften, die nachweislich oder mit großer Wahrscheinlichkeit aus dem Kontext der Klosterschule(n) stammen (meist im Oktav-Format und häufig mit Koperteinbänden ausgestattet), Einblicke sowohl in den Lektürekanon als auch in die Lehr- und Textpraktiken zu St. Michael.” WOLFINGER, *Hort des Wissens* (2018), p. 106. Cf. additionally, *ibid.*, p. 108 for *libri catenati* in St Michael’s.

106 *Ibid.*, p. 105

107 *Ibid.* (cit.: “Überall begegnen ihre Hände”).

108 *Ibid.*, p. 106, cf. the corresponding note *ibid.*, p. 112, n. 71.

109 *Ibid.*, p. 106.

110 “However, Hansjörg Rümelin’s building history findings show that by 1470 at the latest, a separate library existed in the dormitory building, which was located on the upper floor at the northern end of the central corridor that led through the ‘Slaphus’. This meant that it was also in the immediate vicinity or above the ‘small school’”. (“Spätestens um 1470 existierte dann aber, das zeigen nun die bauhistorischen Ergebnisse von Hansjörg Rümelin, eine eigene Bibliothek im Dormitoriumsgebäude, die sich im Obergeschoss befand, und zwar am nördlichen Ende des Mittelganges, der durch das ‘Slaphus’ führte. Damit lag sie auch in unmittelbarer Nähe bzw. oberhalb der kleinen Schule.”). WOLFINGER, *Hort des Wissens* (2018), p. 107. However, textbooks are likely to have often been discarded as waste paper, cf. *ibid.*, p. 104.

111 “With its schools, St Michael’s was a centre of Christian culture and a place of education for the clergy, nobility and Luneburg bourgeoisie.” (“Mit seinen Schulen war St. Michaelis ein Zentrum christlicher Kultur und Bildungsstätte von Klerus, Adel und Lüneburger Bürgertum.”). RÜDEBUSCH, *Die Schulen von St. Michaelis* (2018), p. 114.

112 RÜDEBUSCH, *Die Schulen von St. Michaelis* (2018), p. 114.

we know of conflicts with the Premonstratensians concerning the school which had to be settled by the pope and the Roman rota. In 1406, St Michael's finally renounced its monopoly on schools.¹¹³ The organisation of the school stayed the same during the 15th century¹¹⁴.

ST MARY IN GDAŃSK

With my last example I am leaving the domain of the monastery and the area of today's German-speaking countries. The previous cases have already shown that individual monasteries had close links to the non-clerical world, also with regard to the *algorismus*, but the trading centre of Gdańsk (German Danzig) adds a new aspect. Here we can ask the question about the need of mathematical skills in the form of commercial arithmetics for daily (economic) life,¹¹⁵ similar to the case of Luneburg.

In Gdańsk we have a different situation in terms of tradition. The manuscript discussed here was part of the library of St Mary's Church in Gdańsk, which today is part of the Library of the Polish Academy of Sciences (Biblioteka Gdańska Polskiej Akademii Nauk). The German catalogue by Otto Günther from 1921 gives us a very good idea of the history and structure of the former church library.¹¹⁶ The history begins in the 15th century, more precisely in 1413.¹¹⁷ What the library held in the early period, is difficult to say, as there is no contemporary catalogue.¹¹⁸ As a *terminus post quem*, Günther mentions the 2nd of October 1462 for the All Saints' Chapel ("Allerheiligenkapelle") as a repository for books.¹¹⁹

The manuscript Mar.Q30 contains the *Algorimus* by Sacrobosco on fol. 133r–143r and a commentary on it from fol. 147r–158r. It is again a *liber catenatus*.¹²⁰ Concerning the question when the manuscript came into the possession of the library, one main indicator comes from the catalogue of Heinrich Calow from the middle of the 15th century in which a *terminus ante quem* for the existence of the manuscript is present.¹²¹ Calow was the administrator

¹¹³ Ibid.

¹¹⁴ Ibid., p. 115.

¹¹⁵ Cf. TRAVAINI, Monete (2007), p. 58 on arithmetical treatises as an important source for numismatic; cf. on the heavy interest of merchants in *algorismus* in Provence FAUCONNIER, L' "algorismo" (2017), p. 176, which was mainly influenced by Sacrobosco and de Villa Dei (ibid., p. 173).

¹¹⁶ Otto GÜNTHER (ed.), Katalog der Handschriften der Danziger Stadtbibliothek, vol. 5: Die Handschriften der Kirchenbibliothek von St. Marien in Danzig, Danzig 1921, pp. 1–68. About the main character of the library cf. ibid., p. 66.

¹¹⁷ Ibid., p. 1.

¹¹⁸ Ibid., p. 2.

¹¹⁹ Ibid., pp. 5–7. GÜNTHER argues with an original charter which is dated to this day and mentions the library in All Saints' Chapel, ibid., pp. 6–7.

¹²⁰ Ibid., pp. 533–536, p. 533. Many bindings show traces of chain books. Cf. ibid., p. 11 n. 3.

¹²¹ Cf. ibid., p. 533, where he mentions the ms. as part of Calow's catalogue. Cf. therefor ibid., pp. 30–37.

of the library until 1468 or 1472 and ensured that many volumes were (re)bound.¹²² Codex Mar.Q30, unfortunately, is not among those identified by Günther.¹²³ A scribe's note mentions (fol. 143r) a name: *Explicit algorissimus (sic) de integris per manus Nycolai Newekirche*.¹²⁴ One has to pursue him further in the Gdańsk tradition, especially on whether he had a connection to the church library or to local schools. Notes and marginalia on the text on folio 143r–144v with various small notations on arithmetic, provide information on its usage.¹²⁵ The presence of a commentary (fol. 147r–158r)¹²⁶ could be an indication for usage in a school context. The tradition of commenting and its impact cannot be discussed further here, but the urgent need for research in this direction need to be pointed out once more.¹²⁷

In 1458, the installation of the books in the All Saints' Chapel was made publicly accessible.¹²⁸ This is of great interest for the question of who was able to use these books and to what extent laymen, such as merchants, from the urban environment were also eligible to study Sacrobosco. It also raises the question to what extent the church personnel were involved in local school contexts. This is also a research desideratum.

122 *Ibid.*, p. 21. About Calow as administrator of the library cf. *ibid.*, pp. 16–22, 30–37, p. 35 about the uncertain date of his death and retirement as a librarian. On the significance of his catalogue for the history of the collection cf. *ibid.*, p. 33.

123 *Ibid.*, p. 21, n. 1.

124 *Ibid.*, p. 534.

125 *Ibid.*

126 *Ibid.*

127 The frequent instances in which Sacrobosco appears in the tradition as a commentary on Alexander's *carmen* are of particular interest here. The entire European tradition of *Algorismus* should be considered comparatively.

128 GÜNTHER, *Katalog* (1921), p. 12.

CONCLUSION

To summarise: Mathematical texts in monastic contexts are important and are still largely underestimated by contemporary academic researchers. Their importance can be seen by looking at the extant manuscripts of the Sacrobosco *Algorismus* and the *Carmen de Algorismo* by Alexander de Villa Dei in Austria. We find many codices in situ in monastic libraries which leads to questions of the connection between the monastic and the academic spheres, the necessity of mathematical education in a monastic context, and the relevance of schools and teaching connected to monasteries. It is important to note, that the question concerning how these manuscripts were used in a school context, or by merchants, in addition to their connection between monastic or clerical personage and the ‘outside world’ in the late Middle Ages has to be further studied from a wider European perspective. To that purpose, all manuscripts that are available should be taken into account – within and without monastic contexts. Only further manuscript studies combined with a clear understanding of the social and intellectual history of the High and Late Middle Ages can help us solve these questions and enable us to understand how and to what extent there was, in origin and use, something we can call “monastic mathematics” more clearly.

PRINTER, AUTHOR, HUMANIST

JAKOB KÖBEL AND THE CIRCULATION OF ARITHMETIC BOOKS IN EARLY MODERN GERMANY

Julia Bruch

INTRODUCTION

Jakob Köbel (c. 1462–1533) occupies a significant position in the history of early printing, not only as a prolific printer and publisher, but also as a humanistically educated author. Active first in Heidelberg and later in Oppenheim am Rhein, Köbel's career exemplifies the multifaceted role of early modern printers who operated at the intersection of intellectual culture and the emerging commercial book trade. His printing activities – spanning legal, scientific, pedagogical, and devotional genres – reflect both the educational ideals of humanism and the pragmatic demands of a growing literate public.

Köbel's engagement with humanist networks, his contributions to the vernacular dissemination of mathematical knowledge, and his editorial and authorial interventions render him a figure of considerable importance in the cultural history of the German-speaking territories during the late 15th and early 16th centuries. The examination of Köbel's mathematical works is facilitated via a copy of an arithmetic print by Köbel that is preserved in Klosterneuburg – this copy was printed in Frankfurt by Christian Egenolff in the year 1549.

The following study reconstructs Jakob Köbel's biography, contextualises his publishing enterprise within the broader intellectual and economic networks of the period, and highlights his dual role as both disseminator and producer of knowledge. Particular attention is paid to the genesis, transmission, and reception of his arithmetic books, which circulated widely across cities and social strata and illustrate the transformation of practical knowledge into printed commodities. Köbel's oeuvre, as this analysis will show, exemplifies the entanglement of humanist ideals and economic pragmatism that characterised the early modern book trade.

BIOGRAPHICAL CONTEXT

Jakob Köbel is regarded as a notably prolific printer of the incunabula and early print period, who lived and worked primarily in Oppenheim on the Rhine. Scholarly interest in Köbel's

printing activities began as early as 1763, when C. Büttinghausen published *Incunabula typographiae Oppenheimensis* in Heidelberg, with a revised edition appearing in *Beyträge zur pfälzischen Geschichte* in Mannheim in 1773.¹ What we know of Köbel's life was documented in biographies by Ferdinand Wilhelm Roth in the 19th century and by Josef Benzinger in the 20th century.² Jakob Köbel was born around 1462 in Heidelberg. He was the son of Nikolaus (Klaus) Köbel, who resided in the house known as 'zur Schleihereule'.³ Klaus Köbel was a goldsmith or engraver and held a position as a mint official.⁴ Jakob Köbel, on the other hand, is listed in the matriculation records of Heidelberg University on February 20, 1480. In July 1481, he completed his studies at the Faculty of Arts, and on May 16, 1491, he concluded his legal studies, earning the degree of Baccalaureus in both civil and canon law. In addition to his university education, it is known that he was active in the book trade, as in the account book of Peter Drach of Speyer, Jakob Köbel is mentioned as a bookkeeper (*Buchführer*) in Heidelberg in 1495.⁵

From 1489 onward, Köbel worked as a publisher for the printer Heinrich Knoblochtzter, who had been active in Heidelberg since 1485.⁶ In Heidelberg, Jakob Köbel maintained

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- 1 Ferdinand Wilhelm Emil ROTH, Die Buchdruckerei des Jakob Köbel, Stadtschreibers zu Oppenheim, und ihre Erzeugnisse (1503–1572). Ein Beitrag zur Bibliographie des 16. Jahrhunderts, ed. by Jakob WICHNER, ND 1968, Leipzig 1889 (Zentralblatt für Bibliothekswesen. Beiheft 4/1), p. 461; there, also, the subsequent course of research up to 1889; Josef BENZING, Neues vom Drucker Jacob Köbel. *Das Antiquariat: Halbmonatsschrift für alle Fachgebiete des Buch- und Kunstantiquariats* 19 (1969), pp. 18–19; ID., Ergänzungen zu "Neues vom Drucker Jacob Köbel". *Das Antiquariat: Halbmonatsschrift für alle Fachgebiete des Buch- und Kunstantiquariats* 27 (1971), p. 473; ID., Jakob Köbel zu Oppenheim 1494–1533. Bibliographie seiner Drucke und Schriften, Wiesbaden 1962, pp. 7–12 (with an overview of the research up to 1962); cf. in summary: Christoph RESKE, Die Buchdrucker des 16. und 17. Jh. im deutschen Sprachgebiet. Auf der Grundlage des gleichnamigen Werkes von Josef BENZING, Wiesbaden 2007 (Beiträge zum Buch- und Bibliothekswesen 51), pp. 832–833 and the publications of Richard HERGENHAHN, Jakob Köbel zu Oppenheim: 1494–1533. Stadtschreiber, Feldmesser, Visierer, Schriftsteller, Verleger, Druckherr. *Oppenheimer Hefte* 11 (1995), pp. 2–71; ID., Jakob Köbel 1460–1533. Stadtschreiber zu Oppenheim, Feldmesser, Visierer, Verleger, Druckherr, Schriftsteller und Rechenmeister, in: Rechenmeister und Cossisten der frühen Neuzeit, ed. by Rainer GEBHARDT–Mensio FOLKERTS, Annaberg-Buchholz 1996 (Schriften des Adam-Ries-Bundes Annaberg-Buchholz 7), pp. 63–82; ID., Jakob Köbel, seine Bedeutung als mathematischer Schriftsteller. *Oppenheimer Hefte* 15 (1997), pp. 2–66; therefore, also in the following.
 - 2 Cf. therefore, also in the following ROTH, Die Buchdruckerei (1889); ID., Chronik. Mitteilungen. Jacob Köbel, Buchdrucker zu Oppenheim, als Buchillustrator. *Zeitschrift für Bücherfreunde. Monatshefte für Bibliophilie und verwandte Interessen* 1 (1897), pp. 443–445; ID., Jacob Köbel. Verleger zu Heidelberg, Buchdrucker und Stadtschreiber zu Oppenheim a. Rh. 1489–1533. *Neues Archiv für die Geschichte der Stadt Heidelberg und der Kurpfalz* 4 (1901), pp. 147–179; the more recent works of Richard HERGENHAHN are essentially based on this HERGENHAHN, Jakob Köbel zu Oppenheim (1962); HERGENHAHN, Jakob Köbel 1460–1533. Stadtschreiber zu Oppenheim (1996); HERGENHAHN, Jakob Köbel (1995).
 - 3 ROTH, Jacob Köbel (1901), p. 151.
 - 4 Ibid., p. 147.
 - 5 Ferdinand GELDNER, Das Rechnungsbuch des Speyrer Druckherrn, Verlegers und Großbuchhändlers Peter Drach. *Archiv für Geschichte des Buchwesens* 5 (1964), col. 1–196, p. 48; if the name can *Jacobus Kiblin* be resolved into Köbel, as Josef BENZING, Jakob Köbel zu Oppenheim 1494–1533. Bibliographie seiner Drucke und Schriften, Wiesbaden 1962, p. 8 suggested.
 - 6 Ferdinand GELDNER, Das Rechnungsbuch des Speyerer Druckherrn, Verlegers und Großbuchhändlers Peter Drach mit Einleitung, Erläuterungen und Identifizierungslisten. *Archiv für Geschichte des Buchwesens* 31 (1962),

contact with the local circle of humanists and participated in the exchange network of manuscripts and printed works. For example, Johann von Dalberg, Bishop of Worms, lent him a manuscript of Cicero, which Köbel in turn passed on to the travelling scholar Conrad Celtis. Together with Jodocus Gallus of Ruffach, he published the *Mensa philosophica*.⁷ Köbel is also mentioned – under the name ‘*Caballinus*’ – in a letter by Erasmus Australis from the monastery of St. Emmeram in Regensburg (1494), as well as in the memorial book of Heinrich Spieß in 1496.⁸ The prints he published further demonstrate his active engagement with the humanist community and his role in disseminating their works.

In 1494, Jakob Köbel moved from Heidelberg to Oppenheim am Rhein, where he married Elisabeth, the daughter of councilman Heinrich zum Gelthus, on May 8th of the same year.⁹ The couple had at least three children: a son named Jakob and two daughters, Elisabeth and Katharina.¹⁰ In Oppenheim, Köbel held the positions of city scribe, official land surveyor (*Feldmesser*), and inspector of weights and measures (*Eichmeister*).¹¹ He resided in an official apartment in the town hall where he also managed the municipal wine tavern (*Ratsweirtschaft*).¹² In 1528, he is documented as a town council member in Oppenheim.¹³ In 1531, Köbel suffered from gout and was forced walk with a cane until his death on January 31st, 1533 in Oppenheim.¹⁴ He was buried in St. Katharina’s church. His tombstone featured an owl, and the humanist Helius Eobanus Hessus composed the epitaph:¹⁵ *H. Eobanus Hessus in obitum Jac. Koebelii 1553 (!) / Hac est Koebelius fatis Jacobus in urna / Conditus exigua conditione sua. / Nam pietas, doctrina, sapientia, virtus / Exiguo claudi non potuere loco*.¹⁶ Yet, the tombstone had already disappeared by 1776.¹⁷

p. 885–978, p. 954, n. 1090; on Knoblochtzer cf. Christoph ROTH, Ein “Meister der Druckkunst” in Heidelberg: das Heidelberger Publikationsprogramm des Inkunabeldruckers Heinrich Knoblochtzer 1485–1495/1500, Heidelberg 2021.

- 7 *Mensa philosophica*. Ed. by Jodocus GALLUS, Jakob KÖBEL und Johannes WACKER. Heidelberg: [Drucker des Lindelbach (Heinrich Knoblochtzer)], 1489. 4°; GW M22814; ISTC im00495000 [Munich, Bayerische Staatsbibliothek, 4 Inc.c.a. 667; urn:nbn:de:bvb:12-bsb00039888-9]; frist print: *Mensa philosophica*. [Köln: Johann Koelhoff, ca. 1479]. 4°, GW M22811; ISTC: im00490500.
- 8 ROTH, Jacob Köbel (1901), pp. 148–151.
- 9 Frieder SCHANZE, Der Erstdruck des “Gotteslästerermandats” König Maximilians von 1497. Zum Beginn der Druckertätigkeit J. K.s in Oppenheim. *Gutenberg-Jahrbuch* 74 (1999), pp. 123–130, p. 123; cf. ROTH, Jacob Köbel (1901), p. 152.
- 10 ROTH, Jacob Köbel (1901), pp. 176–178.
- 11 BENZING, Jakob Köbel zu Oppenheim (1962), p. 8.
- 12 ROTH, Jacob Köbel (1901), pp. 152–153.
- 13 *Ibid.*, p. 170.
- 14 *Ibid.*, p. 171.
- 15 *Ibid.*, pp. 172–173.
- 16 *Ibid.*, p. 173. H. Eobanus Hessus on the death of Jakob Köbel, 1553. Here lies Köbel, Jacob, subject to fate, Buried in his humble grave. For piety, learning, wisdom, and virtue. Could not be confined to a small place.
- 17 *Ibid.*

Before his death, Köbel hosted members of the *Sodalitas literaria Rhenana*, a humanist society to which he belonged and with which he maintained close ties,¹⁸ including figures such as Jakob Wimpfeling and Johannes Vigilius.¹⁹ Köbel is mentioned in the correspondence of various humanists.²⁰ Josef Benzing, who catalogued the works from Köbel's printing house, counted him among "those printers of the 16th century who not only practised a craft, but who, by virtue of their education and strong personality, formed intellectual centres in their own right."²¹ Further research into Köbel's activities is hampered by the fact that the municipal archive of Oppenheim, with the exception of the charter collection, was almost entirely destroyed during the city fire of 1621 and again during the destruction of the city in 1689.²²

PRINTING ACTIVITIES IN HEIDELBERG AND OPPENHEIM

The earliest known print associated with Köbel is the aforementioned *Mensa philosophica*,²³ whose prologue, framed as a letter, states that Jakob Köbel of Heidelberg initiated the reprint of this work which had originally appeared in Cologne.²⁴ Also printed by Jakob Köbel at the

¹⁸ BENZING, Jakob Köbel zu Oppenheim (1962), pp. 8–9.

¹⁹ ROTH, Jacob Köbel (1901), p. 153.

²⁰ Hans RUPPRICH (ed.), Der Briefwechsel des Konrad Celtis, Munich 1934 (Veröffentlichungen der Kommission zur Erforschung der Geschichte der Reformation und Gegenreformation. Humanistenbriefe 3), pp. 178–182, nr. 107 from 19th April 1496 (Vigilius to Celtis); *ibid.*, pp. 227–230, nr. 139 from 15th November 1496 (Vigilius to Celtis).

²¹ BENZING, Jakob Köbel zu Oppenheim (1962), p. 7.

²² Rolf KILIAN, Das Stadtarchiv Oppenheim als familiengeschichtliche Quelle, in: 1200 Jahre Oppenheim am Rhein, ed. by STADT OPPENHEIM, Oppenheim 1965, pp. 35–42, p. 35.

²³ *Mensa philosophica*. Ed. by JODOCUS GALLUS, Jakob KÖBEL und Johannes WACKER. Heidelberg: [Drucker des Lindelbach (Heinrich Knoblochzer)], 1489. 4°; GW M22814; ISTM im00495000 [Munich, Bayerische Staatsbibliothek, 4 Inc.c.a. 667; urn:nbn:de:bvb:12-bsb00039888-9]; first print: *Mensa philosophica*. [Köln: Johann Koelhoff, ca. 1479]. 4°, GW M22811; ISTM: im00490500.

²⁴ Jodocus Gallus Rubiacensis, Master of Arts and Philosophy, as well as a Bachelor of Sacred Theology, sends his greeting to the man well-versed in various subjects, Jakob Köbel of Heidelberg, his most closely connected brother and friend. It seemed to me, dearest patron, from the right of our mutual affection, that it is my duty to not only refrain from hindering your honorable endeavor but, to the contrary, to support it to the best of my ability, as far as my other work permits, the work which you have recently decided to submit to the press – a book that is useful to many and overflowing with witty remarks, which its author, though still undecided, intends to call 'The Philosophical Round Table' (*Jodocus gallus Rubiacensis Artium et philosophiae magister et sacre Theologie baccalaureus formatus S. D. P. diuersarum rerum edocto viro Jacobo Koebel Heydelbergensi coniunctissimo sibi fratri et amico Uisum est dulcissime fautor iure amoris internos mutui, hoc ad me muneri pertinere vt honestissimo conatu tuo, quo perutile(m) multisq(ue) faceijs abu(n)dere fertu(m) libellum cui ab autore suo lic(et) i(n) certo me(n)sa philosophica nome(n) est i(n)pressio(n)i tradere nuper decreuisti, non solum no(n) ibsiste, rem, veru(m) etia(m) opera mea, quoad ceteri labores patiuntur adessem*); *Mensa philosophica* (1489), prologue.

press of Heinrich Knoblochtzter were a Latin grammar²⁵ and the work *Footpath to Eternal Salvation* (*Fußpfad zur ewigen Seligkeit*), the latter bearing Köbel's coat of arms (fol. XXVv) and distinguished by its elaborate graphic design, including illustrations and ornate initials.²⁶ Scholarly consensus holds that Köbel himself printed a book on the fishing and hunting of birds in Heidelberg.²⁷ However, no copies of this edition have survived;²⁸ Nevertheless, several contemporary editions from other printing houses exist, suggesting the popularity and commercial appeal of the work.²⁹

Köbel's first printed work in Oppenheim is dated to 1497, a publication that can be clearly identified via the characteristic typeface and display script of his press.³⁰ As Frieder Schanze rightly points out, the fact that this particular print – *the Edict Against Blasphemers* issued

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- 25 Grammatica. Regulae congruitatum, constructiones et regimina. Daran: Constructionarius. [Heidelberg: Heinrich Knoblochtzter für Jakob Köbel, [around 1490]. 4°; GW 11219; ISTC ir00124130.
- 26 Fußpfad zur ewigen Seligkeit. Heidelberg: [Heinrich Knoblochtzter für Jakob Köbel], 1494. 4°; GW 10429; ISTC: if00333000; https://www.deutschestextarchiv.de/book/view/nn_fusspfad_1492.
- 27 Büchlein, wie man Fische und Vögel fangen soll. [Heidelberg: Jakob Köbel, 1493]; GW 0567910N; cf. Regarding this and the reprints in general: Heinrich GRIMM, Neue Beiträge zur "Fisch-Literatur" des XV. bis XVII. Jahrhunderts und über deren Drucker und Buchführer. *Archiv für Geschichte des Buchwesens* 9 (1969), pp. 1413–1446.
- 28 The attribution to Köbel as the printer results from the reprint of 1518 (Die kunst wie man Visch vnd Vögel fahen sol. Mit den Henden Reüsen Anglen Hamen Netzen, Augsburg: Froschauer, Hans, 1518. 8°; VD16 W 2578 [Exemplar: Munich, Bayerische Staatsbibliothek, Res/Oecon. 1040 d; urn:nbn:de:bvb:12-bsb00070214-6]). In the prologue (fol. 2r), Köbel is mentioned alongside the author of the book, Johann Rittershofen, city clerk of Neustadt an der Haardt; Frieder SCHANZE, Art. Rittershofen, Johannes. *Verfasser-Datenbank* (2012), <https://www.degruyter.com/database/VDDBO/entry/vdbo.vlma.3606/html>. [10.3.2025]; cf. to the rightly critical comments made by, Oliver DUNTZE–Ursula RAUTENBERG, Der Neufund eines Inkunabel-Einblattdrucks mit einem Fischkalender und Fischgleichnis (Straßburg: Johann Grüninger, um 1493) in der Stadtbibliothek Trier: Bestimmung und Einordnung in die Überlieferung, in: Der wissenschaftliche Bibliothekar: Festschrift für Werner Arnold, ed. by Detlev HELLEFAIER, Wiesbaden 2009 (Wolfenbütteler Schriften zur Geschichte des Buchwesens 44), pp. 489–506, pp. 491–492.
- 29 Büchlein, wie man Fische und Vögel fangen soll, Ausz. [Strassburg: Johann Grüninger, around 1493]; GW 0567920N; ISTC: ib01273550; Büchlein, wie man Fische und Vögel fangen soll. Strassburg: Mathis Hupfuff, [14]98. 4°; GW: 05680; ISTC ib01273600; Büchlein, wie man Fische und Vögel fangen soll. Erfurt: [Hans Sporer], 1498. 4°; GW: 05681; ISTC ib01273700; Büchlein, wie man Fische und Vögel fangen soll. [Strassburg: Mathis Hupfuff, um 1498/1500]. 4°; GW 05682; ISTC ib01273800; Büchlein, wie man Fische und Vögel fangen soll. Strassburg: [Mathis Hupfuff, um 1511]; GW 5 Sp.626a; ISTC ib01273850; Büchlein, wie man Fische und Vögel fangen soll, niederl. [Antwerpen: Matthias van der Goes, nicht nach 1491]; GW 05683; Büchlein, wie man Fische und Vögel fangen soll, niederl. [Antwerpen: Govert Bac, around 1500] [rather around 1506]. 4°; GW 05684; ISTC: ib01273950; Büchlein, wie man Fische und Vögel fangen soll, niederl. [Antwerpen: Govert Bac, around 1500] [rather around 1507]. 4°; GW 05685; ISTC ib01274000.
- 30 Frieder SCHANZE, Inkunabeln oder Postinkunabeln? Zur Problematik der "Inkunabelgrenze" am Beispiel von 5 Druckern und 111 Einblattdrucken, in: Einblattdrucke des 15. und frühen 16. Jahrhunderts. Probleme, Perspektiven, Fallstudien, ed. by Volker HONEMANN–Sabine GRIESE–Falk EISERMANN–Marcus OSTERMANN, Tübingen 2000, pp. 45–122, pp. 90–91; Maximilian I., Römischer Kaiser: Ausschreiben gegen den Missbrauch des Namen Gottes (Gotteslästerermandat). Worms, 7.VIII.1495. [Köln: Hermann Bungart], cf. 7.VIII.1495 [rather Oppenheim: Jakob Köbel, nach 1.II.1497]; GW M21952; ISTC im00383213.

by Emperor Maximilian I –³¹ was produced by Köbel’s press suggests that his printing house must have already been well established at that time.³² It is therefore reasonable to assume that Köbel had been active as a printer prior to 1497. As such, Schanze compiled an overview of the typefaces used by Köbel.³³ Approximately one hundred prints have been plausibly attributed to him.³⁴ Köbel adorned many of his prints with woodcuts, which began to appear more frequently from 1513 onward.³⁵ It is evident that he collaborated with various woodcut masters, as the style of the woodcuts is not uniform; he used initials that display a Renaissance character but also printed others in different styles.³⁶ While the majority of his texts were printed in the common vernacular, several Latin-language works have also been documented. Köbel was not only a printer but also an editor and author; his geometric and mathematical publications in particular are considered to have exerted a notable influence.³⁷ According to Schneider, the compilation of an arithmetic book represented a lucrative source of supplementary income – an “attractive side business” – especially “for authors of theological works, who up until the end of the 16th century generally received no compensation for their intellectual labor”.³⁸ In contrast, Köbel, as city scribe, inspector of weights and measures, and land surveyor, enjoyed a stable income.

The origins of Köbel’s typefaces remain unresolved. Benzing suggests that they may trace back to Strasbourg and Speyer, but primarily points to “independent printing material” that “clearly stands out from its surroundings”.³⁹ In any case, Köbel, whose publisher’s mark features an owl perched on a passionflower stem,⁴⁰ brought woodcuts from Knoblochtzter’s workshop to Oppenheim.⁴¹ It seems that Heinrich Knoblochtzter’s press ceased operations between 1498 and 1500.⁴² Köbel also maintained business relations with the printer and

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- 31 Maximilian I., Römischer Kaiser: Ausschreiben gegen den Missbrauch des Namen Gottes (Gotteslästerermandat). Worms, 7.VIII.1495. [Köln: Hermann Bungart], cf 7.VIII.1495 [rather Oppenheim: Jakob Köbel, cf 1.II.1497]; GW M21952; ISTC im00383213.
- 32 SCHANZE, *Der Erstdruck* (1999), pp. 126.
- 33 *Ibid.*, p. 127; Das Typenrepertorium der Wiegendrucke verzeichnet für Köbel drei Typen: 1:160G; 2:82G; 3:146G.
- 34 BENZING, Jakob Köbel zu Oppenheim (1962); Frieder SCHANZE, Einblattdrucke von Hans Hochspringer d. J., Jacob Köbel und Adam Dyon. *Gutenberg-Jahrbuch* 59 (1984), pp. 151–156; SCHANZE, *Der Erstdruck* (1999).
- 35 ROTH, Jacob Köbel (1901), p. 158.
- 36 BENZING, Jakob Köbel zu Oppenheim (1962), pp. 10–12.
- 37 RESKE, *Die Buchdrucker* (2007), p. 833.
- 38 Ivo SCHNEIDER, Ausbildung und fachliche Kontrolle der deutschen Rechenmeister vor dem Hintergrund ihrer Herkunft und ihres sozialen Status, in: Erzählen und Rechnen in der frühen Neuzeit: interdisziplinäre Blicke auf Regensburger Rechenbücher, ed. by Edith FEISTNER–Alfred HOLL, Berlin 2016 (Regensburger Studien zur Literatur und Kultur des Mittelalters 1), pp. 35–62, p. 37.
- 39 BENZING, Jakob Köbel zu Oppenheim (1962), p. 9.
- 40 ROTH, Jacob Köbel (1901), p. 151; collected illustrations at Ernst JUNGKERN, Oppenheim – Geschichte einer alten Reichsstadt: eine historische Monographie, Oppenheim 1975, p. 159161.
- 41 ROTH, Jacob Köbel (1901), p. 148, n. 4.
- 42 Cf. GW: 00202, 0139920, 01419, 01454, 01708, 01709, 01721, 02855, 02856, 02857, 02858, 03780, 04124, 06323, 06324, 07285, 09056, 09255, 09401, 10187, 10289, 10429, 10786, 11144, 11219, 11597, 12663, 12795, 12796, 12882, 13746, 13916, M12528, M12524, M14221, M14225, M15394, M16371, M16375, M18217, M18242, M20717, M22076,

bookkeeper Martin Flach the Younger in Strasbourg, who owed him 227 guilders since 1523 for books Köbel purchased at the Frankfurt fair.⁴³ This suggests that Köbel was well-connected not only within humanist circles but also among printers, publishers, and booksellers. In 1507, he printed a work on behalf of the city council of Worms, which had originally intended to hire Peter Drach. However, Drach declined due to a lack of staff, possibly recommending Köbel, who ultimately received the commission.⁴⁴

These few examples demonstrate the importance of further investigating these economic and intellectual networks, a task that remains a desideratum to this day. Köbel's stance on the Reformation on the other hand has been the subject of scholarly debate, with his position inferred from his printing program, his contacts, and his statements in prologues and other paratexts. His attitude can be described as ambivalent. On one hand, Köbel appears to have been open to criticizing the Catholic Church and the calls for reform, and even maintained contacts with famous supporters of the Reformation like Ulrich von Hutten, Franz von Sickingen, and Philipp Melancthon; however, on the other hand, he never took a clear stance in favor of the Reformation and also maintained connections with the Mainz cathedral preacher, Friedrich Nausea.⁴⁵

In his final years, leading up to his death on January 31st, 1533, it is suspected that Köbel's days were marked by illness. He ceased his printing activities, and after his death, his press was dismantled. His typefaces, initials, and woodcuts were used by Peter Jordan in Mainz. The woodcuts were also employed by Christian Egenolff in Frankfurt am Main,⁴⁶ and Ludwig Dietz in Rostock, who originally came from Speyer, worked with Köbel's frequently used text type. Since 1531, Köbel no longer printed himself, but had his works printed in Frankfurt by Christian Egenolff. The latter had only moved from Strasbourg to Frankfurt in 1530, where he had previously worked as a printer⁴⁷, and indeed, printing "works from all fields of knowledge, primarily in history, classical philology, medicine, natural sciences, as well as cookbooks" made his press in Frankfurt very successful.⁴⁸

M2210810, M25010, M25075, M16365, M16367, M31338, M31621, M33125, M37153, M37407, M38921, M42895, M4474030, M45623, M4725510, M47257, M47454, M4745410, M4978110, M50208, M50312, M50711, M50739, M50749, M51243, M51056, M51378.

⁴³ ROTH, Jacob Köbel (1910), p. 168.

⁴⁴ *Ibid.*, pp. 156–157.

⁴⁵ *Ibid.*, p. 168; BENZING, Jakob Köbel zu Oppenheim (1962), pp. 9–10.

⁴⁶ BENZING, Jakob Köbel zu Oppenheim (1962), p. 10.

⁴⁷ RESKE, Die Buchdrucker (2007), p. 240.

⁴⁸ *Ibid.*, p. 241.

JAKOB KÖBEL AS AN AUTHOR

Jakob Köbel was not only active as a publisher and printer but also known as an author of texts. The *Verfasserlexikon* does not list all of his works, only summarising them by themes. The authors of the article also specifically note that “for the numerous other popular prints, mostly written in German “the question of Köbel’s authorship still requires further clarification”. They also point out that the role of the correctors, Peter Günther, a schoolmaster in Oppenheim, and Johann Huttich from Strinz, should be taken into consideration.⁴⁹ To date, research has particularly focused on two works; the first, the Sibylline prophecies, a translation of the *Vaticina Sibillarum* into verse, was dedicated to his father, Klaus Köbel. The second, the *gereimte Tischzucht* (Rhyme on Table Manners) consists of a prose preface, an introduction with 13 rhymed couplets, and 256 verses.⁵⁰

Folkerts and Keil additionally mention more works by Köbel in their article in the *Verfasserlexikon*, as well as Zapf in his article in the *Deutsches Literatur-Lexikon. Das Mittelalter*, including the critically allegorical poem *Hir iñ mā vō d’ fledermuß list || Vñ was der procuramus ist*, and a so-called *ABC print*. However, the authorship of the latter work is also attributed to Jodocus Gallus.⁵¹ The poem about the cheats (*Falschspieler*), a 13-strophe *Meisterlied* in the high style of Jörg Schiller, was printed by Jakob Köbel, and the acrostic in the concluding speech bears Köbel’s name. Zapf doubts that the *Meisterlied* is by Köbel, as the concluding speech attributed to Köbel is not written in the high style of Jörg Schiller, but in simple rhymed couplets.⁵² The authorship of the mathematical, natural scientific, historical, and legal texts are less disputed:⁵³ “With their generally understandable instructions and explanations on calculations, measurement, or astronomy, they are aimed at a lay audience and represent an important contribution to the dissemination of natural scientific knowledge in the German-speaking world.”⁵⁴

KÖBEL’S RECKONING BOOK IN KLOSTERNEUBURG

The arithmetic book analysed in the present paper⁵⁵ is in octavo format and was printed by Christian Egenolff in 1549 in Frankfurt am Main, and it’s content largely originates from

49 Menso FOLKERTS–Gundolf KEIL, Art. Köbel, Jakob, *Verfasserlexikon* 4 (1983), col. 1276–1278, p. 1277. In a similar way cf. Volker ZAPF, Art. Köbel, Jakob, *Deutsches Literatur-Lexikon Das Mittelalter* 7 (2015), col. 1730–1734, col. 1731.

50 FOLKERTS–KEIL, Köbel, Jakob (1983), p. 1277.

51 ZAPF, Köbel, Jakob (2015), col. 1732.

52 Ibid., col. 1732.

53 Ibid., col. 1731. FOLKERTS–KEIL, Köbel, Jakob (1983), col. 1276.

54 ZAPF, Köbel, Jakob (2015), col. 1731.

55 Klosterneuburg, Stiftsbibliothek, G I 92.

Jakob Köbel. The present edition in Klosterneuburg consists of 174 leaves.⁵⁶ The title of the print is *Rechenbuoch / Auff Linien vnd Ziffern. Mit einem Visir Buechlin / Klar vnnd verstandtlich fürgeben. Gerechnet buechlin / auff alle wahr vnd Kauffmanschafft. Müntz/ Gewicht / Elen / vnnd Maß / viler Land vnd Stett verglichen. H. Jacob Koebel / weilant Stattschreiber zu Oppenheim. Mit Keyserlichen Gnaden vnd privilegio* (Reckoning Book / On Lines and Figures).

With a Small Visierbuch / Clearly and Understandably Presented. A Calculating Book / For All Goods and Commercial Transactions. Coins, Weight, Length, and Measure / Compared Across Various Countries and Cities. H. Jacob Koebel / Former City Clerk of Oppenheim. With Imperial Grace and Privilege) (fol. 1r). The printer identifies himself on the title page (Fig. 1):⁵⁷ *Franckfort / Chr. Egenolff* and in the Kolophon (fol. 174r): *Getruckt zu Franckfurt am Meyn / Bei Christian Egenolff. Im Jar 1549* (printed in Frankfurt / Main at Christian Egenolff) (Fig. 2). N.b, other copies of the same edition are also known.⁵⁸

In Klosterneuburg another print was bound together with Köbel's books:⁵⁹ *Ein New kurtz Rechenbuechlein auff der Linien vnnd Federn*.⁶⁰ It is an arithmetic book printed by Weigand Han in Frankfurt. The print is undated, and the edition is not listed in the standard databases (USTC and VD 16); however, it has been deduced that the text was printed by Weigand Han in several editions between 1558 and 1561,⁶¹ – the author of the book being Hermann Gülfferich. The combination of these texts indicates that this is a compilation on arithmetic, likely intended for use in teaching or as a reference work for already practised calculators. Blank pages were inserted between the two prints, which were used for notes by an anonymous writer in the sixteenth century. He or she already began his or her annotations on the verso of the last page of the Köbel print: *Resolüierung in der Geometria* (conversions following the pattern: *4 finger breit ist 1 Palmùs oder handbrait; 4 finger breadths*

⁵⁶ Klosterneuburg, Stiftsbibliothek, G I 92, fol. 1–174.

⁵⁷ On the title page, the year 1531 is added by hand, referring to the first preface on fol. 1v, which is dated 1531.

⁵⁸ VD16 K 1664. further numbers: VD16 K 1614, VD16 K 1654; Munich BSB, Res / Math. P. 744r. <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00028755-3>; Wittenberg, Reformationsgeschichtliche Forschungsbibliothek, ss 3577 (incomplete copy); Wolfenbüttel, Herzog August Bibliothek, 16 Arithm.

⁵⁹ Klosterneuburg, Stiftsbibliothek, G I 92, fol. 177–244. The binding currently present is not contemporary; it is made of cardboard, and an unscribed leaf has been inserted at both the beginning and the end of the codex.

⁶⁰ Ein New kurtz || Rechenbüchlein / auff der Li||nien vnnd Federn / den angehenden || Rechnern / vnd allen Kauffshändtlern zu || gut vnd nutz. Mit viel schönen Exem=||peln vnd Warsagungen / sehr fruchtbarlich || einem jeden zu wissen. Durch Herr=|| mann Gülfferichen zum || anderen mal gemeh=|| ret vnnd ge=|| bessert (Klosterneuburg, Stiftsbibliothek, G I 92, fol. 177r).

⁶¹ Ein New kurtz || Rechenbüchlein/||auff der || Linien vnnd Federn/ den angehen=||den Rechnern/ vnnd allen Kauffshendlern || zu gut vnd nutz. Mit viel schönen Exem=||peln vnd Warsagungen/ sehr fruchtbarlich eim||jeden zu wissen. Jetzundt widerumb || durch Herman Gülfferichen || zum andern mal gemeh=||ret vnd gebes=||sert.||; Frankfurt/Main: Weigand Han, 1558; VD16 G 3911; Ein New kurtz || Rechenbüchlein/ auff der Li||nien vnnd Federn ... || Durch Herr=||mann Gülfferichen zum || anderen mal gemeg=||ret vnnd gebessert.||; Frankfurt/Main: Weigand Han, 1559; VD16 G 3912; Ein New kurtz Rechenbüchlein || auff der Linien vnnd Federn || den angehenden Rechnern || vnnd allen Kauffshendlern zu gut vnd nutz. Zum anderen mal gemehret vnnd gebessert.||; Frankfurt am Main: Weigand Han, 1561; VD16 G 3913.

equal 1 palm or handbreadth); this table was supplemented multiple times.⁶² On the following page read: *Resolüierung in der Astronomia* (like: 1 stünd ist 60 minüten; 1 hour qual 60 minutes), which was likewise a supplement.⁶³ This is then proceeded by a vocabulary list (see appendix) that was evidently written at a later date.⁶⁴ The Latin vocabulary entries pertain partly to mathematics, but also to writing instruction, which gives another strong indication that the codex was used within the context of school education. This assumption is further supported by the annotations of a pupil, Johannes Seuraihs, on fol. 176v (see appendix), where a practice calculation can be found.⁶⁵

In general, the arithmetic book from 1549 is without doubt an identical reprint of the edition from 1544;⁶⁶ with both books themselves being based on earlier prints, which will be further elaborated upon presently. The table in the appendix lists all the reckoning books attributed to Köbel and places the print within a broader network of texts that were regularly printed. The 1549 print



Fig. 1
Frontpage, Klosterneuburg, Stiftsbibliothek, G I 92

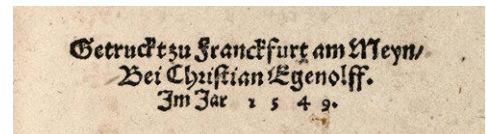


Fig. 2
Colophon, Klosterneuburg, Stiftsbibliothek, G I 92, fol. 174r.

62 Klosterneuburg, Stiftsbibliothek, G I 92, fol. 174v.

63 Klosterneuburg, Stiftsbibliothek, G I 92, fol. 175r.

64 Klosterneuburg, Stiftsbibliothek, G I 92, fol. 175v–176r.

65 The Munich copy can likewise be placed within an educational context; it contains a handwritten preface beginning with the words: *Abhortatio zue allen anfahenten schüelern dieser edlen freyen künst der arithmetica* (Exhortation to all beginning students of this noble liberal art of arithmetic); Munich BSB, Res / Math. P. 744r: <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00028755-3>, image 6.

66 *Rechenbüch/ Auff Lini- en vnd Ziffern. Mit einem Visir Büchlin/ Klar vnd ver- stendlich fürgeben. Gerechnet büchlin/ auff alle Wahr vnd Kauffmanschafft. Müntz/ Gewicht/ Elen vnd Maß/ viler Land vnd Stett verglichen.* | H. Jacob Köbel weilant Statschreiber zu Oppenheim. |; Frankfurt am Main: Christian Egenolff d. Ä., 1544; VD16 K 1663; further numbers: VD16 K 1613 (= Köbel, Jakob: Gerechnet Büchlein auf alle Ware und Kaufmannschaft), VD16 K 1653 (= Köbel, Jakob: Visierbüchlein [EST: Ein neu geordnet Visierbuch]).

is not catalogued as a whole in VD 16, but rather in its individual components. The components themselves consisting of several parts:

Rechenbuch auf Linien und Ziffern (Reckoning Book on Lines and Figures) (VD 16 K 1664) (fol. 1v–99r), the first book, is an identical reprint of the 1531 edition.⁶⁷

Ein neu geordnet Visierbuch (A Newly Arranged Visierbuch) (VD 16 K 1654) (fol. 99v–109v), the second book, is also included in the print of 1531.

Gerechnet Büchlein auf alle Ware und Kaufmannschaft (A Calculating Book for All Goods and Commerce) (VD 16 K 1614) (fol. 150r–174r), the third book, was not included in the preceding work of 1531, but had already been added in the 1544 reprint of the 1531 book.⁶⁸ In addition, it was already printed in 1528 by Christian Egenolff the Elder in Strasbourg, although not authored by Köbel.⁶⁹ This content was incorporated by the printer Egenolff into Köbel's arithmetic book. The attribution of this work to Jakob Köbel in the VD 16 is certainly a misunderstanding.

Mit der Kreide oder Schreibfedern ... zu rechnen ... ein neues Rechenbüchlein (To Calculate with Chalk or Writing Pens ... A New Reckoning Book) (fol. 110r–149v), the fourth book is not listed in VD 16. It is a reprint of *Mit der Kreide oder Schreibfedern ... zu rechnen ... ein neues Rechenbüchlein* (To Calculate with Chalk or Writing Pens ... A New Reckoning Book), printed by Jakob Köbel in 1520 in Oppenheim.⁷⁰

The reckoning book from 1549 itself was reprinted multiple times by Christian Egenolff the Elder and, after his death, by his heirs in 1551, 1564, 1573, and 1584.⁷¹

This example, for instance, demonstrates that mathematical knowledge repeatedly found its way into print, and that books were expanded, reassembled, compiled, or reprinted

67 Ein neu Rechenbüchlein; Titel: Ein new geor=|denet Künstlich Rechennbüchlin/ Ja=|cob Köbels ... || Auff den Linien vnd Spacien/ mit Rech=|enpfenigen ... || Mehr daß vormalis ie getruckt/|| gebessert/ vnd zûgesetzt. || ... Vjsir Büchlin/|| ... ||; Frankfurt am Main: Christian Egenolff d. Ä., 1531; VD16 K 1660 und VD16 K 1650; Munich BSB, Res/J.pract. 76#Beibd.2; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb10206835-2>. Reprint already in the year 1537: Zwey rech=|enbüchlin: vff der || Linien vnd Zipfer/ mit eym angehenck-||ten Visirbuch/ so verstandtlich für||geben/ das iedem hierausz on || eiñ lerer wol zulernen. || Durch den Achtbarn vnd wol erfarnen || H.Jacoben Köbel Statschreiber || zu Oppenheim. ||; Frankfurt am Main, Christian Egenolff d. Ä., 1537; VD16 K 1662; further numbers: VD16 K 1652 (= Köbel, Jakob: Visierbuch [EST: Ein neu geordnet Visierbuch]).

68 REchenbüch/ Auff Lini=|en vnd Ziffern.Mit einem Visir||Büchlin/ Klar vnd ver=|stenttlich fürgeben. || Gerechnet büchlin/ auff al=||le Wahr vnd Kauffmanschaft.Müntz/|| Gewicht/ Elen vnnd Maß/ viler || Land vnd Stett verglichen. || H.Jacob Köbel weilant Statschreiber zu Oppenheim. ||; Frankfurt am Main: Christian Egenolff d. Ä., 1544; VD16 K 1663; further numbers: VD16 K 1613 (= Köbel, Jakob: Gerechnet Büchlein auf alle Ware und Kaufmannschaft), VD16 K 1653 (= Köbel, Jakob: Visierbüchlein [EST: Ein neu geordnet Visierbuch]).

69 Gerechnet || Büchlin. || Vonn || Müntz/ Gewicht/ Elen vnd Maß/ Aller || Land/ gegen einander verglichen. || Zoll/ Vnkosten/ Fürlohn [et]c. ... ||; Straßburg: Christian Egenolff d. Ä., 1528; VD16 G 1466.

70 Titel: MJt der Krydē || o[der] Schreibfedern/ durch || die zeiferzal zû rechē/ Ein || neüw Rechēpüchlein/ den angenden || Schüllern [der] rechnūg zû erē getruckt. ||, Oppenheim Jakob Köbel, 1520; VD16 K 1642; Staatsbibliothek Bamberg, 22/Inc.typ.Ic.I.34.

71 Rechenbüch/|| Auff Linien vnd Ziffern. || Mit einem Visirbüchlin/ Klar || vnd verstandtlich fürgeben. || Gerechnet Büchlin/ auff alle || Wahr vnd Kauffmanschaft/ Müntz/|| Gewicht/ Elen/ vnd Mas/ viler Land ||

without changes. Indeed, this assumption can be substantiated by examining Köbel's other publications (see the table in the appendix). The first reckoning book was printed in 1514.⁷² The reprint published in the same year by Erhard Oeglin in Augsburg is identical in content, though the language was adapted, and a different title woodcut was used. However, the tables and graphics were copied.⁷³ Köbel's Augsburg print was reprinted by Erhard Oeglin in 1516 and again in 1520.⁷⁴ Although his work was not only printed in Augsburg, Köbel printed the work in Oppenheim in increasingly expanded editions between the years 1517, 1518, 1522, and 1525.⁷⁵ The 1522 edition clearly shows that Köbel obtained an imperial decree that

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- vnd Stett verglichen.|| Durch H.Jacob Köbel.|| Frankfurt am Main: Christian Egenolff d.Ä. (Erben), 1564; VD16 K 1665; further numbers: VD16 K 1615 (= Köbel, Jakob: Gerechnet Büchlein auf alle Ware und Kaufmannschaft ...), VD16 K 1655 (= Köbel, Jakob: Visierbüchlein [EST: Ein neu geordnet Visierbuch]). Titel: Rechenbuch|| Auff Linien vnd Ziffern/ für || die junge angehende Schuler.Mit || einem leichten Visirbüchlein ... || Gerechnet Büchlin/ auff alle Wahr || vnd Kauffmannschaft ... || Durch H.Jacob Köbel.|| Frankfurt am Main: Christian Egenolff d.Ä. (Erben), 1573; VD16 K 1666; further numbers: VD16 K 1616 (= Köbel, Jakob: Gerechnet Büchlein auf alle Ware und Kaufmannschaft ...), VD16 K 1656 (= Köbel, Jakob: Visierbüchlein [EST: Ein neu geordnet Visierbuch]). Titel: Rechenbuch auf Linien und Ziffern für die junge angehende Schüler. Titel: Rechenbuch|| Auff Linien vnd Ziffern/ für || die junge angehende Schüler.Mit || einem leichten Visirbüchlein ... || Gerechnet Büchlin/ auff alle Wahr || vnd Kauffmannschaft ... || Durch H.Jacob Köbel.|| Frankfurt am Main: Christian Egenolff d.Ä. (Erben), 1584; VD16 K 1667; further numbers: VD16 K 1617 (= Köbel, Jakob: Gerechnet Büchlein auf alle Ware und Kaufmannschaft ...), VD16 K 1657 (= Köbel, Jakob: Visierbüchlein [EST: Ein neu geordnet Visierbuch]).
- 72 Eynn Newe geordent || Rechēbüchlein vf den || linien mit Rechēpfeni||gen/ den Jungen angenden zū || heüßlichem gebrauch vnd hend||deln leichtlich zū lerner/ mit fi=||guren vnnd Exempeln|| folgt hernach cler=||lichen ange=||tzeygt.||; Oppenheim: Jakob Köbel, 1514; VD16 K 1644, Munich BSB, Res/4 Math.p. 175 u; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00009315-5fol.2r>.
- 73 Ain New geordnet Rech||en biechlin auf den linien || mit Rechen pfeningen: den || Jungen angenden zu heis||lichem gebrauch vnd hend||eln leychtlich zu lernen || mit figuren vnd exempeln || Volgt hernach klâr=||lichen angezaigt.||; Augsburg: Erhard Oeglin, 1514; VD16 K 1643; Wien, ÖNB, 176674-B ALT MAG; <http://data.onb.ac.at/rep/108635DD>.
- 74 Ain new geordnet Rech||en biechlin auff den linien || mit Rechen pfeningen.den || Jungen angenden zu heysz||lichem gebrauch vnd hend||eln leychtlich zu lernen || mit figuren vñ exemp=||eln ... ||; Augsburg: Erhard Oeglin, 1516; VD16 K 1645; Munich BSB, Res/4 Math.p. 175 w; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00009229-1>. Titel: Ein neu geordnet Rechenbüchlein auf den Linien mit Rechenpfennigen. Titel: Ain New geordnet Rech=||en biechlin auf den linien || mit Rechen pfeningen. den || Jungen angenden zū heyß||lichem gebrauch vnnd hend||eln leychtlich zn lernen || mit figuren vnd exem=||peln ... ||; Augsburg: Erhard Oeglin, 1520; VD16 K 1648; Munich BSB, 999/4Jur.853; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb11067810-5>.
- 75 Eyn Neüw Rechēbüch=||lein. Vff den Linien vñ Spaciē/ Mit den.|| Rechenpfeningē: Ytzo: zū dē Zwey||ten male/ Mit viln Züsetzen/ gütēn || Leren/ vnnd Exempeln||; Oppenheim: Jakob Köbel, 1517; VD16 K 1646; Munich BSB, Res/4 Math.p. 175 x; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00009314-9>. DAS new Rechē=||püchlein Wie mann vff den || Linien vnnd Spacien/ mit || Rechēpfeningē/ Kauffmannschaft || vnd Tegliche handelungē/ leichtlich || rechē lernē mage/; Oppenheim: Jakob Köbel, 1518; VD16 K 1647; Munich BSB, Res/4 Math.p. 175 y; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb00024655-8>. EIn Newü Rechē||püchlein/ Wie mañ uff den || Linien vnd Spacien/ mit Re||chenpfeningen/ leichtlich Re||chen Lernen solle/ Mit viln züsetzen/ vor || nie Getrückt ... || Wie mann ein Würtzel/ auß einer || Quadryrten/ oder Cubirten Zalen/ auff || den Linien vnd Spacien Erlernen solle.|| ... ||; Oppenheim: Jakob Köbel, 1522; VD16 ZV 9053; Freiburg, UB, T 2084,ad, St. 2; <http://dl.ub.uni-freiburg.de/diglit/koebel1522>. EIn Neüw Rechē||püchlein/ Wie mañ uff den || Linien vnd Spacien/ mit Re||chenpfeningen/ leichtlich Re||chen Lernen solle/ Mit viln

forbade the book be reprinted for six years.⁷⁶ Köbel then published this edition in Frankfurt with Christian Egenolff the Elder starting in 1531, at which point this work was combined with Köbel's *Visierbüchlein*.⁷⁷ The *Visierbüchlein* itself is also a reprint, and was first printed in 1515 by Jakob Köbel himself.⁷⁸

The popularity of these prints can be easily demonstrated as they continuously found wanting markets, or so it is assumed. The knowledge contained can be attributed to Jakob Köbel, even though it almost developed a life of its own and migrated from Oppenheim to Frankfurt, where it continued to be disseminated throughout the 16th century. However, the influence of this body of work does not end in the printing offices. As we can see in the present print, at least those printed in the workshop of Christian Egenolff the Elder in Frankfurt were geographically widely distributed and found their way not only into the hands of merchants, who were the intended recipients of the prints, but also into monasteries. Thus, the dissemination of knowledge is geographically flexible and can shift between different social groups. The humanist idea of disseminating knowledge widely among the population, as demonstrated by these mathematical prints, was supported by printers and publishers, who earned their livelihood in doing so. Humanism and the burgeoning printing industry are tightly interconnected; intellectual and economic interests are combined, as exemplified by Jakob Köbel, who was both an educated humanist and an economically minded printer and publisher.

zûsetzen/ vor || nie Getrückt ... || Wie mann ein Würtzel/ auß einer || Quadryrten/ oder Cubirten Zalen/ auff || den Linien vnd Spacien Erlernen solle. || ... ||; Oppenheim: Jakob Köbel, 1522; VD16 ZV 30956; Munich BSB, Res/Math.p. 746. Eyn neuw Rechẽ||büchlin Jacob köbels stat||schreibers zû Oppenheym auff || den Liniẽ vñ spaciẽ gätz leicht=||lich Rechen zû lernen mit vyelen zûsetzẽ|| Nemlich der Regeln Fusci vff Specerei || Goldt/ Silber/ Oley/ Honig [et]ç. || Darzû die regel des Pagamëts || eyn müntz gegen anderer: zûuergleichenn [et]ç. ||; Oppenheim.; Jakob Köbel, 1525; VD16 K 1659; Heidelberg, Universitätsbibliothek, L 356-17 RES; <https://doi.org/10.11588/diglit.51650>.

76 EIn Newü Rechẽ||püchlein/ Wie mañ uff den || Linien vnd Spacien/ mit Re||chenpfenningen/ leichtlich Re||chen Lernen solle/ Mit viln zûsetzen/ vor || nie Getrückt ... || Wie mann ein Würtzel/ auß einer || Quadryrten/ oder Cubirten Zalen/ auff || den Linien vnd Spacien Erlernen solle. || ... ||; Oppenheim: Jakob Köbel, 1522; VD16 ZV 9053; Freiburg, UB, T 2084, ad. St. 2; <http://dlub.uni-freiburg.de/diglit/koebel1522>.

77 Ein neu Rechenbüchlein; Titel: Ein new geor=||denet Künstlich Rechennbüchlin/ Ja=||cob Köbels ... || Auff den Linien vnd Spacien/ mit Rech=||enpfeñingen ... || Mehr dañ vormalis ie getruckt/|| gebessert/ vnd zûgesetzt. || ... VJsir Büchlin/|| ... ||; Frankfurt am Main: Christian Egenolff d. Ä., 1531; VD16 K 1660 and VD16 K 1650; Munich BSB, Res/J.pract. 76#Beibd.2; <https://mdz-nbn-resolving.de/urn:nbn:de:bvb:12-bsb10206835-2>.

78 Eyn New geordët || Vysirbüch. Helt yñ. || Wie mañ vff eins yden Lands Eych || vñ Maß/ ein gerecht Vysirüt machẽ || vñ do mit ein ygklich onbekant Vaß || vysieren/ auch seynen inhalt erlernen || solle. Den anhebenden Schülern Vi||sires Leichtlich/ mit Figuren vnnd || Exempeln/ zû lernen/ angezeigt. || Angehengt Tafeln. || ... ||; Oppenheim, Jakob Köbel, 1515; VD16 K 1649; ETH-Bibliothek Zürich, Rar 3060; <https://doi.org/10.3931/e-rara-9314>.

Year	Title	Name
1514	Ein neu geordnetes Rechenbüchlein	Eynn Neue geordent Rechēbüchlein vf den linien mit Rechēpfen gen/ den Jungen angenden zū heülichem gebrauch vnd hen deln leichtlich zū lernen/ mit fi= guren vnnnd Exempeln/ volgt hernach cler= lichen ange= tzeygt.
1514	Ein neu geordnetes Rechenbüchlein	Ain New geordnet Rech en biechlin auf den linien mit Rechen pfeningen: den Jungen angenden zu heis lichem gebrauch vnd hend eln leyhtlich zu lernen mit figuren vnd exempeln Volgt hernach klār= lichen angezaigt.
1515	Ein neu geordnetes Visierbuch	Eyn New geordēt Vysirbüch.Helt yñ. Wie māñ vff eins yden Lands Eych vñ Maß/ ein gerecht Vysirüt machē vñ do mit ein ygklich onbekant Vaß vysieren/ auch seyden inhalt erlernen solle.Den anhebenden Schülern Vi sirens Leichtlich/ mit Figuren vnnnd Exempeln/ zū lernen/ angezeigt. Angehengt Tafeln. ...
1516	Ein neu geordnetes Rechenbüchlein	Ain new geordnet Rech en biechlin auff den linien mit Rechen pfeningen.den Jungen angenden zu heysz lichem gebrauch vnd hend eln leyhtlich zu lernen mit figuren vñ exemp= eln ...
1517	Ein neu Rechenbüchlein	Eyn Neüw Rechēbüch= lein. Vff den Linien vñ Spaciē/ Mit den. Rechenpfeningē: Ytzo: zū dē Zwey ten male/ Mit viln Züsetzen/ gütē Leren/ vnnnd Exempeln/
1518	Ein neu geordnet Rechenbüchlein auf den Linien mit Rechenpfeningēn	DAs new Rechē= püchlein Wie mann vff den Linien vnnnd Spacien/ mit Rechēpfeningē/ Kauffmanschafft vnd Tegliche handelungē/ leichtlich rechē lernē mage/
1520	Mit der Kreide oder Schreibfedern ... zu rechnen ... ein neues Rechenbüchlein	MIt der Krydē o[der] Schreibfedern/ durch die zeiferzal zū rechē/ Ein neüw Rechēpüchlein/ den angenden Schülern [der] rechnüg zū erē getrückt.
1520	Ein neu geordnet Rechenbüchlein auf den Linien mit Rechenpfeningēn	Ain New geordnet Rech= en biechlin auf den linien mit Rechen pfeningen. den Jungen angenden zū heyß lichem gebrauch vnnnd hend eln leyhtlich zn lernen mit figuren vnd exem= peln ...
1520	Ein neu Rechenbüchlein	EIn Neüw Rechē püchlein/ Wie māñ uff den Linien vnd Spacien/ mit Re chenpfeningēn/ leichtlich Re chen Lernen solle/ Mit viln züsetzen/ vor nie Getrückt ... Wie mann ein Würtzel/ auß einer Quadryrten/ oder Cubirten Zalen/ auff den Linien vnd Spacien Erlernen solle. ...
1522	Von Ursprung der Teilung, Maß und Messung	VOn vrsprung der Tei= lüg/ Maß/ vñ Messung deß Ertrichs der Ecker/ Wyngartē/ Krautgarten/ vnd anderer Velder/ in was form vnd gestalt die seind/ Vñ wie man die nach warer khünst Messen vnd Rechen solle/ ist hiernach ey= gentlich durch Regelñ/ Exempeln/ vnnnd Figuren an= gezeygt vnd erclärt.
1522	Ein neu Rechenbüchlein	EIn Neüw Rechē püchlein/ Wie māñ uff den Linien vnd Spacien/ mit Re chenpfeningēn/ leichtlich Re chen Lernen solle/ Mit viln züsetzen/ vor nie Getrückt ... Wie mann ein Würtzel/ auß einer Quadryrten/ oder Cubirten Zalen/ auff den Linien vnd Spacien Erlernen solle. ...

	Author	Printer	Place	Size	Length	VD 16	Benzing
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	[6], XXIII	K 1644	31
	Jakob Köbel	Erhard Oeglin	Augsburg	4°	[6], XXIII	K 1643	97
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	[4], XXVIII	K 1649	36
	Jakob Köbel	Erhard Oeglin	Augsburg	4°	[6], XXIII	K 1645	98
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	[6], XLVI	K 1646	53
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	4, XLVI	K 1647	56
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	[4], 40	K 1642	66
	Jakob Köbel	Erhard Oeglin	Augsburg	4°	6], XXIII	K 1648	99
	Jakob Köbel	Jakob Köbel	Oppenheim	8°	C, [4]	ZV 9053	
	Jakob Köbel	Jakob Köbel	Oppenheim	4°	[4], 20	K 1672	83
	Jakob Köbel	Jakob Köbel	Oppenheim	8°	C, [4]	ZV 30956	

Year	Title	Name
1525	Ein neu Rechenbüchlein	Eyn neüw Rechē büchlin Jacob köbels stat schreibers zû Oppenheim auff den Liniē vñ spaciē gätz leicht= lich Rechen zû lernen mit vyelen zûsetzē Nemlich der Regeln Fuscii vff Specerei Goldt/ Silber/ Oley/ Honig[et] ě. Darzû die regel des Pagamēts eyn münzt gegen anderer: zûvergleichenn [et] ě.
1531	Jakobstab	Jacobs Stab Künstlich vñ gerecht zumachen/ vnd gebrauchen/ Damit an Gebāwen/ Auch sunst allerhand Höhe/ Breyte vnd Lenge abzesehen vnnd messen. ... Allen Werckleutten/ Rüstmeystern vnd ande= ren Künstnern lustig vnd nütz.
1531	Ein neu geordnet künstlich Rechenbüchlein / Ein neu geordnet Visierbuch	Ein new geor= denet Künstlich Rechenbüchlin/ Ja= cob Köbels ... Auff den Linien vnd Spacien/ mit Rech= enpfenningen ... Mehr dañ vormals ie getruckt gebessert/ vnd zûgesetzt. ... VJsir Büchlin ...
1531	Jakobs Stab, künstlich und gerecht zu machen und gebrauchen / Eine künstlich subtile Unterrichtung durch einen Spiegel in Höhe eines Turms, auch Länge einer Ebene ... zu erkennen	Den Stab Jacob kü lich vnd gerecht zemachen vnd gebrauchen/ Damit an gebāw len/ Auch sunst allerhand Höhe/ Breyte abzesehen vnd zumessen. ... Ein Künstlich/ Subtile vnderrichtung durch einen Spiegel ein Höhe eins Thürns/ Auch lenge einr ebene ... zûerkennen ... Durch den wol erfahren H. Iacob Köbel, Statschreiber zû Oppenheim añ tag geben.
1532	Rechnen und visieren / Visieren	REchnen vnd Visi= eren/ so verstandtlich vnnd leicht fûrgen das ein ieden hierauß von sich selb wol zulernen. Durch den Achtbarn vnd wol erfahren H. Jaco ben Köbel Statschreiber zû Oppenheim. Mit vil schönen Exempeln der Mathema= tic vnd Astronomie gemehrt vnnd gebessert.
1535	Geometrie / Jakobstab / Philosophischer Spiegel	GEometrei/ Von künstlichem Messen vnd absehen/ allerhand höhe/ fleche ebene/ weite vnd breyte/ Als Thürn/ Kirchen bāw/ baum/ velder vnd äcker [et]c.mit künstlich zûbereyten Ja= cob stab/ Philosophischen Spiegel/ Schatten/ vnd Meßrû= ten/ Durch schöne Figuren vnd Exempel/ Von dem vil erfahren H. Jacob Köbel/ weiland Statschrei= ber zu Oppenheim/ verlassen.
1536	Geometrie von künstlichem Messen und Absehen allerhand Höhe, Fläche, Ebene, Weite und Breite / Jakobstab / Eine künstlich subtile Unterrichtung durch einen Spiegel in Höhe eines Turms, auch Länge einer Ebene ... zu erkennen	GEometrei/ Vonn künstlichem Messen vnnd absehen/ allerhand höhe/ fleche ebene/ weite vnnd breyte/ ... mit künstlich zûbereyten Ja cob stab/ Philosophischen Spiegel/ Schatten/ vnnd Meßrû= ten ... Von dem vil erfahren H. Jacob Köbel/ weiland Statschrei= ber zu Oppenheim/ verlassen.
1537	Zwei Rechenbüchlein mit Linien und Ziffern / Visierbuch	Zwey rech= enbüchlin: vff der Linien vnd Zipher/ mit eym angehenck= ten Visirbuch/ so verstandtlich fûr geben/ das iedem hierausz on ein lerer wol zulernen. Durch den Achtbarn vnd wol erfahren H. Jacoben Kûbel Statschreiber zu Oppenheim.
1544	Rechenbuch auf Linien und Ziffern / Gerechnet Büchlein auf alle Ware und Kaufmannschaft / Visierbüchlein	REchenbüch/ Auff Lini= en vnd Ziffern. Mit einem Visir Büchlin/ Klar vnd ver= standtlich fûrgen. Gerechnet büchlin/ auff al= le Wahr vnd Kauffmannschafft. Münzt Gewicht/ Elen vnnd Maß/ viler Land vnd Stett verglichen. H. Jacob Köbel weilant Statschreiber zu Oppenheim.

	Author	Printer	Place	Size	Length	VD 16	Benzing
	Jakob Köbel	Jakob Köbel	Oppenheim	8°	[4] Bl., VIII Bl., S. IX- CCXXIII, [1]	K 1659	90
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	4°	[12]	K 1625	120
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	CXII	K 1660 / K 1650	100
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	4°	[15]	K 1626 / K 1638	121
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	107	K 1661 / K 1651	101
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	[28]	K 1610 / K 1627 / K 1639	108
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	4°	[28]	K 1611 / K 1628 / K 1640	109
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	144	K 1662 / K 1652	102
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	167	K 1663 / K 1613 / K 1653	103

Year	Title	Name
1549	Rechenbuch auf Linien und Ziffern / Gerechnet Büchlein auf alle Ware und Kaufmannschaft / Visierbüchlein	REchenbüch/ Auff Linien vnd Ziffern. Mit einem Visir Büchlin/ Klar vnd ver= stendlich fürgeben. Gerechnet büchlin/ auff alle wahr vnd Kauffmanschaft. Müntz/ Gewicht/ Elen/ vnd Maß/ viler Land vnd Stett verglichen. H.Jacob Köbel/ weilant Stattschreiber zu Oppenheim.
1550	Geometrie von künstlichem Messen und Absehen allerhand Höhe, Fläche, Ebene, Weite und Breite	Von Feldtmessen/ Geo metrischem Messen vnd Absehen/ Aller= hand Höhe/ Fleche/ Ebene/ Weite vnd Breyte ... Mit künstlich zü bereitem Jacob stab/ Philosophischen Spiegel/ Schat= ten/ vnd Meßrüten/ Durch schöne figur vnd Exem= pel. Von dem vil erfahren H. Jacob Köbel/ weiland Stattschreiber zu Oppenheim/ verlassen. Dabei/ von Bereytung/ verstand vnd vilfaltigem nützlichen Gebrauch des Quadranten.
1556	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrei. Von künstlichem Feld messen/ vnd absehen/ Allerhand Höhe/ Fleche/ Ebne/ Weitte vnd Breyte: Als Thürn/ Kirchen/ Bâw/ Bâum/ Felder vnd Ecker [et]c. Mit fast wercklich vnd künstlich zübereytem Jacob Stab/ ... Von ... Jacob Kö= bel/ weiland Stattschreiber zu Oppenheim/ verlassen. Dabei/ von bereytung/ verstand vnd ... Gebrauch des Quadranten. [v. (D.Io.Dryander.))]
1563	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrei. Von künstlichem Feld messen/ vnd absehen/ Allerhand Hö= he/ Fleche/ Ebne/ Weitte vnd Breyte: Als Thürn/ Kirchen/ Bâw/ Bâum/ Felder vnd Ecker [et]c. Mit ... zübereytem Jacob Stab/ Phi= losophischen Spiegel/ Schatten/ vñ Meßrüten/ Durch schöne figur/ vnd Exempel. Von ... H. Jacob Köbel/ weiland Stadt= schreiber zu Oppenheim ver= lassen. Dabei/ von bereytung ... des Quadranten. [- Von Johannes Eichmann.]]
1564	Rechenbuch auf Linien und Ziffern / Gerechnet Büchlein auf alle Ware und Kaufmannschaft / Visierbüchlein	Rechenbüch/ Auff Linien vnd Ziffern. Mit einem Visirbüchlin/ Klar vnd verstandlich fürgeben. Gerechnet Büchlin/ auff alle Wahr vnd Kauffmanschaft/ Müntz/ Gewicht/ Elen/ vnd Maß/ viler Land vnd Stett verglichen. Durch H.Jacob Köbel.
1570	Geometrie. Von künstlichem Feldmessen / Von Bereitung, Verstand und vielfältigem nützlichen Gebrauch des Quadranten / Jakobstab / Philosophischer Spiegel	Geometrei. Von künstlichem Feld= messen/ vnd absehen/ Allerhand Höhe/ Fleche/ Ebne/ Weitte vnd Breite: ... Mit fast wercklich vnd künstlich Zübereytem Jacob Stab/ Philo- sophischen Spiegel/ Schatten/ vnd Meßrüten/ Durch schöne Figur/ vnd Exempel. Von dem vil erfahren H. Jacob Köbel/ weylant Statt= schreiber zu Oppenheim verlassen. Darbey/ von bereytung/ verstand vnd vilfaltigem nützlichen Gebrauch des Quadranten. (D.Ioan. Dryander.))
1573	Rechenbuch auf Linien und Ziffern / Gerechnet Büchlein auf alle Ware und Kaufmannschaft / Visierbüchlein	Rechenbuch/ Auff Linien vnd Ziffern/ für die junge angehende Schuler.Mit einem leichten Visirbüchlein ... Gerechnet Büchlin/ auff alle Wahr vnd Kauffmanschaft ... Durch H.Jacob Köbel.

	Author	Printer	Place	Size	Length	VD 16	Benzing
	Jakob Köbel	Christian Egenolff d. Ä.	Frankfurt am Main	8°	174	K 1664 / K 1614 / K 1654	104
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä.	Frankfurt am Main	4°	36	ZV 9058 = ZV 9065	110
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9059	111
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9060	112
	Jakob Köbel	Christian Egenolff d. Ä., Erben	Frankfurt am Main	8°	[12], 193, [1]	K 1665 / K 1615 / K 1655	105
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	38	K 1612 / E 682 / K 1629 / K 1641	113
	Jakob Köbel	Christian Egenolff d. Ä., Erben	Frankfurt am Main	8°	[12], 193, [1]	K 1666 / K 1616 / K 1656	106

Year	Title	Name
1578	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrey. Von künstlichem Feld= messen/ vnd absehen/ Allerhand Höhe Fleche/ Ebne/ Weitte vnd Breyte ... Mit fast wercklich vnnd künstlich zubereytem Jacobs Stab/ Philosophischen Spiegel/ Schatten/ vnd Meßruten ... Von dem viel erfahren H.Jacob Köbel/ weylant Statt= schreiber zu Oppenheim verlassen. Darbey/ von bereytung / verstand vnnd vielfeltigem nützlichen Gebrauch deß Quadranten. (D. Ioan. Dryander.))
1584	Rechenbuch auf Linien und Ziffern für die junge angehende Schüler / Gerechnet Büchlein auf alle Ware und Kaufmannschaft / Visierbüchlein	Rechenbuch/ Auff Linien vnd Ziffern/ für die junge angehende Schüler.Mit einem leichten Visirbüchlein ... Gerechnet Büchlin/ auff alle Wahr vnd Kauffmanschafft ... Durch H.Jacob Köbel.
1584	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrey. VON Künstlichem Feldmessen/ vnd absehen/ Aller= handt Höhe/ Fleche/ Ebne/ Weitte vnnd Breyte: Als Thürn/ Kirchen/ Båw/ Båum/ Felder vnd Ecker/ [et]c. Mit fast wercklich vnnd künstlich zubereytem Jacob Stab ... Von ... Jacob Köbel/ weiland Stadtschreiber zu Oppenheim ver= lassen. Dabey/ von bereytung/ verstand vnd ... Gebrauch deß Quadranten. [v. (D. Io. Dryander.))]
1593	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrey VON Künstlichem Feldmessen/ vnd absehen/ Aller= handt Höhe/ Fleche/ Ebne/ Weitte vnnd Breyte ... Von ... Jacob Köbel/ weiland Stadtschreiber zu Oppenheim ver= lassen. Dabey/ von bereytung/ verstand vnd ... Gebrauch deß Quadranten. (D. Ioan. Dryander.))
1598	Geometrie. Von künstlichem Feldmessen und Absehen allerhand Höhe	Geometrey VON Künstlichem Feldmessen/ vnd Absehen/ Al= lerhandt Höhe/ Fleche/ Ebne/ Weite vnd Breyte ... Mit fast wercklich vnd künstlich zubereytem Jacob Stab ... Von ... Jacob Köbel/ weiland Stadtschreiber zu Oppenheim ver= lassen. Dabey von Bereytung ... deß Quadranten. [von Johannes Eichmann]
1616	Geometrie	Geometrey : Von künstlichem Feld messen unnd Absehen allerhandt Hohe/ Fleche/ Ebne/ Weite unnd Breyte: Als Thürn/ Kirchen/ Båw/ Båum/ Felder unnd Ecker/ [et]c. Mit fast wercklich und künstlich zubereytem Jacob Stab, Philosophischem Spiegel/ Schatten/ und Meßruten/ Durch schöne Figuren unnd Exempel

	Author	Printer	Place	Size	Length	VD 16	Benzing
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9061	114
	Jakob Köbel	Christian Egenolff d. Ä., Erben	Frankfurt am Main	8°	12], 193, [1]	K 1667 / K 1617 / K 1657	107
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9062	115
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9063	116
	Jakob Köbel / Johann Dryander	Christian Egenolff d. Ä., Erben	Frankfurt am Main	4°	39	ZV 9064	117
	Jakob Köbel	Steinmeyer	Frankfurt am Main	4°	39	VD 17 23: 236897C	119

APPENDIX 2: TRANSCRIPTION

Klosterneuburg, Stiftsbibliothek, G I 92, fol. 175v–176r.

Liber, libellus, biblien, codex. büch
 Litera gramma. büchstab
 Tabella. büchlein
 Arithmetica. rechenkünst
 Logista, logiste algorista. rechenmaister, der rechinen lerer
 Calcülator, diarium, calendarius liber. ein rechenbüch, ein rechner
 Rationarius, diarium, calendarius liber. ein rechenbüch
 Calcülator a' rationibus, a' calculis. ein rechien(?)
 Calcülus. ein rechenpfinnis(?)
 Ratio. rechnung
 Ratiocinator. ein rechner
 Pütare rationem. rechnung mach
 Norma. ein wincklmaß; Gnomon,
 libra. wag, pfünt
 Dictio. wort
 Calamarium. schreibzeüß, pennarium
 Atramentum. Dinten
 Calam Atramentum s. schreibfedern; Penna,
 literae. brief. epistola
 Atramentarium. dintenfaß
 Charta. papyr; pappen. charta
 Creta. kreÿden; cara. wax
 Filum. bindfaden
 Pagina. blat. folium
 Linea. zeil
 Scriptura. schrift
 Clausura. Claüsür

Klosterneuburg, Stiftsbibliothek, G I 92, fol. 176v

I(tem) Johnnes Seürais
 Reden, lernen, schreiben, lesen vnd leren mit vleiß dz aimmal ainss so wirdt dir alle
 rechnung gemain.
 Johannes Seuraihs
 wisnaß

This is followed by arithmetic exercises and written addition.

ENTERTAININGLY INDUSTRIOUS

JAKOB KÖBEL'S RECKONING BOOK IN THE CONTEXT OF HIS OTHER WRITINGS: A CASE STUDY ON PRINT G I 92 HELD BY THE ABBEY LIBRARY OF KLOSTERNEUBURG

Michaela Wiesinger

HOW TO GET THE ATTENTION OF YOUR READER AND INSTRUCT THEM SIMULTANEOUSLY

In the year 1531 Jakob Köbel¹ began working with the printer Christian Egenolff, to whom he then awarded the printing privilege of his very successful reckoning book. Köbels' intentions were straightforward: He was aware that many people wanted to read his book. But he also knew that many printers copied his work without his consent. He addressed those people as "unvleissige trucker", as non-diligent printers, and stressed the fact, that Egenolff was the total opposite: He addressed him directly, using the German "du", the informal you, and said:

Dieweil nun deine werck / dich ein(n) fleis-
sigen gerechten Buochtrucker loben / Bit ich dich /
du woellest den junge(n) angehenden schuolern / Rech-
nens vnd Visierens / diß mein new geordnet Re-
chenbuochlin / lustig vnd fleissig zutrucken / an-
men / Den selben und gemeynem nutz zu ehr
außspreyten² (1v)

Egenolff is industrious and just. A reputation that was borne from his work. Köbel begs him to attend to the matter at hand, which is to teach his students arithmetic and sighting by publishing his book. He also mentions that this print is a new version of his older reckoning book. A comment that takes aim at all the printers who are illegitimately selling a now outdated copy and by extension a wrong version. Egenolff is instructed to do his work

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- 1 On the history of Köbel's reckoning book as well as the texts that were bound together in this Klosterneuburg print G I 92, see Julia BRUCH's article in this volume.
 - 2 The transcriptions in this paper simplify the original printed text from 1531 for reasons of legibility: caudated s is converted to round s, nasal abbreviations are expanded, and the stacked diphthongs are expanded.

with delight and even pleasure (“lustig”) as well as with diligence (“fleissig”). The goal is to highlight the general usefulness (“gemeynen nutz”) of the mathematical instructions for everybody.

Köbel connects the making and the study of his book to a feeling of joy. He does not consider learning about mathematics to be a chore. On the contrary, studying the art of reckoning fills the young scholar with delight, by which he or she finds pleasure. The goal is thus to eagerly read, learn, and practice the art of reckoning.

In general, the language used when talking about the intellectual involvement with his reckoning book is very positive. Moreover, Köbel uses words that have a sensual element which bluntly convey an aspect of physical satisfaction that a modern student of arithmetic would most likely not have primarily sought (in such a book). Jakob Köbel wants to instruct and to show the relevance of arithmetic. He also wants to ensure everybody knows that reading his book is fun if you have the right attitude and enough diligence.

This persistence on the enjoyable aspects of studying mathematics goes beyond the paratexts³. Jakob Köbel and Christian Egenolff do their best to make the instructive text as attractive and entertaining as possible. I will thus highlight some of their strategies in two steps: I will first talk about two reckoning examples that fall into the category of recreational mathematics⁴ which connect the aspect of “fun math” to the art of Memoria and strategies of narration. I will focus on the narratological relevance of reckoning examples and define them as a mixture of the two “Simple Forms”⁵: “jokes” and “riddles”. In addition, I will briefly explore the integration of lists as narrative tools. Secondly, I want to then focus on the images added to reckoning examples and ask about their usefulness and their purpose. I will look at the connection between image and text and finally explore what tools Köbel and Egenolff use to lure in and entertain their readers. This study, therefore, aims to establish the significance of reckoning books as a source for philological and cultural research, as well as to demonstrate the detriment that the current lack of research within this field poses.

3 On paratexts of reckoning books, see the article by Franziska PUTZ in this volume.

4 On the topic of recreational mathematics: David SINGMASTER, *The Unreasonable Utility of Recreational Mathematics*. Paper given at the “First European Congress of Mathematics”, Paris 1992. This paper was amended in 1993 and published open access by SINGMASTER: (<https://web.archive.org/web/20020207051215/http://anduin.eldar.org/~problemi/singmast/ecmutil.html> [27.6.2025]).

5 André JOLLES, *Einfache Formen. Legende, Sage, Mythe, Rätsel, Spruch, Kasus, Memorabile, Märchen, Witz*, Halle 1930.

THE LIST, THAT DOESN'T MAKE SENSE

I wish to start with the basic calculating operation Addition. Köbel gives several examples to illustrate how to add “on the line”⁶. Sums of money in one currency are added up (fol. 28r) before different currencies are used to show how to convert everything correctly to get a result (28v). His last example within this Addition section is a little out of the ordinary. Köbel gives a list of differently priced items. The last item on the list, a small amount of money (“16 hlr” 29v, 16 hellers), is marked as a tariff and thus biases the reader into thinking that the items on the list are trade goods. However, they are not your standard merchandise. The list includes: one monkey, a fixed sum of money for buying wine in “Schnörches hauß” (29r), rotten eggs, smelly butter, hellebore, blue thread, sulphur lights, 100 pins, and curdled milk (29r and 29v). This is an eclectic list of goods and the goods themselves are likewise irrelevant for the calculation steps. It does not matter whether one handles sums of money in different currencies or several differently priced items; mathematically speaking, the rotten eggs, the smelly butter, and the monkey are not important. What is gained though, is the interest of the reader. For such a reader after working through several examples on money and currency conversions, it is refreshing to be confronted with a different topic, even if it is only an incoherent list of peculiar goods. At first glance, it might look strange to have such an example amid those that represent the economic reality of the tradesmen or the money-changers more accurately. Yet, when we look closer, we can see the benefit – the listed items are funny. We chuckle when we read about smelly butter and rotten eggs, we pause for a second and might even read the items again as we were not expecting to find those goods right there. These unconventional items are unexpected and therefore immediately command our attention. This has the potential to generate a deeper interest in actively engaging with the instructions and, by extension, truly learning from what the reckoning book has to offer.

A reckoning example like this falls under the category of recreational mathematics. David Singmaster gives a definition and identifies two somewhat overlapping areas of interest: Firstly, recreational mathematics “is mathematics that is fun and popular – that is, the problems should be understandable to the interested layman, though the solutions may be harder.”⁷ He refers to problems and mathematical tasks requiring prior knowledge, while still

6 Reckoning on the line and reckoning with pen and paper are two different cultural techniques. The Hindu-Arabic numerals allow for a different reckoning technique not relying on finger counting, the abacus, or a reckoning table with reckoning pennies. Even though calculating with the Hindu-Arabic numerals started to be taught in Europe in the 12th century, it took hundreds of years for it to fully reach all of Europe and to fully replace the reckoning table. Both techniques were applied parallel to each other for quite a long time, and we have a strong standing tradition of doing calculations “on the lines” in a merchant’s environment. For further information on the history of mathematics and the history of numbers see in general: Hans WUSSING, 6000 Jahre Mathematik. Eine kulturgeschichtliche Zeitreise 1. Von den Anfängen bis Leibnitz und Newton, Berlin–Heidelberg 2008; Adolf P. JUSCHKEWITSCH, Mathematik im Mittelalter, Leipzig 1964; Karl MENNINGER, Zahlwort und Ziffer. Eine Kulturgeschichte der Zahlensymbolik, Göttingen ³1979.

7 SINGMASTER, Unreasonable Utility (1992), n.p.

being widely known and considered fun. Games like Sudoku or the Rubik's Cube fall under this category. Secondly, recreational mathematics is a branch of "mathematics that is fun and used as either [...] a diversion from serious mathematics or as a way of making serious mathematics understandable or palatable."⁸ This is directly connected to the pedagogical aspect of recreational mathematics. Easy and approachable examples as well as those concerning interesting topics can catch a student's attention. The act of being attentive and concentrated can help an individual to process the information being transmitted from the reckoning book. It can also be an incentive to increase practice because fun or unconventional reckoning examples might be more attractive than others. Both approaches to recreational mathematics, as Singmaster describes them, play with elements of joy and gratification: The fun and/or easy example helps overcoming difficulties of understanding and/or explaining mathematical processes, which subsequently increases mathematical knowledge and reckoning abilities. An aspect that underlines the element of joy in gaining more expertise.

A lighter topic can capture an individual's attention more readily and help them to memorise the example and the mathematical instruction more easily. The calculation process can be connected to the extraordinary example so that not only the smelly butter, but also the presented computing method, can be remembered. Here, the process of how to memorise content is important: Frances Yates⁹ and Mary Carruthers¹⁰ have both studied the "Ars Memoria" in premodern cultures and conclude that memorising content works best when emotions are triggered. Not one specific kind of emotion is required, instead it can be anything from being entertained, disgusted, or repulsed. The content can be funny, beautiful, brutal, or totally absurd. The more outrageous the imagery, the more intense the connected emotion, the better an individual can memorise an aspect, and the process is further improved when several of these emotional areas are stimulated.¹¹ Thus, using funny, strange, or even cruel images as a memory aid is not an invention of the reckoning book, but rather a reliable technique that can be traced back to ancient Greece.¹²

A further curious aspect with regard to the peculiar merchandise reckoning example is that all the items mentioned are given in the form of a list.¹³ Every piece of merchandise

⁸ Ibid.

⁹ Frances A. YATES, *Gedächtnis und Erinnern. Mnemonik von Aristoteles bis Shakespeare*, Berlin ⁶2001.

¹⁰ Mary CARRUTHERS, *The Book of Memory. A Study of Memory in Medieval Culture*, Cambridge ²2008.

¹¹ Cf. *ibid.*, pp. 168–172.

¹² More on the connection between Memoria and mathematics cf. Michaela WIESINGER, *Warum Würste und Unterhosen beim Rechnen helfen. Zu den Zahlzeichen 0 und 4 im spätmittelalterlichen Merkspruch *Vnum dat vinger**. *MEMO – Medieval and Early Modern Material Culture Online* 11 (Mathematik und Material 2024), pp. 20–39.

¹³ A list is a simple enumeration of isolated items, without syntactic embedding, vertically arranged. Cf. Roman A. BARTON–Eva von CONTZEN–Anne RÜGGEMEIER, *Literary Lists. A Short History of Form and Function*, Cham 2023, p. 5.

is introduced with an “Item” and takes up its own line. Contemporary readers were used to lists. Even in the 16th century, lists were commonplace, and we don’t have to look far to corroborate this hypothesis – Jakob Köbel used lists to structure his book. The book starts with two long and detailed lists: One list that connects a different Saint to every day of the year (2r–4v) and a list of contents (6v–8r). These lists are – and this is mostly the nature of lists – very pragmatic¹⁴. They fulfil a purpose in making information digestible and structured. The list serves a purpose through its functionality and therefore we see and use it everywhere.¹⁵ Roman Alexander Barton, Eva von Contzen, and Anne Rügemeier all state that a list changes when it is integrated in a literary context. Within a literary context a list is transformed for aesthetic, narrative, and rhetorical purposes; it is decidedly not pragmatic anymore.¹⁶ For them, lists in a literary context weaken the narrative because they disrupt our attention and bore us even though we can look past them. They define a list as a proto-narrative text¹⁷, as it is not yet a story. A list needs a reader to establish connections between individual items or between the list and the narrative context in which it occurs. The reader must fill the narrative gaps to turn the proto-narrative text into narration.¹⁸ Barton *et al.* define “literary” as fictionalised literariness. They are especially interested in novels and the use of itemisations within this genre. But lists are used outside of a pragmatic purpose beyond fiction – Köbel’s reckoning example shows that. The list of peculiar merchandise is a persiflage of a pragmatic, practical list. We must agree with Barton *et al.* on the claim of the disruptive nature of lists, but here this disruption is completely different. We hesitate not because a narration stops or because we are bored. On the contrary, we hesitate as a result of *not* being bored. Köbel’s list grabs our attention and plays with the pragmatic nature of lists in general – even on a visual level. It is a deliberate misappropriation

¹⁴ According to Julia BRUCH, whom I consulted for this article, printing lists is not an easy feat for printers from the 16th century. Not everybody had the technical and practical abilities to make lists. Therefore, seeing this list-format in the context of a reckoning example is not only relevant for how the content of the example is presented but also for the expertise of the printer.

¹⁵ EVA VON CONTZEN, Die Affordanzen der Liste. *Zeitschrift für Literaturwissenschaft und Linguistik* 47/1 (2017), pp. 317–326, p. 318. Also: Lucie DOLEŽALOVÁ (ed.), *The Charm of a List. From the Sumerians to Computerised Data Processing*, Cambridge 2009, p. 1. On Lists in general also cf. Sabine MAINBERGER, *Die Kunst des Aufzählens. Elemente zu einer Poetik des Enumerativen* (Quellen und Forschungen zur Literatur- und Kulturgeschichte 22, Berlin–New York 2003).

¹⁶ BARTON–VON CONTZEN–RÜGEMEIER, *Literary Lists* (2023), p. 3.

¹⁷ There is not a definite set of conditions that must be fulfilled to mark something as a narration. Rather, we can identify a set of different features that define a narration – but not all of them must be applied all the time. The more of these features a text shows, the more narrative it is. In this definition, the term “narration” is of a gradual nature that also takes preliminary stages of narrating into account (cf. Tilmann KÖPPE–Tom KINDT, *Erzähltheorie. Eine Einführung*, Stuttgart 2014, p. 37. Christoph HEILIG defines the Protonarrative as the story that happens before we tell a story or put it down in writing. The story we do tell or write down, is the elaborated version of what we already told ourselves in our minds (cf. Christoph HEILIG, *Paulus als Erzähler? Eine narratologische Perspektive auf die Paulusbriefe* (Beihefte zur Zeitschrift für die neutestamentliche Wissenschaft 237, Berlin–Boston 2020), pp. 549–550).

¹⁸ Cf. BARTON–VON CONTZEN–RÜGEMEIER, *Literary Lists* (2023), p. 8.

that serves the purpose of entertaining the reader by using the known form of a list while simultaneously making it useless via the absurd nature of the given items. Thus, the proto-narrative function comes into play as well, as the specific selection stimulates the reader into thinking about what happened to generate such an eclectic pile of merchandise.

It is safe to say that the role of lists needs to be reconsidered (or even considered for the first time) in connection to their use in functional texts. Just like in fictional texts, we might see a transformation of the original pragmatic purpose of the list. Besides the aesthetic, narrative, and rhetorical purposes, we also have a didactic component correlating with an underlying need to entertain and captivate one's audience. Building on von Contzen, we can state that in functional texts, lists show a different "affordance". They serve a different purpose than the pragmatic lists or the lists in a fictional text. Like these reckoning examples, they are products of their environment. A list serves a purpose that is deeply connected to its writer, who chooses what to put on the list and what to exclude.¹⁹ The decisions made in the process of generating any list are not unbiased, and functional texts bear witness to this.

HINDRANCES IN INHERITANCE

The so-called testament calculation starts with the Incipit "Ein [sic!] reicher Burger lag im todtbett (fol. 74v)"²⁰, a rich bourgeois is lying on his deathbed. In this example, the inheritance of a rich man, 1000 guilders, needs to be arranged. He is about to die, leaving a pregnant wife behind. He wants to divide his fortune with respect to whether his wife gives birth to a son or a daughter. A son should get two thirds of the 1000 guilders, leaving one third for the wife. Yet, if he fathers a daughter, the proportions are to be reversed. The man dies and his wife gives birth. Unfortunately, she delivers twins, a son and a daughter – a possibility nobody had anticipated. Now we must determine, who gets what under these circumstances. Yes, this sounds like a joke. The fact that it does, even though it is not, is exactly why this kind of example has worked for over 2000 years: Mathematically the example is a combination of easy computations, perfect for exercising the skills presented by the

¹⁹ Cf. VON CONTZEN, *Affordanzen* (2017), p. 324.

²⁰ I would like to cite the whole reckoning example: "Ein reicher Burger lag im todtbett / der hett ein schwangere frau / er ordnet sein Testament vnnd letsten willen also: So sein haußfrau einen Son geben wür=de / so solt der selb sein son zwey theyl inn seinen verlaßnen guotten haben / die werden 1000. Gul=den werdt / Vnnd sein haußfrau das drittheyl / das wer all ander sein verlassen hab vnnd gueter. Würdesie [sic!] aber ein Tochter geben / so solt sein haußfrau zwey theyl / vnnd die tochter das drit=theyl aller seiner verlassen gueter haben. Der Er=bar man starb des legers / Vnnd inn der zeit der geburt / gebar die frau zwen zwilling / das was ein son vnnd ein tochter. Nun ist die frag / wie vil ein iegliche der dreier personen / nach ordnung vnd gestalt des Testaments haben solt." (fol. 74v and 75r).

reckoning master, but the story is the real asset here; It is the bait that stands out and captures the attention.

This specific reckoning example has a longstanding tradition in the history of mathematics. It dates back to Roman law and specifically to the *Lex Falcidia de Legatis* from 41 BC.²¹ The *Lex Falcidia* states that a fixed percentage (in Roman Law this percentage was a quarter) of an inheritance must stay with the legal heir, making it harder to disinherit somebody.²² This example already appeared in a 9th century manuscript in which a collection of mathematical problems have been attributed to Alcuin. In the “*Propositiones ad acuendos juvenes*”, the “*Problems to Sharpen the Young*”, example number 35 is called “*De obitus cuiusdam patris familias*” (“*On the Death of a Certain Head of a Household*”).²³ Over the centuries the story hardly changes, but there are variations concerning the number and the sex of the children the wife gives birth to: Twins, triplets²⁴, and quadruplets²⁵ are part of the mathematical problem, and while human babies dominate the story, some examples also focus on the sale of a pregnant cow without knowing how many calves she is due to birth.²⁶ The most striking example is given by Jacob van der Schuere in the year 1600²⁷, when a son, a daughter, and a hermaphrodite are born.

This shows that a reckoning example can be conceived out of a legal necessity but significantly change over time due to changed (societal, political, or religious) circumstances. In Köbel's time the *Lex Falcidia* was not important anymore, but the example still existed and was further developed. It seems that the story in all its absurdity was just too good. The lack of practical applicability is even discussed in a very famous reckoning book from the 16th century; In 1542 Robert Recorde wrote “*The ground of Artes*”. His version of the inheritance problem sticks with the one-son-and-one-daughter-question. Recorde's book has a master and a student talk to each other, and it is within the course of this conversation that the inheritance example is uttered by the master. Interestingly, the first thing the student does is not to solve the mathematical problem but instead inquires further to ascertain the consequences of such a testament. He argues that the testament would be null and void because not all the possible outcomes of the pregnancy were anticipated; he explicitly

21 On the *Lex Falcidia* and its implications on later legislation cf. Fritz G. SCHWARZ, *Die Rechtswirkungen der Lex Falcidia. Zeitschrift der Savigny Stiftung für Rechtsgeschichte. Romanistische Abteilung* 63 (1943), pp. 314–367.

22 Cf. *ibid.*, p. 314; cf. also Moritz CANTOR, *Vorlesungen über Geschichte der Mathematik* 1. Von den ältesten Zeiten bis zum Jahre 1200 n. Chr., Leipzig 1894, p. 522; CANTOR also mentions the tradition of the reckoning example based on the *Lex Falcidia* on pages 523–524.

23 Cf. John HADLEY–David SINGMASTER, *Problems to Sharpen the Young. The Mathematical Gazette* 76/475 (1992), pp. 102–126, p. 118–119. HADLEY and SINGMASTER chose a different title: “*A dying man's will*”.

24 E. g. the Manuscript XI 619 held in St. Florian.

25 E. g. Niccolò TARTAGLIA, *General trattato di' numeri et misure*, Venice 1556.

26 Johannes BUETO, *Logistica*, Lyon 1559.

27 JACOB VAN DER SCHUERE, *Arithmetica oft reken-konst. En een kort onderricht van't italiaens boeckhoude*, Haarlem 1600.

mentions a possible death of the mother and the child/children.²⁸ The Master and student have a longer conversation about the legal implications and are not particularly interested in the mathematical problem, but in the end the example is solved in the traditional way. This clearly shows that the impracticability, the implausibility, and the craziness of some of the examples were not lost on the reckoning masters who wrote them down. Yet they included them regardless. Recorde even decided to add a prolonged discussion on legal issues – very likely to inform, but also to impress his readers. Thus, a reckoning book can be much more than just a manual for learning how to calculate correctly.

We can observe a certain malleability of reckoning examples when it comes to the stories told, but this also counts for the paratexts: No matter how many forewords, excursions, poems, or indices are added to a reckoning book, at its core it still stays a book, that instructs the reader on how to do maths. This is the reason why it is easy to add political, religious, and legal opinions to texts from this specific genre without making it something different on the surface. Individual convictions and beliefs can be transported through paratexts and reckoning examples, turning a reckoning book into a tool for teaching more than just arithmetic.

The inheritance example and the list of peculiar merchandise can be classified as part of the realm of recreational mathematics. I have already mentioned the usefulness of these types of reckoning examples when it comes to pedagogical endeavours and the art of memory, but one more aspect needs to be considered: both examples read like jokes. To a certain degree they are – the one with the rich man and his will even has a punchline!

The two examples²⁹ can be understood as a mixture of elements of two different “Simple Forms”³⁰, as Jolles³¹ defines them: the joke and the riddle. A simple form is a type of “text” that can be considered prelingual, something that has not been solidified and is indefinitely

28 Robert RECORDE, *The Grounde of Artes*, Harison and Byneman, London 1543. The example can be found in the second dialog under the chapter “The Rvle of Felowship”. The pages are not numbered but, in the margins, we find the note “A question of testament”.

29 Of course, these two are just examples; we find more recreational mathematics in all reckoning books (including Köbel’s reckoning book) and even in our corpus of the ARITHMETIC-project (www.arithmetic-project.org [27.6.2025]).

30 The term “form” is a little problematic in literary studies. It is connected to something static, inflexible, and authoritarian. This stems from the fact that “form” turned into something that can almost be considered ahistorical and timeless: There are several forms that are very distinctive and prominent like the novel or the sonnet or the short story. But this does not count for all “forms” we are confronted with, which currently leads to new discussions on the form and how to tackle it. Cf. VON CONTZEN, *Affordanzen* (2017), p. 319.

Here, I am using the term “form” as stated in the Metzler Literaturlexikon as “Anordnung und Organisation der materialen, sprachlichen oder thematischen Teile eines Kunstwerks bzw. eines lit. Textes” (Transl.: “The arrangement and organization of the material, linguistic, or thematic components of a work of art or a literary text.”), cf. Dieter BURDORF–Christoph FASBENDER–Burkhard MOENNIGHOFF (ed.), *Metzler Literaturlexikon. Begriffe und Definitionen*, Stuttgart–Weimar 2007, pp. 246–247.

31 André JOLLES, *Einfache Formen* (1930).

in a condition of in-between orality and literacy.³² Jolles names nine Simple Forms, two of which are the riddle and the joke.

Riddles are always divided into a question and an answer with the latter not being part of the written text. The reader only gets to see the question and must figure out the answer alone. The important part is that every riddle implies that there is a solution – even if it cannot be determined, one must assume that a riddle can be solved. There is always an interrogator – present or not – who knows the answer and is therefore an insider. Solving the riddle means that one becomes an insider as well. Therefore, the process of solving the riddle can be interpreted as a rite of passage³³ (like passing an exam³⁴ or a final test). A reckoning example works similarly: The interrogator in form of the reckoning master asks the questions and has the answers. Every example should theoretically be solvable. In contrast to the riddle as Jolles defines it, reckoning books often present their readers with the answer to the question in the form of a solution, which is regularly given. Conversely, the joke is, according to Jolles, defined by disengagement, meaning that within a joke either language, logic, or ethics do not work the way they usually do. The rules of language might be invalidated and/or ethical or religious rules do not apply.³⁵ Other simple forms can also dissolve into a joke: E.g. a riddle can have a solution that cannot be taken seriously or reads like a pun.³⁶ Both, the riddle and the joke, are integral elements of reckoning examples, especially of the ones from the realm of recreational mathematics. Therefore, I want to define reckoning examples as a variation of the Simple Form.³⁷ The fact that the joke is defined by its disengagement, makes it necessary to ask what a specific joke needs to be disengaged from. In the inheritance example it is a disentanglement from an actual historical legal process that at Köbel's time is not understood anymore. The legal discourse has changed – and here lies

32 In the German Original the passage reads as follows: "Kämen wir so zur Erkenntnis dessen, was innerhalb des großen Gebietes von Sprache und Litteratur [sic!] von Stufe zu Stufe fest und immer fester sich vollzieht, bis es in einer letzten Vollzogenheit als endgültige individuelle Einheit uns erscheint, so liegt es uns andererseits ob, uns mit jenen Formen zu beschäftigen, die ebenfalls aus der Sprache hervorgegangen sind, diese Verfestigung aber zu entbehren scheinen, die sich, bildlich gesprochen, auf die Dauer ein einem anderen Aggregatzustand befinden: mit jenen Formen, die weder von der Stilistik, noch von der Rhetorik, noch von der Poetik, ja, vielleicht nicht einmal von der "Schrift" erfaßt werden, die, obwohl sie zur Kunst gehören, nicht eigentlich zum Kunstwerk werden", cf. JOLLES, *Einfache Formen* (1930), pp. 9–10.

33 Cf. *ibid.*, p. 129.

34 Cf. *ibid.*, pp. 135, 138.

35 One example for this disengagement of the reproachable (cf. *ibid.*, p. 260; "Entbindung des Tadelswerten") can also be found in Köbel's reckoning book: The example "Ein dieb hat in eim schloß ein sack voll gulden / gestolen (85r)" tells the story of a man who stole a sack of guilders from a castle and must pass three gates and three gatekeepers who all want a portion of his loot. There is no moral judgement in the example: neither the robbery itself nor the guards who want their share are condemned. There is more to say about this highly interesting reckoning example and the story it tells. Franziska PUTZ will tackle this task in her upcoming dissertation on the genre of the reckoning book.

36 Cf. *ibid.*, pp. 250–251.

37 This entails that the prelingual qualities stated for the Simple Forms as JOLLES defines them can also be applied to the reckoning example and confirms its (proto-)narrative potential on a structural and a content level.

the most important insight that stems from defining reckoning examples as riddles and/or jokes: Riddles and jokes usually work because they ostensibly deny the listener or reader easy access to a dominant social or historically relevant discourse. From a modern point of view the inheritance example is funny because the underlying legal relevance is completely lost on us. The further we are removed from the original legal implications stated by the *Lex Falcidia*, the stranger and therefore the funnier the examples become – the pregnant cow and the hermaphrodite are both inventions of the late 16th century and are therefore far removed from Roman times. The story is an aberration of what we would expect to hear, and this disengagement of the expected makes the content work as a joke. When it comes to the riddle, Achim Landwehr gives a great example that shows how dependent the form “riddle” is on our cultural discourses. It goes: a son and his father, a surgeon, have an accident. The father dies and the son urgently needs surgery. They bring him to a hospital where the head of the surgery team says, “I cannot operate on this boy, he is my son.”³⁸ Of course from our modern point of view we (hopefully) immediately understand that his mother (or his second father) is also a surgeon – but we happen to live within a time and a place where successful female surgeons (or same-sex marriages) are a part of society in order to be able to understand and solve the riddle. Riddles and jokes in their pre-narrative state rely heavily on the underlying discourse of the times they were conceived in, and this again gives us information about the exact time and the discourses that are relevant to understanding these Simple Forms. Therefore, understanding a reckoning example is dependent on understanding the time it was written in. However, this works in reverse as the nature of the reckoning example is informed by and therefore informs us about the culture – the societal, political, and religious realities and changes – that it belongs to.

EASY ON THE EYE

In this chapter I want to touch upon one further entertaining aspect of Köbel’s reckoning book: The use of images and their function within the text.

Modern mathematical textbooks are full of images. We need them to understand some of the mathematical processes, but also to illustrate the reckoning examples and to break up the content. They provide an anchor point for our memory – just as the outrageous stories or the peculiar list from before did. The only difference is that now the image is not in our mind, but on the page.

Köbel’s reckoning book starts with the title page and a standard depiction of reckoners sitting at a table. Because Köbel gives instructions for calculating with pen and paper as well as with a reckoning board, we see both cultural techniques depicted in the title image.

38 Cf. Achim LANDWEHR, *Historische Diskursanalyse*, Frankfurt–New York 2018, p. 19.



Fig. 1
Köbel: Reckoners at a table, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 1r



Fig. 2
Köbel: Buying herring, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 57v

The reckoners are writing and/or using reckoning pennies. In the middle of the table, we can spot two books that could either be objects of learning or items to write in. The image gives information on what we can expect from the book: We will become these reckoners!

Throughout the text we see a mixture of diagrams and images. The diagrams are mainly used to illustrate line reckonings step by step or to visualise how multiplications, root extractions, or progressions work. However, I will concentrate on the non-diagrammatic images that are used to accompany reckoning examples. These images usually depict the scene or the story that is given in the exposition.³⁹ We see trading scenes such as a merchant buying a barrel full of herring (57v) or somebody buying fabric (p. 66v). These two scenes are set in a city environment. The merchant, for instance, is placed within his fabric shop within a trading station with a vault in the background. The fishmonger haggles his wares to a rich customer and does that somewhere within the city walls.

The scenes conceptualise for the reader how they are supposed to think of a trading environment, where a trade takes place, and the people involved in the trade. Within this book they are usually male merchants who go about their business, but the very first image Egenolff uses in connection to a reckoning example in this Köbel print is of women trading.

³⁹ I want to use the term “exposition” for the first part of the reckoning example, that gives the information we need to ask a question. This part can either be a small story, a scene, or just an enumeration of things. What it does, is that it sets the stage for the reckoner to understand the task and it is this part that can be connected to the culture of the specific time the example was conceived in. More on the term and how I use it cf. Michaela WIESINGER, *Regula Virginum. Archiv für Kulturgeschichte* 105 (2023), pp. 377–404.



Fig. 3
Köbel: Buying fabric, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 66v



Fig. 4
Köbel: Women trading pears,
Klosterneuburg, Stiftsbibliothek, G I 92, fol. 57r

Three women are depicted, two are sitting and presenting their merchandise in wicker baskets. One woman is in a long black coat or dress and stands in the middle, pointing at the pears she wants to buy (which we only know because of the accompanying reckoning example⁴⁰). Due to the gestures and the glances of the three women, the whole situation looks dynamic and depicts an ongoing purchase. Yet the scene varies still further from the ones we have just seen. It is not only the sex of the traders, but also the environment of the trade that is different: the women are not in a city, but in the countryside, and they are sitting on small stools deposited on the ground. Throughout the whole book we never see women as sellers in business premises or designated marketplaces. In addition, compared to other depictions of merchandise throughout the book, the goods the women present are few. Of course, this could very likely be a stylistic choice from the woodcutter: A barrel of fish looks better in the composition of the image

than a couple of fish on a table. But at the same time this specific choice, be it based on historical facts or not, also carries meaning: what students working with this book see is that the richly clothed male merchant buys or sells barrels of fish in the city while two regularly clothed women sell a couple of pears in the countryside. The women are connected to a part of trade that is less prestigious and less profitable than what men do in the city. The scene involving exclusively women in a rural setting is a stark contrast to the trade scenes set in cities and populated by men, thereby creating economic disparities connected to sex within the realm of the book. The readers of the reckoning book thus study maths on the backdrop of this (fictional or not) inequality of power that is not only depicted in the illustrations,

40 The example talks about a housewife who buys a basket of pears at a market for a certain sum of money. At home she counts her pears and we must determine how much one pear cost: "Ein fraw oder Haußmuotter geht auff den marckt / kaufft überhaupt ein koerblin mit rebner byrn / darumb gibt sie achtzehen pfenning / So sie heym kompt / findt sie im koerblin hundert vnnd achtzig byrn / Ist die frag / wie vil byren sie vmd / einn pfenning hab:" (57r).



Fig. 5
Köbel: Mint master, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 80r

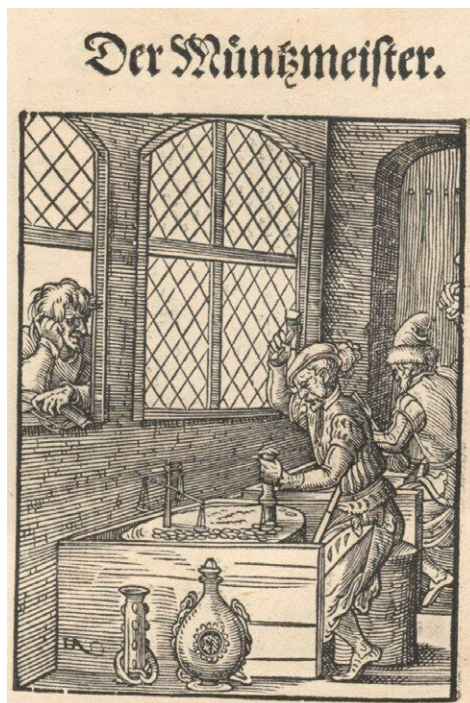


Fig. 6
Sachs: Mint master, München, Bayerische
Staatsbibliothek Res/4 P.o.germ. 176, p. 74

but also on a textual level throughout the whole work. Opinions and beliefs can be subtly influenced by presenting images like these. Therefore, it is significant how women are presented. It is even more telling that we hardly see and read about women at all, even though we know that they studied maths and worked with reckoning books.⁴¹

Egenolff is particularly interested in showing his readers what people working in different trades or crafts look like and how they ply their art. When it comes to how these people are depicted, the images are comparable to the later published “Ständebuch”⁴² by Hans

- 41 Julia BRUCH is currently working on an article on women as reckoners and students of reckoning schools. She already published an article on the mathematical abilities of nuns: Julia BRUCH: Auch Nonnen müssen rechnen können. Zisterziensische Wirtschaft in Frauen- und Männerklöstern am Beispiel der Zisterzen Schöntal an der Jagst und Niederschönenfeld, in: Die Zisterzienser im Mittelalter, ed. by Georg MÖLICH–Norbert NUSSBAUM–Harald WOLTER VON DEM KNESEBECK, Cologne 2017, pp. 303–323.
- 42 For this article I am using a print from 1568 kept by the Bavarian State Library: Hans Sachs, Eygentliche Beschreybung Aller Stände auff Erden, Frankfurt am Main 1568, (<https://www.digitale-sammlungen.de/view/bsb00105474?page=,1> [27.6.2025]). Unfortunately this print does not have page or leaf numbers; the page

Sachs. Illustrated by Jost Amman and published in 1568, the book depicts 114 people/men in different societal positions in descending order, from the pope to the fool. Sachs wrote small poems for each person that consist of eight verses, arranged in rhyming couplets. The book offers short portrayals of every conceivable job or societal status (for men) in the late 16th century by explaining and showing what people working in said jobs or holding said positions look like. When comparing the mint master in both Köbel's reckoning book and the "Ständebuch" there are striking similarities:

Both images depict the same scene: A mint master, who is portrayed as wearing fashionable and expensive looking clothes while engaging with his trade. They are both minting coins, holding and using their tools. Several minted coins are scattered in front of the men upon their table. We get a sense of what being a mint master entails, what the work environment looks like, and how his societal standing might be. However, the image of the mint master in Köbel's reckoning book is given out of context. It does not complement the reckoning examples surrounding it. There is only a loose connection when Köbel suggests caution whilst buying gold or silver because metal is never pure. Here, the image is used to visually break up a long stretch of text. It turns into a tool for page composition and is a strategy Egenolff regularly uses in his books. We know that he reused these expensive wood cuts as much as he could. The connection between image and text was sometimes of secondary importance. Instead, the printer was creating visually appealing books in an economically smart way. By reusing wood cuts, money could be saved and profit maximized at the same time. But sometimes the placement of such images can be problematic as my last example will show: On page 83r of Köbel's reckoning book we find the "Regel des Pagaments" – the rule of payment: It revolves around a merchant who as a foreigner wants to pay for his merchandise in a different currency. The reckoner has to determine how much of his foreign currency is required to make the trade happen (see 83r and 83v). The interesting part of this simple conversion example is the image placed at the beginning. It shows a merchant holding a bag (full of money?) in his right hand, balancing a stack of coins in his left. His clothes are peculiar and do not match the flamboyant and expensive garments we have seen in previous images. Looking into the "Ständebuch" by Sachs and Amman again, we can argue that due to his outfit the merchant depicted in Köbel's reckoning book might be Jewish.

Jost Amman shows a group of Jewish people wearing the same outfit we have just seen in Köbel's book, including the distinctive headdress. The poem underneath the image refers to the practice of money lending and therefore to the Jewish moneylender in a stereotypically

numbers I am giving in this article refer to the pages in the pdf-document provided by the Bavarian State Library.

negative way.⁴³ The reference to Jewish usury is nothing new and is also part of German reckoning examples since around 1400.⁴⁴ The merchant in Köbel's reckoning book is wearing traditional Jewish clothing, even though the connected reckoning example does not state any religious affiliation. Looking into another book printed by Egenolff's workshop, the story becomes even more interesting: Jakob Köbel is not the only reckoning master who had his works printed by Egenolff. Adam Ries' very successful and genre-defining second reckoning book was also manufactured by Egenolff.⁴⁵ A reprint from 1551 held by the Bavarian State Library⁴⁶ shows the exact



Fig. 7
Köbel: Merchant, Klosterneuburg, Stiftsbibliothek, G I 92, fol. 83r



Fig. 8
Sachs: Der Jued, München, Bayerische Staatsbibliothek Res/4 P.o.germ. 176, p. 72

- ⁴³ The poem reads: "Bin nicht vmb sonst ein Jued genannt / Ich leih nur halb Gelt an ein Pfandt / Loest mans nit zu gesetztem Ziel / So gilt es mir dennoch so viel / Darmit verderb ich den loßn haußn / Der nur wil Feyern / Fressn vnd Sauffn / Doch nimmt mein Handel gar nit ab / Weil ich meins gleich viel Brueder hab." Sachs, *Beschreybung Aller Stände* (1568), p. 72. <https://download.digitale-sammlungen.de/pdf/17500568678888bsb00105474.pdf> [27.6.2025].
- ⁴⁴ The very first German reckoning examples we know of were written at the end of the 14th century and are currently held at the University Library in Heidelberg. One of the few examples collected in the manuscript CPL 1216 is on Jewish usury (folio 97v): https://digi.ub.uni-heidelberg.de/diglit/bav_pal_lat_1216?ui_lang=ger [27.6.2025].
- ⁴⁵ According to VD16 (<https://www.bsb-muenchen.de/sammlungen/historische-drucke/recherche/vd-16/> [27.6.2025]) the first Ries print manufactured by EGENOLFF was done in 1533. There is no digitised version of this print available online but the print from 1535 held by the Austrian National Library does not show any images (cf. https://viewer.onb.ac.at/ABO_+Z179878309 [27.6.2025]).
- ⁴⁶ <https://www.digitale-sammlungen.de/de/view/bsb00028756?page=1> [27.6.2025].



Fig. 9

Ries: Vom Wucher, München, Bayerische Staatsbibliothek Res/Math.p. 744 s, fol. 36v

same woodcut as we have seen before in a different context: Here, on page 36v, we see the chapter “Vom Wucher” – on usury – and right there, directly underneath the heading, Egenolff uses the image of the merchant again. But this time he is not labelled as a merchant, he is described as “Jud” (36v), as a Jew.

Even though the reckoning example is not judgemental towards the practice of money lending, the title and the used imagery are biased. Now the bag of money and the coins in the outstretched hand are not read as the earnings of a successful merchant, but as the wrongfully acquired profit of a greedy

money lender. This was due to prevailing societal prejudices against Jewish people and the ever-repeated connection between this religious group and wrongful money lending practices that politically erupted once more in the 16th century. When looking at both books side by side, one must ask about the “original” context. The fact that the clothing is so stereotypically Jewish and the focus lies primarily on the act of owning a rather large sum of money, I might argue that Köbel’s version is the misappropriation, even though Adam Ries’ reckoning book (at least the versions we can access) were printed by Egenolff after Köbel’s work. Nevertheless, what the use of this image shows, is that even making a reckoning book can be a political act without having to say or write anything. All it takes, is an image in a deliberately chosen context to tell a highly topical story. But why use a reckoning book? Keeping the makers and the readers in mind, we can argue that a certain social class was more prone to using these textbooks than others: The merchants and the craftsmen, the wealthier people who worked and lived in early modern cities were the target audiences. They are the ones who economically and politically make the cities work by owning the money and making the policies. They are the ones that need to be influenced when it comes to political decisions. Doing that with subtlety via a reckoning book is smart: Almost all children from this societal sphere need to learn the trade of reckoning and Adam Ries’s textbook sold countless copies. Although it is just an image, the act of choosing the image must be considered a political position, as the previous arguments demonstrate, writers and printers have the means to indirectly influence society.

Therefore, images have several functions throughout a reckoning book: First, they make the book more attractive by graphically breaking up the pages and giving the reckoners something to look at. Second, they serve as a memorial anchor point for the student. Seeing an image makes it easier to remember the connected content and the connected reckoning

steps. Third, some images are deliberately picked and placed to tell socially relevant stories and promote political agendas. Finally, the quality of the image is used to underline the quality of the book. Jakob Köbel was not the best mathematician, but his books were beautifully made, wonderfully illustrated, and written in an engaging style. Of course, they also sell because the necessity of learning how to calculate was explicitly given, but the most important selling point was undoubtedly the pretty book the reader was getting. It is this aspect, connected to the feeling of delight, that has already been mentioned in the foreword and seems to be a common theme for the whole reckoning book: Making, using, and looking at the book is connected to a feeling of joy.

5. CONCLUSION

Jokes and riddles, lists and outrageous stories grab an individual's attention and help to jog their memory. It is likewise not only the written word, but also the images that accompany a didactic text, that are used to entertain and convey a message. Just like the adaptation of a traditional reckoning example to fit contemporary needs, the creation of an iconographic program is an expression of the writer's and/or printer's intentions. The image is there to engage the readers, to lure them in, to make them interact with the text on an intellectual level and to influence them.

Köbel's success as a writer, printer, and editor is connected to his strategy of making a book attractive, engaging, and entertaining. In comparison to other reckoning books, his text is not the most accurate, modern, or didactically innovative; however, it was a bestseller that went on to produce numerous editions and made Köbel famous as a reckoning master, even though this was not his first trade.⁴⁷

In Klosterneuburg, Köbel's book was definitely read and worked with. We have signs of usage throughout the text and more importantly, from at least 6 different hands: On page 15r, a 16th century hand is correcting a wrong conversion. On page 94r, a hand from the first half of the 17th century is adding more information on how to calculate the new and the full moon,⁴⁸ starting on page 95v another hand is correcting some more mistakes⁴⁹. The section of the book that has been commented on the most starts at page 156v and deals with different coins that were available and used throughout Europe in the 16th century. Here, the reader(s) have not only commented extensively on different coins, but some of them have also been coloured in. Especially under the section of "Die verbottenen Gulden", the forbidden

⁴⁷ Cf. Julia BRUCH's article on this topic in this volume.

⁴⁸ We can read: "Du solt auch wissen, wan dir noch deinem abziehen kein stund vberbleibt, dz dasselb New zu mitter macht, dz ist 12 vhrn sich emphanngt dieselb stund auch für den anfang des tags gerechnet wirt".

⁴⁹ Mistakes in (printed and handwritten) reckoning books are very common and handwritten glosses commenting on or mending those mistakes is something we see very often.



Fig. 10
Köbel: Coins, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 162r

guilders, we find a lot of added information concerning conversion rates and the overall worth of these coins.

The most interesting couple of pages in connection to determining who and how many people used the book starts on page 174v, on the empty pages between Köbel's book and the reckoning book written by Hermann Gülfferich⁵⁰. Over the course of five pages at least four different hands give information on mathematically relevant topics: Two different hands take down conversions for geometrical and astronomical problems (174v and 175); A third hand writes a vocabulary list in Latin and German dealing with terminology from the area of mathematics (page 175v) and the scriptorium (176r); A fourth hand notes on page 176v: "Lern mit vleiß dz ainmaleinß so wirdt dir alle rechnung gemain"⁵¹ ("Study the 101 with enthusiasm to do all sorts of calculations!").

Overall, we can argue that this specific print held in Klosterneuburg, is a book that was heavily used – both the glosses and the state

of the book prove this. The book is worn, pages are damaged, and at least six people added handwritten information. Even more have probably read it. When we focus on the signs of usage, it was not the mathematical instruction that caught the canon's attention: Their commentaries focus on Köbel's information on time and currency conversion as well as his astronomical calculations. The reckoning book he is most famous for, seems to have been less important for the monastery. It is very likely that by the 16th century the highly educated canons did not need a book on basic mathematical knowledge. They probably already knew how to calculate with the abacus as well as with pen and paper, but the Klosterneuburg edition is more than just a reckoning book: It covers several topics relevant for trade: It gives information on the measurement of time, barrel-surveying, the calendar, lunar phases,

⁵⁰ On the composition of the Klosterneuburger Köbel-print see BRUCH's article in this volume.

⁵¹ I want to thank Norbert ORBAN for helping me out with the transcription of the handwritten passages of this reckoning book that I could have never deciphered by myself!

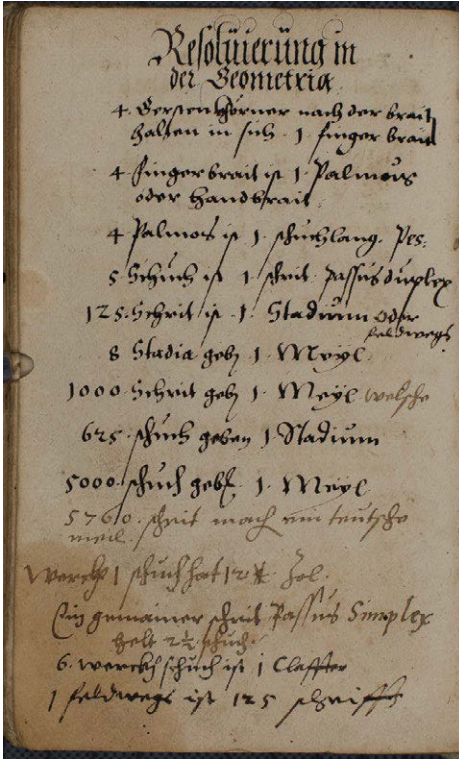


Fig. 11
Köbel, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 174v

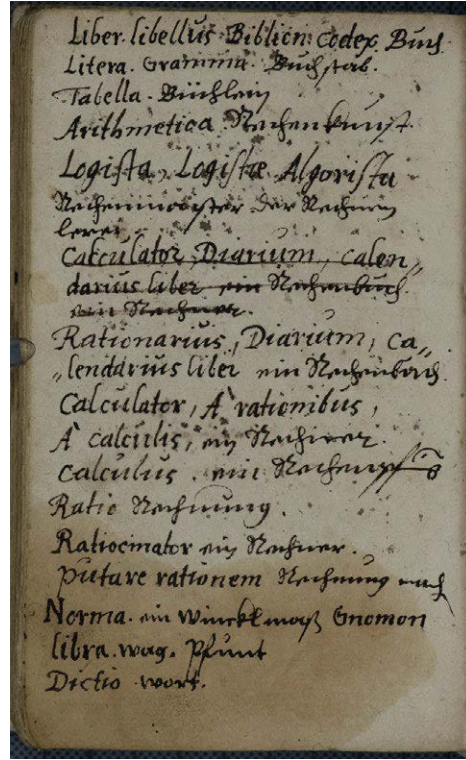


Fig. 12
Köbel, Klosterneuburg,
Stiftsbibliothek, G I 92, fol. 175v

and coins. The book could be considered a reference text, and this might therefore explain its continuing use over the years. The choice of combining all these writings into one large book was a smart one when it comes to supporting the diligence and the enthusiasm of the reader. It is a selling point to offer Köbel's "best seller" in combination with more practical texts to help and enhance working with it. The book demonstrates how to do maths, but also how to apply it once an individual knows how arithmetic works. All it requires is industriousness, and Jakob Köbel knows that keeping his readers interested and entertained is the perfect means to inspire just that.

COUNTING ON PARATEXT

CALCULATING THE SUCCESS OF RECKONING BOOKS IN EARLY MODERN PRINTS¹

Franziska Putz

INTRODUCTION

“Also wil ich diessem Rechenbüchlein / meinem verheiß noch / genung gethon / und sein Ende geben / und so ich empfind mich do mit icht nucz geschafft haben / wil ich kunftiglich mit gottes und der Hochgelerten hilff dz meren und bessern / auch von Vysiren / Veld zu messen / etc. / und andere notturftige ding den leyen zu hewslichem gebrauch Tolmetschen / und auß der Arismetrick und Geometrei offen baren.”²

With this colophon, the reckoning master Jakob Köbel (1462–1533) marks the completion of his first reckoning book – a small octavo format printed in 1514 in his hometown Oppenheim. Within the book, Köbel states his main task as translating (“Tolmetschen”) higher and complex forms of arithmetical knowledge for everyday usage (“den leyen zu hewslichem gebrauch”) of laymen. His apparent passion for production, dissemination, and commercialisation of knowledge is reflected in the sheer bandwidth of publications as a printer and writer. From around 1489 onwards,³ Köbel commissioned, printed, and spread books and pamphlets on various subject matters such as fishing, counterfeiting, religious or political

1 This article is based on a paper delivered by the author at the International Medieval Congress (2024) in Leeds, titled: “‘I will say no more...’: Paratextual Presentation of Knowledge in Transformation”.

2 “With this I have done as promised in this book and will put an end to it / and since I have created benefit with it / I want to continue in the future with God’s help and the help of the most studious and increase and improve it / and measuring / and field measuring / etc. / and other necessary things for the laymen for everyday use will be translated / and further knowledge of arithmetic and geometry will be disclosed.” Jakob Köbel, *Eynn Neue geordent Reche(n)büchlein uf den linien mit Reche(n)pfenigen / den Jungen angenden zu heuslichem gebrauch und hendeln leichtlich zu lernen / mit figuren unnd Exempeln / volgt hernach clerlichen angezeygt*, Oppenheim 1514, fol. 30r.

3 Köbel’s first dated print, “*Practica Teutsch Etliche Jar werende / auf d(er) grossen Coniunction der dreier obersten Planeten Saturni Jovis un(d) Martis gezoge(n) / Von der Zukunft eins newen Propheten etc.*” is dated to 1503, cf. Ferdinand W. E. Roth, *Die Buchdruckerei des Jakob Köbel, Stadtschreibers zu Oppenheim, und ihre Erzeugnisse (1503–1572). Ein Beitrag zur Bibliographie des XVI. Jahrhunderts*, Leipzig 1889, p. 5. His first documented involvement is a print of the “*Mensa philosophica*”, dated to 1489 and published by Jodocus Gallus, Jakob Köbel and Johannes Wacker in Heidelberg, printed by Heinrich Knoblochster. Cf. *Gesamtkatalog der Wiegendrucke*, <https://www.gesamtkatalogderwiegendrucke.de/docs/MENSPHI.htm#M22814> [28.6.2025].

topics, but also on the quadrivial sciences astronomy, astrology, geometry and arithmetic.⁴ Even though Köbel was seemingly a 'jack of all trades' – he was not only the municipal clerk of Oppenheim, but also a local field surveyor, calibrator of barrels, temporary landlord of the town hall tavern⁵ and a widely-known and well-connected humanist scholar⁶ – he produced a consistent load of books that he produced as a writer, publisher, and printer. With a relatively steady output of approximately three to four prints a year, he is a little cog in the wheel of the so-called “explosion of print”⁷ that occurred in the 15th and 16th centuries.⁸ This explosion, be its reason and characterisation multifaceted and manyfold,⁹ is born partly from a new commercialisation of reading and printing books that were then looked on as commodities.¹⁰ As such, they had to then appeal to a broader group of potential read-

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- 4 Köbel wrote, printed and published many types of texts, including calendars, sybil prophesies, an *Elucidarius*, a law booklet, a field measuring booklet, a poem about tricksters, a work on table manners, a book of coats of arms and a plague regiment. Cf. Josef BENZING, *Jakob Köbel zu Oppenheim: 1494–1533. Bibliographie seiner Drucke und Schriften*, Wiesbaden 1962.
 - 5 Cf. Johann August RITTER VON EISENHART, Art. Koebel, Jacob. *Allgemeine Deutsche Biographie* 16 (1882), pp. 345–349, https://de.wikisource.org/w/index.php?title=ADB:K%C3%B6bel,_Jakob&oldid=- [15.4.2025].
 - 6 Köbel was a member (“Sodales”) of the “Sodalitas litteraria Rhenana”, founded by Conrad Celtis, a subsection of a humanist society with members and sections all across Europe. Köbel was not only a member but also a designated “Hospes” who provided accommodation and hospitality for other traveling scholars and was thus playing a significant part in the humanist network. Cf. Heinrich GRIMM, *Ulrich von Hutten’s persönliche Beziehung zu den Druckern Johannes Schöffer in Mainz, Johannes Schott in Strassburg und Jakob Köbel in Oppenheim*, in: *Festschrift für Joseph Benzing zum sechzigsten Geburtstag*, ed. by Elisabeth GECK–Guido PRESSLER, Wiesbaden 1964, pp. 140–156, pp. 145–150. This fits the bill, as print publishers and bookkeepers (such as Köbel) were often highly educated and integrated into networks of scholars, holding a high social status in their respective cities. Cf. Julia BANGERT, *Buchhandelssystem und Wissensraum in der Frühen Neuzeit*, Berlin–Boston 2019, pp. 62–69, pp. 280–285.
 - 7 This term, first and most prominently coined by Hugo KUHN, is referring to the sudden increase in the quantity of literary texts brought into circulation. The new distribution media of paper and print played an important role in the process. Even if KUHN refers mainly to prose literature, this increase in productivity and production can also be applied to printed German-language arithmetic books. Cf. Hugo KUHN, *Versuch über das 15. Jahrhundert in der deutschen Literatur*, in: *Kleine Schriften. 3. Liebe und Gesellschaft*, ed. by Wolfgang WALLICZEK, Stuttgart 1980, pp. 135–158.
 - 8 According to GRIMM, Köbel’s annual average amounts to three to four prints per year and cannot be considered particularly productive. Cf. GRIMM, *Ulrich von Hutten’s persönliche Beziehung* (1964), p. 145.
 - 9 This may also stem from a newfound enjoyment of reading and producing literature – a ‘delectare’ way of life born from the humanist movements of the 13th century and beyond. Cf. Stephen GREENBLATT, *The Swerve. How the world became modern*, New York 2011. The interplay of various political-religious conflict situations in the context of the Reformation movement is also repeatedly cited as one of the many factors. In a reciprocal effect, book printing also promoted the intellectual unrest of the time, and it goes without saying that it increased the dissemination of knowledge and the focus on education. Cf. Hans-Jörg KÜNAST, “Getruckt zu Augspurg”. *Buchdruck und Buchhandel in Augsburg zwischen 1468 und 1555*, Tübingen 1997, pp. 1–31.
 - 10 Cf. Marie-Kristin HAUKE, “In allen guten Buchhandlungen ist zu haben ...”. *Buchwerbung in Deutschland in der Frühen Neuzeit*, Leipzig 2023.

ers who were ready to buy them – the early modern period thus becoming a time of literary consumption.¹¹

The paratext, the so-called “threshold” into the text, is inextricably linked to the production and dissemination of these texts.¹² Paratexts frame and structure the content, guide the reader, and offer additional information; thus, they become especially potent markers of transformation and strategies in the way texts are structured and aimed at a certain readership. They therefore also underwent great changes in the early modern period. This article examines how paratextual elements in reckoning books present knowledge and undergo transformation at a time when books were printed, sold and commercialised in larger numbers than ever before, and where the spread of arithmetic knowledge itself is popularised and thoroughly changed. The primary subject of the present study is a print of Jacob Köbel’s reckoning book found in the Klosterneuburg Abbey, dated to 1549.¹³ The “*Arithmetica Historica*”¹⁴ (1593), a reckoning book by the theologian and mathematician Sigismund Suevus (1526–1596), provides a comparative foil for Köbel’s work and for the use of paratext. Both texts can be categorised as representatives of the same, widespread but albeit very disparate ‘genre’ of vernacular 16th century literature. They shall be examined with regard to the different functionalisations of paratextual elements in arithmetic books. This approach follows Gérard Genette’s observation: “The functions of the paratext [...] constitute a highly empirical and highly diversified object that must be brought into focus inductively, genre by genre and often species by species.”¹⁵

THE POWER OF PARATEXT

Reckoning books are not the only text genre affected by the literary upheaval in the 15th and 16th centuries, but they provide an especially fertile ground for analysing the growing use

11 Cf. Hanns FISCHER, *Neue Forschungen zur deutschen Dichtung des Spätmittelalters (1230–1500)*. *Deutsche Vierteljahresschrift für Literaturwissenschaft und Geistesgeschichte* 31 (1957), pp. 303–345, p. 341.

12 The term of the “threshold” was coined by GENETTE. Cf. Gérard GENETTE, *Paratexts. Thresholds of interpretation*, Cambridge 1997, p. 2.

13 Jakob Köbel, *Rechenbuch / Auff Linien und Ziffern. Mit einem Visir Büchlin / Klar unnd verstandlich fürgeben. Gerechnet büchlin / auff alle wahr und Kauffmanschaft. Müntz / Gewicht / Elen / unnd Maß / viler Land und Stett verglichen*, Frankfurt a. M. 1549. StiBKI, G I 92.

14 Sigismund Suevus, *Arithmetica Historica. Die löbliche Reche(n)kunst durch alle Species und fürnembste Regeln / mit schönen gedenckwürdigen Historien und Exempeln / Auch mit Hebraischer / Griechischer / und Römischer Müntze / Gewicht und Maß / deren inn heyliger Schrift un(d) gutten Geschichtsbüchern gedacht wird: Wegen vieler schönen Historien und derselbigen Bedeutungen männiglichen sehr lustig / lieblich und nutzlich zu lesen. Aus vielen gutten Büchern un(d) Schrifften mit fleiß zusammen getragen*, Breslau 1620 (first published in Breslau in 1593).

15 GENETTE, *Paratexts* (1997), p. 13.

of paratextual elements. The widely spread¹⁶ vernacular treatises, handwritten and printed, are made to be used by a wide range of scholars; they transport arithmetical knowledge for a new group of recipients,¹⁷ namely, traders, merchants, craftsmen and eager scholars studying to practice such professions. Hence, with accordance to Barbara Schmidt-Thieme's observations,¹⁸ a practice-oriented reckoning book typically consist of two parts: A theoretical part explaining the basic operations and then a practical part filled with a wide array of examples and reckoning rules, mainly relating to commercial usage.

These books not only had to present knowledge to a large readership, but they also had to be persuasive enough to be picked up by their potential readers. In the early modern period, "the most important place to communicate books was the book itself"¹⁹ – what else was there to use than the paratextual stage to communicate, promote and contextualise knowledge?²⁰ The term paratext, created by Gérard Genette, signifies a "threshold" or "vestibule"²¹ by which a reader has to step through to enter the main body of text, presenting itself as a title, dedication, and prefaces, as well as through editorial choices, and structural elements within the text like headers or registers.

The Early Modern Period is a transitional period for paratextual elements; on one hand, in many vernacular arithmetic manuscripts paratextual functions are still at least partially integrated in the main body of text.²² On the other hand, new paratextual forms and functions are emerging. The media change, initiated by print, led to a "pluralisation"²³, a multiplication and diversification of paratextual elements. New forms emerge while old

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- 16 As part of the ERC Starting Grant project, ARITHMETIC, we are transcribing vernacular arithmetic manuscripts from the late Middle Ages and the early modern period, with the aim of making them available in digital form. Currently, there are 116 manuscripts. Additionally, the project looks into various printed arithmetic books from the 15th and 16th century. Regarding the project's fundamental questions concerning cataloguing, contextualisation and transcription, an exemplary corpus is used. Cf. Christina JACKEL–Norbert ORBÁN–Michaela WIESINGER, *Handwritten Arithmetic Treatises in German (1400–1550). A First Assessment of the Sources Based on the Exemplary Corpus Held by the Austrian National Library*. *Medieval Worlds* 18 (2023), pp. 72–107.
- 17 Cf. Barbara GÄRTNER, Johannes Widmanns "Behende und hubsche Rechenung". *Die Textsorte 'Rechenbuch' in der Frühen Neuzeit*, Berlin 2000, pp. 12–15.
- 18 Cf. GÄRTNER, Johannes Widmanns (2000), p. 12, p. 112, p. 250.
- 19 Frieder von AMMON–Herfried VÖGEL, *Einleitung*, in: *Die Pluralisierung des Paratextes in der Frühen Neuzeit: Theorie, Formen, Funktionen*, ed. by EAD, Berlin 2008, pp. VII–XXI, p. XII.
- 20 In this paper, mentions of paratextual presentation are equivalent to peritextual presentation, referring to paratexts physically linked to an actual book. By contrast, the epitext is paratext that is not directly connected to the physical copy. While the epitext in the form of interviews, reportages, etc. is useful for modern literature and concepts of authorship, it does not yield the same results for late medieval and early modern literature. Also excluded from this examination of paratext is the material aspect.
- 21 Both terms are used by GENETTE, and signify his definition of the paratext as a first and foremost introductory entrance into the text. Cf. GENETTE, *Paratexts* (1997), p. 2.
- 22 This transitional period is seen in a lot of handwritten vernacular reckoning books, where typical preface qualities are sometimes still integrated in the 'ex abrupto'-beginning of the text, sometimes already moved to the paratext. GENETTE states this as typical for the time. Cf. GENETTE, *Paratexts* (1997), pp. 163–170.
- 23 AMMON–VÖGEL, *Pluralisierung* (2008), p. XIII. This can also be seen in: Karl A. E. ENENKEL, *Die Stiftung von Autorschaft in der neulateinischen Literatur* (ca. 1350–ca. 1650). Zur autorisierenden und

ones,²⁴ like the preface or the dedication, diversify and become more complex, taking on new functions and becoming indispensable. These changes are not only quantitative, but also qualitative at a structural level of literary communication.²⁵ This pluralisation shows that creating and mediating thresholds into knowledge has become more important due to new forms of media, evolving audiences, and the need to adapt different approaches for knowledge transfer. Accordingly, the development “of a paratextual apparatus was an essential tool for embodying, disseminating, and updating thought across a wide range of intellectual disciplines”.²⁶ This goes hand in hand with a new contextualisation of knowledge as well as constructions of a more and more “demanding authorship”,²⁷ an authorship whose (self-)presentation gradually becomes more important. Likewise, the discursive function of the author²⁸ at the intersection of textual and personal instance became increasingly connected to claims of originality and markers of individuality.²⁹

The character of a threshold or a vestibule into the text encourages paratexts to be seen as a form of subordinate entrance guiding readers into the text, to “present” it and “make” it “present”,³⁰ as Genette says. Yet, Helen Smith and Louise Wilson challenge this, stressing the role of paratexts is a much more complex shaping of knowledge and power that is influenced by actors within the book market like printers, editors, patrons, readers, and annotators.³¹ Under these circumstances, questions arise regarding the reckoning books of the early modern period:

How do paratexts frame, expand, and accompany the main text in the two reckoning books in question? How do they mediate the text, and how do they shape the roles of author, reader, and dedicatee?

wissensvermittelnden Funktion von Widmungen, Vorworttexten, Autorporträts und Dedikationsbildern, Leiden 2015, pp. 3–4.

- 24 “The Paratext, like texts themselves, has a certain history, with key elements such as titles, indexes, and footnotes being invented over the course of many centuries and only becoming standardised long after the advent of printing.” Rosalind BROWN-GRANT et. al. (ed.), *Inscribing knowledge in the medieval book. The Power of Paratexts*, Berlin–Boston 2019, p. 1.
- 25 Cf. AMMON-VÖGEL, *Pluralisierung* (2008), p. XIII.
- 26 BROWN-GRANT et. al., *Inscribing knowledge* (2019), p. 1.
- 27 Erich KLEINSCHMIDT speaks about this “demanding authorship” in relation to an “gradualised authorial play with stimulus signals linked to perception thresholds”, e.g. guidance through font sizes or colors. Of course, the concept of authorial staging must not ignore the roles of other actors such as printers and publishers. Cf. Erich KLEINSCHMIDT, *Graduationen der Autorschaft. Zu einer Theorie paratextueller Intensität*, in: *Die Pluralisierung des Paratextes in der Frühen Neuzeit: Theorie, Formen, Funktionen*, ed. by Frieder AMMON–Herfried VÖGEL, Berlin 2008, pp. 1–19, pp. 5–7.
- 28 Cf. Michel FOUCAULT, *Was ist ein Autor?*, in: *Texte zur Theorie der Autorschaft*, ed. by Jannidis FOTIS, Stuttgart 2000, pp. 198–232.
- 29 Cf. Christel MEIER–Martina WAGNER-EGELHAAF, *Einleitung*, in: *Autorschaft. Ikonen – Stile – Institutionen*, ed. by EAD., Berlin 2012, pp. 9–18.
- 30 GENETTE, *Paratexts* (1997), p. 1.
- 31 Cf. Helen SMITH–Louise WILSON (ed.), *Renaissance Paratexts*, Cambridge 2011, pp. 1–14.

How can Genette's categories, which were developed primarily for modern texts from the 18th and 19th centuries, be applied to reckoning books from the early modern period, and where do they need to be modified?³²

How can the functions and forms of the paratext be described for the reckoning books in question? What conclusions can be drawn from this concerning the relationship between text and paratext and the character of paratexts in the 16th century reckoning book prints?

When examining paratext, we must think about the concept of text itself; printed books within the 16th century were still very much part of the "perennial instability of the medieval book".³³ Their character as 'unstable texts' in constant motion is shown in the possibility of textual expansions, reductions, and most importantly, the addition, reconstruction, and deletion of paratextual elements.

THE RECKONING BOOK(S) OF JAKOB KÖBEL

Köbel's reckoning books seem to have appealed to a wide audience,³⁴ and one copy, dated to 1549, found its way into the collection of the Klosterneuburg Abbey library. The book unites three previously separately published works, which were now printed and issued as a single, coherent publication,³⁵ Köbel's great reckoning book, first published in 1525 in Oppenheim,³⁶ is combined with his surveying treatise, the "Vysirbuch"³⁷ (1515), and his reckoning book

32 Even though GENETTE'S concepts are mainly oriented on 18th and 19th century literature, many scholars have already worked on possible applications of the concept in medieval manuscripts and early prints. Cf. BROWN–GRANT et. al., *Inscribing knowledge* (2019); SMITH–WILSON, *Renaissance Paratexts* (2011). Most of this research concentrates on prefaces in a few particular examples.

33 BROWN–GRANT et. al., *Inscribing knowledge* (2019), p. 2.

34 A detailed, but still not complete list of all of Köbel's editions and reprints can be found in BENZING, *Jakob Köbel* (1962).

35 The joint print can also be traced due to the emission of some paratextual elements, e. g. the preface of Köbel's "Mit der Kryden oder Schreibfedern" reckoning book or the epilogue of the first reckoning book, signifying that they were not intended to be printed as standalone works.

36 Jakob Köbel, *Eyn neüw Reche(n)büchlin Jacob köbels statschreibers zu Oppenheym auff den Linie(n) un(d) spacie(n) ga(n)tz leichtlich Rechen zu lernen mit vyelen zusetze(n) / Nemlich der Regeln Fusci uff Specerei Goldt / Silber / Oley / Honig etc. Darzu die regel des Pagame(n)ts eyn müntz gegen anderer zuergleichenn etc.*, Oppenheim 1525. Köbel's first reckoning book was printed in Oppenheim in 1514 and was reprinted several times before he published this further expanded reckoning book in 1525.

37 Here, a shortened title is used. Jakob Köbel, *Eyn New georde(n)t Vysirbuch. Helt yn(n). Wie man(n) uff eins yden Lands Eych un(d) Maß / ein gerecht Vysirüt mache(n) un(d) do mit ein ygklich onbekant Vaß vysieren / auch seyenn inhalt erlernen solle. Den anhebenden Schülern Visirens Leichtlich mit Figuren unnd Exempeln / zu lernen / angezeigt*, Oppenheim 1515.

“Mit der Kryden oder Schreibfedern”³⁸ (1520).³⁹ The latter was the first work to introduce Hindu-Arabic numerals and the new method of reckoning with pen and paper in Köbel’s body of work.⁴⁰ The Klosterneuburg copy of 1549⁴¹ is the reprint of a joint print venture of Christian Egenolff (1502–1555) and Köbel from March 1531. Here, the first two reckoning books mentioned above were jointly printed for the first time, and the colophon explicitly states it as a joint venture by Köbel and Egenolff (fol. 112r).⁴² This cooperation between Köbel and Egenolff comes as no surprise when considering that by 1529, Köbel had to close his own printing house because of advancing sickness.⁴³ Christian Egenolff, on the other hand, was just getting started; after owning a print shop in Strasbourg, he moved to Frankfurt a. M. in 1530 and opened up the first printing house in town.⁴⁴ A joint print of two main arithmetic works of a regionally established reckoning master was exactly the kind of risk-minimising and profit-maximising venture a new businessman like Egenolff needed.⁴⁵ The cooperation with the already well-known Köbel was boosting Egenolff’s business as well as providing an opportunity for Köbel to get his works published again in one of the biggest centres of the book trade.⁴⁶ Their collaboration is correspondingly present in the book’s paratext,

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- 38 Here, a shortened title is used. Jakob Köbel, *Mit der Kryde(n) od(er) Schreibfedern durch die zeiferzal zu reche(n) / Ein neuw Reche(n)püchlein / den angenden Schülern d(er) rechnu(n)g zu ere(n) getrückt*, Oppenheim 1520.
- 39 Egenolff’s print in Klosterneuburg is bound together with a reckoning book authored by Hermann Gülfferich († 1554) and a few pages of handwritten reckoning tables. According to SMITH–WILSON, a text that is added to another text without taking on one of the classic paratext forms such as a table of contents or a preface is also considered a peritext as it is physically connected to the core text. This is not taken into account in the present study. Cf. SMITH–WILSON, *Renaissance Paratexts* (2011), p. 4.
- 40 Köbel’s publication of “Mit der Kryden oder Schreibfedern” is his only book dealing solely with Hindu-Arabic numbers, albeit much more briefly than most of his other reckoning books and without many illustrating examples. This leaves the impression that he is not too familiar with them. It also seems that it did not prove as successful since there are no standalone reprints of this work.
- 41 The library’s ownership mark (which can be dated to the 16th or 17th century) wrongly dates the book to 1531 – probably due to the preface also dating to 1531. In fact, the book was printed in 1549, as seen in the colophon. (174r).
- 42 “Getruckt zu Franckenfurt / am Mein. In Verlag unnd Gemeynschafft des Ernhaftten und fürnemen Herrn Jacoben Köbels / Stattschreiber zu Oppenheim. Bei Christian Egenolffen. Im Mertzen / Nach der geburt Christi. M.D. XXXI. Jar.” – “Printed in Frankfurt / am Main. Published in cooperation with the honorable and excellent Sir Jakob Köbel / municipal clerk of Oppenheim. Printed by Christian Egenolffen in March 1531 a.d.”
- 43 Cf. RITTER VON EISENHART, *Art. Koebel, Jacob* (1882), pp. 345–349.
- 44 Frankfurt’s character as a very important city for booktrade initially blocked the emerging of homegrown printing businesses. Cf. Hans-Jörg KÜNAST, *Bücher für Tirol – Die Literaturversorgung Tirols durch den Augsburger Buchhandel im 15. und 16. Jahrhundert*, in: *Der frühe Buchdruck in der Region – Neue Kommunikationswege in Tirol und seinen Nachbarländern*, ed. by Roland SILA, Innsbruck 2016, pp. 29–46.
- 45 One of Egenolff’s earliest print published in Frankfurt, dated a month earlier to February 1531, was a measuring manual also authored by Köbel: Jakob Köbel, *Jakobs Stab. Künstlich un[d] gerecht zu machen / und gebrauchen*, Frankfurt a. M. 1531.
- 46 Egenolff was spearheading the expansion of Frankfurt as an important city for book printing as well as trading; before that, it was primarily the Frankfurt trade fair that made the city relevant for the regional and national book trade. Cf. Josef BENZING, *Art. Egenolff [Egenolph] Christian. Neue Deutsche Biographie 4* (1959), pp. 325–326, <https://www.deutsche-biographie.de/pnd122968468.html#ndbcontent> [20.5.2025].

particularly in the colophon, in the title and in the preface that Köbel dedicated to Egenolff's noble efforts as a printer.

In 1549, sixteen years after Köbel's death, Egenolff was undertaking his fourth reprint of Köbel's book after acquiring the publishing rights.⁴⁷ However, in comparison to the editions made during Köbel's lifetime, Egenolff made quite a few changes, especially regarding the compilation of paratextual elements surrounding the main works. This already becomes apparent when looking at the title page, a publisher's paratext⁴⁸ and one of the first, most important places⁴⁹ to communicate content to a potential readership.⁵⁰ Unlike the edition of 1531, the book's title page is dominated by a large woodcut that shows four merchants sitting around a table: two are doing maths with a counting board while the other two are writing and thus already working with Hindu-Arabic numerals. This illustrates a perfectly equal balance between the 'old' and 'new' practice of arithmetic, mirrored in the incorporation of two reckoning books concerned with one and the other.⁵¹ There are lines of reckoning engraved on the table and a table of Hindu-Arabic numerals hanging on the wall behind them, indicating their practical use. On the other wall, there is an hourglass, potentially referencing the computus and calendar reckoning that is also supplied at the beginning of the book. The only open book lying on the table is presumably the one in the hand of the reader. It is also the only one the pictured reckoners seem to need. This pictorial representation

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- 47 The earlier reprints are dated to 1532, 1537 und 1544. After further prints in 1549, 1564 and 1573, the last known reprint by Egenolffs printing house, continued by his family after his death in 1555, is dated to 1584 (BENZING, Jakob Köbel (1962)). This reduced frequency and eventual ceasing of the reprints is probably due to the rise of other reckoning masters works, most prominently Adam Ries, for whom Köbel served as an influential predecessor. Ries' work was also published by Egenolffs printing house.
- 48 GENETTE uses this term for all parts of a book that fall within the publisher's decision-making power, possibly in consultation with the author. Cf. GENETTE, *Paratexts* (1997), p. 16.
- 49 Cf. ENENKEL, *Stiftung* (2015), p. 4.
- 50 The concept of a literary public is tricky, because one cannot yet speak of a public as a collective audience that knows and reads the same books. In GENETTE'S definition, all texts aimed at a general public (e.g. the easily accessible title page) and all texts aimed at an at least partially committed group of readers (prefaces, dedications) are grouped under the umbrella of publically accessible and addressed paratext. But there is no such thing as a general public for the early modern period: The ability to read was not widespread, and so booksellers had to access this thinly spread layer of literate people mainly through the formation of personal or scholarly networks to sell their books (BANGERT, *Buchhandelssysteme* (2019), p. 63). WEINMAYER states that the aim of the paratextual elements is to make the texts known to a public of potential readers, but that a "literary public [...] can no longer be grasped". Cf. Barbara WEINMAYER, *Studien zur Gebrauchssituation früher deutscher Druckprosa. Literarische Öffentlichkeit in Vorreden zu Augsburger Frühdrucken*, München–Zürich 1982, p. 13.
- 51 "The most momentous development in the history of pre-modern mathematics is the shift from using Roman numerals to using Indian numerals [...]." Charles BURNETT, *Numerals and Arithmetic in the Middle Ages*, London 2016, p. 15. The introduction of these numerals in the Arabic world by the mathematician Al-Khwarizmi (ca. 780–ca. 850) and their spread in European mathematics through Leonardo Fibonacci's (ca. 1170–after 1240) "Liber abaci" (1202) and, subsequently, through Italian reckoning schools are milestones in the development of modern mathematics. For further information see BURNETT, *Numerals and Arithmetic* (2016), pp. 15–26, pp. 87–97; Frank J. SWETZ, *Capitalism and arithmetic. The new math of the 15th century*. Including the full text of the "Treviso Arithmetic" of 1478, La Salle, Ill. 1987.

shows exactly what to expect from the book and how its contents can be applied. It illustrates the application of the content depicted in the first and visually protruded line of the title: “Rechenbuch / Auff Linien und Ziffern” and therefore emphasises the self-identification of a potential reader with the contents of the book. Through showing a merchant’s practice working thoroughly with this book on the table, it also underlines what is promised in the subtitle: not only is this reckoning book sufficient to teach two methods of arithmetic, it also provides information to work with “alle wahr und Kauffmanschaft. Müntz / Gewicht / Elen unnd Maß / viler Land und Stett verglichen”⁵² – all the goods and tradings, the coins, weights and measurements of many countries and cities compared –, in other words: everything a merchant may need.

The duality of ‘lines and pen’ introduced in the titular picture continues in the content; the book contains an extended preface discussing the difference between the Roman numerals, called German numbers (“teutsche Zahlen”), and the new Hindu-Arabic numbers (fol. 8r–13v). This preface is a staple in Köbel’s works, since it already appeared in his reckoning book of 1514 and its several reprints, as well as in the reckoning books of 1525 and 1531.⁵³ Initially Köbel states his need to be of use to common people, and uses this as a justification to still calculate with the already established Roman numerals, which he calls “Teutsch” (fol. 8r) due to their common distribution. Therefore, he positions them as a status quo; they are widespread and easily understood and therefore serve as a basis for the book. Furthermore, he promises that he will likewise explain the Hindu-Arabic numerals, called “Ziffern” (fol. 8r), even though they are supposedly difficult to be grasped by laymen. He claims to do so mainly to accommodate younger readers, enabling them to understand other, more complex reckoning books dealing with these ‘new’ numbers.

Through these explanations, Köbel constructs his readership; on one hand his book is aimed at every reader wanting to learn (more) about mathematics, therefore incorporating the ‘old’ Roman numerals. On the other hand, he shapes a readership of young and aspiring students who have a lot to gain. His book claims to provide additional didactical value through making mathematics appealing for these eager young pupils. It teaches the ‘new’ numerals, and the new cultural technique of reckoning with pen and paper in contrast to the well-known abacus, as well as making sense of the many different goods and coins one can trade with. He further implies that the use of his book fosters a broad understanding, and stimulates a further thirst for knowledge. Thus, he brings together two target groups

52 The categories of locations named for currencies are Oppenheim, Bingen, Frankfurt, Cologne, Nuremberg, Austria, Hungary, Meissen, Augsburg, Strasbourg, Württemberg, Salzburg, Regensburg, Prague, Ulm, Denmark, Poland, Lübeck, Riga, Königsberg, Gdańsk, Switzerland, Basel, Venice, and Paris (fol. 14r–17v).

53 During Köbel’s life, it appears in the following editions and reprints: Oppenheim 1514, Augsburg 1514, Augsburg 1516, Oppenheim 1517, Oppenheim 1518, Augsburg 1520, Oppenheim 1522, Oppenheim 1525 and Frankfurt a. M. 1531.

that are most important for arithmetic books: the ordinary user, who uses and needs mathematical operations in their everyday life, and the student.

With regard to the popularity of these two systems, Köbel demonstrates a discrepancy: After his introduction, Köbel justifies his explanation of the well-known “Teutsch”, meaning Roman, numerals with the need for young readers to know them even if they already seem outdated and are not in common use anymore. Thus, he creates a disparity between taught and lived mathematics – even though the Roman numerals are outdated in teaching, they are still practised by many people who do not know the ways of Hindu-Arabic numerals. Köbel wants to incorporate the ‘new’ numbers and legitimise himself as a ‘modern’ reckoning master, while careful not to disregard or discredit the established system and those readers still dependent on its use. He aims to create the utmost amount of applicability, to the point of openly interpret statements of hierarchy between two disputing systems. Hindu-Arabic numerals and their complex place value system, which was apparently already in use by the majority of young scholars, are also explained in detail. So it seems, at least according to Köbel, that the new figures are not yet widespread enough for everyone to master them easily. Nevertheless, his lengthy explanation also hints at their growing importance.

Even though this kind of preface was already published several times before in Köbel’s work over a long span of time, it was apparently still relevant enough for Egenolff to include it in the 1549 reprint obtained by the Klosterneuburg Abbey, especially against the backdrop of the new inclusion of “Mit der Kryden oder Schreibfedern”, Köbel’s book solely concerned with Hindu-Arabic numerals. This cannot be said about all of Köbel’s established prefaces and paratexts. A lot of his paratextual elements have been repeated throughout a number of his books and their reprints. Notably, another lengthy preface officially authored by Köbel can be traced back through various earlier books,⁵⁴ but by 1549, it had disappeared.

In order to further investigate the matter, the functionality of a preface must be considered alongside another paratextual element that fulfils a similar function. In the aforementioned first reckoning book by Köbel, printed in Oppenheim in 1514, he includes an extensive dedication to “Dietherichen Kemerer von Wormbs” (fol. 2r–2v), presumably Dieter VI. of Dalberg (1468–1530), a knight and high-ranking Electoral Palatinate official stemming from the noble and influential “von Dalberg” family.⁵⁵ In his dedication, Köbel construes a personal bond between himself and the “Junckhern” (fol. 2r) by claiming he still owes him a housewarming gift owing to Dieter’s father Wolfgang relocation from Oppenheim to Dalberg and thus creating the Dalberg line. Since he cannot offer gold, silver, or, as it would be fitting for

54 The preface appears first in an edition of the reckoning book of 1514, Oppenheim 1517, and after that, in the following reprints: Oppenheim 1518, Oppenheim 1522, Oppenheim 1525 and Frankfurt a. M. 1531.

55 The “von Dalberg” family was younger branch of the “Kämmerer zu Worms” family who held important offices within the Holy Roman Empire and was influential in the upper Rhine region. Cf. Kurt ANDERMANN (ed.), *Ritteradel im Alten Reich. Die Kämmerer von Worms genannt von Dalberg, Epfendorf* 2009.

a poet, a poem, Köbel has to resort to a reckoning book (fol. 2r) thus implying that reckoning is the best speciality he can offer and simultaneously framing it as an immensely valuable asset.⁵⁶ By mentioning himself and his work in the same breath as a poet and drawing parallels between their works, Köbel also positions the arithmetic book within the realm of literary creation.

Furthermore, Köbel attributes his work to all young, budding, inquisitive calculators and praises his patron's scientific abilities and interest in arithmetic. Thus, Köbel uses the dedicatees status and relations to make himself and his work tangible. Knowledge transfer “moves towards its goal via the concept of the author, his appearance and his network”⁵⁷ – this works not only by Köbel introducing himself through his position as a municipal clerk but also by establishing a personal relationship (“fruntschafften”, fol. 2v) with the humanist Dieter VI., thus managing to underline his own credibility. Even though an otherwise established scholar, it shows that Köbel is still required to do so with his first reckoning book.⁵⁸ At the same time, he also evokes factual paratext,⁵⁹ a paratext composed of the knowledge and opinions readers already harbour about mentioned people. Dieter VI. plays an important role in the transfer of knowledge as he is an authoritative figure of reference for Köbel, on whom he relies when he enters public space.⁶⁰

But contrary to Genette's distinct separation of preface and dedication, the same cannot be so readily said for early modern literature. In the early modern period, a dedication not only serves vague “economic reasons”⁶¹, as Genette puts it without elaborating further. As was shown, it shares a range of possible tasks with the preface: constructing and perpetuating authorship concepts and authorial staging, guiding the readership, imparting knowledge and demonstrating the value and justification of the text itself.⁶² This comes into play

56 Later in the text, Köbel again compares reckoning to gold and diamonds and values the former much higher since everything in the divine creation is organised through numbers and measures (fol. 2r). Of course, regarding the comparison of his abilities to the works of predecessors, Köbel shows appropriate and necessary humility – praising the art of reckoning which he can only depict to the best of his abilities.

57 ENENKEL, Stiftung (2015), p. 17.

58 Cf. MEIER-WAGNER-EGELHAAF, Autorschaft (2012), pp. 9–18.

59 GENETTE's concept of factual paratext is tapping into a presumed ‘general’ or worldly knowledge: “By *factual* I mean the paratext that consists not of an explicit message (verbal or other) but of a fact whose existence alone, if known to the public, provides some commentary on the text and influences how the text is received.” GENETTE, Paratexts (1997), p. 7. For the area around Oppenheim, this may apply to the educated students and readership, to whom Köbel could have been known as a former bookkeeper, high-ranking town official and well-connected scholar.

60 Cf. n. 50.

61 GENETTE, Paratexts (1997), p. 123. For a period roughly categorised as ‘before the 18th century’, GENETTE attributes dedications solely to economic reasonings without elaborating much on the implied relationship between dedicator and dedicatee. *Ibid.*, pp. 117–123.

62 Regarding the functionality of a preface, Hans EHRENZELLER puts up a distinction between work-, author- and reader function for 16th century prefaces which proves to be a useful instrumentarium: Work functions include all information about origin, sources, arguments of justification, explanations regarding the title, predecessors, etc. Reader function includes every form of contact with the imagined recipient, for example

when Köbel's mentions of Dieter VI. grow less and less over the first few editions of his book. While he is first present in the Oppenheim print of 1514, both in the dedication as well as in a woodcut showing him holding a book together with Köbel (fol. 1v), the engraving already disappears in the Augsburg reprints of 1514 and 1516, and by 1517⁶³ his appearance is entirely replaced by the aforementioned lengthy preface officially authored by Köbel. When looking at prefaces with regards to the author's "suggestive effect on the audience" as a "structure-forming principle"⁶⁴, it seems that Köbel simply does not need his dedicatee to promote his work in the paratext anymore. Instead, he deflects criticism of his first book and shows his scholarly competence by referring to the authorities of Demosthenes and Plutarch when complaining about the impossibility of pleasing everyone. Despite the alleged disapproval and resistance of the envious and the ignorant, he then presents an improved, expanded version of the book originally dedicated to Dieter VI., because many friends and colleagues sought after a new book: "Aber onangesehen dasselbig / wil ich umb bit / vieler / meiner Herren / Fründ und Gesellen mein [...] Rechenbüchlein [...] Ytzo Meren" (fol. 2r). Köbel furthermore puts a lot more emphasis on his readership, emphasising multiple times how easy it is to study with his book and how well it caters to the needs of more experienced reckoners expanding their knowledge. He highlights that the book is suitable for both young and experienced calculators, but puts a special emphasis on the necessity of studying mathematics at a young age, since without the knowledge of numbers an individual could not benefit themselves or others, nor govern goods or act well (fol. 2r–2v).⁶⁵ The construction of the author and the establishment of contact with the recipients, previously created mainly through introducing a relationship in the dedication, is now replaced in the preface: The conception of the author Köbel and his work now puts its emphasis more strongly on his proof of scholarship and the inclusion of a supportive scholarly environment. Communication with the recipient is less dependent on the relationship to an influential person but rather focuses on guiding the reader and placing emphasis on the target group.

The only remaining paratext combining these functions in Egenolff's reprint of 1549 is a short preface originally appearing in the print of 1531 (fol. 1r). It reads like a quick run-through of earlier paratextual functions. Köbel introduces himself, cites authorities, and makes himself known as a scholar before moving on to the main part: promoting his

humility, dedications, direct approach, reading guides and so on. Lastly, the author function includes every information the author gives about himself or his circumstances. Cf. Hans EHRENZELLER, *Die Romanvorrede von Grimmelshausen bis Jean Paul*, Basel 1955.

- 63 Jakob Köbel, *Eyn Neüw Reche(n)büchlein. Uff den Linien und Spacien / Mit den Rechenpfeninge(n): Ytzo: zu dez Zweyten male / Mit viln Zusetzen / guten Lernen / unnd Exempeln / Zu Oppenheim Geordent und Getrückt*, Oppenheim 1517.
- 64 WEINMAYER, *Studien* (1982), p. 10.
- 65 This argument, which treats the knowledge of mathematics as paramount in a world 'made of numbers', culminates in elevating the art of arithmetic above all other arts. In doing so, he picked up a common trope appearing in vernacular reckoning books since the "Sacrobosco Algorismus" by Johannes de Sacrobosco (ca. 1195–ca. 1256).

then-new printer Egenolff. Köbel contrasts the hard-working Egenolff with previous, lazy printers and praises his work. Their joint edition is again corrected and new material is added which serves as a sales argument. For the sake of the young prospective pupils, hereby again outlining a target group, Egenolff is to print this book on arithmetic and field measuring in order to spread the common benefit, thus emphasising its applicability. On a side note, Köbel's preface is dated to the Monday after *Esto Mihi*, the last Sunday before lent, which in the year of 1531 falls on the 20th of February, the day of St Corona. St Corona is the patron saint of money, whose German meaning "crown" (Krone) also possibly refers to various currencies.⁶⁶

What is kept and what is lost in the paratext is significant. The explanatory preface about two parallel numeral systems is still deemed necessary by Egenolff (fol. 8r–13v). Combined with the fact that Köbel's only Hindu-Arabic-specific book is now, under Egenolff's sole oversight, part of the joint print makes an argument for the ever-growing relevance of the new numeral system and the persistence of change in merchants' mathematics of the time. Egenolff adds more emphasis on the new numerals than Köbel or the reckoning books published in 1525 and 1531, partly because they have probably become more widespread in the meantime, while the Roman numerals still have not completely vanished. Furthermore, in contrast to the catholic Köbel, Egenolff was privately and commercially involved with leading figures of the Reformation like Philipp Melanchthon (1497–1560).⁶⁷ Popularising knowledge is, therefore, not only a means to make good business, as these easily understandable books were for Egenolff,⁶⁸ but it was also part of the reformatory movement.⁶⁹

While Köbel's own authorial constructions are mostly deleted, only an essential preface tying him to Egenolff is deemed necessary enough to remain. Meanwhile, the book is expanded in many other ways, putting the focus on an utmost inclusion of knowledge; on one hand by carrying on the paratext of the numeral preface and adding another body of main text solely about Hindu-Arabic numerals; on the other hand by adding a register of coins with illustrations (fol. 150r–167v), a calendar of all the major trade fairs and their

66 Jakob Köbel is not the only one to make such a reference. The St. Gallen mathematician Clemens Hör also uses a specific date to give additional meaning to his paratext, as can be seen in another study published in this book: Norbert ORBÁN, *Faith in Trade – The Reckoning book of Clemens Hör (1515–1572) and the Reformation Crisis*, p. 45.

67 Marie Louise GÖLLNER establishes a direct link between Egenolff's corpus of music publications and his close relationships with the humanist movement and the leaders of the Reformation. Cf. Marie Louise GÖLLNER, *Art. Egenolff, Christian*. *Grove Music Online*, <https://www-oxfordmusiconline-com.uaccess.univie.ac.at/grovemusic/display/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000008601> [16.6.2025].

68 Cf. Christian Egenolff: 1502–1555. Ein Frankfurter Meister des frühen Buchdrucks aus Hadamar, ed. by KULTURVEREINIGUNG HADAMAR, Limburg 2002; Hermann GROTEFEND, *Christian Egenolff. Der erste ständige Buchdrucker zu Frankfurt a. M. und seine Vorläufer*, Frankfurt a. M. 1881.

69 Cf. Thomas SCHLAG, *Reformation als Bildungsbewegung und ihre Bedeutung für religiöse Bildung in der pluralen Gesellschaft*, in: *500 Jahre Reformation. Rückblicke und Ausblicke aus interdisziplinärer Perspektive*, ed. by Peter OPITZ, Berlin–Boston 2018, pp. 111–130; *Spurenlese: Wirkungen der Reformation auf Wissenschaft und Bildung*, ed. by REFORMATIONSGESCHICHTLICHE SOZietät DER MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG, Leipzig 2013.

dates in Germany (fol. 167v–169r), the list of a typical Frankfurt annuity (fol. 169r–169v), and conversion tables of weights (fol. 170r) and wine-related measures of capacity and standard measures (fol. 170v–172v). This also first appears in the 1549 edition. The book also includes a calendar for computus reckoning that had appeared before in 1531. As a result, contents of broad applicability, which are intended to make the book more marketable, not only support and present the main text, but are also delegated to the paratextual framework of the print. They substitute authorial presentation, which is shown to be far less relevant in the 1549 edition than it was before. Köbel's possibly dwindling reputation, eventually overshadowed by Ries, which is evident in the lessening frequent reprints, could be a reason for that.

These contents, arguing in favor of applicability, are not only seen in the changes to the publisher's and the authorial paratext. Their appearances seem to almost transform the character of the whole book: By adding so many paratextual elements theoretically working on their own – a calendar of markets, another calendar suitable for computus reckoning, an explanation of two numeral systems and a register of coins – a larger framework, almost resembling a compendium of knowledge related to the use of numbers and to trading practice rather than merely a reckoning book is built up. The arithmetic book is transformed from a pure textbook that has a stringent reading character to an applicable reference work and handbook: The topics are tied together by their mathematical origin, but they are broadly spread. It truly serves as a reference work for the use of mathematics by the 'common man'.

SIGISMUND SUEVUS

The second arithmetic book examined in this study is the “*Arithmetica historica*”⁷⁰, written by the theologian, pastor, and teacher Sigismund Suevus, and first printed in 1593 in Wrocław. At first glance, Suevus' reckoning book shows the typical paratextual elements of a 16th-century print, similar to Köbel's work. On an expansive title page, the onlooker's eye is first caught by the large red font displaying “*Arithmetica Historica. Die löbliche Reche[n] kunst*”. Its composition “*Aus vielen gutten Büchern un(d) Schriff[Note: continued with = ten]*” (“Of many good books and scriptures”) is highlighted as well, relating to important predecessors. But the attention of the public, now expecting a reckoning book, is subverted when taking a closer look. Instead of advertising the work's applicability and maximising usefulness through incorporating various coins and measurements from surrounding cities and countries, like Köbel's books do, Suevus claims to calculate with Hebrew, Greek and Roman coins. He also does not care about including a variety of goods and merchandise, but rather focuses on “*gedenckwürdigen Historien*” (remarkable stories), taken not from preceding reckoning

70 In the following, primarily a posthumous reprint from 1620 is used, supplemented by the first print from 1593. Cf. n. 14.

books, but from the holy scripture and history books. Furthermore, Suevus' self-construction at the bottom of the title page specifically presents the image of a preacher, provost and pastor, not a mathematician.⁷¹

This ambiguous messaging to the addressee continues in the preface: Albeit dedicated to the honourable merchants of Breslau and thus establishing a connection to trade practice and merchantry, its list concerning the applicability of mathematics puts clergy and church offices on top, ahead of merchants who are named only in fourth place. After Suevus extensively demonstrates his scholarly knowledge of Bible passages and different authorities (fol. 2r–4v), he then makes reference to his many years of experience as a teacher (fol. 5r), but still always closely tied to his church offices. His detailed self-styling as a teacher, scholar and theologian, thus creates a didactic expertise, but one that never strays from his religious background. This is then followed by a statement that serves as an additional, now even clearer directive for the readers expectations, as he wants to play to his self-declared strengths (fol. 5r). Suevus does not base his reckoning examples on other, albeit prestigious arithmetic books, but rather on stories and examples as well as currencies and measurements from the Bible and history books (fol. 5r–5v). Where Köbel explicitly states that his reckoning book is catered to the needs of young students and the everyday man who needs to calculate, Suevus further reinforces the opposite. He makes it clear that his explanations of mathematical operations can only be understood if the individual has already gained enough mathematical knowledge from other reckoning books (fol. 5v), thereby defeating the purpose of an arithmetic book to teach basic operations.⁷² Even though the layout of the main body of the text is copying the basic structure of a reckoning book (basic operations first, reckoning rules and body of examples later) and its title suggests that it is an instructive text on reckoning, the actual aim of the text and the readership it is targeted to must be understood through the metadiscoursal function of the paratext. This metadiscoursal function is initiated in the title and concluded again in the preface: Even though promoted as a reckoning book at first glance, it is not accessible to the group Köbel had constructed as his core readership, but rather to readers already proficient in mathematics and more

71 Suevus' life was characterised by frequent changes of location: He went to Wittenberg in 1551, probably to expand his theological knowledge and prepare for the preaching ministry, where he attended lectures by Philipp Melanchton. Suevus later worked as a pastor and teacher before settling in Breslau in 1584, where he became provost of the church "Zum heiligen Geist" and pastor of the main and parish church of St Bernardin. Cf. Chr. Fr. D. ERDMANN, Art. Suevus, Siegmund. *Allgemeine Deutsche Biographie* 37 (1894), pp. 129–135, <https://www.deutsche-biographie.de/pnd124639240.html#adbcontent> [30.6.2025]; a newer, updated article sadly has not been written. Furthermore, cf. Martin CHRIST, Sigismund Suevus (1526–1596), Sharing Spaces and Objects, in: EAD., *Biographies of a Reformation. Religious Change and Confessional Coexistence in Upper Lusatia, 1520–1635*, Oxford 2021, pp. 153–174.

72 Cf. n. 18.

interested in honing their skill on theological matters, with mathematics serving a primarily recreational purpose.

Thus, Suevus makes use of the widely taught art of arithmetic and the wealth of reckoning books that compete for an audience, jumping on this successful bandwagon to promote another cause. His mathematical instructions are merely a backdrop for theological didactics and lessons about greed, righteousness, and piety. Suevus, a supporter of the Reformation and a disciple of Philipp Melanchthon,⁷³ therefore utilised the widely spread, successful structural scheme of the arithmetic book to insert his religious teachings into its narrative. He thus taps into an already established large readership interested in mathematics. Furthermore, as Wrocław was one of the most important trading cities of the Holy Roman Empire,⁷⁴ Suevus could count on a large and potentially interested audience. Even if people were not yet capable of reckoning and could not use his book in the same way they could use Köbel's, Suevus' work gives the impression that it predominantly serves to acquire other knowledge against the arithmetic setting.⁷⁵

However, by combining mathematics and storytelling, Suevus also positions himself not entirely out of the context of his predecessors. In German vernacular arithmetic books from the second half of the 15th to the 16th century, arithmetic example collections are increasingly filled with larger examples telling more intricate stories, thus tapping into "protonarratives"⁷⁶ to shape fully formed short narratives. These 'mathematical narrations' are also increasingly associated with entertainment and emotional appeal.⁷⁷ In Suevus' case, this takes on a new form in the combination of calculations with Bible stories and contents presented as chronical, even letting the stories take precedence over the mathematical

73 Furthermore, Suevus compiled Luthers work: Sigismund Suevus, Register aller Schrifften des ehrwürdigen Herrn D. Martini Lutheri / gerichtet zu gleich auff die XIX. Wittenbergischen / und XII. Jhenischen Tomos / beyders des Alten unnd Newen Drucks / allen Liebhabern der Bücher Lutheri gantz nützlich zu gebrauchen, Breslau 1563.

74 Cf. Wien. Geschichte einer Stadt. Band 2: Die frühneuzeitliche Residenz (16. bis 18. Jahrhundert), ed. by Karl VOCELKA–Anita TRANINGER, Wien 2003.

75 Interestingly enough, one of the few modifications made between the first print of 1593 and the reprint of 1620 (besides the epitaph remembering the since then deceased Suevus), can be found in the title: While the original edition of 1593 still boasts to be a great and entertaining read even for those who have not been taught to do math ("Auch denen die nicht rechnen können / wegen vieler schönen Historien und derselbigen bedeutungen lustig und lieblich zu lesen"), this short passage of text was deleted from the 1620 title page and thus seems to show a shift in target groups and contextualisation of the work.

76 Caroline EMMELIUS, Kasus und Novelle. Beobachtungen zur Genese des Decameron (mit einem generischen Vorschlag zur mhd. Märendichtung). *Literaturwissenschaftliches Jahrbuch* 51 (2010), pp. 45–74.

77 Arithmetic examples are e.g. populated by carousing virgins and hermaphrodites embroiled in inheritance problems, cf. Michaela WIESINGER, Regula Virginum: Die kulturhistorische Relevanz von Rechenaufgaben am Beispiel des "Zechrechnens". *Archiv für Kulturgeschichte* 105/1 (2023), pp. 61–88; this can also be seen in Jakob Köbel's reckoning book situated in Klosterneuburg, as shown in the article published in this book: Michaela WIESINGER, Entertainingly industrious. Jakob Köbel's reckoning book in the context of his other writings: A case study on print G I 92 held by the monastery library Klosterneuburg, p. 105.

problems presented.⁷⁸ Through his use of topics, Suevus also ties his text to a second, widespread genre mostly used by preachers like him:⁷⁹ theological, especially protestant collections of examples. This fusion works well for several reasons: the term ‘example’ does not have to refer to specific content, but rather to the function of providing a reference to something else.⁸⁰ Collections of examples lay claim to a certain degree of historicity,⁸¹ especially when relating to examples from (contemporary) history, like Suevus does. The setting of a reckoning book, through which one can attain knowledge of the divine order of all things (fol. 2r) and calculate historic and biblical dates, reinforces this claim even more. Additionally, the reckoning book also lends its basic framework to the arrangement of the individual examples: A collection of examples cannot be arranged in a random or arbitrary sequence, but instead it needs an overarching structure.⁸² This structure is provided by the arithmetic book’s relatively fixed narrative composition of theory and practice, which provides great interchangeability in the individual parts.

This structural exchangeability can also be extended to the paratext. After the end of the main text, Suevus’ book, like Köbel’s, also contains a series of appended paratexts. However, while the latter’s book contains a coin register and a calendar of trade fairs, Suevus adds a register of ancient currencies and units of measurement to his work. He also includes an index of the histories, doctrines, and names mentioned. The difference here does not lie in the possibility of applicability, but again in their functionalisation: Where there is a register of trading fairs and current measurements, it is likely helpful for a merchant to read the book. Where there are registers of stories, it more likely useful for those searching for a theological and moral education.

To better understand Suevus’ fascinating amalgam, Albrecht Koschorke’s concept of literary centres and peripheries, which is based on Jurij Lotman’s concept of cultural semiotics, can be of great help.⁸³ According to Koschorke, every categorisation of literature implies an inner consolidated core that weakens towards the periphery.⁸⁴ This is also applicable to arithmetic books. Their peripheral border area is more dynamic and more open to change than the established centre, and thus accordingly the potential for contact and innovation

78 Suevus thus joins the ranks of the forerunners of later purely entertaining mathematicians who published arithmetic books that favored entertainment over education, cf. Georg Philipp Harsdörffer, *Mathematische und philosophische Erquickstunden*, ed. by Jörg Jochen Berns, Frankfurt a. M. 1990/1991 (Repr. of Nürnberg 1636–1651); Daniel Schwitzgebel, *Deliciae physico-mathematicae*, Nürnberg 1636.

79 Cf. Bärbel Schwitzgebel, *Noch nicht genug der Vorrede: Zur Vorrede volkssprachiger Sammlungen von Exempeln, Fabeln, Sprichwörtern und Schwänken des 16. Jahrhunderts*, Tübingen 2013, pp. 11–14.

80 *Ibid.*, p. 12; Walter Haug–Burghart Wachinger, *Exempel und Exempelsammlungen*, Tübingen 1991.

81 Cf. Gert Ueding, *Rhetorik des Schreibens. Eine Einführung*, Weinheim 41996.

82 Collection of examples often use the dekalog as a structuring principle, cf. Schwitzgebel, *Noch nicht genug* (2013), pp. 39–40.

83 Cf. Albrecht Koschorke, *Wahrheit und Erfindung. Grundzüge einer Allgemeinen Erzähltheorie*, Frankfurt a. M. 2013, pp. 128–133.

84 *Ibid.*

on the periphery arises.⁸⁵ Diachronically speaking, Sigismund Suevus is already situated on the temporal periphery for the printed merchant's account books, compared to Köbel's.⁸⁶ Furthermore, his professions as a theologian and priest, as well as a mathematician and teacher, lay the ground for a contact of both professions, resulting in a transformative effect. Wrocław, geographically on the edge of the Habsburg monarchy, but still an important trading centre, provides a fertile market for reckoning books. All of this is recorded in the paratext, which offers a place for the meta-discursive handling of the text type itself. The paratext, also spatially situated on the periphery of the text, allows for a distinct and outspoken contextualisation of the text, making it in fact, as Genette says, present.

Interestingly enough, this crossing of a border is also very present in the approach to constructing authorship. In Suevus' book, the staging of authorial identity is significant: His persona is highly visible in the lengthy preface, and a publisher's peritext in the form of an epitaph (fol. 1v)⁸⁷ is added in the 1620s print as well as a Latin text remembering his life (fol. 6v). His frequent appearances, always keeping him in the forefront of the reader's mind, are always related to his position as a theologian and preacher, thus aiding and strengthening the innovative directive of the book.

In contrast to Suevus, the authorial staging of Jakob Köbel has almost disappeared from the posthumous reprints of his work. This can be attributed to the fact that an outstanding authorial presentation simply no longer adds value to the presentation of the book and the mediation of its knowledge as desired by Egenolff. It is questionable whether this is not necessary because Köbel was a household name, or, more likely, because he was not. Köbel is possibly more or less 'concealed' due to his lack of proficiency and prestige regarding Hindu-Arabic numerals, and due to being overshadowed by the likes of Adam Ries. His name seems to no longer be a selling point. Suevus, however, is presumably present because his portrayal as a theologian and, in a secondary capacity, as a teacher and mathematician, is important for the communication of the knowledge conveyed. Whether Suevus was indeed such an esteemed and well-known citizen of Breslau, as he is claimed to have been, is of secondary importance. The main point is the suggestive effect of this claim and his characterisation in the paratext, and thus in the perception of the audience.

85 One could argue that a reckoning book with its narrative examples is also located on the dynamic periphery of narrative literature and can therefore bend and change the rules that apply to genuinely fictional texts. As mentioned before, Köbel even draws a parallel between a poet and himself.

86 E.g., the earliest printed reckoning books, among them Ulrich Wagners "Bamberger Rechenbuch" (1483) or Johann Widmanns "Behende und hubsche Rechenung" (1489), appeared in the 1480s, while a pinnacle of print production can be seen in the first half of the 16th century, as seen in many appearing popular prints, e.g., Christoff Rudolff's popular reckoning book "Künstliche Rechnung mit der Ziffer unnd mit den Zalpfennigen" (1526) or Adam Ries' "Rechenung auff der Linien und Federn" (1522).

87 The epitaph is attributed to Nicolaus Steinberg, a teacher, principal and writer from Wrocław. He also authored an additional preface in latin, giving further praise to Suevus.

CONCLUSION

Both texts show that paratextual elements in early modern reckoning books are becoming more numerous and diverse in terms of their form and function. Jakob Köbel, as a former bookkeeper in the economically potent region around Oppenheim,⁸⁸ knew how to promote a book. In his earlier arithmetic works, his strong authorial presentation in the paratext can be related to the ever-increasing claims of originality by authors, probably due to new professionalisation strengthening the importance of proclaimed expertise and authorship.⁸⁹ Furthermore, it also stems from the need to present and contextualise ‘new’ knowledge, e.g. in the form of a newly introduced numeral system or simply in the case of a reckoning book written by a scholar not yet known for his proficiency in mathematics.⁹⁰ This innovative character also applies to Suevus, he, too, needs a strong presence of his persona as a theologian and teacher to defend an innovation, in this case his novel mixture of an arithmetic book and an example collection. All of this is transported to the recipients via the diverse paratextual elements grouped around the main body of text.

According to Albrecht Koschorke, each individual work of a greater ‘genre’ (i.e., also the individual arithmetic book in the greater context of reckoning books) is composed of an individual sequence of interchangeable structural elements. These elements are taken out of a larger ‘narrative matrix’ of the genre, containing its possibilities, variances and limitations.⁹¹ Subsequently, this can be applied not only to the main text, but also to the paratextual elements. The ‘genre’ of vernacular German arithmetic books, therefore also makes up a paratextual narrative matrix, from which the individual work can take and apply what is needed to convey messages to the public. This is shown in the way that Köbel’s and Suevus’ works incorporate very similar paratextual elements (indexes, prefaces, registers of coins, currencies and measurements), but with different functionalisations, fitting to their respective content. It can also be seen in the way Christian Egenolff breaks apart, rearranges, and reframes the paratextual elements of Köbel’s former works to fit his narrative of a reckoning book that was designed for broad usability and applicability.

As Wilson and Smith argue, the paratext is not merely a threshold but rather an outpost of a text that does more than just introduce and present:⁹² “Even properly liminal paratexts, including indices and addresses to the reader, operate in multiple directions, structuring the reader’s approach not only to the text in question but to the experience of reading, and of

⁸⁸ Oppenheim is not only situated on an important Rhine crossing, but also close to the already mentioned Frankfurt trade fair. Furthermore, GRIMM states that many booktraders slept at Köbel’s place when travelling to Frankfurt. Cf. GRIMM, *Ulrich von Huttens persönliche Beziehung* (1964), p. 147.

⁸⁹ Cf. MEIER–WAGNER–EGELHAAF, *Autorschaft* (2012), p. 17.

⁹⁰ As MEIER and WAGNER–EGELHAAF say, a strong authorial appearance is especially potent for the defense of not entirely unchallenged innovations. Cf. MEIER–WAGNER–EGELHAAF, *Autorschaft* (2012), p. 14.

⁹¹ Cf. KOSCHORKE, *Wahrheit und Erfindung* (2013), pp. 38–61.

⁹² Cf. SMITH–WILSON, *Renaissance Paratexts* (2011), pp. 4–7.

interpreting the world beyond the book.”⁹³ Accordingly, the way paratexts work as multidirectional stages in German reckoning books has to be seen in the greater context of a process of popularising knowledge. This popularisation must be distinguished from pure distribution and simple reduction, as it is an individual process of interaction between producers and recipients, especially in an economically driven sector such as book printing.⁹⁴ Paratexts are, therefore, as Arthur Marotti puts it, zones of parleying where different interests and authorities meet: They are “a site of contestation and negotiation among authors, publishers /printers, and readership(s)”.⁹⁵ This also applies to the work of Köbel, where the paratextual stage becomes not only a place for the promotion of himself, but also for his deletion and the recontextualisation of his work by Egenolff. Meanwhile, Suevus must make an impact to convince a broad readership of the bold premise of his work.

This communication between text producer and addressee takes shape primarily in the accompanying texts through direct addresses and through the positioning of the author and the audience. Paratexts, therefore, recontextualise or even change the character of reckoning books. A possible next step would be to examine the structures and functions of paratextual elements across a broader range of arithmetic books.⁹⁶

⁹³ Ibid., pp. 6–7.

⁹⁴ Cf. Carsten KRETSCHMANN, *Einleitung: Wissenspopularisierung. Ein altes, neues Forschungsfeld*, in: *Wissenspopularisierung. Konzepte der Wissensverbreitung im Wandel*, ed. by EAD., Berlin 2003, pp. 7–22, pp. 9–16.

⁹⁵ Arthur F. MAROTTI, *Manuscript, Print, and the English Renaissance Lyric*, Ithaca 1995, p. 222. As cited in SMITH–WILSON, *Renaissance Paratexts* (2011), p. 8.

⁹⁶ Paratextual functionalisation strikes a balance between the implementation of general structures and individualisation: While predetermined paratextual structures are adhered to, they are also adapted to address specific issues. Paratext is therefore important for understanding how the authorial, teaching and narrating figure is constructed. I will discuss this in more detail in my dissertation on late medieval and early modern arithmetic books, using the reckoning books of Sigismund Suevus (1526–1596), Robert Recorde (1510–1558) and Clemens Hör (1515–1572) among many others as examples.

“PUT/THROW FROM YOU!”

SUBTRACTING IN MEDIEVAL BRYTHONIC, GERMAN, IRISH, AND LATIN

Bernhard Bauer

PRELIMINARIES

The idea for this paper¹ arose while working together with Michaela Wiesinger, the PI of the ERC-Starting Grant project “ARITHMETIC: German Arithmetical Treatises in Manuscripts of the Late Middle Ages (1400–1522). A Study on Philology, History and Culture based on a Digital Edition of the Treatises” (agreement no. 101039572)². This project focuses on how arithmetic knowledge and the practice of arithmetic changed in the late Middle Ages in Europe. An important factor here is the change from Latin to using the vernaculars in mathematical contexts which eventually led to the establishment of a German mathematical jargon. While working on the manuscript *St. Gallen, Vadiana, ms 418*³ which transmits Clemens Hör’s reckoning book, we came along the phrase *wirf(f) (hin)weck/von* ‘through away/from’. It first occurs on folio 7r: *Die prob nim also / nemlich von baiden zalen obdem strich [...] 6 zu 4 ist 10 wirff 9 daruon* ‘How to take the test / namely from both numbers above the line [...] 6 to 4 is 10 throw 9 of it’⁴. Using ‘throwing from’ to describe subtraction reminded me of examples in a completely different environment: early medieval Latin and Celtic glossed manuscripts, and stimulated an exploration into this semantic overlap, focusing on the preliminary corpus of my own ERC-Consolidator project “GlossIT: Celtic and Latin glossing traditions: uncovering early medieval language contact and knowledge transfer” (agreement no. 101123203).⁵

1 I would like to thank Michaela Wiesinger, Hanna Blum, the GlossIT-team, the anonymous reviewer, and the editors for insightful comments.

2 <https://www.arithmetic-project.org/> [19.6.2025].

3 See the appendix for short descriptions of the manuscripts mentioned in this article.

4 Unless otherwise stated translations are mine.

5 <https://glossit.uni-graz.at/en/> [19.6.2025]. This project started in June 2024 and will run until the end of May 2029. Together with my team, we are researching knowledge transfer and language contact between the early medieval Insular Celtic vernaculars, i.e. Old Irish, Old Breton, and Old Welsh, and Latin in the early medieval period visible in glosses.

EXAMPLES AND ANALYSIS

Early Medieval Computistical Texts and Their Glosses

A major part of the corpus for GlossIT consists of Latin and Celtic glosses on the Venerable Bede's computistical works *De Natura Rerum*, *De Temporibus* and *De Temporum Ratione*. The latter counts as Bede's *opus magnum* on time-reckoning and dates to 725.⁶ Copies of it were widely distributed and feature heavy glossing in Latin and other Western-European vernacular languages. The text is essentially about finding the correct date for Easter. Hence, it contains different formulae and many calculations, especially from chapter 16 to chapter 24.⁷ In terms of arithmetical operations, the most frequent ones are multiplication and division, followed by addition. Subtraction is not needed in many formulae, but when it is mentioned it is usually expressed with the Latin second singular present active imperative *tolle* 'remove, take away!'. It occurs a total of 13 times in Jones' edition⁸ of Bede's *De Temporum Ratione*, and nine times in chapter XXII alone. In this chapter Bede presents an old formula (*uestus argumentum*) to calculate the Moon or weekday for any day occurring between the kalends of two months. He stresses that '[i]t is somewhat more difficult to learn, but it was passed down to us by the authority of our elders, and so ought to be handed on conscientiously to our juniors'⁹. Essential for this formula is that one knows the age of the Moon on the kalends of January. Equipped with this knowledge, one can then calculate the age of the moon on any given day. After introducing the argumentum, Bede continues to remind the readers of the number of days for each single month on the kalends, nones, and ides. He then presents several examples, and it is this part that is most relevant for the present discussion. Lat. *tolle* occurs eight times in the same formulaic use: "X tolle Y remanent Z"¹⁰ which can be translated as '(from) X take away Y remain Z'. The formula is also found in four other

6 Cf. Faith WALLIS, *Bede. The Reckoning of Time*, Liverpool 2004, p. xvi n. 4.

7 The titles of these chapters are: *XVI De Signis Duodecim Mensium* 'The signs of the twelve months', *XVII De Lunae Cursu Per Signa* 'The course of the moon through the signs', *XVIII Item De Lunae Discursu Si Quis Signa Ignorat* 'More on the course of the moon: for those who are ignorant of the signs', *XVIII Item De Eodem Si Quis Computare Non Didicit* 'More on the same subject: for those who do not know how to calculate', *XX Quota Sit Luna In Kalendas Quasque* 'What the age of the moon is on any given first day of the month', *XXI Quae Sit Feria In Kalendas* 'What day of the week it is on the kalends', *XXII Argumentum De Qualibet Luna Vel Feria* 'A formula for any moon or weekday', *XXIII De Aetate Lunae Si Quis Computare Non Potest* 'For those who do not know how to calculate the age of the moon', and *XXIII Quot Horis Luna Luceat* 'The number of hours of moonlight'.

8 Charles JONES, *De Temporum Ratione Liber* (CCSL 123B), Turnhout 1977.

9 WALLIS, *Bede* (2004), p. 69.

10 The exact attestations taken from JONES', *De Temporum Ratione Liber* (1977), p. 352 edition are: ".cxxi., tolle kalendas, remanent .cxx." (line 35); ".lviii. (quinguagies nouies bini cendecusoctus), tolle .cxviii., remanent .xi." (line 37); ".clii; tolle .xv. kalendas lunias, remanent .cxxxvii." (lines 39–40); ".cccxlvii.; tolle .vii. idus, remanent .cccxl." (line 44); ".lviii. (quinguagies nouies quini .ccxcv), tolle .ccxcv., remanent .liiii. (line 46)"; (connected with the previous example) "tolle .xxx., remanent .xxiii." (lines 46–7); and ".cclxxiii., tolle .viii. kalendas Octobres, remanent .cclxvi." (line 58).

attestations of *tolle* in *De Temporum Ratione*. They are in chapter XX (p. 346, line 14), XXI (p. 350, line 22), XLVI (p. 424, line 38), and LII (p. 441, line 7). The only exception is the ninth attestation in chapter XXII, which is found at the beginning where Bede explains the argumentum:

Si ergo uis scire hoc uel illo die quota sit luna, computa dies a principio mensis Ianuarii usque in diem de quo inquiris et, cum scieris, adde aetatem lunae quae fuit in kalendis Ianuariis, partire omnia per .lviii. et, si amplius .XXX. remanserint, *tolle* triginta; et quod superest ipsa est luna diei quam quaeris.¹¹

‘If you wish to know how old the Moon is on this or that day, count the days from the beginning of January up to the day you want, and when you know this, add in the age of the Moon on the kalends of January. Divide the total by 59, and if more than 30 remain, subtract 30.’¹²

In this case Bede flips *tolle* and *remanserint*, but it nonetheless occurs in the same context. A similarity search in the Library of Latin Texts database¹³ using *tolle* and *remanent* returned 21 matches. However, only one was in a mathematical context and indeed a direct quotation of the quoted passage found in chapter 74, page 290, line 11 of Hrabanus Maurus’ *De Computo*, which dates to the first half of the 9th century. This means that *tolle* is not frequently used in such contexts. The question is, however, which verb/s is/are actually used in such contexts. A likely candidate seems to be Lat. *subtrahe*, the second singular present imperative of Lat. *subtrahō*, *-ere* ‘to remove, subtract’. However, this imperative occurs less frequent in Bede’s *De Temporum Ratione*, i.e. only three times.¹⁴ Once again, I have also inquired into the Library of Latin Texts database, this time setting the period filter on “medii aevi scriptores” ‘medieval writers’, which encompasses texts between 736 and 1500, to find attestations fitting to the present corpus. Out of the 81 results, only six are in a mathematical context – all of them are once again found in Hrabanus Maurus’ *De Computo*. This means that, as mentioned above, the examples I have found are limited to the computistical genre. These findings, however, should not be overestimated, because they could also be caused by the corpus from which the database consists.

Things are clearer concerning the Insular Celtic glosses, most of which are available in different editions and databases. Insular Celtic consists of two branches: Brythonic and Goidelic. The former includes Breton, Cornish, and Welsh, while the latter comprises Irish, Scottish Gaelic, and Manx. Early medieval glosses feature mostly Old Breton, Old Irish, and

¹¹ JONES, *De Temporum Ratione Liber* (1977), p. 351, lines 6–11.

¹² WALLIS, *Bede. The Reckoning of Time* (2004), p. 69.

¹³ <http://clt.brepolis.net/llta/pages/Search.aspx> [19.6.2025].

¹⁴ JONES, *De Temporum Ratione Liber* (1977), p. 426, line 69; p. 429, line 43; p. 447, line 4.

Old Welsh material. Additionally, this is also true for the glossing tradition on Bede. The following example features glosses in both branches of the Insular Celtic languages.

Item anno qui sex habet concurrentes, sume .V. regulares mensis Martii; adde concurrentes sex, fiunt undecim; *tolle* septem, *remanent* quattuor. Quarta feria sunt kalendae Martiae.¹⁵

Again, in a year which has 6 concurrents, take the 5 regulars for the month of March, add the 6 concurrents, and they make 11. Take away 7, and 4 remains. The kalends of March is on the fourth weekday [Wednesday].¹⁶

The two manuscripts transmitting Irish glosses on Bede's computistical works are now kept at the Badische Landesbibliothek in Karlsruhe and the Austrian National Library in Vienna, respectively. Both of them feature a gloss on Lat. *tolle* found in this passage:

*.i. cuire huait*¹⁷
'i.e. put from you!'

*cuire [...] huait*¹⁸
'put from you!'

While it is possible that one of these glosses is a copy of the other, it seems more likely that they go back to a common archetype.¹⁹ Presumably, this gloss was intended to translate Lat. *tolle* into Old Irish – probably in an educational environment. There is also a parallel gloss on this passage found in Angers 477, which dates later than the two Irish manuscripts:

*i. ot. a te*²⁰
'i.e. put from you!'

¹⁵ JONES, *De Temporum Ratione Liber* (1977), p. 350, lines 21–24.

¹⁶ WALLIS, *Bede. The Reckoning of Time* (2004), p. 69.

¹⁷ Karlsruhe, aug. perg. 167, 32c50.

¹⁸ Vienna, cod. 15298, 4c43.70. Due to the condition of the manuscript, the gloss is very hard to read.

¹⁹ Cf. Bernhard BAUER, Early medieval vernacular Celtic glosses: originals or translations? A case study on the Vienna Bede [version 2; peer review: 1 approved, 2 approved with reservations], *Open Res Europe* 3: 108 (2023), <https://doi.org/10.12688/openreseurope.16006.1>.

²⁰ Angers, ms 477, 58b2.

This one is a bilingual Brythonic²¹/Latin gloss. It starts with the Brythonic imperative of 'put' and ends with Latin *a te* 'from you'. This ties in with a general observation that we tend to find more bilingual glosses in early medieval Brythonic gloss corpora than in their Irish counterparts.²² This might be caused by the fact that Irish had a head start compared to Brythonic in vernacular literacy, which led to the establishment of Irish as a written language before the glosses were composed and copied. These three parallel glosses are, however, not the only interesting examples for the present study.

The verb from which OIr. *cuire* is derived, OIr. *fo-ceird* 'to put, to place, to set, to throw, to apply, to explain, to happen upon, case' is also attested a second time in the Vienna Bede manuscript. And once again in chapter XXII:

dindrala huait cxuiii dofuarat latt oienar .i. nonus oculus x condid .xi.²³
 'if 118 happens to be (taken) from your starting point [i.e. 120], it remains with you from January, i.e. the ninth (day of the moon) and the tenth (day of the moon) so that it is the eleventh (day of the moon)'²⁴

This gloss is found between the two columns of folio 4v and is linked with a *signe de renvois* to the Latin numeral CXX in the base text in the context of:

Si ergo scire uis, uerbi gratia, anno quo per kalendas Ianuarias nona est luna, quota sit luna in kalendas Maias, dicito Maias in Calendas ·cxxi·; tolle kalendas, remanent ·cxx·.²⁵

'So for example, if you wish to know what the age of the Moon is on the kalends of May in a year in which the Moon is nine days old on the kalends of January, say "May: 121 on the kalends". Subtract the [day of the] kalends, and 120 remains'²⁶

²¹ Most of the glosses in Angers 477 can be identified as Old Breton. However, there are cases in which one cannot determine which Brythonic language a specific gloss is in.

²² Bernhard BAUER, Different Types of Language Contact in the Early Medieval Celtic Glosses, *Proceedings of the 37th Harvard Celtic Colloquium (2017)*, Cambridge-Massachusetts 2019, pp. 33–46, esp. pp. 42–44.

²³ Vienna, cod. 15298, 4d26.74.

²⁴ Bernhard BAUER, New and corrected MS readings of the Old Irish glosses in the Vienna Bede, *Ériu* 67 (2017), pp. 29–48, p. 44.

²⁵ JONES, *De Temporum Ratione Liber* (1977), p. 352, lines 33–35.

²⁶ WALLIS, *Bede. The Reckoning of Time* (2004), p. 70.

As I have discussed elsewhere,²⁷ the gloss proposes an alternative approach in Old Irish for calculating the age of the moon on a specific day (the main topic of *De temporum ratione's* chapter XXII). What is important for the present study is that it includes a form of the Old Irish verb *fo-ceird*, namely the second singular augmented preterite *dind-rála* 'if it happens to be (taken)'. Similar to the previous examples with this verb, the gloss instructs the reader to subtract something, i.e. 118 from their starting point 120. However, this time not in the imperative. This is the only outlier in the present corpus. I have queried the Corpus Palaeohibernicum database²⁸ for further attestations of *fo-ceird* in a mathematical usage. Of the total number of 47 occurrences in the database, only the three present here refer to subtractions. This means that we are dealing with a highly specific context here. As will be shown in the next section, this also happens with the German verb *werfen* which belongs to the same semantic field of 'removing' or 'getting rid of something'.

LATE MEDIEVAL GERMAN ARITHMETICAL TREATISES

In German arithmetical texts the imperative form Germ. *wirf(f)* 'throw' is used to describe subtractions. Digging deeper into the yet unpublished transcriptions of arithmetical manuscripts carried out by the ARITHMETIC-team,²⁹ I found that it is used exclusively in *probae* ('tests'). Klügel³⁰ describes a *proba* as "eine Rechnung, wodurch man sich zu versichern sucht, daß das Resultat einer vollführten Rechnung in Zahlen richtig sey"³¹, 'a calculation, which one tries to assure oneself that the result of a completed calculation is correct in numbers'. In his opinion, the best test for any calculation is if two people come to the same result. He then goes on to explain different types of tests a single person can run to verify their results. One of them is important for the present study: *Neunerprobe* 'casting out nines'. Most of the attestations for Germ. *wirf(f)* in the ARITHMETIC corpus are found in conjunction with "casting out nines"-calculations. This test is based on the fact that the cross sum of any number divided by nine leaves the same remainder as the number itself divided by nine. Klügel offers an example of how to use it to test a sum:

Eine Summe zu prüfen, zähle man die Ziffern aller Theile zusammen, wobey man jede volle Neun wegwirft, und merke sich den Rest. Die Ziffern in der Summe addire man ebenfalls, werfe die Neuner weg, so muß der Rest mit

27 Bernhard BAUER, *New and corrected MS readings* (2017), pp. 44–46.

28 David STIFTER et al., *Corpus Palaeohibernicum* (CorPH) v. 1.0, 2021, <https://chronhib.maynoothuniversity.ie/chronhibWebsite/tables?page=0&limit=0&fprop=&fval=&dttable=text&ctable=text&search=false> [19.6.2025].

29 I thank them for granting me access to their transcriptions.

30 Georg Simon KLÜGEL, *Mathematisches Wörterbuch* 4, Leipzig 1823, pp. 177–183.

31 *Ibid.*, p. 177.

jenem vorher gefundenen übereinstimmen, wenn die Rechnung richtig geführt ist.³²

‘To test a sum, add up the digits of all parts, throwing away every full nine, and note the remainder. Add the digits of the sum in the same way, discarding the denominators. In this way the remainder must be the same as the one previously found if the calculation was carried out correctly.’

As an example, we can look at a simple addition $12345 + 67890 = 80235$ and how its test would look like:

Calculation		Test	
Summand	12345	$1+2+3+4 = 10-9 = 1+5 = 6$	6
Summand	67890	$6+7 = 13-9 = 4+8 = 12-9 = 3+9 = 12-9 = 3+0 = 3$	3
			$6+3 = 9-9 = 0$
Sum	80235	$8+0+2 = 10-9 = 1+3+5 = 9$	$9-9 = 0$

The table shows the two summands and their sum, i.e. the calculation, on the left-hand side. On the right we can see a rundown of the test. As instructed, one adds the digits of the first summand. Whenever 9 is surpassed, we throw 9 away (i.e. we subtract 9) from the current sum. We then carry on and add the next digit to this difference (i.e. the result of this subtraction). This continues until the final digit of the number. As we can see in the final column, this operation yields 6 and 3 respectively for the present summands. These two results are then added to each other, and if their sum surpasses 9, we also subtract 9 from this result, meaning that in the present example the result of the test is 0. This is then compared to the remainder of the actual sum of the calculation, which is established in the same way. As shown in the final row of the table, this also yields 9 minus 9 equals 0. Since the two remainders are equal, we have the proof that the result of our addition is correct. Besides explaining this presently not very common way, on how to test one’s calculation results, Klügel’s dictionary also shows that ‘throwing away’ was still used in the context of subtraction in the 19th century. I therefore now wish to list a few attestations found in the ARITHMETIC

³² Ibid., p. 178.

corpus – apart from the last one, they are all in the context of *casting out nines*. The first one is from the aforementioned reckoning book of Clemens Hör:

probier [...] sprich 4 mal 5 ist 20 wirff 9 von deser zal so offt du magst / so bli-
bend dir 2 [...] ³³

‘test [...] say 4 times 5 is 20 throw 9 from this number as often as you want /
you are left with 2’

Apart from the usage of “wirff”, the phrase “so offt du magst” ‘as often as you can’ is also interesting, as what initially reads like a suggestion actually means that one has to subtract nine as many times as possible: $20-9 = 11-9 = 2$, which is the result he gives. The following two examples show that “werfen” can also be used with different adverbs, e.g., Germ. *hin* ‘hither’, Germ. *hinweg* ‘away’, or Germ. *daraus* ‘from that’:

Nu wirf 9 hin ³⁴
‘Now throw 9 hither’

wirff 9 hinnweck ³⁵
‘throw 9 away’

wirf aber 7 daraus ³⁶
‘but throw 7 out of it’

I have also located five attestations of “wirff” in the famous reckoning book of Adam Risen ³⁷:

Also: wirff 9. Hinweg als offt du magst ³⁸
‘So: throw 9. away as often as you like’

³³ Vadiana, 418, fol. 9v.

³⁴ Aargau, ZQ 27, fol. 17v.

³⁵ Augsburg, cod. 4°, fol. 2v.

³⁶ Heidelberg, pal. germ. 618, fol. 8v. This is the only example I have found which is not connected to *casting out nines*, but rather to *casting out sevens* which is another way to test calculations based on the number seven.

³⁷ I have used a scanned version found on Google Books: Risen, Adam RISEN, Rechenbuch auff Linien und Ziphren in allerley Handthierung Geschäften unnd Kauffmanschafft, Frankfurt 1581.

³⁸ Ibid., fol. 10v.

Aber mit 9. Wirff oben hinweg / als offt du magst³⁹
 'but with 9. throw away above / as often as you like'

wirff 9. hinweg so offt du magst⁴⁰
 'throw 9. away as often as you like'

wirff 9. hinweg als offt du magst⁴¹
 'throw 9. away as often as you like'

wirff hinweg 9⁴²
 'throw away 9'

Similar to the example in Hör's reckoning book, four out of the five examples in Risen's reckoning book also contain the phrase "als offt du magst", once again actually instructing the reader to do it as often as they can; meaning: as often as the arithmetical rules allow. The one thing all examples have in common is that 'throwing' only occurs when subtraction occurs in the context of a test calculation – be it *casting out nines* or *sevens*. This means that – similar to Lat. *tolle*, OIr. *cuire*, and Old British Celtic *ot* – Germ. *wirf(f)* only occurs in a specific mathematical/arithmetical context. This context, however, differs from the German usage to the one in Latin and Celtic. What we can see, however, is a semantic connection by using verbs denoting 'putting/throwing (away)'. In the next section I will examine these verbs a little closer.

LINGUISTIC AND TRANSLATIONAL ANALYSIS

In the foregoing section we have become acquainted with four second person singular imperatives in four different languages. We will now look at the etymologies of their underlying verbs (in the order they were first mentioned above) and see that they all derive from different Proto-Indo-European roots.

Lat. *tolle* is the second person singular imperative from Lat. *tollō, -ere* 'to pick up, raise, remove'⁴³ ultimately derives from PIE **tl-né/n-h₂* - 'to carry' from the PIE root **telh₂* - 'to lift,

³⁹ Ibid., fol. 11v.

⁴⁰ Ibid., fol. 12r.

⁴¹ Ibid., fol. 13v.

⁴² Ibid., fol. 15r.

⁴³ Michiel DE VAAN, *Etymological Dictionary of Latin and the Other Italic Languages*, Leiden–Boston 2008, pp. 261–262.

to take (upon oneself)⁴⁴. This root is, for instance, also attested in the Greek aorist ἔτλην ‘endeavoured’, Gothic *þulan* ‘to endure, bear’, Tocharian B *tallam* ‘raises’, or OIr. *tlenaid* ‘to take away, to steal’.

The Old Irish second singular imperative *cuire* is derived from OIr. *fo-ceird* ‘to put, to place, to set, to throw, to apply, to explain, to happen upon, case’ (<https://dil.ie/22405>). The verb goes back to PC **kerd-e/o-* ‘to put, to place, to set’ to the PIE root 3. **kerH-* ‘to scatter, to pour’⁴⁵. This root is, for instance, also attested in Vedic *kirāti*, *-te* ‘scatters, pours out’, the Tocharian B participle medium *kārskemane* ‘shooting’, Sogdian *kyr-* = */kēr-/* ‘to sow’, or Young Avestian *kāraiiēiti* ‘scatters, sows’.

For the other Celtic imperative in our corpus, it remains unclear whether the form is Old Breton or Old Welsh, as does its further etymology. As mentioned by Falileyev⁴⁶, it is connected to a PIE root **pet-* in the standard historical dictionary of the Welsh language⁴⁷. The *Lexikon der Indogermanischen Verben*⁴⁸ mentions Middle Welsh *odi* ‘to throw’ under the root PIE **peth₂-* ‘to fly (up)’⁴⁹ (cf. also Schumacher⁵⁰). In his addenda to LIV², Kümmel⁵¹ states that the roots **peth₁-* and **peth₂-* should no longer be maintained, but rather combined in the already mentioned root **pet-* ‘to fly, to fall’.

Moving to our Germanic example, MHG/NHG *werfen* ‘to throw’ is usually derived from the root PIE **uerg^u-* ‘to throw’⁵². This root is also attested in other Germanic languages: Gothic *wairpan*, Old Norse *verpa*, Old English *weorpan*, or Old Frankish *werpa* all meaning ‘to throw’, as well as in Old Church Slavonic *vrěšti* also meaning ‘to throw’⁵³.

Although the four main imperatives of the present study all derive from different PIE roots, they all emerge from the same semantic connection in meaning ‘putting or throwing away, removing’. This leads to another issue I would like to raise: how they are translated. To do this, I wish to draw your attention to the differences between the Latin examples on the one hand, and the Celtic and German ones on the other. Wallis⁵⁴ translates most occurrences

44 Helmut RIX ET AL., *Lexikon Der Indogermanischen Verben*, Wiesbaden 2001, pp. 622–623; Julius POKORNY, *Indogermanisches Etymologisches Wörterbuch*, Bern 1959, pp. 1060–1061.

45 Stefan SCHUMACHER, *Die keltischen Primärverben: Ein vergleichendes, etymologisches und morphologisches Lexikon*, (IBS 110, Innsbruck 2004), pp. 401–403; RIX ET AL., *Lexikon Der Indogermanischen Verben* (2001), pp. 353–355; POKORNY, *Indogermanisches Etymologisches Wörterbuch* (1959), pp. 933–935.

46 Alexander FALILEYEV, *Etymological Glossary of Old Welsh*, Tübingen 2000, p. 126.

47 R. J. THOMAS–Gareth BEVAN–Patrick DONOVAN (ed.), *Geiriadur Prifysgol Cymru*, Cardiff 2007.

48 RIX ET AL., *Lexikon Der Indogermanischen Verben* (2001), p. 479.

49 POKORNY, *Indogermanisches Etymologisches Wörterbuch* (1959), pp. 825–826.

50 SCHUMACHER, *Die keltischen Primärverben* (2004), p. 515.

51 Martin KÜMMELE, *Addenda und Corrigenda uu LIV2*, 2014, <http://www.martinkuemmel.de/liv2add.pdf> [19.6.2025].

52 RIX ET AL., *Lexikon Der Indogermanischen Verben* (2001), p. 689; POKORNY, *Indogermanisches Etymologisches Wörterbuch* (1959), p. 1153.

53 Friedrich KLUGE, *werfen*. Berlin–Boston 2012. <https://www.degruyterbrill.com/database/KLUGE/entry/kluge.12364/html> [19.6.2025].

54 WALLIS, *Bede. The Reckoning of Time* (2004).

of Lat. *tolle* with English 'subtract!', whereas I tend to translate the same terms more literally. In translation studies, these two strategies can be subsumed under the terms "domestication" and "foreignisation".⁵⁵ In the latter, translations aim to keep as much information from the source text as possible – including even deliberate breaking of conventions in the target language. The translations of the Celtic and the German examples (the latter being my own) fall into this category, because they keep the meaning of the verb in the source language. Germ. *wirff* is therefore translated with, in the context of subtractions somewhat unusual, 'throw!' The same is true for the Celtic glosses, which also semantically mean 'subtract', but are translated with 'put (from)'.

The strategy of "domestication" allows a loss of information from the source text by translating according to the rules of the target language and audience. Wallis' translation of Lat. *tolle* falls into the latter category. She deliberately made this choice because her translation of Bede's computistical *opus magnum* was made for the "Translated Texts for Historian" series. This series is specifically designed for students and researchers who do not have enough knowledge of Latin or Greek to read the texts in the original. In the light of this, her decision makes sense, because her aim is to make Bede's text accessible for everyone who does not have a fundamental knowledge of Latin. This discussion shows how important translational choices are for future research on the respective texts and that there is no such thing as "just" a translation – something that is prone to being overlooked when translating medieval texts into modern-day English. This also means that philological and/or linguistics researchers cannot solely rely on already published translations. Quite the contrary, there is an intrinsic necessity of returning to source texts to uncover nuances such as the ones discussed in this study – especially to find the relevant examples in the first place – as translations inevitably shape subsequent interpretations.

CONCLUSIONS

The semantic overlap between Old Brythonic *ot*, German *wirf(f)*, Old Irish *cuire*, and Latin *tolle* in the context of subtraction reveals a convergence of linguistic expression across different medieval mathematical traditions. Despite their distinct etymological roots, these imperatives share common semantics of 'removing' or 'throwing away'. They illustrate how arithmetic operations were conceptualised in vernacular and scholarly contexts. The restricted usage of these verbs – limited to specific genres like computistical texts or the arithmetical test operations – suggests a specialised technical jargon that evolved independently yet

⁵⁵ These two terms were established in translation studies by VENUTI, Lawrence. See e.g., *The Translator's Invisibility: A History of Translation*. London–New York 1995. They can also be compared to the two translation strategies mentioned by Friedrich Schleiermacher in his treatise on different methods of translation presented at the Königlichen Akademie der Wissenschaften, Berlin as early as 1813.

analogously in different linguistic and cultural settings. This phenomenon underscores the importance of examining mathematical terminology not just as abstract operations but as embedded in the linguistic and pedagogical practices of their time. The findings from both the GlossIT and ARITHMETIC projects demonstrate how interdisciplinary approaches – combining (amongst others) philology, history of mathematics, and linguistics – can illuminate the transmission and transformation of knowledge across medieval Europe. Future research should further explore these connections, particularly in understudied vernacular traditions, to deepen our understanding of how mathematical concepts were linguistically framed and pedagogically conveyed.

APPENDIX – LIST OF MANUSCRIPTS

This short overview lists all the manuscripts referred to in this article. Where possible I give information on their place of origin and their date.

Aarau, Kantonsbibliothek Aargau, ms Z 27 Q dates from 1600 to 1625.⁵⁶

Angers, Bibliothèque Municipale, ms 477⁵⁷ is dated to 897 on account of a calculation found on folio 21a.⁵⁸ It was either written in Brittany or North-East France.

Augsburg, Stadt- und Staatsbibliothek, cod. 4° 138 was written in Augsburg and dates to around 1480.⁵⁹

Heidelberg, Universitätsbibliothek, pal. germ. 618 is dated between 1443 and 1446.⁶⁰

Karlsruhe, Badische Landesbibliothek, Augiensis pergamenum 167 (olim Codes Augiensis CLXVII) dates to the first half of the 9th century.⁶¹

St. Gallen, Kantonsbibliothek Vadiana, ms 418 dates to 1546.

Vienna, Österreichische Nationalbibliothek, cod. 15298 (olim suppl. 2698) was likely written in Ireland and dates from the late 8th/early 9th century.⁶² Only four folios have survived until today.

56 Kurt-Werner MEIER, *Die Zurlaubiana*. Werden. Besitzer. Analysen. Eine Zuger Familiensammlung, Grundstock der Aargauischen Kantonsbibliothek Zweiter Teil 1/II, Aarau/Frankfurt a. M. 1981, p. 1054.

57 Dominique BARBET-MASSIN, *Le manuscrit 477 (461) d'Angers: étude codicologique et textuelle*. *Brianna Monastica* 19 (2017), pp. 15–44.

58 Cf. Pierre-Yves LAMBERT, *Les gloses en vieux-breton aux écrits scientifiques de Bède*, dans *le manuscrit Angers 477*, in: *Bède le vénérable entre tradition et postérité*, Stéphane LEBECQ–Michel PERRIN–Olivier SZERWINIACK (ed.), Lille 2005, pp. 309–319.

59 <https://handschriftencensus.de/15025> [19.6.2025].

60 <https://handschriftencensus.de/4916> [19.6.2025].

61 Cf. Dagmar BRONNER, *Verzeichnis altirischer Quellen*, Marburg 2013, pp. 19–20.

62 Cf. BAUER, *Early medieval vernacular Celtic glosses* (2023), p. 4.

VERMESSUNGSABENTEUER

IMAGINÄRE GEODÄSIE IM KLOSTERKONTEXT

Jan Habermehl

EINFÜHRUNG

O bwohl der unspektakuläre Titel seiner *Kurtzen und grundlichen anlaytung zu dem rechten verstand Geometriae* nicht den Anschein erwecken mag, hier einen außergewöhnlichen geometrisch-technischen Druck vorliegen zu haben, ist Christoph Puehlers eigener Einschätzung, dass ihn sein „kleiner unnd schlechter verstandt [...] zu gantz newer Tradition geführt“ (*2v) habe, nach der Lektüre der gut 250 Quartseiten seiner einzigen bekannten Veröffentlichung zweifellos zuzustimmen.¹ Zwar finden sich in der 1563 in Dillingen gedruckten *Anlaytung* einige Topoi geodätischer Bücher der Zeit wie die Auflistung antiker Maßeinheiten oder die Geschichte des Messens sowie Textpassagen, die sich in bereits bestehende Texttraditionen einschreiben, dennoch erschöpft sich das eigentlich Neue an Puehlers Ansatz nicht in der geschickten Montage von Altbekanntem, sondern lässt sich an einer besonderen Art der Textorganisation festmachen, in der mathematisch-logische, deskriptive und narrative Ordnungsstrukturen mit multiplen Adressierungen verschränkt werden.² Erstmals im deutschsprachigen Raum werden Wissensinhalte der Geometrie erzählend aufbereitet. Hierzu wird auf Erzählmuster und konventionalisierte Schemata zurückgegriffen, die die mathematik- und technikgeschichtliche Forschung bislang nicht wahrgenommen hat. Zu den Rezeptionsangeboten, die sich aus dieser Geometrie-Erzählung ergeben, zählt eine frühneuzeitliche Form buchgestützter ‚Technikunterhaltung‘.

‚Technikunterhaltung‘ verstehe ich als Unterart der ‚Wissensunterhaltung‘ und diese als beobachtbares Phänomen und beschreibbaren kommunikativen Effekt der medienbasierten Darstellung von Bildungs- und Handlungswissensbeständen aller Art, die entsprechend

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- 1 Ein kurtze und grundliche anlaytung zu dem rechten verstand Geometriae. Durch Christoffen Puehler von Syclas in Ungern/ gemacht und von neuen beschriben. Was nun ordenlich hierinn begriffen/ wirdt in dem nechsten blat angezeigt. Mit Röm. Kay. May. Freyheit, Dillingen 1563 [VD16 P 5358]. Puehlers *Anlaytung* wird unter Angabe der Seitenzahl direkt im Fließtext zitiert.
 - 2 Für einen Überblick über frühneuzeitliche deutschsprachige Bücher, die sich dem geometrisch-technischen Ab- und Vermessen von Längen, Breiten, Höhen, Tiefen und Flächen widmen, darf ich an dieser Stelle auf meine kürzlich erschienene Dissertation verweisen: Jan HABERMEHL, *Geodätische Bücher des 16. Jahrhunderts*, Frankfurt am Main 2025, doi 10.21248/gups.91233 [12.6.2025]. Auf einem meiner Dissertationskapitel beruht der vorliegende Beitrag.

eines unterhaltenden Selbstverständnisses gestaltet ist und demgemäß auch als unterhaltend rezipiert wird. Viele Sachbücher oder Dokumentarfilme etwa haben einen wissensunterhaltenden Charakter, da ihnen Wissensbestände als Mittel zum ‚bloßen‘ Zeitvertreib dienen und nicht etwa als Unterrichtsinhalte. Es geht diesen Medien um Unterhaltung durch Wissen, nicht um Wissen durch Unterhaltung. Gleichermäßen können Medien mit dezidiertem Informations-, Anwendungs-, Anleitungs- oder Bildungsanspruch gelegentlich von ihren Rezipierenden entgegen ihrem Selbstverständnis als ‚nur‘ unterhaltend wahrgenommen und zum Zeitvertreib herangezogen werden. Auch sie fallen unter den Phänomenbereich in meinem Sinne. Wissensunterhaltung bezeichnet hier also entweder eine produktionsseitige Eigenverortung bzw. eine mediale Affordanz oder eine rezeptionsseitige Zuschreibung bzw. Nutzung oder auch beides. ‚Technikunterhaltung‘ verstehe ich als Unterart der Wissensunterhaltung mit inhaltlichem Fokus auf Technik und Techniken aller Art. Sie thematisiert technische Instrumente, Werkzeuge, Maschinen und Geräte sowie deren Funktionsweise und deren Gebrauch oder auch deren Geschichte, Gegenwart oder Zukunft.

EINE LESEREISE DURCH RAUM, ZEIT UND TECHNIK

Über stolze neun Druckseiten erstreckt sich das Inhaltsverzeichnis von Puehlers *Anlaytung*, das in numerischer Folge sämtliche Kapitel auflistet. Alle Einträge des Inhaltsverzeichnisses folgen einem Muster und das Layout aller neun Seiten ist auf gleiche Weise gestaltet; es gibt weder Unterkapitel noch übergeordnete ‚Teile‘ oder ‚Bücher‘, wie sie gelegentlich in anderen deutschsprachigen Geodäsiebüchern der Zeit vorkommen. Aus diesem gestalterischen Kontinuum ergibt sich der Eindruck eines textuellen Kontinuums, innerhalb dessen es offenbar keine innere Differenzierung oder Hierarchisierung der Kapitel und dem, was sie behandeln, zu geben scheint. Diese Art der Textpräsentation könnte eine stringente und kontinuierliche (Erst-)Lektüre nahelegen. Als geeignetes Hilfsmittel zum kurzfristigen und vor allem gezielten Nachschlagen bestimmter Inhalte eignet sich das Inhaltsverzeichnis allerdings nur bedingt.

Nichtsdestoweniger gibt es eine Reihe von Schlagwörtern aus dem geometrisch-geodätischen Repertoire der Zeit, die bereits bei der Lektüre des Inhaltsverzeichnisses ins Auge springen. Das erste Kapitel handelt von „mancherley massen / welche man zu den Geometrischen messungen zugebrauchen pflegt“, dann geht es um die Geschichte der Geometrie, um ihre Einteilung nach Längen-, Breiten- und Tiefenmessung, dann weiter um Dreiecke, um Messinstrumente wie das Astrolabium, um die Vermessung von Gebäuden oder Entfernungen, um Längen- und Breitengrade und gegen Ende auch um Sonne, Mond und Sterne. Bereits das Inhaltsverzeichnis eröffnet eine Verstehensdimension der gesamten *Anlaytung*, die insbesondere vor dem klerikalen Hintergrund der Manuskript- und Druckentstehung nicht unplausibel erscheint. Die genaue Anzahl der 72 Kapitel lässt sich als unmissverständlichen Verweis auf die Anzahl der Völker der Welt und ihrer Sprachen nach

alttestamentlicher Überlieferung (Gen 10) interpretieren. In der Abfolge der Kapitel spiegelt sich eine exemplarisch-episodisch geordnete vermessende Erkenntnis der gesamten Welt, angefangen vom Gerstenkorn bis hin zum Erdumfang – und noch ein wenig darüber hinaus.

Parallel zu dieser spatial hierarchisierten Weltfahrt vom Kleinen ins Große verläuft zudem eine temporal strukturierte Ordnung, die angefangen bei Euklids *Elementen* über (spät-)mittelalterliche Mathematiker und Astronomen wie Johannes von Gmunden bis zu zeitgenössischen Theoretikern wie Kopernikus und zu technischen Neuheiten voranschreitet. Diese zweite Ordnung, eine Art Reise durch die Messgeschichte, wird in den Kapitelüberschriften allerdings nur ansatzweise deutlich, etwa wenn von den ‚Alten‘ die Rede ist. Kopernikus zum Beispiel wird hier noch nicht genannt. Dem Inhaltsverzeichnis ist noch nicht zu entnehmen, dass im Verlauf des Textes die Komplexität der beschriebenen Instrumente gesteigert werden wird. Die zunehmende Komplexität der Technik lässt sich auf die innere Logik der beiden Ordnungsstrukturen Raum und Zeit zurückführen: je größer der zu vermessende Raum wird und je weiter die beschriebenen Messverfahren an die Gegenwart rücken, desto komplexer und fortschrittlicher müssen und werden die Geräte sein, die Puehler im Verlauf seines Textes erwähnt. Die choro- sowie die chronologische Ordnung des Textes bedingen eine dritte, die man ‚technologische‘ Ordnung nennen könnte.

Puehlers *Anlaytung* lese ich als ‚Lesereise durch Raum, Zeit und Technik‘, da sich erstens der gesamte Text dem exemplarisch-episodisch strukturierten Schema der Reise bedient, und zweitens auf Kapitelebene von zum Teil abenteuerlichen Messreisen und Vermessungsfahrten erzählt wird. Einige dieser Kapitel sind entsprechend eines (technik-)unterhaltenden Selbstverständnisses gestaltet bzw. lassen sie sich als unterhaltend auffassen, wodurch die *Anlaytung* zumindest partiell als (mess-)technikbezogene frühneuzeitliche Wissensunterhaltung charakterisiert werden kann.

TITELBLATT UND WIDMUNGSVORREDE

Auf der Rückseite des zweifarbig gedruckten Titelblattes finden sich vier knappe Absätze, die einen Ausblick auf den Inhalt des Kommenden bieten bzw. beschreiben, „[w]as nun ordentlich hierinn begriffen“, wie es auf der Vorderseite formuliert ist. Diese Vierteilung der *Anlaytung* in „aller grundt des messens“, Höhen- und Tiefenmessung, Breiten- und Entfernungsmessung sowie die Konstruktion eines „newen Torquet“, eines astronomischen Instruments, wird, so wie sie sich auf der Titelblattrückseite findet, allerdings weder im Inhaltsverzeichnis noch in der Abfolge der durchnummerierten Kapitel aufgegriffen.

Noch vor dem Inhaltsverzeichnis befindet sich eine dreiseitige Widmungsvorrede, die wichtige Informationen für eine erste kultur- und literarhistorische Kontextualisierung des Drucks liefert. Gerichtet ist sie an den „besondern liebhaber/ *Fautor* [Gönner, jh] unnd verstandigen der löblichen Kunst Mathematicken“ (*3r) Bartholomäus Madauer († 1579), den Abt des Klosters Aldersbach bei Vilshofen (Bistum Passau), der sich nebenher als Mathematiker,

Astronom sowie vor allem als Instrumentenbauer betätigte. Der Abt ließe sich daher als mathematisch-technischer Fachmann mit klerikalem Bildungshintergrund charakterisieren und ähnelt darin dem Verfasser der *Anlaytung*, denn Christoph Puehler ist ebenfalls Angehöriger des Klerus.³ Sein Widmungsschreiben datiert er auf den 9. Februar 1561, „[g]eben zu S. Nicola bey Passaw“ (*3v). In diesem Augustinerchorherrenstift war der aus dem Burgenland stammende Puehler wohl bis zu seinem Tod als Kaplan und Mathematiklehrer beschäftigt, dort dürfte auch der Manuskripttext entstanden sein; in Passau ist er seit der Jahrhundertmitte nachweisbar.

Vor vier Jahren, so beginnt Puehler seine Widmung, habe Gott ihn „mit grosser und beschwerlicher krankheit heimgesucht“ (*2r), sodass ihm „keine andere frewd oder kurzweil“ geblieben sei als das Studium der Mathematik, „so ich und weilandt der Edel/ hochgelert und weitberümbte Petrus Apianus/ *Mathematicus Cæsareus*, unnd *Professor* der löblichen Universitet zu Ingolstatt/ seliger gedechtnuß/ vor vierzig jaren zu Wien mit einander gelernet unnd geübt haben“ (ebd.). Der Verweis auf die gemeinsame Studienzeit mit dem nur wenig älteren Peter Apian profiliert nicht nur Puehler als Akademiker, auch sein ungefähres Geburtsjahr lässt sich aus diesen Angaben ableiten. Im Juni 1521 erhält er den Grad eines *baccalareus artium*, er wird folglich um 1500 geboren sein, was die *Anlaytung* zu einem Alterswerk macht. Die Wahl seines Therapeutikums kommentiert der Mathematikhistoriker Abraham Gotthelf Kästner mit spitzer Zunge: „Ich weiß nicht ob unter den unzähligen medicinischen Observationen eine ist, da ein von Krankheit entkräfteter sich mit Mathematik erhohlt. Gewöhnlich wäre doch wohl Mathematik am sichersten was die Aerzte einem Reconvalescenten verbieten würden.“⁴ Wie nun gestaltet sich Puehlers Heilverfahren? Ihm sei, möglicherweise in der Stiftsbibliothek,

ein alt geschriben büchlein inn die händt geraten/ darinn ein klein und ordenlichs Compendium de Practica Geometriae, jedoch ohn inscription und namen des Authors/ inn lateinischer sprach begriffen. Hab ich/ umb die verdrossen und langweilige zeit zuvertreiben/ dasselbig verteutschen/ auch andern damit dienen wöllen/ Gleich aber zu anfang/ hat mich mein kleiner unnd schlechter verstand/ vil ein andern weg/ auch zu mehrer erweyterung und gantz newer Tradition gefürt/ inn massen dann gegenwertiges büchlein nach lenges außweiset (*2v).

3 Vgl. Dieter LAUNERT, Wer erfand die Transversalteilung? Brahe, Ursus, Hommel, Pühler. Pühlers *Practica Geometriae* (Algorismus 79, Augsburg 2014), S. 8; dort weitere Nachweise.

4 Abraham Gotthelf KÄSTNER, *Geschichte der Mathematik seit der Wiederherstellung der Wissenschaften bis an das Ende des 18. Jahrhunderts I*, Göttingen 1796, S. 671.

Die Erwähnung einer durch Zufall aufgefundenen lateinischen Handschrift mit anonym überliefertem Text hat die jüngere mathematikhistorische Forschung sowohl dazu veranlasst, den möglichen Prätext (Hugos von St. Victor *Practica geometriae*) zu identifizieren,⁵ als auch den Topos des redigierenden Übersetzens einer lateinischen Vorlage als gängige Legitimationsstrategie des eigenen Schreibens als solchen ernst zu nehmen.⁶ Für Puehler scheint sich allerdings die Frage nach dem Grad der Abhängigkeit seiner Arbeit von einer lateinischen Vorlage und damit die Frage nach der Klassifikation als ‚Übersetzung‘, ‚Pseudo-Übersetzung‘, ‚Redaktion‘ überhaupt nicht zu stellen, da er, wie er selbst sagt, sein anfängliches Übersetzungsvorhaben sehr schnell aufgegeben habe. Dementsprechend wird Puehler das „geschriben büchlein“ im weiteren Verlauf seines Textes überhaupt nicht mehr erwähnen. Denn trotz aller Bescheidenheitstopik manifestiert sich in seinem ambitionierten Umgang mit antiken, mittelalterlichen und vor allem zeitgenössischen Wissensbeständen ein Überbietungsgestus und ein ebenso aemulativer Anspruch auf Neuartigkeit.

Nach Vollendung des Manuskripts habe Puehler es „meinem günstigen herrn und freunt/ *Philippo Apiano, Petri filio, et Mathematicum Professore ordinario* zu Ingolstatt“ (*2v) zur Korrektur und Prüfung geschickt und, nachdem dieser und weitere Gelehrte es „für gut“ (ebd.) und für publikationswürdig befunden hätten, von Apian in den Druck geben lassen. Obwohl es üblich sei, fährt Puehler fort, sich für die eigenen Veröffentlichungen einen „*Patron unnd schützerhen*“ (ebd.), wohl zur Verteidigung gegen Kritiker, auszuwählen, habe er das im vorliegenden Fall unterlassen. Erstens sei sein Buch „schlecht und gering“ (**3r) und zweitens „allein den anfangern dieser kunst zu gütem gemacht und beschriben worden“, weswegen er sich auch nicht um „schützen/ loben oder schenden“ bekümmern müsse, sondern einzig hoffe, dass die „verständigen und guthertzigen Leser[]“ einen „nutz und bericht“ (alle ebd.) aus der *Anlaytung* ziehen könnten. Puehler nennt hier die üblichen Legitimationstopoi frühneuzeitlicher Messlehren. Im Unterschied zu anderen Drucken verzichtet er auf eine engere Eingrenzung seines Zielpublikums. Im Verlauf seiner Schrift werden mehrere textimmanente Adressatentypen auftreten: der Geometer, der Handwerker, der fleißige Schüler; über die Widmungsvorrede vermittelt, ist zudem der technikbegeisterte Abt, dem Puehler zum Abschluss sein „büchlein zulesen geschenckt“ (ebd.) haben möchte, als externer Adressat präsent. Der Abt nimmt in der Widmungsvorrede sowohl die Rolle des Beschenkten als auch die eines Lesers ein, der gerade nicht zu den ‚Anfängern der Kunst‘ gerechnet werden kann. Worin genau nun der ‚nutz und bericht‘ für den Leser überhaupt besteht, wird nicht präzisiert, da sich die ‚Nützlichkeit‘ des Buches an den mathematischen Vorkenntnissen und der Interessenlage der jeweiligen Rezipientin oder der Verfügbarkeit von technischem Gerät und ergänzendem Schrifttum zu bemessen scheint. Daneben zeichnet sich

5 So LAUNERT, *Transversalteilung* (2014), S. 28–39.

6 Vgl. Thomas MOREL, *Bringing Euclid into the Mines: Classical Sources and Vernacular Knowledge in the Development of Subterranean Geometry*, in: *Translating Early Modern Science*, hg. von Sietske FRANSEN–Niall HODSON–Karl A. E. ENENKEL (*Intersections* 51, Leiden 2017), S. 154–181, S. 162.

bereits eine weitere Funktionalisierung der *Anlaytung* ab, die als materialisiertes Resultat von Puehlers eigenwilliger, aber erfolgreicher Mathematik-Kur ein ideales Therapeutikum gegen Langeweile darstellt. Die Polyfunktionalität des Drucks wird also bereits in der knappen Widmung erkennbar.

Als Klosterarbeit bildet die *Anlaytung* eine Ausnahme unter den gedruckten deutschsprachigen Messlehren. Ihr Status als Liebhaberprojekt hat Auswirkungen auf die konkrete Buchgestaltung. Puehlers *Anlaytung* ist (vor allem im Unterschied zu den von Christian Egenolff verantworteten Drucken) den zeitgenössischen Buchmarktlogiken nicht unterworfen, beispielsweise was die Wiederverwendung von Holzschnitten betrifft. So wurden sämtliche Schnitte ausschließlich für diesen Druck beauftragt und hergestellt. Sie sind von guter Qualität und sehr aufwändig gestaltet, außerdem werden alle jeweils nur einmal genutzt, es gibt keine Dopplungen. Einige Abbildungen zeichnen ein gewisses Lokalkolorit aus. Diese Regionalismen, die einen ortskundigen Liebhaber wie Madauer sicher erfreut haben mögen, standen einer, teils deutlich überregionalen Rezeption der *Anlaytung* jedoch nicht im Wege.

PUEHLERS PROPÄDEUTIK

Noch vor Kapitel 1 findet sich eine recht allgemein gehaltene fünfseitige Hinführung zum Inhalt des Folgenden, die die Funktion einer Leservorrede übernimmt und Exordialtopoi aus der Dedikation wie etwa den Bescheidenheitstopos aufgreift. Zudem wird eine weitere ‚Rolle‘ des Büchleins vorgeschlagen, die eines ‚stummen Lehrers‘. Denn Puehler berichtet darüber, wie etliche „liebhaber der Geometrie“ (1v) mit Messinstrumenten, „einer das/ ein ander ein anders“, zu ihm gekommen seien, die nicht gewusst hätten, wie sie diese verwenden sollten, da sie sich aller „regeln und proposition/ wie sie die fürgeschriben gefunden/ on allen gründtlichen verstand beholfen“ hätten. Andere hätten sich die nötigen „Regeln dort und da erbettelt“, weil sie sich keinen Lehrer hätten leisten könnten. Damit „aber auch disen menschen/ [...] geholffen wurd“, habe Puehler sich von guten Freunden dazu bewegen lassen, „dises Büchlein von der practica der Geometrie zuschreiben“ (alle ebd.), das er den ‚Anfängern‘ „als ein stummenden Maister oder Preceptorem geschenkt und zugestellt haben“ (2r) möchte. Von schwerer Krankheit und mathematischem Zeitvertreib ist hier keine Rede mehr, stattdessen bemüht Puehler gegen Ende des *prologus praeter rem* den Topos des zur Abfassung eines Lehrbuches Gedrängten, der sein Wissen nicht für sich behalten möchte und es der Allgemeinheit schenkt.⁷ Ähnlich zu anderen deutschsprachigen Geodäsiebüchern des 16. Jahrhunderts ruft Puehler das Versprechen eines autodidaktischen

7 Vgl. zum Topos den Beitrag von Jan-Dirk MÜLLER, Jch Vngenant und die leüt. Literarische Kommunikation zwischen mündlicher Verständigung und anonymer Öffentlichkeit, in: Der Ursprung von Literatur, hg. von Gisela SMOLKA-KOERDT–Peter SPANGENBERG–Dagmar TILLMANN-BARTYLLA (Materialität der Zeichen 1/A, München 1988), S. 149–174, v.a. S. 150–152.

Lernens auf, das ohne Lehrer gelingen könne, allerdings wird der interessierte Leser den ‚stummen Meister‘ ohne mathematische Vorkenntnisse und geeignete Instrumente nicht völlig verstehen können. Als dezidiert didaktisches Buch im engeren Sinn ist die *Anlaytung* aber ohnehin nicht konzipiert.

Gut euklidisch beginnt Puehler den *prologus ante rem* mit einer Definition: „messen ist nichts anders/ denn sich erkündigen/ wie oft diese oder ein andere fürgenomne und bestelte maß in dem/ deß grösse der lenge/ höhe/ tieffe/ weite etc. man will wissen/ gefunden werde“ (2r). Messen ist für den Verfasser derjenige Vorgang, der ein Objekt unter Zuhilfenahme eines Messinstrumentes quantifiziert und somit für die menschliche Erkenntnis auch qualitativ erst vollends erfassbar macht, indem er es ins Verhältnis setzt zu bestimmten, festgelegten (Längen-)Maßeinheiten, die „den namen gemainiglich von den glidmassen der menschen“ (3r) haben. Es könnte sein, dass Puehler sich hier auf die Erkenntnistheorie des Nikolaus von Kues bezieht, der in *De docta ignorantia* (1440) auf ganz ähnliche Weise das Proportionieren als Erkenntnisvermögen des Verstandes (*ratio*) bestimmt:

Alle, die etwas untersuchen (*investigantes*), beurteilen das Ungewisse im Vergleich und gemäß seinem Verhältnis zu einem als gewiß Vorausgesetzten; also ist jede Untersuchung (*inquisitio*) ein Vergleich, der sich eines Verhältnisses (*proportionis*) als Mittel bedient [...].⁸

Jede rationale Untersuchung der Welt geschieht Nikolaus nach zunächst vergleichend. Cusanus' (und auch Puehlers) neuplatonisch beeinflusster Hierarchie der vier am Erkenntnisprozess beteiligten Erkenntniskräfte entsprechend übersteigt der messende und proportionierende Verstand die bloße Sinneswahrnehmung (*sensus*) sowie die Vorstellungskraft (*imaginatio*). Auf Letztere wird Puehler referieren, wenn er seine erkenntnistheoretischen Überlegungen weiter ausführt und dort insbesondere sein cusanisch geprägtes Verständnis der vierten und höchsten Erkenntniskraft, der Vernunft, präzisiert.

Zwei Ankündigungen beschließen die kurze Einführung. Erstens würden zum Messen zwei Instrumente benötigt, „eins zu den Triangln/ wie gesagt: ein anders zu dem messen oder überschlagen eines dings höhe/ tieffe/ lenge/ weite etc. welchs ein geordnete und fürgestelte maß ist“ (ebd.), ein Triangulationswerkzeug und ein Messstab. Zweitens „[w]öllen wir dieser massen etliche nach einander erzelen/ deren sich die alten Geometre in dem

8 Zitiert durchwegs nach dem Cusanus-Portal, hier: *De docta ignorantia* I, n. 2: cusanus-portal.de/content/werke.php?werk=13 [12.6.2025]. Der digitale Volltext beruht auf: Nikolaus von KUES: Philosophisch-theologische Schriften, hg. und eingeführt von Leo GABRIEL, übers. und kommentiert von Dietlind und Wilhelm DUPRÉ. Sonderausgabe zum Jubiläum. Lateinisch-Deutsch. Zweiter Nachdruck der 1964 erschienenen 1. Auflage. Drei Bände, Wien 1989. Die Bezeichnungen Nikolaus von Kues, Nikolaus und die latinisierte Form Cusanus verweise ich synonym.

feldmessen gebraucht haben“ (3r). Der Verweis auf die römische Agrimensurik – das „aller erste[] messen“ (ebd.) – übernimmt hier die Funktion, einen historischen Anfang zu setzen, von dem aus „ordenlich nach einander“ (3v) erzählt werden kann. Klassisch-agrimensorische Flächeninhaltsberechnungen werden von Puehler jedoch nicht thematisiert.

Die ersten beiden Kapitel listen römische Maßeinheiten ihrer Länge nach auf, als Marginalien ordnen ihre Bezeichnungen den Fließtext.⁹ Es werden Umrechnungen notiert und die lateinischen Termini übersetzt. Die folgenden beiden Kapitel bringen die bekannte Dreiteilung des Messens und euklidisches Grundlagenwissen, wobei nicht der Punkt, sondern die Linie den Anfang macht. Euklid zufolge ist der Punkt, der gerade wegen seiner Ausdehnungslosigkeit den Anfang und zugleich das Ende der Geometrie bildet, eigentlich unsichtbar; man kann ihn nicht vermessen. Doch nach Puehlers Verständnis hinterlässt das Unsichtbare messbare ‚Spuren‘. So begreift er die Linie als „den fußstapffen eines laufenden oder fließenden punct[s]“ (8v) und diese ‚Spur‘ ist zumindest ihrer Länge nach messbar, „[d]enn wo sich die lini hinstreckt/ da erstreckt sich auch das messen der leng hin“ (9r). Die euklidische Vorstellung, „dass eine Linie nichts anderes sei als ein verschobener, also bewegter Punkt“, wird in der *Anlaytung* dahingehend umgedeutet, als dass die Linie nun die messbare Spur des fließenden Punkts ist.¹⁰

Anschließend geht Puehler zur Geschichte des Messens über, indem er die Entfaltung der Vernunftkenntnis mit immer komplexeren und ausgreifenderen Messvorgängen parallelisiert:

[D]as erst messen ist geschehen mit abmessen und außthailung der feldungen unnd landschafften des erdtrichs mit massen wie die im ersten unnd andern Capitel seind angezeigt worden: sie ist aber mit der zeit in dem verstand des menschen so hoch kommen/ daß durch diese kunst so wunderbarliche unnd ungläubliche ding/ in allen messen [...] geoffenbaret werden/ das die/ dem unkündigen dieser kunst wöllen nit möglich gesehen sein zuglauben. Denn die vernunft des menschen ist an dem allein nit benüget gewesen/ daß sie ein ordenliche außthailung eines grossen platz oder feldung oder gantzen land wiß unnd könn machen: ja sie hat sich auch umb den gantzen umbkraiß der erden angenommen [...] das gantz *Corpus* der erden in seiner grösse abzumessen [...]. Und uber das alles ist die vernunft des menschen noch nit ersettigt gewesen: sie hat sich auch umm die waltzenden himel und körper angenommen/ derselben grösse/ distantz/ und lauff erforschen und der sich

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- 9 Im Falle der kleinsten Einheit, *digitus* bzw. „fingerbraut“ (3v), findet sich in den Marginalien eine Abbildung von vier nebeneinander gelegten Gerstenkörnern, was der *digitus*-Definition entspricht.
- 10 Robert FELFE, *Nebenwege der Perspektive. Die Linie als bildnerisches Element zwischen Geometrie und Handwerkspraxis*, in: *Dynamiken des Wissens*, hg. von Klaus W. HEMPFER–Anita TRANINGER (Reihe *Scenae* 6, Berlin–Wien 2007), S. 61–89, S. 62.

erinnern: nit wie die an in selbst/ und Got allein wissend seind: sonder sich derselben sovil zuerinnern understanden/ als vil der menschlichen vernunft und verstand notwendig ist/ ein solche ordenliche und richtige rechenschafft zumachen und auffrichten/ mit der die verendrunge/ so täglich und alle stund mit den himlischen körpern/ durch die lauffe der himlischen Sphären geschehen und gesehen werden [...] (10v).

Die Erkenntniskraft des quantifizierenden Verstandes führt zu Einsichten, die die bloße Sinneswahrnehmung und die Vorstellungskraft des ‚unkündigen‘ übersteigen. Als der Verstandeserkenntnis übergeordnete Fähigkeit vermag es nur noch die Vernunft (*intellectus*), in höhere Erkenntnisphären vorzudringen. Während der Verstand sich in dieser Konzeption etwa in der Befolgung mathematischer Regeln oder der sachgemäßen Anwendung von Instrumenten zeigt, scheint die spezifische Leistung der Vernunft in der Einsicht bislang unbekannter Zusammenhänge zu bestehen. Die Vernunft sucht ‚andere weg‘, sie agiert also kreativ-schöpferisch.

Alles Wissen ist Puehler zufolge dennoch endlich, denn wie die Dinge ‚an in [sich, jh] selbst sind‘, weiß nur Gott. Auch diese Vorstellung findet sich bei Cusanus wieder, der konstatiert: „Es kann also der endliche Geist (*finitus intellectus*) durch Ähnlichkeit die Wahrheit der Dinge (*rerum veritatem*) nicht genau erreichen“.¹¹

Obwohl im Drucktext nie direkt auf Nikolaus von Kues verwiesen wird, sind terminologische und konzeptionelle Analogien zu dessen Epistemologie unverkennbar. Als gleichermaßen theologische wie mathematische Autorität ist der Kardinal für einen Klostermathematiker des katholisch geprägten Donaauraums recht naheliegend. Es ist zudem nicht unwahrscheinlich, dass Puehler Nikolaus’ Denken womöglich bereits während der Studienzeit in Wien kennengelernt hatte, denn neben Paris, wo 1514 die erste gedruckte Cusanus-Gesamtausgabe erscheint, ist gerade Wien „von erheblichem Einfluß auf die Form der Cusanusrezeption durch den deutschen Renaissancehumanismus“.¹²

Zurück zum Druck. Vom Feld zum Land zur Erde steigert sich der geometrische Appetit der menschlichen Vernunft, bis die „kunst *Geometria*“ (11r) ihren irdischen Untersuchungsbereich verlässt und schließlich „den namen *Cosmimetria*, das ist/ der welt messen“ (ebd.) erhält.

In den folgenden Kapiteln behandelt Puehler das Pythagoras-Theorem und Grundlagen der Triangulation. Entgegen der Ankündigung, nur irdisches Messen thematisieren zu wollen, findet sich in den Kapiteln 9 bis 11 ein Exkurs zur sphärischen Trigonometrie, die beispielsweise für die Höhenmessung von Himmelskörpern über dem Horizont Anwendung findet. Hiermit endet der erste Teil der *Anlaytung*, der die Weltfahrt vom Gerstenkorn bis

¹¹ *De docta ignorantia* III, n. 10: cusanus-portal.de/content/werke.php?werk=13 [12.6.2025].

¹² Stephan MEIER-OESER, Die Cusanus-Rezeption im deutschen Renaissancehumanismus des 16. Jahrhunderts, in: Nicolaus Cusanus zwischen Deutschland und Italien, hg. von Martin THURNER, Berlin 2002, S. 617–632, S. 618.

zu den Sternen – also noch weiter als ‚nur‘ bis zum Erdumfang – gewissermaßen en miniature schon einmal unternimmt.

DER GEOMETER UND DER WERKMANN

Die beiden nächsten Textteile beschäftigen sich mit den diversen Anwendungsmöglichkeiten des Astrolabiums bzw. dessen rückseitigen Quadranten: Höhen-, Tiefen-, Längen- und Breitenmessungen.¹³

Puehlers Adressat ist bis Kapitel 31 zunächst ‚der Geometer‘. Zwischenzeitlich wird er noch mit einem weiteren Messinstrument ausgestattet, denn es „ist zumercken/ dz ein jeder *Geometra* einen steten meßstab soll haben/ der sein leng von der solen biß zu dem aug hab“ (37r). Das erklärt sich daraus, dass bei den meisten Höhenmessungen die Entfernung vom Boden bis zum Auge des Geometers zu der mit dem Astrolab oder dem Quadranten gemessenen Höhe addiert werden muss, um das richtige Messergebnis zu erhalten. Eine geeichte Messrute wäre für diesen Zweck entsprechend ungeeignet, da sie keine Rücksicht auf die Körpergröße des Geometers nehmen kann.

Äußerst hypotaktisch kommt Puehler in Rückgriff auf die Widmungsvorrede und die einführnden Absätze vor Kapitel 1 zum Abschluss der ersten Exempelreihe der Quadrantenmessung auf die dominante Eigenverortung seiner *Anlaytung* als Lehrwerk für fleißige Geometrieneulinge zu sprechen, die keinen persönlichen Unterricht nehmen könnten (vgl. 48r).

Für bereits Vorgebildete sind die vom Verfasser als zusammengehörig konzipierten Kapitel 24 bis 30 seiner Wortwahl nach überflüssig; für den fleißigen Schüler hingegen, der allerdings zumindest den Dreisatz beherrschen muss, ersetzt die Konsultation des gedruckten Buches den Lehrer.

Gut zu erkennen ist, dass der Verfasser vor einem nun folgenden textimmanenten Adressatenwechsel mit dem Verweis auf bereits gebrauchte Legitimationstopoi einen gezielten Einschnitt setzt, denn in den nächsten vier Kapiteln ist der ‚Protagonist‘ des Messens nicht mehr ‚der Geometer‘, sondern ‚der Handwerker‘:

Nun wöllen wir dem gemeinen werckman/ als maurern/ Steinmetzen/ und Zimmerleuten auch einen kleinen underricht geben/ wie sie die höhe eines gebew/ oder der bäume die sie zu den gebäwen sollen schlagen/ ob die die

13 Vgl. hierzu LAUNERT, *Transversalteilung* (2014), S. 58–101. Nach Puehlers eigener Zählung bilden sie den ‚eigentlichen‘ ersten bzw. zweiten Teil der *Anlaytung*.

rechte leng haben oder nit/ mit schlechten Instrumenten suchen und finden sollen [...] (48v).

Puehlers ‚kleiner Unterricht‘ erinnert nicht nur in Hinblick auf die genannten Handwerksberufe, sondern auch in seiner mathematischen und technischen Einfachheit an die Köbel-Tradition.¹⁴ Die Kapitel beschreiben sehr anschaulich den Gebrauch des sogenannten Försterdreiecks – „ein gerecht winckelmaß mit einer pleywag“ (ebd.) – als besonders leicht konstruier- und handhabbares Messinstrument sowie die Nutzung von Schattenlängen zur ebenerdigen Höhenmessung. Im Unterschied zu Köbels Druckwerken fehlen hier der Messspiegel und der Jakobsstab mit verschiebbarem Läufer, den Puehler schon zu den höherwertigen Werkzeugen rechnet. Im Verlauf der *Anlaytung* lassen sich die Werkmeister-Kapitel als Exkurs in den Bereich des zwar oftmals unpräzisen, dafür äußerst unkomplizierten ‚einfachen‘ Messens beschreiben, der dem Ganzheitsanspruch von Puehlers Reise durch die Welt der Messtechnik entsprechend nicht ausgelassen werden kann. Die Kapitel zum handwerklichen Messen bieten leicht erlern- und anwendbares Praktikerwissen und machen ein Lektüreangebot, das in erster Linie ein persönliches Interesse – ‚grosse lust und natürliche neigung‘ (vgl. 48r) – an (Mess-)Technik(en) befriedigt.

DIE SONDE, DER SEE UND DER SCHREIBTISCH

Die wohl aus der agrimensurischen Tradition stammende und bereits von frühmittelalterlichen Geometrieschriften behandelte Aufgabe der Messung einer Brunnentiefe leitet das nächste Technikunterhaltungsbeispiel ein.¹⁵ Mit einem Stock, der so weit über den Brunnenrand gelegt wird, dass der Messer über dessen Ende genau den Pegelstand anpeilt, kann unter Berücksichtigung des Strahlensatzes die Tiefe gemessen werden. Die Entfernung vom Standpunkt des Messers auf dem Rand zu seinem Auge muss bekannt sein, ebenso muss er den Dreisatz beherrschen. Puehler schildert im Kapitel 43 das genaue Vorgehen, kommt aber gegen Ende zu einer Einsicht: „Das gewissest und fürderlichst aber/ der tieffen eines Brunnen/ oder eines wasser zubekommen/ achte ich nach der gemeinem werckleut gebrauch/ mit dem pleysenckel zu bekommen“ (65v). Die Einführung des Senklotes als alternative Tiefenmessoption lässt sich als Pointe im Sinne einer „produktiven Erwartungsenttäuschung oder einer überraschenden Wendung“ beschreiben, die „zu einer Neuinterpretation des

¹⁴ Vgl. zu den geometrischen Schriften Jakob Köbels meine Dissertation: *Geodätische Bücher* (2025), S. 39–67.

¹⁵ Vgl. Menso Folkerts, *Die Mathematik der Agrimensoren – Quellen und Nachwirkung*, in: *In den Gefilden der römischen Feldmesser. Juristische, wissenschaftsgeschichtliche und sprachliche Aspekte*, hg. von Eberhard Knobloch–Cosima Möller (Topoi – Berlin Studies of the Ancient World/Topoi – Berliner Studien der Alten Welt 13, Berlin–Boston 2013), S. 131–148, S. 145.

vorherigen Textes“ führt, indem sie die Zweckmäßigkeit der im Gegensatz zum Lot noch relativ komplexen Stockmessung konterkariert und als technische Spielerei entlarvt.¹⁶

Gleich zu Beginn des Folgekapitels 44 tritt das Bleilot erneut auf, das somit eine Scharnierfunktion übernimmt. Diesmal allerdings wird auf die Beschränktheit der Lotmessung bei großer Wassertiefe hingewiesen, der nur mit großer technischer Raffinesse in Form einer Gewässerbodensonde begegnet werden kann. Meinen Fokus möchte ich auf potenzielle Prätexte der Doppelaufgabe ‚Brunnentiefe und Sondenmessung‘ legen, denn beide Aufgabenteile finden sich in dieser Folge bereits in der Hugo von St. Victor zugeschriebenen *Practica geometriae*.¹⁷ Ferner existieren einige noch ältere lateinische Handschriften, die nur den zweiten Aufgabenteil thematisieren.¹⁸ Ganz wesentlich sind allerdings die um 1450 entstandenen *Ludi rerum mathematicarum* des Leon Battista Alberti, die schon im Titel den unterhaltenden Charakter der Mathematik akzentuieren und die sich anbieten, um die Besonderheiten von Puehlers Darstellung zu verdeutlichen.¹⁹ Gerhard Dohrn-van Rossums Behauptung, Albertis „Vorschlag zur Tiefenmessung“ sei von Puehler einfach nur „nachgeschrieben worden“, möchte ich bezweifeln.²⁰ Es gibt Ähnlichkeiten zwischen den beiden Texten: Beide fassen die Doppelaufgabe als Einheit auf; bei beiden veranlasst ein zu kurzes Lot die Sondenmessung, die dann ingenieurstechnisch auf sehr ähnliche Weise abläuft. Allerdings ist nicht zu rekonstruieren, ob und auf welche Weise Puehler mit Albertis Schrift vertraut war.

Doch wie funktioniert nun eigentlich das Messverfahren? Die grundlegende Idee ist, dass man eine Sonde ins Wasser sinken lässt, die, sobald sie den Gewässerboden berührt, einen

¹⁶ Ralph MÜLLER, Art. ‚Pointe‘, in: *HWRh* 6 (2003), Sp. 1398–1403, Sp. 1398.

¹⁷ Practical Geometry [Practica Geometriae]. Attributed to Hugh of St. Victor, hg. und übers. von Frederick A. HOMANN (Mediaeval Philosophical Texts in Translation 29, Milwaukee 1991), S. 54–55 (Abschnitte 33–35).

¹⁸ Vgl. Gerhard DOHRN-VAN ROSSUM, Mechanische Uhren, moderne Zeitordnungen und die Wissenschaften im Spätmittelalter, in: *Zeit in den Wissenschaften*, hg. von Wolfgang KAUTEK–Reinhard NECK–Heinrich SCHMIDINGER (Wissenschaft – Bildung – Politik 19, Wien–Köln–Weimar 2016), S. 9–43, S. 34. Für weitere Aufsätze zur „komplizierten Überlieferungsgeschichte“ vgl. ebd. Anm. 55. Eine gute Übersicht der lateinischen Manuskripttradition bieten Catherine JACQUEMARD–Alain HAIRIE, *Avant le sondeur de Puehler [!]* (1563): *Le De profunditate maris uel fluminis probanda* (XI^e siècle). *Archives Internationales d’Histoire des Sciences* 50 (2000), S. 244–255. Im gleichen Zeitschriftenheft findet sich ein zweiter Aufsatz von JACQUEMARD–HAIRIE: *Étude théorique et expérimentale du sondeur sans fil décrit dans le manuscrit latin Avranches, BM 235*, S. 256–263, der mit wissenschaftsarchäologischem Interesse ein Experiment mit der Sonde schildert und auf Seite 258 sowie 261 das Kapitel 44 kurz streift.

¹⁹ Leon Battista ALBERTI, *Ex ludis rerum mathematicarum*, in: *The Mathematical Works of Leon Battista Alberti*, hg. von Kim WILLIAMS–Lionel MARCH–Stephen R. WASELL, Basel 2010, S. 9–140, S. 20–25 (Probleme 7 und 8). Auf den Seiten 93 bis 96 kommentiert Stephen R. WASELL die beiden Probleme. — Im gleichen Jahr vollendet Cusanus mit *De staticis experimentis*: cusanus-portal.de/content/werke.php?werk=30 [12.6.2025] seinen letzten der sogenannten Idiota-Dialoge, der im Abschnitt 181 ebenfalls eine sehr einfach gehaltene Sonde beschreibt, die aus einem Senkblei und einem Apfel besteht. Vgl. zu den Messverfahren der *Ludi* und des Dialoges den Beitrag von Felix JÄGER, *Dialektik der Genauigkeit. Nicolaus Cusanus und Leon Battista Alberti*, in: *Bilder der Präzision. Praktiken der Verfeinerung in Technik, Kunst und Wissenschaft*, hg. von Matthias BRUHN–Sara HILLNHÜTTER, Berlin–Boston 2018, S. 269–281, v. a. S. 270–272.

²⁰ DOHRN-VAN ROSSUM, *Uhren* (2016), S. 35.

Schwimmer absetzt, der zurück an die Wasseroberfläche steigt. Je länger dieser für den Auftrieb braucht, desto tiefer ist das Gewässer. Ganz ähnlich wie beim Echolot wird eine Wassertiefe über die verstrichene Zeit bestimmt, die ein Signal, in diesem Fall der Schwimmer, benötigt, um eine gewisse Distanz zurückzulegen. Dass das Verfahren aus dem „heutigen physikalischen Wissen heraus falsch“ ist, da beispielsweise der ungleiche Reibungswiderstand unterschiedlich geformter Körper im Wasser sowie variierende Geschwindigkeiten beim Absinken und beim Aufsteigen der Sonde nicht berücksichtigt werden können, muss nicht weiter stören.²¹

Alberti behauptet, dass er die Sondenmessmethode „dagli scriptori antichi“ übernommen habe, ohne jedoch Autorennamen zu nennen.²² Puehler hingegen gibt die Methode als eigene Erfindung aus. Auf einen Gewährsmann, wenn auch bloß für unergründbare Gewässertiefen, verzichtet er ebenfalls nicht:

Wenn aber ein wasser in einem Weiher/ Graben/ See/ oder sunst ein ander stilstehend Wasser also tieff ist/ das du des selben tieffe auch mit dem Pley-senckel nit ergründen kanst/ als mir Wolffgangus Orthner/ der freyen künsten/ unnd insonderheit der Astronomiæ ein gelehrter Mann/ so ein zeit lang inn der Statt Gmünden an dem Traunsee/ in Osterreich ob der Ens gelegen/ gewondt/ von solchem See anzeigt hat: wie im alt erbar Leuth zu Gmünden gesagt haben. Das hoch löblicher gedechtnus Keyser Maximilian/ auff ein zeit den Traunstain unnd den Gmündner See hab lassen abmessen/ unnd die höhe des Bergs 358. Klaffer hoch gefunden. Den See aber ein wenig von dem Felsen herdan/ 368. klaffter tieff gefunden. Da man aber noch weytter von dem Felsen herdan gefaren/ hat man den See nit ergründen können. Und wenn dem also ist/ als mir der Orthner/ und ime die inwoner zu Gmünden/ wie gesagt/ anzeigt haben: unnd du wolltest den Boden oder Grund des Sees/ das ist/ die tieffe des Sees suchen und finden: kanstu das durch ein solchs Instrument und also bekommen (65r–66v).

So beginnt das Kapitel. Hierauf folgen die Beschreibungen der Bodensonde, ihrer Funktionsweise sowie ihrer Anwendung. Bei Alberti, das ist der Hauptunterschied zu Puehler, fehlen diese Historisierung der Tiefenmessung und die damit zusammenhängenden Regionalismen völlig.

²¹ LAUNERT, *Transversalteilung* (2014), S. 72.

²² ALBERTI, *Ex ludis rerum mathematicarum* (2010), S. 22. Es überrascht nicht, dass die mathematikhistorische Forschung nach diesen *scriptori* gesucht hat. Der um die Wende des 11. zum 12. Jahrhunderts im katalanischen Raum tätige Mathematiker, Astronom und Philosophen Abraham Savasorda beispielsweise wurde als möglicher Vorgänger Albertis identifiziert, vgl. ebd. S. 96.

Die Forschung konnte Puehlers Gewährsmann, Wolfgang Orthner, bislang nicht urkundlich belegen,²³ doch er tritt in jedem Fall als zuverlässige Quelle auf: Erstens ist er als ‚gelehrter Mann‘ und Astronom ein Kollege des Verfassers; zweitens war er als Einwohner Gmundens viele Jahre im doppelten Sinn ‚vor Ort‘: Vor der Stadt Gmunden wurde auf einer kleinen Insel im See Schloss Ort errichtet, auf das sich der Nachname des Astronomen beziehen könnte.

Orthner selbst hat glaubwürdige Quellen: tugendhafte und vor allem alte Einheimische, die Maximilians Vermessungen potentiell selbst hätten beiwohnen können. Für Letztere war keinerlei Beleg ausfindig zu machen; immerhin von einer Besteigung des Traunsteins, die Maximilian im November des Jahres 1506 unternommen habe, berichtet Johannes Cuspinian, wenn auch nur in seinem privaten Tagebuch.²⁴ Doch ist auch in diesem Fall der Wahrheitsgehalt der ‚Anekdote von der gescheiterten Tiefenmessung‘ unerheblich. Entscheidend ist vielmehr, wie Puehler sie für die folgende Darstellung der Gewässerbodensonde funktionalisiert. Denn er benötigt die Erzählung, um der Rezipientin, der er ein eigenes Interesse an der Messung der Tiefe des Traunsees suggeriert, eine Lösung des Senklotproblems anzubieten. Dies ermöglicht, sich gewissermaßen selbst auf eine (imaginierte) Expeditionsfahrt ins Salzkammergut zu begeben, um mit Hilfe eines neuartigen Instruments korrekte Ergebnisse für fehlgeschlagene Vermessungsarbeiten nachzureichen, die einst von Kaiser Maximilian in Auftrag gegeben wurden. Als Ausgangspunkt der Inszenierung des Instruments und vor allem als Katalysator eines ‚Vermessungsabenteuers‘ ist die Traunsee-Erzählung von großer Bedeutung für die spezifische Form technikbezogener Wissensunterhaltung, wie sie dieses Kapitel der *Anlytung* bietet.

Ich hatte weiter oben Zweifel an Gerhard Dohrn-van Rossums Einschätzung geäußert, dass Puehler Albertis Entwurf bloß ‚nachgeschrieben‘ habe. Er schreibt:

Albertis deutlich an den alten Autoren orientierter und als reine Schreibtischtechnik leicht erkennbarer Vorschlag zur Tiefenmessung ist noch bei Roberto Valturio 1482, bei Christoph Pühler 1563 und Anderen nachgeschrieben worden.²⁵

Das dort behauptete Übernahmeverhältnis kann zwar nicht bestätigt werden, dennoch scheint mir der von ihm für die Texte Albertis und seiner Nachfolger gefundene Terminus ‚Schreibtischtechnik‘ (trotz des Fehlens einer genaueren Erläuterung) eine unmittelbar

²³ Vgl. LAUNERT, *Transversalteilung* (2014), S. 70, Anm. 135.

²⁴ Vgl. Hans ANKWICZ-KLEEHOVEN, *Der Wiener Humanist Johannes Cuspinian. Gelehrter und Diplomat zur Zeit Kaiser Maximilians I., Graz-Köln* 1959, S. 38: Maximilian, damals noch König, sei „zwischen sechs und sieben Uhr morgens mit einigen Adeligen und Jägern zur Besteigung des Traunsteins ausgezogen und erst um die siebente Abendstunde heimgekehrt“.

²⁵ DOHRN-VAN ROSSUM, *Uhren* (2016), S. 35.

plausible und präzise Etikettierung der Gewässerbodensonde darzustellen. Sie wird sowohl von Alberti als auch wegen der oben beschriebenen Zusätze noch in höherem Maße von Puehler als Stimulans rein imaginärer Messungen ‚am Schreibtisch‘ und weniger als konkret anwendbares technisches Hilfsmittel bathymetrischer Praxis inszeniert. Dieser Funktionalisierung der Sonde entsprechend erscheint es beinahe zwingend, dass Puehler abschließend gerade keine Angabe zur Tiefe des Traunsees macht, dass eben „durch ein solchs Instrument“ (66v) gerade kein konkretes Messergebnis erzielt wird!

Das Kapitel 44 nimmt innerhalb der Rezeptionsgeschichte des Drucks eine besondere Rolle ein, als dass es das einzige ist, das in einen späteren Druck aufgenommen wurde, dazu noch in unveränderter Form. In Daniel Schwenters dezidiert als Technik- bzw. Wissensunterhaltung konzipierten *Erquickstunden* bildet es den Schluss des Textabschnittes zur Hydraulik.²⁶ Puehlers Bodensondenerzählung scheint beinahe ein Dreivierteljahrhundert nach ihrer Veröffentlichung als gelungene Wissensunterhaltung wahrgenommen worden zu sein.

DER DRITTE GESELLE

Das nächste Textbeispiel behandelt die Anwendung der Strahlen- und Ähnlichkeitssätze (*Elemente* VI,2 und VI,4) auf freiem Feld, um Entfernungen „on Instrument leichtlich abzumessen“ (74v). Auch in Kapitel 50 wählt Puehler das Vertextungsmuster der Erzählung, denn wie das Messverfahren funktioniert, will er nicht etwa erklären oder beschreiben, sondern „durch ein geschicht anzeigen“ (ebd.):

Auff ein zeit giengen unser drey einem Dorff in Ungern zu. Saget meiner gesellen einer zu mir: Dises Dorff laßt sich ansehen/ als solt nahend hinein sein: Ich trag aber sorg/ nach dem das feld zu dem Dorff hinein eben ist/ der weg werde sich gar lang hinein ziehen. Auff diese wort sihe ich gegen dem Dorff/ und sihe auff der lincken hand vor mir/ ein wenig von dem weg hindan/ ein kleins bäumlin/ oder stauden stehen: alsdann sagt ich zu meinem gesellen: Ich will dir sagen/ wie weit von dannen/ da wir jetzt stehen/ oder von der stauden/ die vor uns stehet/ zu der kirchen/ die du neben dem Dorff sihest ligen/ ist: und will dir uber 50. oder 60. schrit nit fehl sagen. Und das galt ein gewet/ welcher verlur/ das er ein pint wein zalet (74v–75r).

In Begleitung zweier namenloser „gesellen“ schätzt bzw. misst Puehler irgendwann „auff ein zeit“ die Distanz von seinem Standpunkt auf einem Feld irgendwo in „Ungern“ aus

²⁶ Vgl. Daniel SCHWENTER, *Deliciae physico-mathematicae oder mathematische und philosophische Erquickstunden* [...], Nürnberg 1636 [VD17 12:196878Q], S. 513–515. In der *Anlaytung* beschließt es die Höhen- und Tiefenmessung, es folgt die Breiten- und Entfernungsmessung.

zu einer unweit eines Dorfes gelegenen Kirche. Nachdem einer der Begleiter gegen die Ankündigung des Erzählers wettet, die Wegstrecke auf wenige Schritt genau messen zu können, begründet auch das in Aussicht gestellte kostenlose „pint wein“ die intradiegetische Entfernungsmessung. Es ist Puehler selbst, der als autodiegetischer Erzähler Informationen aus erster Hand bereithält. Auch in einigen darauffolgenden Kapiteln wird Puehler vorgeblich Selbsterlebtes erzählen und so seine eigene ‚Vermessungsbiografie‘ weiter ausbauen.

Ich möchte zunächst zwei Details der Exposition betrachten: die ‚gesellen‘ und das ‚bäumlin‘. Drei ‚gesellen‘ auf Wanderschaft, ein kleines Dorf in Sichtweite, eine Wette um Wein – so könnte gut und gerne ein Schwank beginnen. Der Schwanktyp ließe sich über das jeweilige Figurenensemble der ‚gesellen‘ sogar noch konkretisieren: ein Studentenschwank, ein Junggesellenschwank, ein Betrügerschwank. Im Verlauf des Kapitels finden sich im intradiegetischen Gespräch des Erzählers mit seinem Wettgesellen Verweise auf die *Elemente* und den Dreisatz, was Letzteren als einen mathematisch zumindest rudimentär Vorgebildeten erscheinen lässt, vielleicht einen Kommilitonen Puehlers. Über den dritten Gesellen erfährt man abgesehen von seiner Anwesenheit weiter nichts, er bleibt stumm und scheinbar völlig unbeteiligt.

Freilich handelt es sich bei Puehlers Erzählung nicht um einen Schwank im gewohnten Sinn – eine List etwa bleibt aus und komisch ist das Kapitel auch nicht –, wenngleich anfangs traditionelle Motive des Schwanks versammelt werden, der allerdings im Folgenden gerade nicht zur narrativen Entfaltung kommen wird. Man könnte vorsichtig anmerken, dass der Schwank als in diesem Fall ausschließlich implizites alternatives Erzählmuster angedeutet wird. Der analytische Vorteil, diese Passage dennoch mit einem Schwank zu vergleichen, besteht darin, überhaupt erst erkennen zu können, dass sich die *Anlaytung* gewisser Erzählmuster bedient.

Ich komme zum ‚bäumlin‘, bei dem es sich um einen Busch oder einen Strauch handelt. Puehler erblickt also das Gewächs, dessen Vorhandensein in der Diegese völlig kontingent ist, links vor sich neben dem vor ihm liegenden Weg, und weiß „alsdann“ (74v) bereits, dass er die Entfernung zur Dorfkirche wird bestimmen können, weil er die beiden wesentlichen Propositionen sowie ihre praktische Anwendung kennt. Er weiß zudem, dass er die von seinem Begleiter als Reaktion auf diese Behauptung vorgebrachte Wette eigentlich schon gewonnen hat, da sich die gesuchte Strecke durch eine instrumentelle Verwendung des ‚bäumlins‘ berechnen lassen wird. Wie Puehler nun allerdings bei der Entfernungsmessung vorgehen wird, wissen anfangs weder sein Wettpartner noch der Leser – das Gebüsch am Wegesrand bleibt für beide zunächst einfach ein Gebüsch am Wegesrand. Der Leser kann allerdings ahnen, dass das ‚bäumlin‘ – dann in seiner Funktion als Instrument – für das Kapitel noch wichtig werden wird.

Wie funktioniert Puehlers Messung? In einem ersten Schritt benutzt er seinen Wettgesellen als menschliche Markierung eines beliebigen Punktes auf dem Weg – „Da stehe mir auff dem Weg still.“ (75r) –, geht dann von diesem Punkt so weit nach links, bis er über das Gebüsch hinweg die Kirche von einem zweiten Punkt aus anpeilen kann. Dann zählt er die

Schritte bis zur Position seines Begleiters zurück. Nun gehen beide den Weg von dort aus in Richtung Kirche und zählen ihre Schritte, bis sie auf der Höhe des ‚bäumllins‘ angelangt sind, wo der Geselle erneut als Markierung eines dritten Punktes fungiert. Puehler geht anschließend erneut in Richtung des Gebüschs, peilt ein zweites Mal die Kirche an und zählt abermals die Schritte zum Gesellen zurück. Vom Erzähler in Bewegung gesetzt, läuft sein Geselle wie der ‚lauffende oder fließende punct‘ aus den ersten Kapiteln umher und hinterlässt dabei messbare Spuren. Es sind die drei Strecken, die Puehler für die Entfernungsmessung benötigen wird.

Auf das Abgehen dieser Strecken folgt die Erklärung des Messvorgangs, deren intradiegetischer Adressat der Erzählsituation entsprechend der Wettgeselle ist. Puehler sagt zum ihm: „da will ich dir auf den weg ein figur reissen/ auß der du selbst erkennen kanst/ und sagen/ wie weit von dannen [...] zu der kirchen ist/ und machte im ein solche figur/ wie du vor dir sihest“ (ebd.).²⁷ Am Seitenende befindet sich die einzig sichtbare Illustration des Kapitels. Sichtbar deshalb, weil es streng genommen noch eine zweite, innerhalb der Diegese von Puehler angefertigte, Illustration gibt, von der allerdings ausschließlich erzählt wird. Vor Augen gestellt wird stattdessen eine Illustration, die ein mit den entsprechenden Schritt- bzw. Zahlwerten sowie mit Buchstaben zur Kennzeichnung der Eckpunkte versehenes geometrisches Diagramm mit der Darstellung der Kirche und des Gebüschs in einer ansatzweise ausgestalteten Landschaft kombiniert. Die letzteren Bilddetails hatte der Erzähler seinem Begleiter wohl eher nicht auf den Weg ‚gerissen‘; die Zahlwerte und die Buchstaben allerdings schon, das erfährt man auf der nächsten Druckseite. Obwohl also beide ‚figuren‘ nicht völlig identisch sind, übernehmen sie dieselbe autodidaktische Funktion: sie sollen es dem intra- bzw. extradiegetischen Betrachter ermöglichen, die Entfernung zur Kirche eigenständig zu bestimmen. Und da bereits im vorherigen Kapitel die zentrale *Elemente*-Proposition VI,4 genannt und gebraucht wird, wäre es dem aufmerksamen Leser prinzipiell möglich gewesen, die gesuchte Streckenlänge anhand der gegebenen Messwerte korrekt zu berechnen. Allerdings ist die einwandfrei bestimmte Entfernung zur Kirche dort bereits eingetragen, ansonsten hätte sich die Illustration am Seitenende hervorragend als Selbsttest geeignet.

Auf der Folgeseite beginnt die Erklärung des Erzählers:

[...] der buchstab A bedeutet deinen ersten stand/ da ich dich zum ersten hab heissen still stehen. Der buchstab B aber/ bedeutet meinen ersten stand/ da ich das erst mal von dir bin gangen/ unnd die kirchen uber die stauden hab abgesehen [...] (75v).

²⁷ Mit dem ‚du‘ im letzten Nebensatz ist der Leser gemeint, Puehler springt hier für einen kurzen Moment in die Extradiegese. Blättert man die Seite 75r um, ist der Wettgeselle wieder Puehlers Adressat. Er wird es bis zum Schluss des Kapitels bleiben.

Mittels des ‚bäumlin‘ habe er zwei ähnliche Dreiecke abschreiten und dann ganz unkompliziert die Entfernung zur Kirche mit dem Strahlensatz messen können. Euklid-Verweise belegen die geometrische Richtigkeit des Vorgangs, der hier nicht im Detail dargestellt werden muss. Selbstverständlich hört der Leser bei der Erklärung mit und versteht im besten Fall, was der Verfasser der *Anlaytung* ihm in diesem Kapitel „durch ein geschicht anzeigen“ (74v) wollte.

Auffällig ist, dass Puehler den dritten Gesellen nicht ebenfalls als menschliche Markierung der Dreiecksunkte benutzt. Warum wird er nicht miteinbezogen?

Meine Vermutung ist, dass dem Leser der *Anlaytung* das Rezeptionsangebot gemacht wird, die Rolle des stummen, beobachtenden Gesellen einzunehmen, der zwar während des Messvorgangs passiv bleibt, aber die intradiegetische Erklärung mithört. Der dritte Geselle ließe sich in dieser Konstellation als intradiegetische Stellvertreterfigur des extratextuellen Rezipienten auffassen, der Puehlers Expertise in Messangelegenheiten auf der bedruckten Buchseite in Text und Bild nachverfolgen kann. In der kunstgeschichtlichen Forschung würde man von einer ‚Assistenzfigur‘ sprechen.

Auch hier scheint es Puehler daran gelegen zu sein, die Aufmerksamkeit des Lesers nicht nur auf das bloß registrierende Erfassen unkontextualisierter mathematisch-technischer Wissensinhalte zu lenken, sondern auf den Verlauf einer unterhaltsamen Anekdote, die alltagstaugliche Anwendungsmöglichkeiten geometrischen Wissens zum Gegenstand hat.

Erzählt wird hier wie auch im Traunsee-Kapitel aus mehreren Gründen: Zum einen ermöglicht es den unterschiedlich stark forcierten Miteinbezug des Lesers, etwa zum Zweck der Imaginationsstimulation oder der gezielten Aufmerksamkeits- und Verstehenslenkung; zum anderen bieten autodiegetische Erzählungen dem Verfasser Gelegenheiten zur positiven Selbstdarstellung, zur Inszenierung lebensweltlicher Erfahrung sowie fundierter fachlicher Expertise. Zum Zeitpunkt der Erstveröffentlichung des Drucks ist das eine bemerkenswerte Neuheit, die sich in älteren und auch jüngeren deutschsprachigen Geodäsiebüchern nicht wiederfinden lässt.

DIE GROSSE WESTFAHRT

Im Kapitel 65 liest man, wie sich vor nicht allzu vielen Jahren der seinerzeit fast Sechzigjährige auf eine strapaziöse Fernreise begeben hatte:

Nachdem ich mich aber von meiner fürgenomenen statt Passaw auff land und wasser geben/ frembde lender und gegenden erfahren und zubesichtigen/ und nun ein zeit auff dem Märe gefahren: haben wir erdrich gesehen/ und den zehenden tag Octobris des 1557. Jar zu einer Insel kommen/ alda unsere schiffung mit holtz und süssen wasser/ an den wir nun mangel gehabt/ versehen/ und so wir nun ettliche tag unser station alda gehalten/ und ich künde

wissen wo hin werts / und wie weit/ ich von meiner fürgenommenen statt Passaw were: hab ich der Insel mittag lini gesucht/ nach derselben mein Instrument auffgericht/ und den Septentrionischen *polum Tramontanus* von den Schifflüeten genent. 14. gradus hoch uber den horizont der Insel erhebt gefunden [...] (112v).

Um zu erörtern, wie dieser Textausschnitt in den thematischen Kontext des „dritten theyl[s] dises Büchlein[s]“ (98r) eingebettet wird, gehe ich zurück zum Kapitel 59:

Ich will dir anzeigen/ unnd leren/ wie eines jeden grossen circkel umbkreyß/ der wasser und erden/ der gantzten welt in ein ainige runde kugel von Gott zusammen gemacht/ und nach der alten Philosophorum unnd Astronomorum meinung mitten in dem gantzen geschöpff Gottes / wie das centrum in der gantzen kugel ruhet/ in aller mitte entzwey teylet/ in seiner grösse gesucht und gefunden soll werden: Sovil gesagt: ich will dir einen solchen bericht geben/ das du durch instrument/ so zu solchem messen gemacht sollen sein/ wie du hernach wirst hören/ kanst finden wieviel meil [...] die gantz welt/ [...] groß ist [...] (ebd.).

Das Ziel seiner vom Gerstenkorn ausgehenden Weltfahrt hat der Verfasser hier schon ins Auge gefasst: Es geht um nichts Geringeres als die Vermessung der ‚gantzen welt‘. Außerdem verspricht er zu erklären, wie man „durch instrument/ zu solchem messen gemacht“ (98v) den genauen Längen- und Breitengrad eines Punktes auf der Erdoberfläche findet und somit die Distanz zweier Punkte – die Luftlinie – berechnen kann.

Für diese ambitionierten Vorhaben muss man entsprechend befähigt sein, weshalb er „einen jeden liebhaber dieser kunst [...] ermanet haben“ möchte, sich gründlich im Rechnen zu üben, „oder er wirdt s[]unst wenig frucht schaffen“ (ebd.). Doch nicht nur fundierte Mathematikkenntnisse werden benötigt, man braucht auch eine angemessene Ausrüstung. Aus diesem Grund liefert Puehler im Kapitel 60 die Bauanleitung eines Instruments, von dessen Leistungsfähigkeit er überzeugt zu sein scheint: „unnd hab bey mir zu solcher [astro-nomischer, jh] observation/ als du jetzt hernach wirst hören/ kein besser Instrument nit erdencken können“ (108v–109r).

Die nächsten vier Kapitel, die den Gebrauch des aus geschliffenen, gefalzten, gebohrten, geschraubten und gravierten Messingblechen bestehenden ‚Hahns‘ erläutern, suggerieren, dass der Leser zunächst bauen und dann weiterlesen soll.²⁸ Ich gehe allerdings davon aus, dass ein tatsächlicher Nachbau vor allem aufgrund der außerordentlich hohen

²⁸ Im Kapitel 67 empfiehlt der Verfasser sogar, dass man sich um der Praktikabilität willen am besten gleich zwei Exemplare anfertige; eines, „wenn du frembde Land unnd Flecke erfahren und sehen wilt“ (116r) und eines gewissermaßen ‚für den Heimbedarf‘.

handwerklichen Anforderungen präziser feinmechanischer Metallverarbeitung die absolute Ausnahme geblieben ist.²⁹

Puehler fährt fort, als ob dem Leser der ‚Hahn‘ für die kommenden kosmimetrischen Messungen vorläge und erörtert zunächst ganz allgemein, wie man mit dessen Hilfe Längengrade bestimmt. Damit die einzelnen Abläufe „noch gründlicher verstanden“ (112r) werden „will ich das mit einem exempel und Figur gar für die augen legen“ (112r–v). Bei diesem „exempel wie die *longitudo* einer statt zu finden sey“ (112r) handelt es sich um die oben bereits zitierte Schilderung von Puehlers Fernreise, womit ich zu den bereits oben zitierten Geschehnissen des Jahres 1557 zurückkomme.

Was der Verfasser auf Seite 112v nüchtern und stark gerafft erzählt, ist die Abenteuerreise schlechthin: eine Westfahrt über den Atlantik, die vom Passagier Puehler salopp mit einem *curiositas*-Topos legitimiert wird. Er habe eben gerne von seinem Wohnort Passau ausgehend „frembde lender und gegendn erfahren und [...] besichtigen“ (ebd.) wollen. Dabei stellte die

Annahme, die Erde sei ein aus allen vier Elementen zusammengesetzter, ‚einfacher‘, auch jenseits des Äquators bewohnbarer, teilweise von Wasser bedeckter, komplett zur See befahrbarer geometrischer Körper, der im Prinzip zur Gänze erkundet und vermessen werden könne, [...] noch zu Beginn des 16. Jahrhunderts keine Selbstverständlichkeit

dar, wie Martin Disselkamp mit Verweis auf den Seefahrtshistoriker Klaus Anselm Vogel betont.³⁰ Für Puehler ist die Erdkugel vermessen- und demnach auch grundsätzlich überall erfahrbar. Man muss nur genügend Zeit einplanen und entsprechend ausgerüstet sein.

Nichtsdestoweniger zeugen seine knappen Bemerkungen im Kapitel 59 von der fortwährenden Wirkmacht älterer Weltbilder. Denn dort heißt es, er wolle „leren/ wie eines jeden grossen circkel umbkreyß/ der wasser und erden/ der ganzen welt in ein ainige runde kugel von Gott zusammen gemacht“ (98r) worden sei, gefunden werden könne. Puehler beschreibt hier die ptolemäische Vorstellung von Erd- und Wassersphäre und ruft damit wohl das der Sacrobosco-Tradition folgende kosmologisch-kosmographische Modell des universitären Unterrichts auf.³¹ Dieses Modell wird zwar vor allem von portugiesischen

²⁹ Es sei daran erinnert, dass Bartholomäus Madauer als Instrumentenbauer tätig und also mit diesen Anforderungen vertraut war.

³⁰ Martin DISSELKAMP, Eine neue Welt. Kosmographie als gelehrtes Arbeitsfeld im 16. Jahrhundert, in: Neue Diskurse der Gelehrtenkultur in der Frühen Neuzeit. Ein Handbuch, hg. von Herbert JAUMANN–Gideon STIENING, Berlin–Boston 2016, S. 457–506, S. 463. Ausführlich widmet sich Klaus Anselm VOGEL dem Westfahrts-Diskurs des 15. und 16. Jahrhunderts in seiner Dissertation: *Sphaera terrae – das mittelalterliche Bild der Erde und die kosmographische Revolution*, Göttingen 1995, S. 336–352 [Die Idee der Westfahrt: Eine Handschrift der Pariser Nationalbibliothek (um 1470) weist auf Quellen aus dem Orient] sowie S. 368–383 [Darum wurde Kolumbus ausgelacht: Das Projekt der Westfahrt im Kontext seiner Zeit].

³¹ Zu Sacrobosco und seiner Stellung im akademischen Lehrbetrieb der Zeit vgl. ebd., S. 153–161 und S. 416–425. Vgl. zu einem anderen Aspekt der Sacrobosco-Rezeption der Zeit Christoph SANDER, Johannes de Sacrobosco

Seeleuten bereits in Frage gestellt, dennoch transportiert Puehler es als selbstverständlich immer noch mit.³² Doch auch das kosmologisch Neue findet Platz in seinem Druck: Mehrfach erwähnt er Kopernikus, was zeigt, wie brüchig seine Vorstellung von der Gestalt der Weltkugel eigentlich ist.³³

Es gibt mehrere Belege, dass Puehler nach Westen segelt: Es findet sich eine Visualisierung seiner Fahrt auf einer stilisierten Erdkugeloberfläche und er schreibt auch, dass die am 10. Oktober betretene Insel von Passau aus „gegen dem nidergang der Sonnen ligt“ (114r–v). Puehler beschreibt, dass während der langen Überfahrt „holtz und süssen wasser“ (112r) zur Neige gehen. Es herrscht bereits Mangel an Bord, als das Schiff anlandet. Dass Puehler dort eine

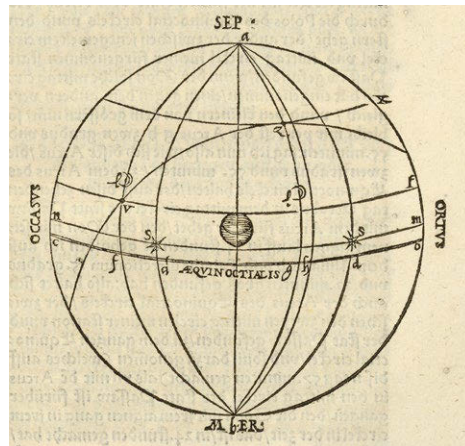


Abb. 1

Christoph Puehler, Ein kurtze und grundliche anlytung zu dem rechten verstand Geometriae [...], Dillingen 1563, S. 113r (Ausschnitt), Exemplar der ETH-Bibliothek Zürich, Rar 5419.

Insel betritt, ist aus zeitgenössischer Perspektive logisch: Bis weit ins 16. Jahrhundert hinein waren Geo- und Kartographen nämlich davon überzeugt, dass in westlicher Richtung keine weiteren Kontinente, sondern ausschließlich Inseln zu finden wären. Die mittelalterlichen OT- bzw. TO-Karten, die traditionellerweise nur drei Kontinente zeigen, waren trotz empirischer geowissenschaftlicher Neuerkenntnisse nach wie vor weit verbreitet.³⁴ Die namenlose Insel der *Anlytung* scheint neu zu sein, denn ihre Koordinaten sind in Puehlers mitgeführten Tabellenwerken noch nicht aufgeführt.

Nachdem die Brennholz- und Süßwasservorräte aufgefüllt und einige Tage verstrichen sind, möchte Puehler herausfinden „wo hin werts/ und wie weit/ ich von meiner fürgenommenen statt Passaw were“ (112r). Bedauerlicherweise erhält der Leser hierauf keine Antwort.

und die *Sphaera*-Tradition in der katholischen Zensur der Frühen Neuzeit. *NTM. Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin* 26 (2018), S. 437–474.

32 VOGEL, *Sphaera terrae* (1995), S. 425: „noch im Jahre 1500 war die Annahme einer exzentrischen Lage von Erd- und Wassersphäre [...] nicht widerlegt.“

33 Er integriert sogar eine Sternentafel ins Kapitel 67, die er „in dem Copernico gefunden“ (115r) habe. Dennoch scheint er eher Geozentriker zu sein. Zusätzlich irritierend ist, dass er eine lateinische Ausgabe von Ptolemäus’ *Almagest*, eines Zentraltextes des geozentrischen Weltbildes, ausgerechnet mit dem Titel von Kopernikus’ astronomischem Hauptwerk in eins wirft: „Und also wirdt *Ptolomeus* die *gradus* und *Partes* seiner Instrument abgeteilet haben/ wie du dich des in dem 7. und 8. Buch in seinen *revolutionibus orbium caelestium*, *Almagestum* genennt/ gar leichtlich kanst erinnern und war nemmen“ (97r).

34 Vgl. DISSELKAMP, *Eine neue Welt* (2016), S. 467.

Man erfährt lediglich, dass die Insel auf einer geographischen Breite von 14° vom Äquator aus liegt und zum Längengrad Passaus eine Differenz von knapp 69° besteht.³⁵

Irritierenderweise fällt die Zeit an Bord und auf der Insel mit Puehlers Krankheit zusammen: Vier Jahre zuvor, also im Frühjahr 1557, sei er schwer erkrankt und die Mathematik seine einzige Freude gewesen. Dass Puehlers Fernreise fingiert ist, war dem zeitgenössischen Lesepublikum wohl ohnehin klar. Allein seine Behauptung, so weit nach Westen und wieder zurück gesegelt zu sein, muss stutzig gemacht haben. Aber warum erzählt er die angeblich autobiographische Abenteuergeschichte überhaupt? Innerhalb der fundamentalen Steigerungs- und Überbietungslogik des Textes ist dieses außergewöhnliche „exempel“ (ebd.) natürlich konsequent. Sich en passant als Kolumbus-„Nachfahrer“ zu inszenieren, zeugt vom großem Selbstbewusstsein des Verfassers. Erneut, und das verbindet die Westfahrt mit der Traunsee- und der Wettmessungserzählung, stellt die *Anlaytung* hier den Aspekt des Imaginären der Geometrie in den Vordergrund.

Doch warum datiert Puehler das Jahr seiner Westfahrt ausgerechnet in das Jahr seiner schweren Krankheit? Es ließe sich als Hinweis darauf verstehen, dass die Westfahrt als Therapeutikum gegen Melancholie inszeniert wird. Puehlers Beschäftigung mit der angewandten Mathematik zur Zeit seiner Krankheit wird über komplizierte astronomische Messungen und Berechnungen auf einer neuentdeckten Insel parallelgeführt. Die gesamte Westfahrt lässt sich so als technikerunterhaltende Erzählung verstehen. Da nun frühneuzeitliche Wissensunterhaltung nicht nur dem Zweck des Zeit-, sondern auch des Melancholievortreibs dienen kann, und da man aus Puehlers Vorrede weiß, dass die Beschäftigung mit Mathematik gegen Erkrankungen hilft, könnte es sein, dass der Verfasser seine eigene Melancholie erfolgreich mit Mathematik und einer imaginierten Westfahrt therapieren konnte.

Im vorletzten Kapitel des Drucks wird nun erläutert, wie man die Entfernung zweier Ortschaften berechnen kann, deren geographische Koordinaten bereits bestimmt sind. Als Beispiel dient die Strecke zwischen Puehlers Wirkungsort Passau und Rom, dem politischen und religiösen Zentrum des Katholizismus, zwei Städte, die nicht zufällig gewählt wurden.

Dieses letzte Kapitel füllt nur eine Druckseite und behandelt recht unvermittelt noch den Satz des Ptolemäus zu Sehnenvierecken. Offenbar um die 72 Kapitel zu füllen, hat Puehler kanonisches Wissen notiert, ohne auf einen potenziellen Anwendungsbezug Rücksicht zu nehmen. Ohne echten Abschluss, ohne Wiederholung des Vorherigen, ohne Beschlussrede an den Leser oder Ähnliches endet die Weltfahrt der *Anlaytung* mit der Zeile „End dises Büchleins“ (121v). So könnte auch ein Roman enden.

³⁵ Vgl. LAUNERT, *Transversalteilung* (2014), S. 132. Er lokalisiert die Insel in der Karibik, es könne sich den Koordinaten nach um Barbados handeln.

FAZIT

Der vorgestellte Druck ist in Hinblick auf seinen Status als Klosterprodukt bzw. als Liebhaberprojekt, das keinen ökonomischen Zwängen unterworfen ist, singulär. Es stellt auch auf textueller Ebene einen bemerkenswerten Ausnahmefall dar. Die *Anlaytung* ist überlegt komponiert. Sie spannt vom ersten bis zum letzten Kapitel „ordenlich nach einander“ (3v) einen Erzählbogen, der den drei Strukturlogiken Raum, Zeit und Technik folgt. Bei der geschickten Rekombination von Bestandteilen des traditionellen geometrischen Repertoires, das um technische Neuheiten ergänzt wird, bedient sich der Verfasser des Schemas der Reise, genauer: einer imaginären Lesereise durch die Welt und die Geschichte des Messens und der zugehörigen Technik. Eine vergleichbare Textorganisation existiert im Bereich deutschsprachiger Messlehren der Zeit nicht und kein anderer Druck rückt das Imaginäre der Geometrie so sehr in den Vordergrund.

Eine besondere Rolle nimmt die Erzählerfigur Christoph Puehler ein, die als welterfahrener, abgeklärter und sachkundiger ‚Reiseleiter‘ auftritt und das Erzählte souverän vom Gerstenkorn zum Erdumfang, von Euklid bis Kopernikus und von der Messrute zum ‚Hahn‘ strukturiert und dynamisiert. Über Leseranreden simuliert der Erzähler immer wieder den direkten Kontakt zum Rezipienten, durch die Wiedergabe persönlicher (Mess-)Anekdoten füllt er seine Biografie und schärft sein Profil als vertrauenswürdiger Fachmann. Die *Anlaytung* ist ein außergewöhnlicher Fall vormodernen Ich-Erzählens in einem inhaltlichen Kontext, in dem es nicht unbedingt zu erwarten ist. An Textstellen wie dem Kapitel über die West- (und die Rück-)fahrt über den Atlantik tritt Puehler dem Leser als heimgekehrter Weltreisender und damit als beinahe archetypische Abenteurerfigur entgegen. Gelegentlich assistieren ihm Figuren wie der Astronom Wolfgang Orthner oder die Wandergesellen. Ähnlich wie in piktoralen Medien regeln diese Assistenzfiguren das Verhältnis von Involvierung und Distanzierung des Rezipierenden zum Rezipierten, der Leserin zum Gelesenen. Am deutlichsten wird diese Funktion beim dritten Gesellen, der als Stellvertreterfigur des *Anlaytungs*-Lesers verstanden werden kann. An diese Assistenzfiguren ist in der Regel ein bestimmtes Messinstrument gekoppelt, dessen Einsatz im Laufe des Lehrbuchs immer mehr Imaginationsvermögen von den Rezipierenden voraussetzt: Auf das einfache und leicht nachzubauende Försterdreieck des ‚gemeinen Werkmanns‘ folgt die schreibbischtechnische Bodensonde, ehe der äußerst komplexe ‚Hahn‘ für ein imaginäres Messabenteuer in Übersee zum Einsatz kommt.

Das Reiseschema lässt sich in der Abfolge der 72 Kapitel, in Einzelkapiteln, aber vor allem natürlich in der Atlantikfahrt erkennen. Einige dieser Kapitel oder Kapitelgruppen haben einen markant wissensunterhaltenden Charakter. Bringt man diesen Anspruch in Verbindung mit der Mathematik und der Beschäftigung mit ihr als ausgezeichnetes Therapeutikum gegen Langeweile, inszeniert sich der Druck als geeignetes Mittel zum Zeit- und vielleicht sogar zum Melancholievvertreib. Bildungs- und Handlungswissensinhalte werden hier den drei Strukturlogiken Raum, Zeit und Technik sowie dem Erzählschema der Reise unterworfen, um Rezipientinnen und Rezipienten durch Wissen zu unterhalten – und nicht umgekehrt.

„DÜRER FÜR DUMMIES“

EYN SCHÖN NÜTZLICH BÜCHLIN UND UNDERWEISUNG DER KUNST DES MESSENS

Kristian Faschingeder und Anna Reisenbichler

Eyn schön nützlich büchlin und underweisung der kunst des Messens / mit dem Zirckel / Richtscheidt oder Linial. Zu nutz allen kunstliebhabern / fürnemlich den Malern / Bildhawern / Goldschmidern / Seidenstickern / Steynmetzern / Schreibern / auch allen andern / so sich der kunst des Messens (Perspectiva zu latin gnant) zugebrauchen lust haben. Darinn man auch solche kunst leichter / dann auß etlichen hievorgetruckten büchern / begreifen und lernen mag / mit vil schönen darzu dienenen figuren.

Diesen Titel trägt das hier besprochene schmale Buch aus dem Jahr 1531, in der Stiftsbibliothek Klosterneuburg katalogisiert unter D III 80.¹ Der Buchtitel liefert die Beschreibung, was die (in der Folge stets kurz) *Unterweisung* leisten möchte und an wen sie sich richtet (Abb. 1).

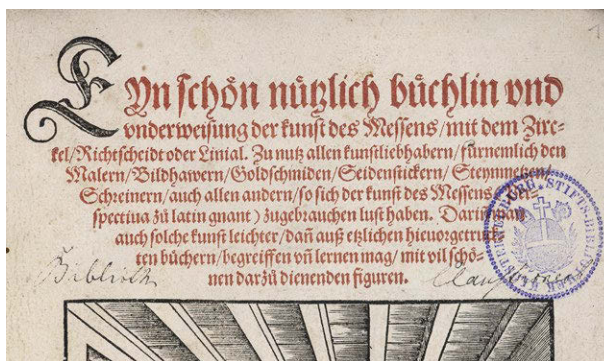


Abb. 1

Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], Simmern 1531, Frontispiz, Detail: Buchtitel.

¹ Online verfügbar ist diese erste Auflage auch an der ÖNB Wien: <https://viewer.onb.ac.at/10A76A84> [6.6.2025]. Auf dem Frontispiz der Ausgabe der ÖNB liest man auf dem Titel in Zeile 5 „so sich der kunst des Augenmeß“ anstelle von „so sich der kunst des Messens“. D. h. es wurden offenbar innerhalb einer Auflage Änderungen vorgenommen.

Eyn schön nützlich büchlin vnd
 vnderweysung der kunst des Messens / mit dem Zire-
 tel / Richtscheidt oder Linial. Zu nutz allen kunstliebhabern / fürnemlich den
 Malern / Bildhawern / Goldschmiden / Seidenstickern / Etenymcken /
 Schreibern / auch allen andern / so sich der kunst des Messens /
 spectura zu latin gnant / zugebrauchen lust haben. Darin ist
 auch solche kunst leichter / dan auß eptlichen hievorgetrich-
 ten büchern / begreiffen vn̄ lernen mag / mit vil schö-
 nen darzü dienenden figuren.

Biblich



Mit Keyserlicher freihent.

Abb. 2

Eyn schön nützlich büchlin und unterweisung der kunst des Messens [...], Simmern 1531, Frontispiz.

DAS BUCH IN DIE HAND NEHMEN

Die am Frontispiz platzierte Darstellung einer Werkstatt zeigt einige der adressierten „Kunstliebhaber“ in Aktion (Abb. 2); insgesamt fünf Personen, von links hinten nach rechts vorne:

- 1., ein (Gold)Schmied, ausgerüstet mit Kohlenzange und Blasebalg, vor der Feueresse;
- 2., ein Goldschmied (identifizierbar an der Lederschürze zum Auffangen der Kleinstabfälle des Edelmetalls) bei der Arbeit an einem Gefäß am Tisch sitzend, vor ihm einige Werkzeuge;
- 3., ein Seidensticker, gebeugt über einen eckigen Stickrahmen, was für einen schweren Stoff und/oder Goldstickerei spricht;
- 4., an einem Arbeitstisch ein Malergehilfe, der mit einem Stößel Farbpigmente reibt;² vor ihm liegt ein Spatel; seitlich am Arbeitstisch sind kleinere Töpfe sichtbar, wohl mit oder für Farben;
- 5., ein Maler an der Staffelei auf einem Hocker sitzend, mit den typischen Utensilien Palette, Pinsel und Malstock.

Die schriftliche Aufzählung deckt sich folglich nur zum Teil mit der Darstellung; so ist beispielsweise der „Goldschmid“ zweifach abgebildet (bzw. könnte der linke Mann auch ein anders spezialisierter Schmied sein). Der „Maler“ wird durch zwei Personen repräsentiert, während „Bildhauer“, „Steynmetz“ und „Schreiner“ gänzlich fehlen. Der Beruf des Steinmetzes spielt sich primär im Freien ab, die beiden anderen Professionen wären aber durchaus im Innenraum zeigbar. Erwähnenswert ist, dass am Frontispiz „Kunstliebhaber“ adressiert werden (eine für uns passiv-rezipierend konnotierte Bezeichnung), wo doch (aktiv schaffende) Kunsthandwerker:innen gemeint und dargestellt sind. Alle sechs Berufe werden beispielsweise 1568 im sog. *Ständebuch* von Hans Sachs und Jost Amman vorgestellt: „Bildhauer“, „Handmaler“, „Seydensticker“, „Goldschmid“, „Steynmetz“ und „Schreiner“.³

Für unseren Zusammenhang ist insbesondere Ammans Darstellung „Der Handmaler“ auf fol. G2r (Abb. 3) relevant: Die Figuren des jeweils schöpferischen Malers vor der Leinwand sind von der Sitzhaltung bis hin zu den Utensilien sehr ähnlich (vgl. Abb. 3 und 4). Neben bzw. hinter dem Maler befindet sich jeweils ein zweiter, mit einem Stößel Farbpigmente

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- 2 Vgl. hierzu die Darstellung des „Brieffmalers“ von 1568 im *Ständebuch* des Hans Sachs (siehe Anm. 3), fol. F4r, Digitalisat: <https://www.digitale-sammlungen.de/de/view/bsb00105474?page=50,51>, oder eines „Tünchers“ (Anstreichers) von 1611 in den sog. *Nürnberger Hausbüchern*, Stadtbibliothek im Bildungscampus Nürnberg, Amb. 317b.2°, fol. 88v: https://online-service.nuernberg.de/viewer/image/0f5e1d20-0f54-473b-9516-8cf87c93689a/180/LOG_0180/ [jeweils 7.6.2025].
 - 3 Vgl. Hans SACHS–Jost AMMAN, *Eygentliche Beschreibung aller Stände auff Erden, hoher und nidriger, geistlicher und weltlicher, aller Künsten, Handwercken und Händeln [...]*, Frankfurt am Main 1568, Digitalisat verfügbar unter: <https://mdz-nbn-resolving.de/details:bsb00105474> [3.6.2025].



Abb. 3

Jost Amman, Der Handmaler, in: Hans Sachs, Eygentliche Beschreibung aller Stände auff Erden, hoher und nidriger, geistlicher und weltlicher, aller Künsten, Handwercken und Händeln [...], Frankfurt am Main 1568, fol. G2r, Detail.



Abb. 4

Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], Simmern 1531, Frontispiz, Detail: Der Maler und sein Gehilfe.

reibender Mann. Der Handmaler und sein Gehilfe agieren in einem bildparallel angelegten, eher konventionellen Innenraum, während sich der Maler der *Unterweisung* in einem perspektivisch stark fluchtend konstruierten Raum befindet. Letztere Darstellung würde sich ebenso als passende Illustration der ersten beiden Zeilen der „Berufsbeschreibung“ des Handmalers eignen: „Die Kunst der perspectiff ich pur / Bericht bin / und Contrafactur / [...]“⁴.

Am Frontispiz sind mehrere unterschiedliche Professionen gemeinsam in einer „Gemeinschaftswerkstatt“ dargestellt (vgl. Abb. 2). Interaktion findet aber kaum statt; jeder der Männer ist versatzstückartig in das Gehäuse gestellt, um dabei fokussiert seiner Tätigkeit nachzugehen. Einzig der Malergehilfe blickt zu seinem Meister, und – anders als in der Darstellung des *Handmalers* (vgl. Abb. 3) – ist er nicht, seiner untergeordneten Tätigkeit entsprechend, an den Rand der Darstellung, sondern in das Zentrum der Komposition

4 Zit. nach. ebd., fol. G2r.



Abb. 5
 Johannes Vermeer van Delft, Die Malkunst, um
 1666/1668, Wien, Kunsthistorisches Museum,
 Inv.-Nr. GG, 9128.

gerückt; sein Arbeitstisch bildet mit jenem des Goldschmieds und der Nische an der Rückwand eine Linie, denen auch die Holzdielen und die Deckenbalken entsprechen. Als Betrachter:innen können wir die Werkstatt am einfachsten über die Figur des Gehilfen betreten, und dann entweder den Fluchtlinien bis zur Nische hin folgen, oder aber mit dem Blick des Gehilfen mitgehen, der sich auf den Maler richtet. Die Figur des Malers erinnert frappant an *Die Malkunst* von Johannes Vermeer van Delft (Abb. 5), heute im Kunsthistorischen Museum in Wien. Beide Maler wenden uns, auf einem Hocker vor der Leinwand sitzend, den Rücken zu. Die elegante Kleidung verweist auf den höheren Stand ihrer Profession – als Attribute jeweils Palette, Pinsel und Malstock – auch wenn die Positionierung des Stocks auf der *Unterweisung* anatomisch merkwürdig gelöst ist. In beiden

Fällen blicken wir dem Maler über die Schulter auf seine Leinwand, der sich dadurch aber nicht stören lässt (oder es gar nicht bemerkt). Konzentriert betrachtet Vermeers Maler sein Modell; bei der *Unterweisung* hingegen ist kein Modell vorhanden, im Fluchtpunkt des Bildes befindet sich vielmehr die Nische. Auf der Leinwand ist jedoch ein bartloses Gesicht zu erkennen, das sich in einem tonnengewölbten Innenraum befindet. Man darf nochmals an das bereits erwähnte *Ständebuch* denken: „Die Kunst der perspectiff ich pur / Bericht bin / und Contrafactur / [...]“.

Das Abbilden nach dem lebenden Modell zu vermitteln ist nicht das Anliegen der *Unterweisung*, sehr wohl aber die perspektivische Konstruktion des (Innen-)Raumes und wie man Akteur:innen darin platziert. Blättert man weiter, findet sich auf fol. D4v ein dem Bild auf der Leinwand vergleichbarer Holzschnitt (Abb. 6).

Dies legt den Gedanken nahe, der dargestellte Maler führe uns unmittelbar vor Augen, wie man die *Unterweisung* idealerweise umsetzt. Die Selbstreferenzialität endet hier allerdings keineswegs: Die Darstellung des Werkstatttraumes am Frontispiz selbst ließe sich nach Lektüre des Buches problemlos bewältigen; ein sehr ähnlicher Innenraum (allerdings mit stehenden Figuren) ist auf fol. G6v (Abb. 7) konstruiert, und auch Anleitungen zur perspektivischen Konstruktion von Möbeln, Bänken und Tischen bietet das Buch. Wenn wir es also intensiv studieren und die Regeln praktisch anwenden, können wir dann wie der Maler

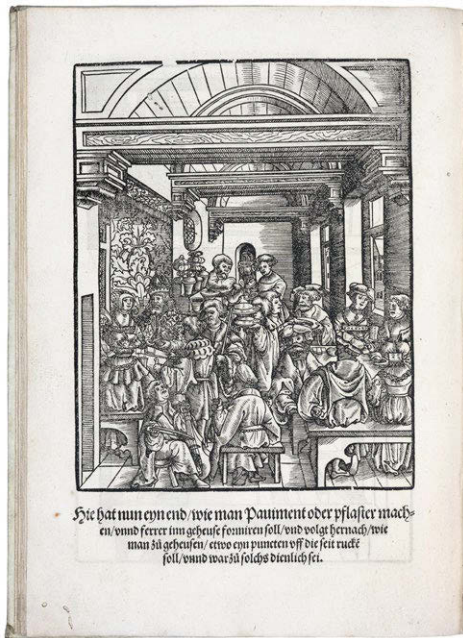


Abb. 6
Eyn schön nützlich büchlin und underweisung der
kunst des Messens [...], Simmern 1531, fol. D4v.

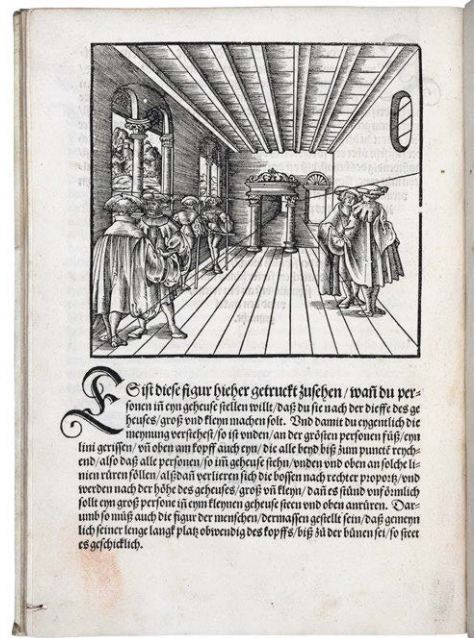


Abb. 7
Eyn schön nützlich büchlin und underweisung der
kunst des Messens [...], Simmern 1531, fol. G6v.

malen? Sicherlich wird man durch die Lektüre nicht gleich zu Vermeer,⁵ aber wer weiß, denn „Übung macht den/die Meister:in“. Wo in Vermeers *Malkunst* der leere Stuhl platziert ist (vgl. Abb. 5), auf dem wir uns als Betrachter:innen niederlassen können, um den Malprozess zu *beobachten*, befindet sich auf der *Unterweisung* der Gehilfe – die Blicklenkung geht in beiden Fällen Richtung Maler. Bei Vermeer bleibt unser Zutun ein passives Schauen oder auch Bewundern der Fähigkeiten des Malenden; der Blick über die Schulter des Malers auf der *Unterweisung* aber ermutigt dazu, es ihm gleichzutun, indem wir das Buch aktiv nutzen, um „auch solche kunst leichter [...] [zu] begreifen und lernen“. Die am Frontispiz adressierten

5 Auch Vermeer konstruierte seine Perspektive mechanisch, indem er in die noch weiche Farbe im zentralen Fluchtpunkt eine Nadel ansetzte, an der ein Faden befestigt war. Das entsprechende Spannen der Fäden ermöglicht sowohl das Zeichnen der Fluchtlinien als auch die Kontrolle, ob die einzelnen Bildelemente korrekt angelegt sind. Im Detail: Elke OBERTHALER, Ein restauratorischer Blick auf Vermeers *Malkunst*, in: Die verkaufte Malkunst. Jan Vermeers Gemälde im 20. Jahrhundert, hg. von Susanne HEHENBERGER–Monika LÖSCHER (Schriftreihen der Kommission für Provenienzforschung 4, Wien–Köln–Weimar 2013), S. 281–302, S. 285–286 und Abb. 4.

„Kunstliebhaber:innen“ fallen an dieser Stelle mit den das Buch benutzenden „Kunstproduzent:innen“ zusammen.

Während Vermeers Darstellung als *Allegorie* des Malens auf „einen rein intelligiblen Horizont verweist“⁶ – primär deshalb, weil das Gemälde auf der Staffelei gerade im Entstehen begriffen ist, also gleichzeitig ein „Vorher“ und ein „Nachher“ sichtbar sind –, ist jenes auf der *Unterweisung* so gut wie fertig gestellt. Das Malen deutet als „eine offensichtlich ‚intentionale‘ Bewegung“⁸ nicht nur von der Gegenwart auf die Zukunft, es ist auch „ein Vorwegnehmen der Zukunft“⁹: Wir haben auf der *Unterweisung* das Ziel des Malens/Malers bereits vor Augen, oder, wie Vilém Flusser es formuliert, wir kennen die Erklärung, „welche die Bewegung mit ihrer Zukunft in Verbindung“¹⁰ bringt: „das zu malende Gemälde“¹¹. Die Entstehung dieser Zukunft können wir im Vermeer’schen Sinne „beobachten“ oder aber, mit der *Unterweisung* als konkreter Anleitung, selbst in die Hand nehmen.

DAS BUCH AUFBLÄTTERN

In seiner Funktion als Sekretär von Johann II., Regent über das winzige Fürstentum Pfalz-Simmern, druckte Hieronymus Rodler die *Unterweisung* 1531 in der Offizin des Schlosses Simmern auf dem Hunsrück. Der Foliodruck besteht aus sieben Lagen (A–G) mit jeweils drei Doppelblättern und endet mit einem Kolophon auf fol. H3v.¹² Er ist einer von mehreren Büchern, die in dieser Druckerei in hoher Qualität hergestellt wurden.¹³

Die *Unterweisung* versteht sich als direkte Antwort auf jenes Werk zur Perspektive und Proportionslehre, das Albrecht Dürer sechs Jahre früher, 1525, unter dem Titel *Underweysung der messung / mit dem zirckel und richtscheyt / in Linien ebnen unnd gantzen corporen* herausgebracht hatte. Die Bedeutung der Bände Dürers kann nicht genug hervorgehoben werden: Sie bilden die erste Abhandlung, in der das gesamte Wissen, das mit der Darstellung der Formen zu tun hat, zusammengefasst wurde, noch dazu auf Deutsch (und nicht, wie

6 Vgl. Jens SCHRÖTER, Das Malen des Malens. *kritische berichte. Zeitschrift für Kunst- und Kulturwissenschaften* 27/1 (1999), S. 17–28, S. 22, DOI: <https://doi.org/10.11588/kb.1999.1.10666> [8.6.2025].

7 „Auf der Leinwand sehen wir, was der Maler bereits gemalt hat (Vorher), nämlich den Lorbeerkranz, und was der Maler noch malen wird (Nachher), die Umrißskizze.“ Zit. nach ebd., S. 21 (Hervorhebungen im Original). Vgl. hierzu auch Vilém Flussers achtes Kapitel „Die Geste des Malens“, in: Vilém FLUSSER, *Gesten. Versuch einer Phänomenologie*, Frankfurt am Main 1994, S. 86–99.

8 FLUSSER, *Die Geste des Malens* (1994), S. 96.

9 Ebd., S. 92.

10 Ebd., S. 90.

11 Ebd., S. 90.

12 Vgl. Christina LECHTERMANN, Der lange Raum: Die grosse kirch in der Vnderweysung der kunst des Messens der Offizin Hieronymus Rodler, in: *Handbuch Literatur & Raum*, hg. von Jörg DÜNNE (Handbücher zur Kulturwissenschaftlichen Philologie 3, Berlin–Boston 2015), S. 344–354, S. 345.

13 Vgl. Georg R. SPOHN [1974] Johann II. (Artikel aus *Neue Deutsche Biographie*) | bavarikon, <https://www.bavarikon.de/> [27.6.2025].



Abb. 8
Eyn schön nützlich büchlin und underweisung der
kunst des Messens [...], Simmern 1531, fol. F6v.

so oft, auf Latein). Indem Dürer viel Neues zum ersten Mal in Worte fasste, galt sein Werk jedoch als schwer zugänglich. So liest man in der Einleitung der *Unterweisung*, dass Dürers Bücher „überkünstlich und unbegreiflich gemacht / das es alleyn den hochverstendigen dienlich“ sei und wenig praktischen Nutzen für „jung anhebende künstner“ habe (fol. A2r). Die *Unterweisung* war nun „schlechter unnd begreiflicher“ als die Bände Dürers (fol. A2r),¹⁴ womit sie die erste praktische Anleitung für die Kunst der Perspektive verfügbar mache. Während das Wort ‚Perspektive‘ in Dürers Traktat keine Erwähnung findet, ja überhaupt nur wenige Seiten der perspektivischen Konstruktion gewidmet sind,¹⁵ wird die Herleitung und Definition der Perspektive ausdrücklich Gegenstand der Einleitung der *Unterweisung*. Unter diesem Gesichtspunkt betrachtet ist es das erste deutschsprachige Handbuch, das sich ausdrücklich der bildlichen Perspektive widmet (im

Unterschied zu älteren Traktaten, bei denen ‚Perspektive‘ noch Gegenstand der Optik ist).¹⁶

Von der *Unterweisung* selbst existieren zwei Auflagen. Die erste Auflage erschien 1531 in Simmern, die zweite nach Rodlers Tod 1546 in Frankfurt. Die Unterschiede zwischen den beiden Auflagen sind gering; für die zweite Auflage wurde der Text in einer etwas anderen Schrift neu gesetzt und es gibt leichte Abweichungen in der Orthografie. Für die Illustrationen wurden dieselben Platten wiederverwendet, wobei z. B. bei den beiden Darstellungen auf fol. F6v die kompositorischen Linien und auch landschaftliche Elemente aufwendig

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- 14 Vgl. Birgit SEIDENFUSS, „Daß wirdt also die Geometrische Perspektiv genandt“: Deutschsprachige Perspektivtraktate des 16. Jahrhunderts, Weimar 2006.
- 15 Vgl. Albrecht DÜRER, *Unterweysung der Messung, mit dem Zirckel und Richtscheyt, in Linien, Ebenen unnd gantzen corporen* – Wikisource, https://de.wikisource.org/wiki/Unterweysung_der_Messung,_mit_dem_Zirckel_und_Richtscheyt_in_Linien,_Ebenen_unnd_gantzen_corporen [8.6.2025]; vgl. Jeanne PEIFFER, *Projections embodied in technical drawings: Dürer And His Followers*, in: *Picturing machines: 1400–1700*, hg. von Wolfgang LEFÈVRE, Cambridge, MA 2004, S. 245–275, S. 258.
- 16 Panofsky diskutiert die Methode der *Unterweisung* in einer langen Fußnote und sieht in diesem Werk weniger den Neuheitswert als vielmehr ein altes handwerkliches Verfahren des Nordens überliefert – das muss aber kein Widerspruch sein. Erwin PANOFSKY, *Die Perspektive als symbolische Form* [1927], in: *DERS., Aufsätze zu Grundfragen der Kunstwissenschaft*, Berlin 1980, S. 156–159, Anm. 60.

entfernt wurden (Abb. 8). Auch in der Innenraumdarstellung auf fol. G6v wurden diese Linien getilgt (Abb. 7).

Die *Unterweisung* gilt als typografisches Meisterwerk. Rodler hat in seinen Drucken, die allesamt anonym erschienen sind, die Schreibkultur der Handschriften mit der noch neuen Technik des Buchdrucks verbunden.¹⁷ Als Schrift verwendete er, wie Dürer, eine Neudörffer-Andreä-Fraktur (als solche speziell für Dürer geschnitten), die mit ihren variablen Strichstärken (der Federhaltung von 45 Grad folgend) Elemente aus den Handschriften entlehnt.¹⁸

Anders wird jedoch der Umgang mit der Perspektive selbst beurteilt. Eine französische Quelle bezeichnet diesen gar als „médiocre“: In einigen Beispielen, so die Quelle, führe dies zu wahren Katastrophen: Eine Wendeltreppe würde zu einem Fragezeichen; eine von oben betrachtete Brücke zeige die Unterseite ihrer Bögen (vgl. Abb. 11 und 15). Fehler wie diese seien in frühen Abhandlungen zur Perspektive recht häufig zu finden. Sie würden zeigen, wie schwierig es war, sich das perspektivische Denken anzueignen, bzw. dass die ‚Fehler‘ jedenfalls nicht sofort ins Auge fielen.¹⁹ Möglicherweise hatten diese aber gar nicht so sehr mit mangelndem Verständnis zu tun. Genauso gut könnten sie schlicht das praktische Bedürfnis nach einfacher, schneller Wirkung bezeugen, die auf einem gemeinsamen Standard beruht – schließlich kann ein räumlicher Eindruck innerhalb eines Bildes bereits durch einen groben Einsatz perspektivischer Techniken erreicht werden.²⁰

ZUR AUTOR:INNENSCHAFT

Hieronymus Rodler ist Herausgeber, nicht aber Autor der *Unterweisung*. In der Einleitung erfahren wir, dass der ungenannte Autor Rodler eben jenes Wissen in Form eines handgeschriebenen Büchleins überlassen habe, das dieser dann genau so, wie es ihm vorlag, abdruckte: „Darumb eyner / welcher die kunnst des messens / malens und was darauß volgen mag (zû Latein Perspectiva genant) hievor zum theyl auch gelernt / un[d] volgends durch tegliche übung ergründet“ hat (fol. A2r).

Als Autor wird Johann II. Pfalzgraf zu Simmern, Begründer besagter Offizin, vermutet. Das legt unter anderem ein Akrostichon nahe, das die Abschnittsanfänge der *Unterweisung* bis in die siebte Lage durchzieht. Es lautet: „JOHANS PFALTZGRAF BEJ REJN HERTZOG JN BEYRN VND GRAF ZU SPANHEJM“.²¹ Es ging allerdings weniger darum, die Anonymität als Autor

17 Vgl. Werner WUNDERLICH, Der anonyme Autor des „Fierrabras“ (1533) und der „Haymonskinder“ (1535). *Zeitschrift für deutsches Altertum und deutsche Literatur* 118/3 (1989), S. 193–202, S. 195.

18 Vgl. ebd., S. 196.

19 Vgl. Albert FLOCON–René TATON, *La perspective*, Paris 1994, S. 50.

20 Vgl. J. V. FIELD, Giovanni Battista Benedetti on the Mathematics of Linear Perspective. *Journal of the Warburg and Courtauld Institutes* 48/1 (1985), S. 71–99, S. 78.

21 Vgl. WUNDERLICH, Der anonyme Autor (1989), S. 197.

zu wahren, sondern darum, dass „das akrostichische Spiel [...] als eine beliebte Möglichkeit der Verfasserangabe beim Publikum gewiß geläufig“ war, wie Werner Wunderlich festhält.²²

Johann II. hat nicht nur den Text, sondern sehr wahrscheinlich auch die Illustrationen geliefert;²³ er hat sich nachweislich als Illustrator betätigt: „Daß Johann nicht nur der Autor, sondern auch der Illustrator seiner Perspektivenlehre gewesen sein soll, hatte schon 1773 der Heidelberger Historiker Carl Büttinghausen erwähnt. Der Gelehrte bezog sich dabei auf eine Mitteilung im Nürnberger Nachdruck der fürstlichen Perspektivenlehre durch Hans Lencker aus dem Jahre 1571.“²⁴ Lencker wiederum schreibt in der Widmung („an den Fürsten und Herrn / Herrn Friderichen Pfaltzgraven bey Rhein“) seiner *Perspectiva* über den „Fürst und Herr / Herr Johannes Pfaltzgrave bei Rhein“: „Und nebendem / allen Künstlern zu lieb unnd gefallen / noch ein Buch von der Perspectief publicirt unnd an tag gegeben / alle Figurn auf dem grund / unnd vermögens derselben kunst gleicher weiß mit eignen henden darein verzeichnet“.²⁵

WAS DIE PERSPEKTIVE „FÜR EYN KUNST SEI“²⁶

Johann II. soll laut zeitgenössischer Aussagen seine Standesgenoss:innen an Bildung, mathematischen Kenntnissen und wissenschaftlicher Befähigung überragt haben.²⁷ Entsprechend gibt es über den Umweg des inhaltlichen Zugangs bzw. anhand der Rhetorik der Einleitung einen indirekten Hinweis darauf, dass dieser humanistisch gebildet gewesen sein musste. Eine Betrachtung der Einleitung kann in diesem Zusammenhang einige Anhaltspunkte liefern, wie die Perspektive aufgefasst wurde.

Auch wenn sich die *Unterweisung* als anwendungsbezogenes Handbuch versteht, behandelt die Einleitung vor allem die Definition des Begriffs ‚Perspektive‘ selbst und dessen Herleitung in Form einer These und einer Antithese. Erst in der zweiten Auflage (Frankfurt am Main 1546) wird dann dem langen Titel nochmals das Wort „Perspectiva“ vorangestellt (vgl. Abb. 2 und Abb. 9) – das kann als Hinweis darauf gedeutet werden, dass sich dieses Wort für diese Art von Darstellung erst allmählich verbreitet und eingebürgert hat.

²² Ebd., S. 200.

²³ Ebd., S. 197.

²⁴ Ebd., S. 196.

²⁵ Hans LENCKER, *Perspectiva*, Nürnberg 1571, fol. A2v; vgl. WUNDERLICH, *Der anonyme Autor* (1989), S. 198.

²⁶ StiBKI, *Eyn schön nützlich büchlin und underweisung der kunst des Messens [...]*, Simmern 1531, fol. A2v.

²⁷ Vgl. Georg R. SPOHN [1974] Johann II. (Artikel aus *Neue Deutsche Biographie*) | bavarikon, <https://www.bavarikon.de/> [27.6.2025]; vgl. WUNDERLICH, *Der anonyme Autor* (1989), S. 196–197.

Bevor die mit fast sechzig Holzschnitten reich bebilderte *Unterweisung* in einzelnen Schritten jene Mittel erläutert, mit denen vor allem Innenräume nach „rechter Perspektivischer art“ (fol. C4v) zu konstruieren seien, gibt es im ersten Kapitel eine Hinführung zum Thema und im zweiten eine zum Aufbau des Buches. Dass der Begriff ‚Perspektive‘ für diese Art von Darstellung noch keineswegs fixiert war, wird daran ersichtlich, dass gleich zu Beginn der Einleitung der Ursprung der Perspektive als These postuliert wird – wenngleich sie als „meynung“ bezeichnet wird: „[...] der merck diese meynung: Perspectiva die kunst / nimbt iren ursprung auß dem gesicht / dann Perspicere / heyyßt uff teutsch / durchsehen / oder hefftig sehen“ (fol. A2v). Mit ‚durchsehen‘ oder ‚heftig sehen‘ verweist der Autor, wie weiter unten darzulegen sein wird, nicht auf den künstlerischen Ursprung der Perspektive als Mittel zur Darstellung, sondern auf den älteren in der Optik, als Mittel zum Sehen.

Als Untermauerung dafür, dass seine Herleitung nicht „erdicht“ sei, regt der Autor gleich ein praktisches Experiment an, das er mit folgenden Worten einleitet: „Damit auch du lesender nitt gedenckest / als sollt es erdicht sein / daß diese kunst erstlich aus dem hefftigen sehen / sunder vermeynst villeicht alleyn auß speculation vñ scherppff der sinne / erfunden sei / so will ich dir diesen bericht geben.“ Es gäbe also noch die Alternative, dass die Perspektive eine Form von Spekulation sei, bzw. allein aus Sinnesschärfe heraus entstanden sei.

Das praktische Beispiel, als „deskriptive Handlungsanweisung“ auf fol. A2v formuliert,²⁸ besteht darin, in eine große Kirche zu gehen, die Säulen und hohe Fenster aufweist. Insbesondere sei dann zu beobachten, dass „die plätz zwischen den seulen (so du verrer sihest) sich ie lenger ie mer verlieren thûn: Deßgleichen mit dem pflaster oder paviment uff der



Abb. 9
Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], 2. Auflage, Frankfurt am Main 1546, Frontispiz.

28 LECHTERMANN, Der lange Raum (2015), S. 346.

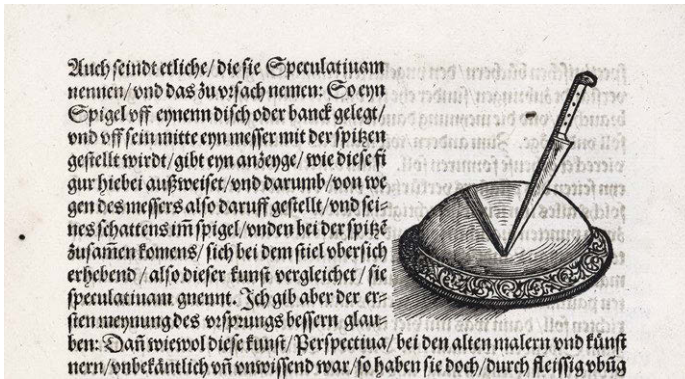


Abb. 10

Eyn schön nützlich büchlin
und underweisung der
kunst des Messens [...],
Simmern 1531, fol. A3r,
Detail.

erden“ (fol. A2v) Der Autor empfiehlt für sein Experiment also einen „langen Raum“,²⁹ wobei dies bereits eine moderne Umschreibung ist: Es kommt in dieser Anweisung, genauso wie im Rest des Buches, niemals das Wort ‚Raum‘ vor. So wird der Abstand zwischen den Säulen als „Plätz“ bezeichnet, während an späterer Stelle für den Innenraum von „Geheuse“ (fol. A3v) die Rede ist. Somit muss das von seinen liturgischen Elementen – und damit von seiner symbolischen Bedeutung³⁰ – vollkommen entleerte Innere einer Kirche erhalten. Der vormals gerichtete Raum der Kirche dient nur der nüchternen, experimentellen Wahrnehmung perspektivischer Verkürzung – die Einleitung erwähnt nicht, wie aus dieser Wahrnehmung zu einer perspektivischen Darstellung zu gelangen sei. Ohne den abstrakten, isotropen Raum zumindest als Begriff zu kennen, wird die Kirche im Rahmen der Beobachtung zu einem solchen gemacht.³¹

Darauf folgt die Antithese: Einige würden „diese Kunst“ (der Perspektive) vielmehr „Speculatiuum nennen“ (fol. A3r), da die Kunst der Perspektive auf den Spiegel zurückzuführen sei. Wenngleich diese Herleitung schnell abgehandelt wird (und die Erklärung dazu schwer nachvollziehbar bleibt), scheint sie doch wichtig genug für die einzige Illustration in der Einleitung: Ein liegender Spiegel, der von einer Messerspitze berührt wird (Abb. 10). Diese

²⁹ Ebd., S. 344–354.

³⁰ Vgl. ebd., S. 347. Ein Symbol ist – wie jedes Zeichen – etwas, das auf etwas anderes verweist. Die kulturell konnotierte, symbolische Bedeutung wird jedoch vom Kirchenraum abstrahiert, wodurch nur mehr das Raumkonstrukt übrigbleibt. Vgl. hierzu u. a.: Colin ROWE–Robert SLUTZKY, Transparency: Literal and Phenomenal. *Perspecta* 8 (1963), S. 45–54; Nelson GOODMAN, How Buildings Mean. *Critical Inquiry* 11/4 (1985), S. 642–653; Douglas GRAF, Diagrams. *Perspecta* 22 (1986), S. 42–71; Peter EISENMAN, Aspects of Modernism: Maison Dom-ino and the Self-Referential Sign. *Log* 30 (2014), S. 139–151; Pier Vittorio AURELI, Intangible and Concrete: Notes on Architecture and Abstraction. *e-flux Journal* 64 (2015). URL: <https://www.e-flux.com/journal/64/60845/intangible-and-concrete-notes-on-architecture-and-abstraction> [27.8.2025].

³¹ Auffallend ist, dass diese ‚Zweckentfremdung‘ einer Kirche kein Problem darstellt. Darauf folgt außerdem die Ablehnung einer Zurückführung der perspektivischen Darstellung aus dem lateinischen Wort für Spiegel, *Speculum*, das im Mittelalter nahezu synonym für ‚göttliche Offenbarung‘ war. Christina Lechtermann stellt fest, dass Kirchenräume nur sehr selten als Lehrbeispiel herangezogen werden. Lediglich bei Jean Pélerin (1505) und seiner deutschen Adaption durch Jörg Glockendon (1509) sei dies der Fall. Vgl. LECHTERMANN, *Der lange Raum* (2015), S. 351.

Darstellung ist einigermaßen rätselhaft: Warum wird ein liegender, noch dazu konvexer Spiegel gezeigt, weshalb die Berührung mit der Messerspitze?

Die Quelle für diese Herleitung ist die Katoptrik; jener Teil der seit der Antike überlieferten Optik, der sich mit der Reflexion in Spiegeln befasst und im Mittelalter besondere Faszination ausübte (*kát-optron* ist das griechische Wort für Spiegel, *speculum* das lateinische). Mit Beginn des 15. Jahrhunderts wurden sowohl konvexe Spiegel aus Glas als auch flache Spiegel aus versilbertem Metall in handlichen Größen hergestellt und zunehmend zu gebräuchlichen Haushaltsgegenständen. Deren Reflexionen wurden sowohl faktisch als auch symbolisch mit gemalten Bildern verglichen.³²

Samuel Edgerton bemerkt, dass alle optischen Abhandlungen mit Abschnitten über Katoptrik Theoreme enthielten, die nachwiesen, dass jedes Objekt, vor einen Spiegel gehalten, genau so weit hinter der Oberfläche des Spiegels zu sein schien, wie das Objekt selbst vor ihm;³³ genauer, dass ein Objekt, das in einem Winkel vor einem Spiegel steht, immer im gleichen Winkel reflektiert wird. Bereits die alten Griechen hatten entdeckt, dass die Spiegelung von Lichtstrahlen und beleuchteten Objekten ebenfalls den Gesetzen von Euklid entsprach.³⁴ Interessanterweise zeigt auch Edgerton als Illustration ein sehr ähnliches Motiv (wobei das Messer von einer Hand gehalten wird); allerdings um zu zeigen, dass die Reflexion eines beleuchteten Objekts senkrecht zur Spiegeloberfläche immer auf derselben senkrechten Linie und genauso weit im gespiegelten Raum erscheint wie das Objekt vor ihr.³⁵

Mit diesen beiden Herleitungen in der Einleitung werden zwei ‚Ursprünge‘ der Perspektive diskutiert. Beide Male stammt der Begriff aus der Optik: einerseits ist *Perspectiva* jener Begriff, mit dem Boethius im 6. Jahrhundert die *optikē technē* der Griechen übersetzt, also die Kunst des Sehens, die gleichermaßen die physiologischen Untersuchungen zur Anatomie des Auges, die geometrische Optik bis hin zu den physikalischen Gesetzen der Lichtbrechung einschließt,³⁶ andererseits jene aus der Optik des Mittelalters, bzw. der Katoptrik, der Lehre von der Reflexion des Lichtes an spiegelnden Oberflächen, die ein Teilgebiet der Optik ist.

Keinesfalls kommen hier die aus Italien tradierten Methoden vor, etwa der Schnitt durch eine Sehpyramide, oder das Durchsehen wie durch ein Fenster, mit dem Dürer die Perspektive charakterisiert: „Item prospectiua ist ein lateinisch wort, pedewt ein durchsehung.“³⁷

32 Vgl. Samuel Y. EDGERTON, *The Renaissance rediscovery of linear perspective*, New York 1975, S. 134–135, und DERS., *The mirror, the window, and the telescope: how Renaissance linear perspective changed our vision of the universe*, Ithaca, NY 2009, S. 24, 27. Alberti empfahl, mit Hilfe von Spiegeln die Qualität von Bildern zu beurteilen. Vgl. David C. LINDBERG, *Theories of vision from al-Kindi to Kepler*, Chicago, Ill. 1981 (University of Chicago history of science and medicine), S. 151–152.

33 Vgl. EDGERTON, *The Renaissance rediscovery of linear perspective* (1975), S. 135.

34 Vgl. EDGERTON, *The mirror, the window, and the telescope* (2009), S. 24–25.

35 Ebd., S. 25. Der für die mittelalterliche Optik sehr einflussreiche Alhazen (965–1040) nennt Schwerter, Pfeile und andere Projektile. Vgl. LINDBERG, *Theories of vision* (1981), S. 75 u. 79–80.

36 Vgl. Emmanuel ALLOA, *The Share of Perspective*, übers. von Nils F. SCHOTT, New York 2024, S. 6.

37 Albrecht DÜRER, zit. nach PANOFKY, *Die Perspektive als symbolische Form* (1980), S. 99.

Dürer deutet ‚prospectiua‘ als ‚perspicere‘, also als ‚durchsehen‘. Er ist jedoch der erste, der diese Definition macht, und damit eine mit der Wahrnehmung verbundene Kategorie in den Bereich der Abbildung überträgt; ein Aspekt, der auch Erwin Panofsky nicht entgangen ist.³⁸ Panofsky sagt denn auch, dass die *Unterweisung* „von der modern-exakten Theorie [speziell ist das sogenannte *Distanzpunktverfahren* gemeint] noch völlig unberührt“ ist.³⁹

Die *Unterweisung* übernimmt Dürers Diktion, fügt dieser allerdings einen weiteren Aspekt hinzu: „dann Perspicere / heißt uff teutsch / durchsehen / oder hefftig sehen“ (fol. A2r). Das ist interessant: Obwohl der Autor auf Dürer Bezug nimmt, greift er mit „hefftig sehen“ auf eine etwas andere Definition von Perspektive zurück, und zwar eine, die älter ist als die italienische: Die Herleitung des Terminus aus dem lat. *perspicere* = „genau, deutlich sehen, gewiß wahrnehmen“ ist wahrscheinlich, weil er so die Übersetzung des griechischen ὀπτικὴ τέχνη darstellt – so verwendet Boethius den Begriff in seiner Aristoteles-Übersetzung.⁴⁰ *Perspicuitas* bedeutet Klarheit oder Klarsichtigkeit, Durchblick im intellektuellen Sinn, „hefftig sehen“ im Sinne von ‚scharf sehen‘ bzw. auch von Scharfsinn, wie im französischen *perspicacité*. Es ist bemerkenswert, dass die Vorsilbe *per* bei Boethius nicht auf eine kausale Funktion hinweist; es geht ihm vor allem darum, diese „Kunst des Sehens“, die die Gesetze des Sehens selbst durchdringt, durch einen Superlativ zu qualifizieren. *Perspicuitas* bedeutet Klarheit oder Klarsichtigkeit, *perspectiva* als Scharfsinn (*perspicacity*) bleibt für eine lange Zeit in Gebrauch.⁴¹

Wie James Elkins feststellt, wird die Perspektive, einschließlich ihrer zahlreichen Methoden, heute als singulärer Korpus betrachtet: ‚Entdeckt‘ von einer Person, Brunelleschi, entstand sie an einem Ort, Florenz, und zu einem bestimmten Zeitpunkt (ca. 1413–1435). Später wurde sie kontinuierlich weiterentwickelt. So jedenfalls stellt es Panofsky in seiner *Perspektive als symbolische Form* dar. Wird davon ausgegangen, dass die Perspektive einen einzigen Ursprung hat, dann kann sie als eine einheitliche Disziplin betrachtet werden; ohne diese Annahme könnte es sich um mehrere Ideen oder eine lose verbundene Tradition handeln.⁴² Die Texte der Renaissance zeugen von einer solchen Möglichkeit, und so spricht etwa Giorgio Vasari von mehreren ‚Perspektiven‘.⁴³

³⁸ Vgl. ALLOA, *The Share of Perspective* (2024), S. 7.

³⁹ PANOFSKY, *Die Perspektive als symbolische Form* (1980), S. 156, Anm. 60. Panofsky diskutiert Rodler ausführlich; er dürfte allerdings nur die 2. Auflage kennen, da er als Erscheinungsdatum 1546 festhält.

⁴⁰ ARISTOTELES, *Zweite Analytiken, oder Lehre vom Erkennen*, 1,7; 1,10, zit. nach PANOFSKY, *Die Perspektive als symbolische Form* (1980), S. 127, Anm. 2. Vgl. die deutsche Übersetzung in: *Aristoteles‘ zweite Analytiken, oder, Lehre vom erkennen*, hg. und übers. von Julius Hermann von KIRCHMANN, Leipzig 1877, S. 16, 19.

⁴¹ Vgl. ALLOA, *The Share of Perspective* (2024), S. 6.

⁴² Vgl. James ELKINS, *The poetics of perspective*, Ithaca, NY 1994, S. 8, 46.

⁴³ Vgl. ebd., S. 46.

Diese angenommene Revolution (auch epistemisch, weil mit ihr der abstrakte, isotrope Raum und eine Vorstellung vom Unendlichen einhergeht) scheint ohnehin von längerfristigen Übergängen begleitet zu sein. Sven Dupré bemerkt, dass die Geschichtsschreibung zur Perspektive, besonders nach Panofskys *Perspektive als symbolische Form*, essentialistisch und teleologisch geprägt war.⁴⁴ Alleine der Begriff ‚perspectiva‘ hatte im Mittelalter eine extensive Bedeutung, bezog sich auf die zahlreichen Aspekte des Sehvorgangs⁴⁵ und war noch nicht auf eine bestimmte Darstellungsweise festgelegt oder auch eingeschränkt. Erst Dürer übertrug den Begriff von einer Wissenschaft des Sehens zu einer Wissenschaft des Darstellens.⁴⁶

Was die unterschiedlichen Methoden der Zentralperspektive betrifft, so nennt Elkins elf verschiedene, Günzel et al. nennen immerhin sechs.⁴⁷ Letztere treffen eine anschauliche Unterscheidung, weshalb deren Einordnung kurz präsentiert werden soll, da all diese Methoden zur Entstehungszeit der *Unterweisung* bekannt waren.

Zum einen gibt es ‚algorithmische‘ Methoden, wo das Bild anhand von Geometrie und Berechnung konstruiert wird. Dazu gehört die *construzione legittima* von Alberti, wo Grund- und Aufriss mit der Sehpyramide verbunden wurden, und die Methode mit zwei Distanzpunkten (1505 von Jean Pelerin in *De artificiali perspectiva*) – ein abgekürztes Verfahren, wo zwei gekreuzte Diagonalen über ein Schachbrettmuster gelegt wurden. Zum anderen gibt es die sogenannten ‚automatischen‘ oder ‚halbautomatischen‘ Methoden, die darin bestanden, durch ein Medium hindurchzublicken und das Gesehene möglichst 1:1 abzumalen. Etwa indem mit Hilfe eines Spiegelbilds das Abgemalte verglichen wurde, durch ein Glasfenster geblickt und dieses direkt bemalt wurde oder auch mittels eines Gitternetzes das Gesehene auf eine gerasterte Fläche übertragen wurde. Die letzte Methode bestand darin, mit Hilfe einer Camera obscura ein um 180 Grad gedrehtes Abbild der äußeren Gegenstände abzumalen. Eine ähnliche Unterscheidung trifft bereits Giovanni Lomazzo 1584, wenn er zwischen freihändiger Perspektive, mechanischen Methoden und konstruierter Linearperspektive unterscheidet.⁴⁸

Tatsächlich gab es in der Renaissance unterschiedliche Methoden, die zum Teil unvereinbar waren.⁴⁹ Ihr Vorhandensein legt Zeugnis davon ab, dass in den Ateliers der Pragmatismus über der theoretischen Konsistenz stand. Die ‚korrekte‘ perspektivische Darstellung ermöglichte zwar eine zusammenhängende räumliche Konstruktion, brachte aber zugleich eine neue Inflexibilität bei der Komposition der bildhaften Erzählung mit sich.

44 Vgl. Sven DUPRÉ, *Perspective as Practice: Renaissance Cultures of Optics*, Turnhout 2019, S. 11.

45 Vgl. Klaus BERGDOLT, *Der Sehvorgang als theologisches Analogon: Augen-anatomie und -physiologie bei Roger Bacon*. *Sudhoffs Archiv* 75/1 (1991), S. 1–20, S. 1.

46 Vgl. ALLOA, *The Share of Perspective* (2024), S. 7.

47 Vgl. ELKINS, *The poetics of perspective* (1994), S. 87; Bild, hg. von Stephan GÜNZEL–Dieter MERSCH–Franziska KÜMMERLING, Stuttgart 2014, S. 168–170.

48 Vgl. ELKINS, *The poetics of perspective* (1994), S. 52, Anm. 24.

49 Vgl. DUPRÉ, *Perspective as Practice* (2019), S. 10.

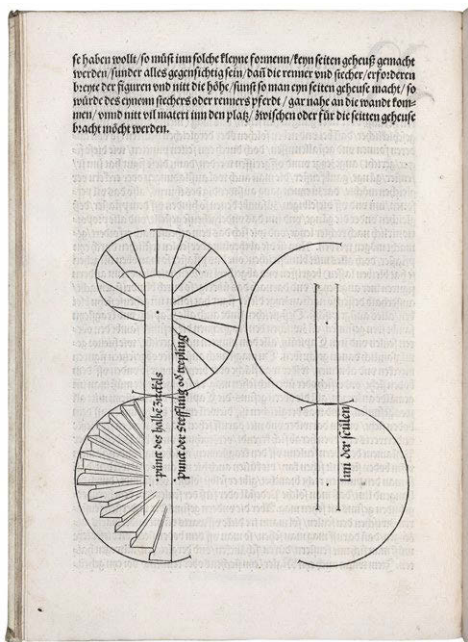


Abb. 11

Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], Simmern 1531, fol. E6v.

Fehler wurden somit zum Teil bewusst in Kauf genommen,⁵⁰ weshalb die Schlussfolgerung, dass ‚die‘ Perspektive, bzw. die Lehren Dürers von seinen Nachfolgern nicht verstanden wurde, voreilig scheint.⁵¹ Die *Unterweisung* selbst bietet durch ihre sehr reduzierte/n Methode/n einige Inkonsistenzen.

Ein besonders anschauliches Beispiel ist die Darstellung einer Wendeltreppe, die mit nur zwei Zirkelschlägen konstruiert wurde (fol. E6v) (Abb. 11).

Albrecht Dürer hatte eine exakte, aber eben aufwendigere – und unbekanntere – Methode für die Konstruktion einer solchen präsentiert; und dabei eine der ersten gedruckten Darstellungen geschaffen, die aus der maßstabgleichen Kombination von Grund- und Aufriss besteht (Abb. 12 und 13). Dürer betont ausdrücklich, dass es keine andere Technik gibt, um die Helix zu konstruieren, als ihre Entwicklung aus

dem Grundriss, wobei es hierfür noch keine Begrifflichkeiten gibt – ein eindrucksvolles Beispiel dafür, dass die Grenzen der Welt bisweilen über jene der Sprache hinausgehen.⁵² Dürer benutzt noch die Sprache der Parler und Steinmetzen des Mittelalters, wenn er bei der Helix, die sich Dürer als Treppe in der Spitze eines runden Turms vorstellt, die Konstruktion der Darstellung beschreibt: ⁵³ „Das ist der schneck auf dem grund auf gezogen / mit allen nottürftigen linien daraus er gemacht wirdet“ (fol. B1v).⁵⁴

⁵⁰ Vgl. ebd., S. 23.

⁵¹ Vgl. FLOCON-TATON, *La perspective* (1994), S. 50; PEIFFER, *Projections embodied in technical drawings* (2004), S. 258; MARTIN KEMP, *The science of art: optical themes in western art from Brunelleschi to Seurat*, New Haven–London 2^o1992, S. 61. Flocon und Kemp erwähnen ausdrücklich die *Unterweisung*.

⁵² Vgl. Ludwig WITTMENSTEIN, *Tractatus logico-philosophicus*, in: DERS., *Werkausgabe*, Bd. 1, Frankfurt am Main 1984, S. 7–86, hier S. 67 (§ 5.6).

⁵³ Albrecht DÜRER, *Unterweisung der Messung*, fol. B3r; vgl. Wolfgang LEFÈVRE, *The emergence of combined orthographic projections*, in: *Picturing machines: 1400–1700*, hg. von DEMS., Cambridge, MA 2004, S. 209–244, S. 226–229.

⁵⁴ Albrecht DÜRER, *Unterweisung der Messung*, fol. B2r; vgl. PEIFFER, *Projections embodied in technical drawings* (2004), S. 257.

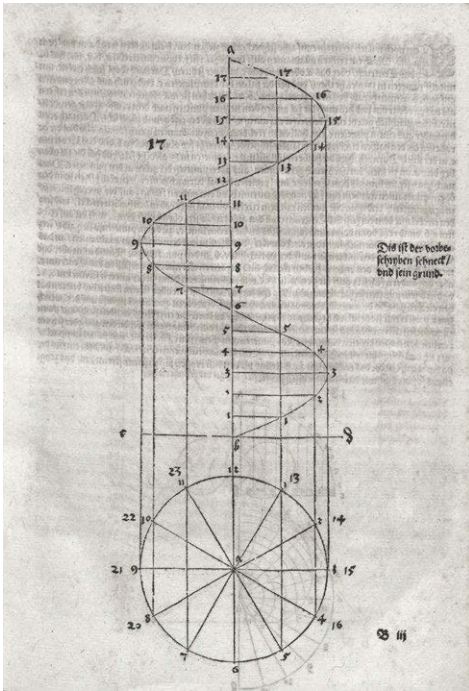


Abb. 12
Albrecht Dürer, Unterweysung der Messung, mit dem Zirckel und Richtscheyt, in Linien, Ebenen unnd gantzen corporen [...], Nürnberg 1525, fol. B3r.

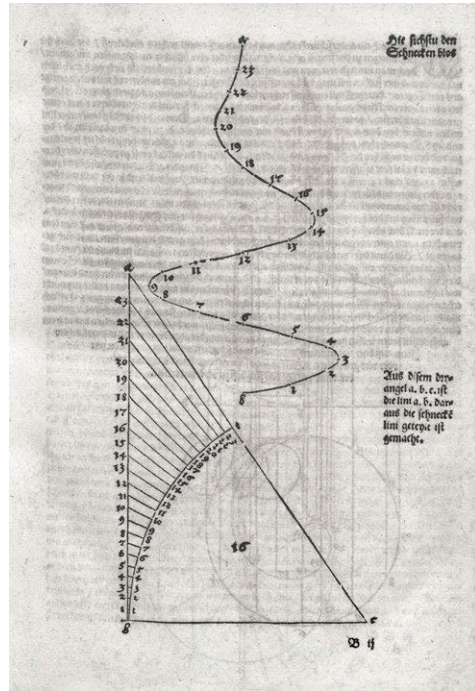


Abb. 13
Albrecht Dürer, Unterweysung der Messung, mit dem Zirckel und Richtscheyt, in Linien, Ebenen unnd gantzen corporen [...], Nürnberg 1525, fol. B2r.

Jene Methode, die die *Unterweisung* präsentierte, kam nur mit einem Aufriss aus, was den aus der Architektur des Mittelalters bekannten Entwurfsmethoden entsprach, wo Ansicht und Grundriss noch nicht in einem gemeinsamen System gebunden waren.⁵⁵ Die Darstellung der *Unterweisung* ist zwar auffällig ‚falsch‘, wie die fertige Darstellung auf fol. F1v zeigt, gleichzeitig aber einfach und nachvollziehbar. Grobe Vereinfachungen wie diese müssen nicht, wie oft angenommen, von Unverständnis allein zeugen, vielmehr können sie einen Hinweis darauf liefern, dass nördlich der Alpen die sehr produktiven Handwerkskünste den alltagstauglichen, schnellen Lösungen den Vorzug gaben. Grundlage für diese erstaunlich flexible Praxis, die offensichtlich keiner ausdrücklichen Vereinbarung bedurfte, war ein überlieferter Rahmen von Regeln und Konventionen.⁵⁶

Ein weiteres Beispiel für den Sinn für Einheitlichkeit, den wir in der Renaissance sehen, ist das Konzept des Fluchtpunkts als hypothetischer Punkt im Unendlichen. Als solcher wurde

⁵⁵ Vgl. hierzu: LEFÈVRE, The emergence of combined orthographic projections (2004), S. 209–244.

⁵⁶ Vgl. ebd., S. 221. Außerdem vgl. Werner MÜLLER, Grundlagen gotischer Bautechnik: ars sine scientia nihil, München 1990, S. 14–20.

der Fluchtpunkt allerdings frühestens mit der Wende zum 17. Jahrhundert, also nach dem Erscheinen der *Unterweisung* konzipiert:⁵⁷ 1600 beschrieb Guidobaldo del Monte in *Perspectivae libri sex* in mathematischen Begriffen, dass parallele Geraden im Unendlichen in einem Punkt der Darstellung zusammenlaufen.⁵⁸ In der *Unterweisung* gibt es nur den „punct“; als Endpunkt des *Cathetus*, jener Sehachse bzw. *axis perpendicularis*, die das Auge mit dem Mittelpunkt der dargestellten Sache verbindet und in der mittelalterlichen Katoptrik viel diskutiert war – wieder ein Hinweis darauf, dass beim Übergang zur perspektivischen Darstellung vor allem für die Künste Bezüge zur Optik hergestellt wurden.⁵⁹ In seinem Werk *De Artificiali perspectiva* von 1505 diskutiert Jean Pèlerin, genannt Le Viator, diesen Punkt gleich nach der Einleitung, die, wie die *Unterweisung*, Klarheit und Zugänglichkeit in der Einleitung betont („Bonum, quanto communius, tanto melius“).⁶⁰ Viator nennt diesen Punkt „punctus principalis“, der auch als ‚Fixpunkt‘ oder ‚Subjektpunkt‘ („qui punctus / dicitur fixcus vel subiectus“) bezeichnet wird.⁶¹

Ganz ähnlich der Zugang in der *Unterweisung*, die sich wahrscheinlich nicht nur an Dürer, sondern mehr noch an Pèlerin orientiert hat – wobei auf jede Abstraktion verzichtet wird. Anstatt von *Linien* (die erst im darauffolgenden Kapitel präsentiert werden) ist von *Objekten* die Rede.⁶² Bereits im dritten Kapitel, und damit im ersten Abschnitt der eigentlichen Erklärung (erstes und zweites Kapitel können als Einleitung betrachtet werden) ist „von den puncten“ die Rede. Ein Punkt wird zum Beispiel „in die mitte des geheuses“ (fol. A3v) angebracht, und zu diesem werden „alle Thüren Fenster / Kragsteyn / Schorsteyn oder schlât / Tisch / Stül / Benck / Ladenn / Balcken / Capitál / Postament oder Pedestal unden an seulen und Paviment / was die seit und fläche in im hat“ gerichtet. Ein solcher Punkt ist z. B. gut ersichtlich auf fol. F4r mit der auf dem Kopf stehenden Bezeichnung „punct“ (Abb. 14). Zum Abschluss gibt es einen (kryptischen) Verweis auf die Distanzpunktmethod Viatators: „es were dañ (wie her nach in etlichen orten gemeldet wirdt) daß má etwo zwen puncten braucht“ – diese Methode wird die *Unterweisung*, allerdings ohne Illustration, erst spät auf fol. F3r einführen, sodass ihre Bedeutung nebensächlich erscheint.

57 Vgl. ELKINS, *The poetics of perspective* (1994), S. 8; DUPRE, *Perspective as Practice* (2019), S. 11.

58 Vgl. Thomas FRANGENBERG, *The Image and the Moving Eye: Jean Pélerin (Viator) to Guidobaldo del Monte*. *Journal of the Warburg and Courtauld Institutes* 49 (1986), S. 150–171, S. 165.

59 Vgl. Giulio Carlo ARGAN–Nesca A. ROBB, *The Architecture of Brunelleschi and the Origins of Perspective Theory in the Fifteenth Century*. *Journal of the Warburg and Courtauld Institutes* 9/1 (1946), S. 96–121, S. 104; EDGERTON, *The mirror, the window, and the telescope* (2009), S. 25.

60 Jean PÉLERIN, *La perspective positive de Viator latine et française. Reveüe augmentée et réduite de grand en petit [...]*, hg. von Mathurin JOUSSE, *La Flèche 1635*, S. 5 – Architectura, <https://architectura.univ-tours.fr/livres-consultation/inha-12r52consult/> [24.6.2025].

61 Für Viator ist dies der Ausgangspunkt, von dem jene Linien ausgehen, anhand derer die Körper erstellt werden; vgl. ebd., S. 8.

62 Laut Elkins war die Aufmerksamkeit der Künstler und ihre perspektivischen Methoden mehr auf die Darstellung bestimmter Objekte als auf die Errichtung des Gerüsts für einen fiktiven Raum gerichtet. Vgl. ELKINS, *The poetics of perspective* (1994), S. 56.



Abb. 14
Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], Simmern 1531, fol. F4r.

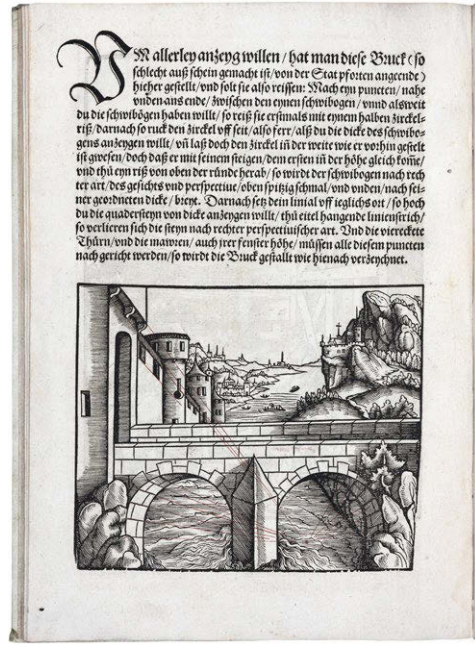


Abb. 15
Eyn schön nützlich büchlin und underweisung der kunst des Messens [...], Simmern 1531, fol. F5v.

Hier ist also nicht, in abstrakter Form, davon die Rede, dass alle parallelen Linien aus einem Fluchtpunkt hervorgehen. Es gibt auch keinen Verweis auf die Unendlichkeit des Fluchtpunkts oder gar auf eine Aughöhe, und oft hat er auch nichts mit dem Horizont gemeinsam, wie z. B. auf fol. F5v ersichtlich (Abb. 15): Die Steinfugen auf der Unterseite der Brücke fluchten nicht zum fernen Horizont hin (dann wären sie nicht sichtbar), sondern auf einen willkürlich weit unten angesetzten Punkt zu. Bei den beiden ‚perspektivischen‘ Landschaftsdarstellungen auf fol. F6v (Abb. 8) ist die Methode nochmals vereinfacht und dient nur einer annäherungsweise Darstellung: Ein eingezeichnetes Dreieck, dessen spitzer Winkel auf einen seitlich angebrachten Punkt zuläuft, soll dazu dienen, „daß sich das gebirg nach der ferre verkleyner / und damit die ordnung der perspectiva gehalten werde“ (fol. G1r). Panofsky nennt denn auch die Methode der *Unterweisung*, dessen Autor er als „theoretisch ganz ahnungslosen“ bezeichnet, als „Distanzpunktverfahren ohne Distanzpunkt“.⁶³

⁶³ PANOFSKY, Die Perspektive als symbolische Form (1980), S. 156, Anm. 60. Streng genommen führt die *Unterweisung* diese Methode sehr wohl ein, allerdings ohne Illustration (vgl. fol. F3r).

MOBILE IMMOBILE

Die Anfänge der Perspektive sind von der Wissenschaft gründlich erforscht worden. Weniger bekannt sind die etwa 40 Traktate, Essays und eben Unterweisungen, die in der Folge zu ihrer Verbreitung beitrugen.⁶⁴ Ab dem 15. Jahrhundert entstehen viele Initiativen, die darauf abzielen, das abstrakte und technische Wissen um die Perspektive zu verbreiten und für die Künste nutzbar zu machen.⁶⁵ Schon viel früher, 1270, schreibt John Peckham (auch Pecham) zwei Traktate zur Perspektive, von denen das zweite den Titel *Perspectiva communis* trägt. Es ist knapp gefasst und richtet sich, wenngleich auf lateinisch, an eine breitere Leser:innenschaft. Zum einen soll es die wichtigsten Ergebnisse der Optik zugänglich machen, andererseits geht es darum, jene Lehren zusammenzufassen, die von den sogenannten *Perspektivisten* vertreten werden. Es ist somit eine Art Kompendium oder gar Synthese der wichtigsten Entdeckungen und eine gemeinsam getragene Doktrin.⁶⁶ Emmanuel Alloa macht hier einen Ursprung der Perspektive aus, die ihrer rezenten Auslegung als Metapher für Subjektivismus oder als Ursprungsort des modernen Subjekts zuwiderläuft. Für Hubert Damisch hingegen ist dessen Entstehung gleichbedeutend mit der Entstehung der Perspektive: Das Subjekt wird durch das System produziert, weil es im Fluchtpunkt seinen markierten Platz, seinen Ursprung hat.⁶⁷

Freilich ist dieses moderne Subjekt nicht ein bestimmtes Individuum, sondern viele, die in der Perspektive denselben Blickpunkt bzw. Standpunkt teilen. Wie Alloa feststellt, ist das Sehen niemals unmittelbar. Wir sehen immer nur über oder *durch* etwas, und in diesem Sinne lässt sich die Perspektive als *per-spicere*, also „sehen durch“ oder auch „durch-schauen“ deuten; als Medium der Vermittlung, das ein Sehen erst ermöglicht. Die Perspektive wäre dann die Schaffung einer gemeinsamen, intersubjektiven Form des Sehens, die zu einer Bedingung für den Zugang zur Realität wird: „Weit davon entfernt, die Realität zu relativieren, ist die Perspektive das, was sie verwirklicht“, sagt Alloa.⁶⁸ Bei dieser Interpretation der Perspektive geht es nicht um Subjektivität und nicht um Perspektivismus, sondern vielmehr darum, dasselbe sehen zu können, was eine Austauschbarkeit ermöglicht.

Wie Antonio di Tuccio Manetti, Biograf von Brunellesci, über dessen *Tavoletta* festhält, mit der zwischen 1415 und 1420 das erste Experiment zur Perspektive gemacht wurde, konnte sich jede:r von der Übereinstimmung der perspektivischen Darstellung mit dem tatsächlichen Objekt, dem Florentiner Baptisterium, überzeugen. Durch seine Verifizierbarkeit und Wiederholbarkeit entsprach dieses Experiment den Bedingungen eines wissenschaftlichen

64 Über die Renaissance hinaus existieren tausende Abhandlungen und Aufsätze, über die noch viel weniger bekannt ist. Vgl. ELKINS, *The poetics of perspective* (1994), S. 7.

65 Vgl. ALLOA, *The Share of Perspective* (2024), S. 11.

66 Vgl. SEIDENFUSS, *Daß wirdt also die Geometrische Perspektiv genandt* (2006), S. 53.

67 Vgl. Hubert DAMISCH, *L'origine de la perspective*, Paris 1987, S. 455; vgl. Ulrike HASS, *Das Drama des Sehens: Auge, Blick und Bühnenform*, München 2005, S. 86.

68 ALLOA, *The Share of Perspective* (2024), S. 4 (hier eigene Übersetzung).

Experiments.⁶⁹ Die Perspektive ermöglichte einen gemeinsamen Standard für alle Arten von Darstellungen (seien es wissenschaftliche oder auch künstlerische) und wurde damit zu einer der wichtigsten Voraussetzungen der 1986 von Bruno Latour diskutierten ‚unveränderlichen Mobilen‘.⁷⁰ Gemeinsam mit der Druckerpresse erlaubt es die Perspektive, Informationen zu verflachen und zu verdichten, mit geringem Aufwand zu transportieren und mit ebenso wenig Aufwand in einer neuen Darstellung bzw. Auflage zu verbessern und zu aktualisieren⁷¹ – oder eben auch zu vulgarisieren bzw., positiver formuliert, zu ‚enthierarchisieren‘. Dies funktioniert aber nicht, wie man annehmen könnte, über ‚Objektivität‘, sondern über ‚optische Konsistenz‘, der Hauptqualität dieses „new meeting place [...] for fact and fiction, words and images.“⁷²

Zur Frage der Mobilität meinte bereits Walter Benjamin: „Die Reproduktionstechnik, so ließe sich allgemein formulieren, löst das Reproduzierte aus dem Bereich der Tradition ab. Indem sie die Reproduktion vervielfältigt, setzt sie an die Stelle seines einmaligen Vorkommens sein massenweises. Und indem sie der Reproduktion erlaubt, dem Aufnehmenden in seiner jeweiligen Situation entgegenzukommen, aktualisiert sie das Reproduzierte.“⁷³ Die *Unterweisung* bedient diese Idee der ‚Demokratisierung‘ von Information, auch indem sie kleiner, dünner und handlicher ist als Dürers Werk. Im Sinne Latours verfügt die *Unterweisung* über alle Parameter, die ein hochfunktionales visuelles ‚Argument‘ ausmachen: Sie ist „mobile but also immutable, presentable, readable and combinable“⁷⁴. Demokratisierung der Perspektive kann nur heißen, sie nutzbar zu machen.⁷⁵ Dies bedeutet nichts weniger als die Umwälzung der sozialen Funktion von Kunst: „An die Stelle ihrer Fundierung aufs Ritual tritt ihre Fundierung auf eine andere Praxis: nämlich ihre Fundierung auf Politik.“⁷⁶ Und das ist das, was die *Unterweisung* beabsichtigt und was das Frontispiz zeigt (Abb. 2): Eine gemeinsame Form der Darstellung für alle (Künste), ihre einfache Verfügbarkeit und eine geteilte Sicht der Wirklichkeit.

69 Vgl. ebd., S. 12.

70 Vgl. Bruno LATOUR, *Visualisation and Cognition: Drawing Things Together*, www.bruno.latour.fr N°21, S. 7–8; <http://www.bruno-latour.fr/sites/default/files/21-DRAWING-THINGS-TOGETHER-GB.pdf> [1.3.2020].

71 Siehe hierzu die unterschiedlichen Versionen des Frontispiz, vgl. Anm. 1 im vorliegenden Text.

72 LATOUR, *Visualisation and Cognition*, S. 10.

73 Walter BENJAMIN, *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*, in: DERS., *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit. Drei Studien zur Kunstsoziologie*, Sonderausgabe Frankfurt am Main 2003, S. 7–44, S. 13.

74 LATOUR, *Visualisation and Cognition*, S. 6.

75 Vgl. ALLOA, *The Share of Perspective* (2024), S. 11–13.

76 BENJAMIN, *Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit* (2003), S. 7–44, S. 18.

ABBREVIATIONS/ABKÜRZUNGSVERZEICHNIS

Deutsch

Abb.	Abbildung(en)
Anm.	Anmerkung(en)
Art.	Artikel
Bd. / Bde.	Band / Bände
bzw.	beziehungsweise
ca.	circa
Cod.	Codex
ders.	derselbe
dies.	dieselbe
ebd.	ebenda
etc.	et cetera
fol.	Folio(s)
Hg.	Herausgeber:in
hg.	herausgegeben
Inv.-Nr.	Inventarnummer
Jg.	Jahrgang
N. F.	Neue Folge
Nr.	Nummer(n)
r	recto
red.	redigiert
S.	Seite(n)
Sp.	Spalte
St.	Sankt
v	verso

English

art.	article
ca.	circa
cf.	confere
ch.	chapter
Cod.	Codex
col(s).	column(s)
ead.	eadem
ed.	edited / editor(s)
esp.	especially
etc.	et cetera
fig.	figure(s)
fol(s).	folio(s)
ibid.	ibidem
id.	idem
i.e.	id est
inv. no.	inventory number
n.	note(s)
no. /nos.	number / numbers
p. / pp.	page / pages
r	recto
repr.	reprint
St	Saint
v	verso
vol(s).	volume(s)

Obwohl Klöster als Räume des spirituellen Rückzugs verstanden werden, sind für die Verwaltung von Besitztümern, das Rechnungswesen, den Handel und das Betreiben von Schulen fortgeschrittene mathematische Kenntnisse notwendig. Die zehn Beiträge dieses Bandes untersuchen, wie dieses mathematische Wissen in klösterlichen Umgebungen gesammelt und angewandt wurde. Anders als in akademischen, universitär organisierten Institutionen liegt der Sammlungsschwerpunkt im monastischen Umfeld auf pragmatischen Texten: Rechnungsbücher, Vermessungsanleitungen, Rechenbücher und Perspektivtraktate finden sich vermehrt in Klöstern wieder und offenbaren jene als aktive Orte, an denen theoretische Neugier und praktische Notwendigkeit kontinuierlich ineinandergreifen.

This volume explores the vital role of mathematics in monastic life. While monasteries are associated with spiritual contemplation, they also require sophisticated mathematical skills for managing properties, trade, schools, and accounts. The ten contributions to this volume examine how mathematical knowledge was collected and applied in monastic environments. Unlike academic institutions prioritising theory, monasteries favoured practical texts: accounting manuals, surveying guides, reckoning books, and treatises on perspective. The articles analyse manuscript organisation, account books, algorism treatises, and influential works like Jakob Köbel's reckoning book. They reveal monasteries as active sites where theoretical curiosity and practical necessity are continuously intertwined.



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