CONCLUSION

IN THIS BOOK, we have argued for a new engagement with medieval manuscripts, one that discusses the promises and the limitations of computational approaches to textual variance, scribal attribution, and the materiality of the handwritten book. We used the large corpus of Paris bibles, a form of the medieval Latin Bible of the thirteenth and fourteenth century, as a case study to explore how scribal contribution to a manuscript can be captured by automated transcription, and to suggest that new and different questions can be advanced using digital and computational methodologies. We argue for innovative ways of transcribing and analyzing manuscript data and advocate for more collaborative partnerships in the humanities, whether through data co-creation, data sharing, or multidisciplinary research collaboration. Our project illustrates Bobley's four major transformations in medieval studies and in the humanities more broadly brought about by digital technologies: it sheds light on access to digitized medieval manuscripts in global archives, brings new computational methods to bear in the analysis of medieval sources, reconfigures interactions between scholars, libraries, and archives, and suggests generative pathways for multidisciplinary collaboration. At its core, the Paris Bible Project, and this book reflecting on it, argue that neither humans nor machines can interpret the vast medieval record alone, but rather a collective effort, accompanied by significant critical humility, is required.

In Chapter 1, we presented the form of the Paris bible, reflecting on the challenges of building a research corpus and highlighting limitations in terms of availability, quantity, and quality of digitized resources needed to carry out computational analysis. We approached two ideas from contemporary digital culture and their applicability in the study of the premodern humanities: the concepts of big data created from medieval sources and the idea of the pattern searching within those sources. Contemporary technologies such as HTR provide access to a significant amount of text that can be created in direct dialogue with book history. By introducing the idea of computational analysis through an experiment on the biblical prologues, we highlighted the potential of such methods to understand patterns in archival objects and explored the implications of working with digitized collections.

DOI: 10.17302/mfsk158610

We questioned how our access to digital surrogates not only reshapes what we can see in manuscripts, but also what new forms of interpretation we can forge from these data-rich collections.

For many researchers today, access to the physical object is no longer the fundamental condition of research on medieval manuscripts, but rather serves as a supplement to work done with digital copies. As we demonstrate throughout this book, this is certainly the case of the Paris Bible Project, where the dispersion of the genre makes it next to impossible for a group of researchers to access the corpus first-hand. Seen from this perspective, we have attempted to explore how digitization of our sources not only enables—but also reshapes—possibilities of scholarly interpretation. We concluded that even though we do not have access to everything that was produced in the Middle Ages—because so much has been lost, and because the many small cultural institutions holding manuscripts will not digitize them—what we already have is too much to process. New ways of managing and collectively studying digitized manuscripts in the computational age need to be developed and taught.

In Chapter 2, we made the case for human-curated, domain-specific datasets in computational humanities. Rather than pursuing unreasonable ideals of completeness or one-size-fits-all solutions, we argued that more bespoke HTR models grounded in material and digital philology allow for forms of ethical, scholarly analysis. Looking at practices in diplomatic and normalized transcriptions in the scholarly literature, we asked how we might approach producing data about scribal practices using recent technological advances to automate material philology with both caution and pragmatism. Our approach to transcription foregrounds scribal practices as complex, layered phenomena, requiring careful modelling of handwriting and textual features at the character level. We argued that machine learning has particular promise for the study of transcribed medieval texts and that the creation of ground truth datasets—far from being a neutral pre-processing step—is a deeply interpretive act that shapes the potential outcomes of scholarly research. Questioning the idea of the scribal profile that has existed for some time, we proposed an approach to modelling scribal behaviour at the intersection of quantitative codicological methods and digital philology. Such modelling requires defending the features that are most relevant to the research questions we have, rather than exhaustively describing these book-objects. This chapter also highlighted implications for a future of manuscript studies in which scholars will most likely complement traditional knowledge in language skills, palaeography, and codicology with competencies in data curation, model evaluation, and computational thinking.

In Chapter 3, we designed four experiments aimed at putting the arguments developed in the previous chapters into practice. Using a dozen Paris bible manuscripts, our case studies examine scribal attribution, while underscoring both the potential and limitations of interpretation using computational methods. By demonstrating how scribes left a mark on the texts they copied, our analyses reveal how computational modelling sometimes confirms the scholarly record, but also offers critical refinements that go beyond long-standing arguments in the field. From comparing the hands in a single codex with what the trained palaeographer can see with the trained, but naked eye (Experiment 1) to testing attributions based on colophons or cataloguers' claims (Experiment 2), we demonstrated how computational models corroborate, refine, or challenge human expertise. Experiments 3 and 4 took the analysis a few steps further, by analyzing previous scholarly claims of artistic groups and circles of manuscript production, nuancing the way that we frame and analyze such production. We also introduced the idea of a companion scribal style for describing manuscripts exhibiting statistical affinities with each other. We argue, therefore, for the need for hybrid approaches in manuscript studies, in which statistical techniques support—but do not supplant—narrative modes of argumentation. The experiments we carried out highlighted that while computational methods can offer significant insight, they also foreground a tension in medieval studies: the more we lean into algorithmic abstraction, the more we can run the risk of distancing ourselves from the materiality of such objects. We argue, therefore, for the need for more widespread, hybrid approaches in manuscript studies, which blend statistical techniques and philological, palaeographical, and codicological expertise.

Finally, in Chapter 4, we shifted perspectives to invite our reader to consider the role of collaboration in medieval studies in both the past and the future, and to the possibilities such collaboration might enable. In the first half of the chapter, we looked back to the last century, through the lens of the science of science and bibliometrics in publications in medieval studies. We highlighted not only how multi-authored research in medieval studies is slowly on the rise, but also how varied teams of researchers tend to have increased citation and impact over time. We also highlighted the benefits of medievalists working together, but also the many possible limitations of such endeavours. Then, we examined recent trends in data co-creation and ways medievalists are working together. Collaborative research in computational medieval studies can expose tensions between technological ambition and disciplinary practices. Moreover, computational infrastructures are not neutral: their design, distribution of labour, and mechanisms of credit shape what kinds of collaboration are possible and whose expertise counts.

While the idea of collectively studying manuscripts dispersed across institutions and continents using their digital avatars is appealing, such visions run up against the material realities of access and infrastructure. Thus, computational approaches can easily fall short of the global, cross-collection approaches desired by serious historical scholarship. The organization of computational humanities research, at least as it is currently constituted as we are writing, tends to be organized within national, institutional, or collection-specific frameworks. The prospect of a future in medieval studies shaped by diverse participation in large-scale knowledge production across boundaries is compelling, but it is important to recognize that data co-creation and mutualization—as a methodological framework and in practice—pose significant challenges to equitable participation in the field. Since infrastructure may inadvertently re-inscribe the very exclusion that collaborative scholarship hopes to overcome, the mutualization of infrastructures for collaborative work cannot only consist in the pooling, or indexing, of data, but needs to strive for a more radical transformation of disciplinary cooperation. Rather than celebrating scale for its own sake, we call for models of cooperation that render visible the interpretive and technical labour sustaining them, and for societies and journals in medieval and pre-modern studies to champion innovative forms of shared, cross-disciplinary work. Ultimately, we conclude that medieval studies should consider collaboration in our fields more seriously as an opportunity to create better, more sustainable research.

We would be remiss to conclude a book that featured medieval Latin bibles without also pointing toward the possibility and potential of future research concerning the specific genre under study. We believe such computational research has significant potential in studying the textual micro-variance long observed in thirteenth- and fourteenth-century bibles across the thousands of copies and across different communities, the presence and use of fragments of the *Vetus Latina* among the text of Vulgate bibles, as well as spatio-temporal patterns of variability of prologues across the wider corpus as suggested in Chapter 1. As we have claimed at the beginning of this book, a comprehensive history of the Paris bible has yet to be written, but such a history would necessarily encompass a wide range of subjects that computational methods can address: theme and variation in iconographic programmes; textual transmission and variance; detailed analysis of the prologues, and scribal contribution to them beyond the general indexing created by Stegmüller; exploration of marginalia and decoration; computational approaches to quires, codicology and miniaturization; as well as the material conditions of manuscript production and the networks of

circulation that shaped medieval book culture. Following the lead of generations of research in the domain of quantitative codicology, such an account would necessarily foreground the manuscript not only as a carrier of text, but as a crafted and designed object. Our suggestions here for future directions of study for the Paris bible corpus may just have resonance for medievalists working in other genres, languages, and periods. We believe that there are myriad promising directions for manuscript studies to expand to incorporate computational workflows including, but not limited to, complex layout segmentation to study the "cognitive layout" of manuscript design; image-text alignment and visual stylometry; or generative or agent-based approaches that help us model complex textual transmission. More generally, integrating decorative and iconographic analysis with textual study in a computational way could also illuminate the dynamic relationship between image and text, opening pathways to a fuller understanding of manuscripts, including how they were made, used, and transmitted. Such complex research requires not only cross-collection access, but also creativity and cross-disciplinary cooperation.

What is certain is that the digital and computational turns have transformed what counts as evidence, method, and participation in medieval studies. Not all scholars will engage in large-scale data modelling or transcription, yet all are implicated in the shifting infrastructures and epistemologies that shape our field. The expansion of computational approaches demands vigilance: while they offer new precision in tracking textual variance, scribal identity, and material form, they also reconfigure the humanities themselves. Following Tilton, Mimno, and Johnson, we advocate a reflexive and participatory stance that models new forms of interpretative work, but also helps shape the tools, environments, and pedagogies that mediate our research. As technological landscapes shift, we humanists (and medievalists) must be much more involved in critiquing and shaping a research future, insisting that research environments not only reflect our technical needs, but also the humanistic values and scholarly commitments that we hold dear. What is at stake is not only how we study the medieval past, but how we imagine and sustain the humanities to come.

Finally, as a way of concluding this book, we would like to reflect on the collaborative work that made it possible, and to situate it in relation to the questions raised in Chapter 4. Although the research project that gave rise to this book may be considered by the authors' respective institutions as a testament to innovation or a reflection of scholarly values worthy of praise in today's scholarly landscape, it is important to clarify that it did not emerge from an institutional mandate, strategic initiative, or external funding agenda.

Rather, it was driven by the intellectual curiosity, sustained commitment, and collaborative energy of its two co-authors and their occasional collaborators. The work represents, therefore, not the fulfilment of an institutional vision, but the product of a self-directed and self-organized scholarly endeavour. We recognize, however, that such autonomy—while often idealized in academia—is not evenly accessible and would not have been possible without the scholarly freedom that both authors were afforded by their respective institutions. The ability to pursue independent, long-term research outside the constraints of project-based funding cycles is tied to structural privilege: to those with secure academic and professional positions, supportive infrastructures, and the temporal flexibility to engage in exploratory, often interdisciplinary work. When the project started, the independence we enjoyed was possible only because both authors had stable professional positions. Free from the constraints of funding cycles, tenure pressures, or grant deliverables, we were able to take risks and pursue paths that might otherwise have been closed. While this example may match the conditions that the SciSci literature would consider ideal for innovation, in reality, the project's autonomy reflects conditions that are rare, and we acknowledge the broader systemic inequities that would exclude others from participating fully in this mode of scholarship.