

we made, and the rules we devised for making sense of the context, would have to be clear enough for the search system to ‘learn’ and apply. Yet that decision would still need to reflect the term’s changing and indeterminate use in a way that would satisfy historian users of the search system. These tricky and problematic decisions have been built into our system, and we are of course anxious that our users be aware that, thanks to such decisions and to the complexity of the overall task, they need to be critical as they approach the results our system gives. In fact, the system facilitates critical engagement by the ease and speed of making alternative and cross-checking interrogations.

As we trial our ‘beta-version’ with our Advisory Group, we are excited by the possibilities that this system, and that TM and indeed digital humanities tools as a whole, open up. First, our system speeds up searches dramatically, and allows more focused searches than would be possible even with fairly sophisticated Boolean searching. By searching for *Condition*: ‘tuberculosis’, for example, the user gets results where the system has recognised the term as referring to tuberculosis as a condition, rather than finding every instance of the word ‘tuberculosis’ in the text (in phrases like ‘National Tuberculosis Association’, or ‘tuberculosis nurse’). But semantic searching is about much more than convenience. The user can find all instances of a particular entity category: one can, for example, locate all articles published in 1892 where a *Biological Entity* (including non-human animals and microorganisms) is mentioned, and find the frequency with which each *Biological Entity* is mentioned. Combining entity searches and relationship searches enables the user to find instances where one entity is said to cause another: by asking what *Condition* entities are said to *cause* the entity *Sign or Symptom*: ‘swelling’ in the entity *Anatomical*: ‘feet’, the user can find case reports and reviews that discuss which ailments were understood to cause the feet to swell. (By contrast, consider the overwhelming flood of results the searcher would get by searching for the terms ‘feet’ and ‘swelling’.) This capacity is particularly useful for those who want to investigate relatively common, everyday phenomena that would stymie the best intentions of researchers because they are difficult to find in text, too numerous to manage easily, or easily overlooked by the all-too human researchers. We thus expect this tool not only to speed up searching and make it more precise, but also to help us see things that would otherwise be too difficult to see or too easy to miss, or that we might not even have known we were looking for. It will never provide easy and obvious answers to big questions, and it requires that the user know something about how it works. Nevertheless, we hope that as a tool that can facilitate exploration and new ways of encountering existing resources, it will be valuable both as a resource in its own right, and as a means of introducing our colleagues to TM tools and some of the possibilities of digital humanities.

**Elizabeth Toon, Carsten Timmermann and Michael Worboys**  
University of Manchester, UK

doi:10.1017/mdh.2016.19

## Reflections

‘Grand challenges’ abound in every discipline.<sup>1</sup> The grandest challenges are interdisciplinary. They hold the potential to change theory, practice, and the very shape of research,

<sup>1</sup> American Academy of Arts & Sciences, Commission on the Humanities and Social Sciences, *The Heart of the Matter: The Humanities and Social Sciences for a Vibrant, Competitive, and Secure Nation*, available online at [http://www.humanitiescommission.org/\\_pdf/hss\\_report.pdf](http://www.humanitiescommission.org/_pdf/hss_report.pdf) (accessed June 23, 2015).

teaching and service. How best to create, use and understand the methodological, philosophical and practical implications of digitised and born-digital medical historical resources is one of the grandest challenges currently facing nearly every discipline, including history and the subfield of medical history. From archival science to data science, library science to museum studies, publishing to information technology, clearly such work is also the grandest challenge now confronting history-oriented affiliated institutions and organisations that are invested in the work of archiving, preserving and interpreting the past for the benefit of current and future research, education and learning.

Three factors, among many others, will probably influence how future historians of medicine will research, write and interpret the past for each other and for the public: (1) the changing character of historical medical libraries and archives in the expanding digital age, (2) the increasing interdisciplinarity of historical scholarship, and (3) the need to record and expand the historiography of that scholarship. These factors inform my appraisal of the essays that have been published in this two-part series on 'Digitalization, Big Data, and the Medical Humanities' by Chaplin, Ewing *et al.*, and Toon *et al.*<sup>2</sup> They are also intended to motivate strategic thinking and action about the future among individuals, institutions and organisations whose work is focused on the past and also to intimate that there is a pressing need for such work. Now.<sup>3</sup>

### Futures of Historical Medical Archives and Libraries

Scholars, educators and students – and among them growing numbers of practitioners in the digital humanities – increasingly use and expect to have access to larger, better quality and better organised collections of digitised historical medical collections, from printed texts and audio-visual productions to manuscripts and statistical data. As Chaplin rightly suggests, through local, regional, national and international collaborations, historical medical libraries and archives have come a long way to meet this expectation.<sup>4</sup> For these long-standing institutions to survive and thrive in the future, their unique stewardship of medical-cultural heritage – collecting it, cataloguing it, preserving it, curating it, making it accessible, as well as refining collection development and retention policies related to it – must remain collaborative-minded and future-oriented in terms of digitising their collections for the sake of wider access as well as preservation. These institutions stand together – and alongside related heritage organisations – in the face of an overarching present and future that could well overtake them and their stewardship of history.

Present trends can sometimes prompt blind embrace of the virtual world and foolish disregard of the physical one. These trends will not dissipate soon. How specialised historical medical libraries and archives will survive and thrive along this trajectory depends not upon technology alone but also upon their leadership effectively navigating the digital and 'big data' worlds and the corresponding factors of culture, economy, society and politics. How they will survive and thrive will also depend upon their patrons

<sup>2</sup> Simon Chaplin, 'Why Creating a Digital Library for the History of Medicine is Harder than You'd Think', in *Medical History*, 60 (2016), 126–129; E. Thomas Ewing, *et al.*, 'Look Out for "La Grippe": Using Digital Humanities Tools to Interpret Information Dissemination during the Russian Flu, 1889–90', *Medical History*, 60 (2016), 129–31; Elizabeth Toon, *et al.*, 'Text-Mining and the History of Medicine: Big Data, Big Questions?', in *Medical History*, 60 (2016), 294–296.

<sup>3</sup> Jeffrey S. Reznick, 'Embracing the Future as Stewards of the Past: Charting a Course Forward for Historical Medical Libraries and Archives', *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage*, 15, 2 (2014), available online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4332590/> (accessed 24 June 2015).

<sup>4</sup> Chaplin, *op. cit.* (note 2).

who, individually and together, bear the responsibility of engaging directly with these institutions, not as traditional users but as twenty-first century partners in – and advocates for – the creation, production, and curation of high-quality and well-organised digital collections. Chaplin rightly concludes that ‘Building a digital library for the history of medicine may be hard, but then being a librarian has never been easy!’<sup>5</sup> I’ll argue further that doing history may be hard, but then being a historian has never been easy, and both the work and the role of the historian will become even harder as the digital world evolves and expands. It follows, therefore, that the future success of historical medical libraries and archives – and equally the research, teaching and learning that these institutions inform – ultimately depends upon the interdisciplinary collaboration of librarians and historians, and other professionals who are, both broadly yet also each in their integral way, engaged in the business of collecting, preserving and interpreting history.

### Shaping Interdisciplinarity

The interdisciplinary, collaborative research models of Ewing *et al.* and Toon *et al.*<sup>6</sup> are vastly different from the ‘traditional’ models of historical research, writing and publication that have reigned supreme for generations in disciplines of the humanities: the individual researcher on her or his own physical journey through archives and libraries, taking notes, presenting at traditional conferences and publishing in traditional publications. Times have changed – they will continue to change – and arguably the greatest drivers of this change are digitisation, big data and the digital humanities. These drivers are provoking interdisciplinary inquiry and practice, and changing how the discipline of history sees itself and its putative scientificity, and how it interacts with other disciplines traditionally seen as being *in service* to the enterprise of doing history. Opportunity abounds at this intersection, even as many are rightly unsure exactly where this intersection is located or the best means of assessing its results.<sup>7</sup>

Historians of medicine should stand firmly in this intersection by raising their current interdisciplinary initiatives to new levels, by supporting new and innovative initiatives, and by encouraging and expecting professional societies in their meetings and publications to register the relevance and importance of interdisciplinary scholarship, teaching and service projects.

Perhaps sponsorship of this panel and others by the American Association for the History of Medicine (AAHM) signals a change already underway. But much more could be achieved for the greater good now, and for the generations of history-minded professionals to come who will work in a world far richer in data, digitised historical material, and born-digital sources that document life in the twenty-first century. Opportunities abound. The annual meetings of the AAHM and Archivists and Librarians in the History of the Health Sciences (ALHHS) have been co-located for years, but there has been limited, if any, effort to cross-programme the proceedings in ways that mirror the advance of interdisciplinary research generally, and as reflected by the digital humanities in particular. Such cross-programming holds the promise of benefiting the constituencies of both organisations, promoting and supporting greater collaboration, and pushing boundaries of thinking and action in research, teaching and public service in the history of medicine.

<sup>5</sup> Chaplin, *op. cit* (note 2).

<sup>6</sup> Ewing, *et al.*, *op. cit* (note 2) and Toon, *et al.*, *op. cit* (note 2).

<sup>7</sup> Erez Aiden and Jean-Baptiste Michel, *Uncharted: Big Data as a Lens on Human Culture* (New York: Riverhead Books, 2013), see especially 207–8.

With the advent of the digital humanities and ‘big data’ drawn from digitised and born-digital collections alike, digital resource-creators (namely librarians and technical specialists) are increasingly partners, indeed true collaborators, with digital-resource users (namely historians) in their research. Digital-resource creators increasingly have more to say and expertise to offer to digital-resource users, about the principles and practices of their work, and vice versa. The programmes of professional associations should reflect this more pervasive reality, and in turn stop reinforcing traditional roles that reinforce traditional methods and ultimately do little to advance either field. It is often stated that innovative thinking and action takes place most dynamically at the intersection of disciplines. If this true, there is no better time than the present to acknowledge it and embrace it.

### Transforming Historiography?

Equally at the centre of the grandest challenge I described is the need to move beyond merely stating that digitised collections are available and growing, and describing them as such. Producers *and* consumers of digitised historical materials are at the curious critical point – if not in some ways well beyond it – where a critical assessment of the philosophical, methodological and practical *implications* of the use of these sources both in conjunction with, and sometimes in place of, their original counterparts has become necessary. Producers *and* consumers of digitised historical materials must explain more clearly and convincingly – to each other and to interested stakeholders – *how* tools of the digital humanities can open new windows onto medical history and historical interpretation of disease, health and their dimensions in terms of culture, society and economy. Additionally, producers *and* consumers of digitised historical materials need to frame their new efforts historiographically in the constellation of other projects like and unlike them wherever they have emerged, whether in centres for the digital humanities, or where these centres may not (yet) exist, at intersections of history, literature and computer science departments, libraries and archives. The equal challenge at hand, therefore, is not merely to digitise better (and better) large (and larger) portions of the vast analogue record of the human condition, but to do so with an eye to capturing, preserving, and building upon both discipline-specific and interdisciplinary principles, practices and aspirations.

### Concluding Realities

As priorities and innovations relating to ‘big data’ are informing the future of medical research and practice, they are shaping the future of the National Library of Medicine and its service to the nation, indeed to the world.<sup>8</sup> Stewardship of the NLM’s vast historical collections and associated programmes will need to grow and change along this trajectory.<sup>9</sup> The unfolding world of digitised medical historical collections is meeting the long-standing analogue world that we have known and relied upon for generations. But this world is also meeting an expanding world of born-digital material that will be the historical record of tomorrow.

<sup>8</sup> National Institutes of Health, Advisory Committee to the Director, National Library of Medicine (NLM) Working Group. Final Report, available online at <http://acd.od.nih.gov/reports/Report-NLM-06112015-ACD.pdf> (accessed 2 July 2015).

<sup>9</sup> Jeffrey S. Reznick, *Report from the Field: History of Medicine Division of the US National Library of Medicine*, 2 June 2015, available online at <http://blog.historians.org/2015/06/report-field-history-medicine-division-us-national-library-medicine/> (accessed 2 July 2015).

The existence and persistence of this vast and expanding virtual world should prompt more historians to learn about the tools of the digital humanities and partner with technical specialists who know these tools well and how they can (and will) help to capture and make sense of the increasingly digital record of the human condition which will co-exist with the traditional analogue record. Better to try to understand and learn to use these tools today than to wait until tomorrow, when the historical record will be bigger than it has ever been, and close readings of historical texts will be ever more challenging. We should critically embrace the varied tools of the digital humanities as an investment in the future and see it as a collective mission to develop them intentionally rather than haphazardly. Only by doing so can we hope that we will not look back and realise that we missed an opportunity to do history better, or, still better, imagine forward knowing that we strove to prepare future generations to surpass our example.

**Jeffrey S. Reznick**

History of Medicine Division, US National Library of Medicine,  
National Institutes of Health, USA