

SHOW ME THE HISTORY! BIG DATA GOES TO THE MOVIES

Deb Verhoeven

“To have lived so long with time and to find, when one thought one had *all the time in the world*, that time had deserted, disappeared.”

Janet Frame¹

“The apocalypse is not something which is coming. The apocalypse has arrived in major portions of the planet and it’s only because we live within a bubble of incredible privilege and social insulation that we still have the luxury of anticipating the apocalypse.”

Terence McKenna²

ALL THE TIME

Before big data could up anchor and put to sea, before it had unfurled and stretched its sails, the wind was already turning. Hasty verdicts disdaining the utility, merit, influence, and defining features of large-scale data driven studies abruptly deflated the ascent of big data’s hype curve. The preemptory backlash against big data³ has been especially pronounced in the humanities and creative arts⁴ where amplification alarmism⁵ and concerns over historical ethics and methodologies⁶ have prompted calls for extreme caution.

In this context there has been little concerted effort made in the humanities and creative arts to specifically assess how big data might contribute something, anything, to the way we undertake data-driven enquiry. In film studies particularly, the recent availability of very large datasets has the potential to alter the shape and scope of our studies, as well as prompt us to creatively reconsider some of the underlying precepts and practices of our research.

This chapter is based on my work within the Kinomatics Project, a multidisciplinary big data study of film exhibition at an international scale. The project proceeds from the New Cinema History's proposition that cinema is not an isolated set of practices but comprises institutional, social, and commercial networks that are interdependent and which in turn influence and shape our own approach to the field.⁷ So for example, the Kinomatics Project combines its central film exhibition dataset with other data (demographic, social media, technical infrastructure, economic and financial, and climatic data, to name just a few) in order to explore the value of an expanded approach to cinema data, rather than simply focusing on the idea of one big dataset per se. In this sense, the Kinomatics Project demonstrates that it's not how big your data is, it's what you do with it that counts.

Indeed, focusing only on the size of big data can result in missing its most significant features. Given the unprecedented and rapid expansion of data production, this week's big data is almost certainly going to be next week's iota. And this variability applies across different disciplines as well. The Kinomatics Project's big cinema data, for example, is tiny compared to the data used by astronomers, but it stretches capacity within the field of cinema studies. In this sense, big data might be understood as a collection of data that, in any given context, is so large that it is ungraspable and incomputable using conventional approaches to analysis. Big data is data that in some way defies our comprehension and exceeds our capacity to handle it. Instead, new adaptive computational techniques that are designed to operate within indeterminate environments are required. This aspect of big data has epistemic implications (pushing at the edges of what can be known and how we can know it) as well as ontological ones (in its reliance on machine-based analytics rather than human-centered methods).

So given its ontological and epistemological dimensions, it is not

surprising that much of the anxiety around big data is tied up in apocalyptic or originary narratives. The impact of big data in this sense is that it challenges us, through its massive presence, to imagine what in the end we are dealing with and how we are, ourselves, redefined by it. This is big data as both self-effacing and conceiving—an impossible moment of perceptual mastery, production, and knowledge in which multiple contingencies of time are condensed, and time and endings/beginnings are conflated into a totalizing coincidence. This characterization of big data is at the heart of popular arguments that suggest it will lead to the end of theory such that representation and deliberation would be made obsolete by a sheer mass of information.⁸ In the discourse of data hyperabundance, big data gestures at a sort of vanishing point of history, an amniotic abstraction where differences, disparities, and divergences (the conditions of classification) disappear. In this view, big data and its information overload threaten to produce, through sheer incalculable scale, a type of invisibility or indistinguishability, an undifferentiated (zero and) Oneness from which identity, our ‘selves,’ might be mercurially discerned but into which they might equally disappear.

Yet neither the apocalyptic (big data as the end of the world as we know it) nor the originary (big data as a primal scene) are especially helpful frameworks for getting to how we, as *researchers* and even more specifically as film and media historians, can conceptually and practically engage with large-scale databases as part of our research repertoire. How might we better understand and perhaps intervene in the development of emerging data-driven practices? How might we aim for working with digital archives and databases as a form of historical thinking, to reflect, for example, on how the technologies we engage in might also be attributed temporalities, that they do not simply and instrumentally and chronologically follow a preexisting claim for the truth? We might instead take this opportunity to better consider how different computational technologies participate in and respond to chang-

ing definitions of time and history. In amassing and archiving vast amounts of commercial cinema exhibition data that would otherwise be disposed of, scholarly projects such as Kinomatics create new forms of research repository that invite new uses, practices, and questions. These include examining the kinds of change and continuity that are already inscribed temporally within big data and which might contribute to a revised understanding of what we mean when we talk about film history.

And yet, because the Kinomatics Project is perceived by many to be a study of contemporary cinema, it is frequently isolated from the New Cinema History which forms its intellectual framework. More often than not, the work we are undertaking is characterized as being not “prior” enough, our data not sufficiently dated to contribute to matters of history; as if time is a stream that flows forward in one direction, coursing from the headwaters of the past through the present to estuaries of the possible; as if there is some identifiable point in time that segregates the past from the present; as if time is external, an abstract measure that can be applied to our studies and which lays down the syntactic rules for determining scholarly disciplines by progressions of tense.

However, if we understand both our information systems and our disciplines as inherently theoretical and temporary formations/formulations, then we can also consider what theoretical and historical questions they themselves recommend and advance. And then in turn, how our own understandings of (new) cinema history might contribute to a practical reconsideration of emerging digital research techniques. All disciplines are temporal gatherings, bearing ideas about the past and the present, of what was and what is (and usually an implicit sense of what should be): a notion of time, a theory of history. With this in mind we can consider how working with the Kinomatics data practically and theoretically alters the “new,” the “cinema,” and the “history” in what new cinema historians do.

By its very nature working with large datasets challenges the tendency to taper history to a specific temporal horizon or to a belief in chronological succession. By insisting we analyze *at scale*, rather than using proxy datasets as a metonymy for interpretative generalizations, big cinema data brings to light the ways in which multiplicities and complexities of time actively produce film history; in which, for example, the nature of film and the film industry contribute to the production of time; and the ways in which data and the databases that accommodate them also lend themselves to the production of differing dimensions of temporality. In this essay I want to show how film history can be seen emerging from a set of uneven, variable temporalizing processes rather than as a set of sequential points known distinctly as past, present, and future.

This chapter will explore, in the context of the Kinomatics dataset, both how cinema researchers can work with historical data and how cinema researchers can work historically with data. I want to consider how the experience of using big data opens up more nuanced ways of thinking temporally and historically around our digital archives and databases. I want to ask how data-based research collections like Kinomatics might inspire researchers to reflect on the nature of history and how we might deal differently with passing media, passing computational technologies, and also passing ideas about pastness itself (what is it, when is it, who or what gets to exist in it, and who decides?).⁹

IN THE WORLD

To date, digital cinema exhibition and distribution history has been undertaken through a series of initiatives produced “from below.”¹⁰ Without exception the existing datasets that form the empirical basis for digital cinema research have occurred at the national or subnational level. Cinema datasets have been generated for scholarly research projects focused on (and not limited to): London,¹¹ the Netherlands,¹² Ghent,¹³ Antwerp,¹⁴ Australia,¹⁵

Scotland,¹⁶ Italy,¹⁷ and North Carolina.¹⁸ Each of these datasets was developed independently to solve specific research problems and they are not technically or semantically compatible. The prospect of interoperating these data collections remains a tantalizing but near impossible challenge with few options for resourcing an undertaking of this magnitude.

While the proliferation of these digital case studies has produced a great deal of methodological innovation in cinema studies, this disjointed approach has also resulted in a significant deficit in our understanding of the international nature of the cinema. These distributed research collections are not yet capable of addressing the global, elastic, and networked nature of the contemporary international film industry that is itself currently producing and exploiting huge quantities and varieties of data. Companies such as Rentrak and Netflix, for example, are using newly available big data (describing purchasing behaviors, preferences, and social media sentiment) to drive business decisions including production investment and the customization of promotional materials to the level of individual consumers. For the first series of the US television series *House of Cards* (2013–), Netflix created ten different trailers that were circulated according to the specific viewing profiles of subscribers developed through an analysis of consumer preferences. Netflix also analyzes large-scale transactional data to improve playback quality (and understand how changes in the quality of viewing experience affect user behavior) and identify poorly translated subtitles.

The primary source of data for the Kinomatics Project derives from our global showtime database. Data arrives on a weekly basis from a third-party commercial data provider. This data records all screenings of all films for all cinema venues in forty-eight countries around the world. We collect data for formal theatrical distribution only (not, for example, community screenings or viewings in other media). Previously this information would

have been discarded as noise both industrially and within cinema studies. For film historians wanting to examine pre-digital film exhibition and distribution, extant records such as theater log books are highly coveted for their rarity. Instead researchers must typically reconstruct cinema programs from newspaper advertising and other ephemera. Our collection of monumentally detailed screening data is unique in film research to this point, and the Kinomatics showtime database is the only repository of this data in the world. Nevertheless, its accessibility to researchers outside the Kinomatics team is restricted by our legal contract with the commercial data provider. The dataset includes data about:

- * Venues: name, addresses, geographic coordinates, number of screens, sound technology, etc.
- * Movies: title, main actors, genre, running time, director, writer, producer, etc.
- * Showtimes: film, venue, date, time, whether it was part of a film festival

The time period for the Kinomatics showtime database is December 1, 2012 until May 31, 2015. During this thirty-month period, we collected data on just under 97,000 movies playing in over 33,000 venues with a total of 338,660,831 screenings. Although the vast majority of screenings are for first release titles, the screenings recorded in the dataset are not specifically limited to new releases. The data provider obtains information directly from cinema venues mostly through automated electronic means and also email and phone calls. Once we receive the data, it is stored on a Linux server at Deakin University and then organized into a data model with a consistent format and hosted in a relational database (MySQL 5.1.67). (See figure 1 for the database schema).

Although very large, the Kinomatics data is limited in its cleanliness (in that some values are missing in some records), in its evident biases (Western commercial cinema is far better repre-

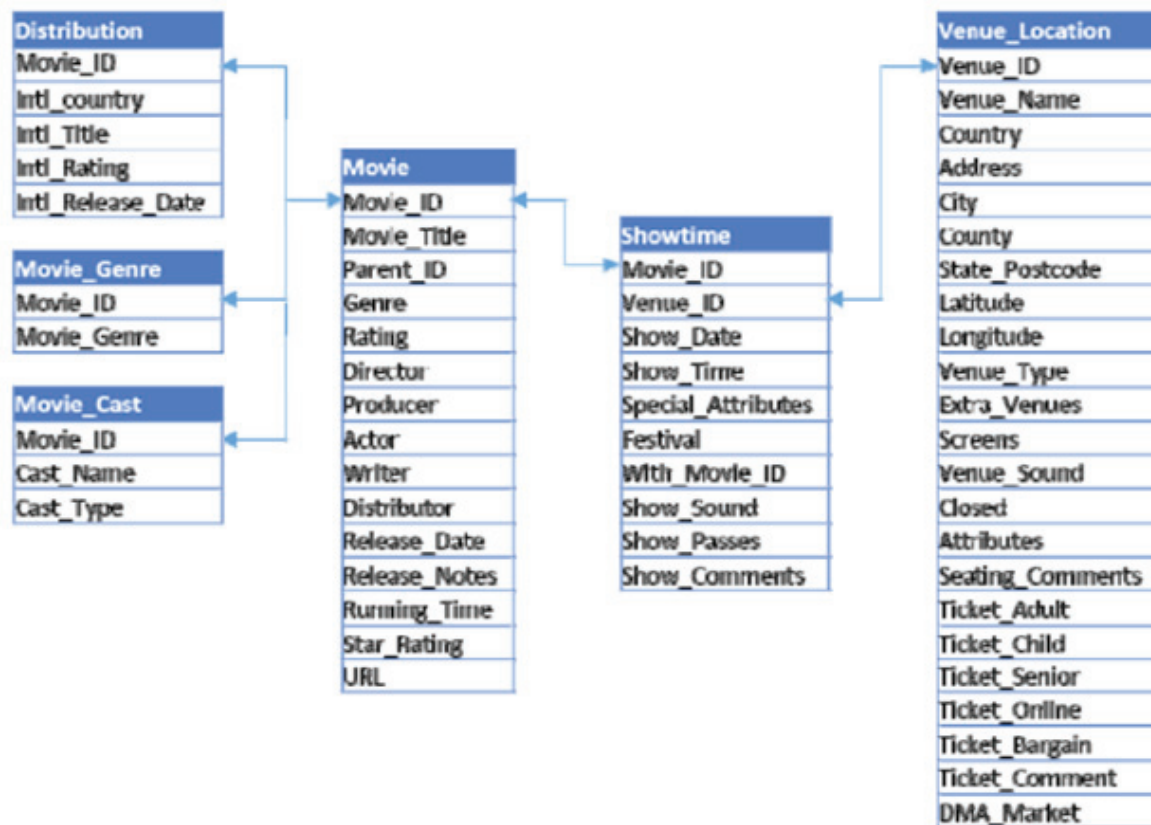


Figure 1. Conceptual Kinomatics database model.

sented), and in its consistency (standards of data collection vary for some countries). Because of the sheer size of the dataset many of these anomalies are not evident until experiments and audits are performed on the dataset (often as visualizations of the data). Indeed, working on the Kinomatics showtime dataset has entailed from the outset, of necessity and in principle, an orientation to iterative and recursive ways of working with data.

This focus on feedback is perhaps most evident in our attempts to think around the restrictions on access to the data that resulted from our commercial data contract. Two projects, the Cinema Cities project¹⁹ and the Film Impact Rating project,²⁰ represent our attempts to make the Kinomatics data accessible in some way, as well as make transparent the algorithmic processes on which so much big data analysis relies. In both these projects the public are invited to engage with the dataset by expressing their own values and preferences using an online tool. In the case of Cinema Cities,

they can ‘weight’ their motivations for cinema venue attendance on a sliding scale, in order to produce a measure of what we call “cinemability.” The combination of these weighted factors produces a ranked list of global cities that conform most closely to their preferences. In the Film Impact Rating project, site visitors can indicate their views on how any given film’s success should be measured against fourteen variables including commercial attributes, critical assessments, and global venue coverage. This results in a ranked list of films based on their own weighting of success factors.²¹

These public preferences are then collected so we, the researchers, can further reflect on our own analytic decisions and choices and make adjustments. In both projects there were clear differences between the values held by the public and those proposed by the Kinomatics project team. In the case of Cinema Cities, ticket pricing was a particularly significant issue for users. For the Film Impact Rating, the public indicated that commentary such as critics’ ratings and IMDb user votes, was most important to them in terms of defining a film’s success. Through these participatory, feedback-focused approaches, we believe it is possible to appreciate within the global a range of diverse perspectives, inheritances, structures, and ownerships of information. In this way too, we hope that temporality emerges relationally and transparently, within a constant process of research engagement rather than the product of the conventionally imposed methods and the sequential categories of film history. This approach would certainly honor the complex temporalities of the data itself.

For the most part, Kinomatics captures data about cinema occasions that haven’t yet occurred, but they may as well have occurred. The weekly arrival of data typically describes screenings from a Friday to Thursday *forthcoming*. However, because play weeks are not consistent around the world, some of the weekly data dump will describe information about screenings held on

days in a previous week. The Kinomatics database counts four types of play weeks: Wednesday–Tuesday, Thursday–Wednesday, Friday–Thursday, and Saturday–Friday (fig. 2). Known erroneous data (for instance, projected showtimes that then did not actually occur) are overwritten and corrected as they come in—so, in some cases, there is a recognized obsolescence built in to the projection of forthcoming showtimes. Kinomatics doesn't keep a copy of these replaced records so at any given time during the collection process the database is a mixture of reported and projected showtimes. Furthermore, the data provider disposes of all data after one month. So anything older than a month exists only in our dataset and nowhere else. In this sense the Kinomatics showtime database might be also considered an archival repository.

The idea of capturing prospective cinema events would seem to fly in the face of typical historical research. Data that casts into the future certainly questions the documentary impulse and truth function of conventional history as well as the claims to legitimacy of so many historical datasets. And yet, because this is the same data would-be cinemagoers see when they Google local showtimes in search of a program to attend, we can assume there is a high level of investment in its accuracy. If the forecast showtimes were incorrect then the cinema businesses issuing them would suffer.

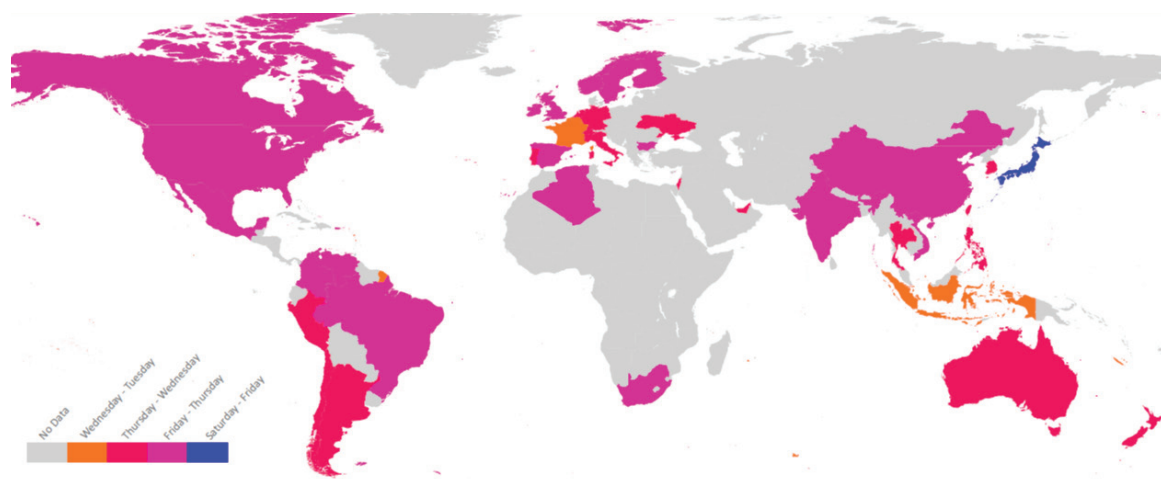


Figure 2. Differences in play weeks for countries in the Kinomatics database.

In Kinomatics, film events are “forth-comings,” embodying and anticipating a particular temporality which also constitutes it as a form of archival history. Every showtime event in the Kinomatics database is made up of many information events which contain pasts, presents, and futures. Here, the lightning of computation is recreated in time’s grasp as cinema data is captured at the level of intention. The projected occasions it describes provide the conditions from which the present and past are creatively assembled, in some contrast to the traditional archive’s presentation of the pastness in the present. Instead, the big data of the Kinomatics showtime dataset is clairvoyant in nature, a leap of faith that reveals the politics and fragility of our capacity to know. This is the emergence of temporality in the context of constant computational processing, or, in other words, data as process, as movement. The cinema, in turn, is figured as a kind of hopeful industriousness—the result of temporal inferences and constantly evolving practices. As Georgina Born suggests, we might look within our data for “distinctive scales, speeds, rhythms, and shapes of change opened up and enacted by cultural objects and events—that through their complex interactions participate in the emergent processes we identify as history.”²² Big cinema data gives us the means to examine more open temporal systems. So, for example, we have proposed a rethinking of the annualization of analysis of the film industry.²³ And the opportunity exists to think beyond geopolitically produced temporalities (holiday seasons and so on) to accommodate other forms of temporal organization in the cinema.

There are other aspects to computational time that fall outside the scope of this brief discussion but can be at least acknowledged. Temporality is both an aspect of the various realities that databases attempt to model and it is also a form of measurement that shapes the data they keep. Many different types of time are captured by databases, and different taxonomies of computational

time (valid-time, transaction-time, user-defined time) will produce different types of demands on database design.²⁴ But even their measurement of time is subject to changeability. Computers and the databases they serve are not somehow above or beyond time. The past is not an outside to be captured and organized by the database or by the researcher. For Timothy Barker, working with databases (small or large) involves engaging in a process that “not only changes the information that it archives but is also generative of a particular type of presentness in which the information is accessed. This is a process that brings together pastness and presentness; a process that does not sit outside or beyond everyday life, but rather a system that is involved in a process *with* everyday life; a system that is necessarily temporal.”²⁵ The way in which time is shaped in a digital repository is dependent on the database’s organizing structures and the computer’s system capabilities rather than the position of events in a linear or chronological sequence.

To begin thinking historically in data-driven research then, we might also consider how database design and file-system management produce temporal perspectives as well. A more historically informed approach to database-driven research might consider (but not be limited to) making provision for:

* **File version management and tracking** that allows researchers to see how files and directory structures have changed and evolved over time. An elaboration of this is to design for Point-in-Time Views of the file system that enable users to “turn back the clock” and see all of their data exactly as it existed at any past point in time. In an ideal world this would also entail full file system audit trails (with SQL-based reporting) that can show every change, deletion, and even access of every file in the system by every user in support of tracking activities. To accommodate historical and as-at reporting, researchers need to design their databases

with a big-data mentality, with an eye to scale and elapsed time in the construction of result sets.

* **Code versions** so that the historical development of a database at the code level is preserved on an open-access platform such as GitHub.

* **Graceful degradation** in which the web interface and functionality of the database is designed in such a way that it can continue to operate and is legible even when viewed with less-than-optimal software.²⁶

CONCLUSION

Cinema archives in the form of databases present history as a complex constellation of narratives that can be searched and browsed and from which temporality emerges.

By enabling us to analyze the film industry at scale, big cultural data collections like Kinomatics bring into view different temporal dimensions, uncertainties, and contingencies. Without a doubt, my own understanding of and ability to evaluate and theorize the temporal processes of film exhibition and distribution has been challenged and changed by Kinomatics' vast network of interconnected events formed from multitemporal information.

In the context of 'big' data then, we might consider the ways that time both exceeds us and yet is not external to our historical enquiries or our selves. Working "historically" with big data should mean that our digital research efforts are as embedded, relational, and enacted as our data itself. Our ethics, methods, and theories of history should be transparent in our tools and in the way we account for their temporalities. And we must also account for the temporalities of the researcher herself, how our own personal perspectives, positions, and productions are shaped by time's grip, the way the rhythms of academic life are woven into our work, the sheer duration required to labor over large data, for example, or how patience, impulsiveness, urgency, exasperation, and for-

bearance all play a role in bringing our research to a terminus, however transitory.

The point, as a new ‘big’ cinema historian however, is not to bind time to our experience of it, but rather to acknowledge the ways in which our digital technologies can also iteratively open up our thinking, expectations, and encounters with time. We must endeavor to understand how we, as cinema researchers, how the technologies we work with, the film industries we study, all distribute time differently. But the work of the new ‘big’ cinema historian is not simply to accrue and authenticate diversities of time across the global, cultural, social, organizational, and biographical dimensions of our studies. The New Cinema History itself needs to recognize the coexistence of multilateral temporalities that are scaled unevenly between expansion (being with time) *and* contraction (being without time).

By working with large-scale digital archives like Kinomatics, we can recognize and critically reflect on how both our conventional disciplinary and technical standards have acted temporally to regulate and chronologically direct our data toward the idea of a more capacious (better informed) future. In developing new digital formats for historical research that are specifically designed to realize the temporal potential and creativity of data relations, we can now contemplate the scalability of time itself and not just our data. We can wonder what it is to simultaneously hold and be held, more or less by time; and likewise, by more or less time.

* I would like to acknowledge the efforts of the Kinomatics research team and the assistance of Kevin Whitesides, Mark Pesce, and James Verhoeven in the preparation of this chapter.

ENDNOTES

1 Janet Frame, *In the Memorial Room* (Melbourne: text publishing, 2013), 108 (emphasis in original).

2 “Imagination in the Light of Nature (Terence McKenna),” YouTube video, 1:37:13, from a presentation at the Earth Trust Benefit, October 2nd, 1992, posted by “Deus Ex Mckenna ~ Terence Mckenna Archive,” July 9, 2011, <https://youtu.be/IERPnScenBM?t=8m14s>.

3 “The *Economist* Explains: The Backlash against Big Data,” *Economist*, last modified April 20, 2014, accessed March 12, 2016, <http://www.economist.com/blogs/economist-explains/2014/04/economist-explains-10>.

4 Stephen Marche, “Literature Is Not Data: Against Digital Humanities,” *Los Angeles Review of Books*, last modified October 28, 2012, accessed March 12, 2016, <https://lareviewofbooks.org/essay/literature-is-not-data-against-digital-humanities>.

5 See danah boyd and Kate Crawford, “Critical Questions for Big Data: Provocations for a Cultural, Technological, and Scholarly Phenomenon,” *Information, Communication & Society* 15, no. 5 (2012): 662–79; and Anne Burdick et al., *Digital Humanities* (Cambridge: MIT Press, 2012).

6 See Tim Hitchcock, “Academic history writing and the headache of ‘Big Data’,” *Historyonics*, last modified January 30, 2012, accessed March 12, 2016, <http://historyonics.blogspot.com/2012/01/academic-history-writing-and-headache.html>; and Frederick W. Gibbs and Trevor J. Owens, “Hermeneutics of Data and Historical Writing,” in *Writing History in the Digital Age*, ed. Jack Dougherty and Kristen Nawrotzki (Ann Arbor: University of Michigan Press/Digital Culture Books (Online), 2013), <http://writinghistory.trincoll.edu/data/gibbs-owens-2012-spring/>.

7 Richard Maltby, “New Cinema Histories,” in *Explorations in New Cinema History: Approaches and Case Studies*, ed. Richard Maltby, Daniel Biltereyst, Philippe Meers (Oxford: Wiley-Blackwell, 2011), 3–40; Deb Verhoeven, “New Cinema History and the Computational Turn,” in *WCCA 2012: “Beyond Art, Beyond Humanities, Beyond Technology: A New Creativity,”* ed. Claudio da Rocha Brito, et al. (Guimarães: COPEC-Science and Education Research Council, 2012); and Richard Maltby, Dylan Walker, and Mike Walsh, “Digital Methods in New Cinema History” in *Advancing Digital Humanities: Research, Methods, Theories*, ed. Paul Arthur and Katherine Bode (Hampshire: Palgrave Macmillan, 2014), 95.

8 Chris Anderson, “The End of Theory: The Data Deluge Makes the Scientific Method Obsolete,” *Wired*, last modified June 23, 2008, accessed

March 12, 2016, <http://www.wired.com/2008/06/pb-theory/>.

9 Questions inspired by Carolyn Dinshaw's contemplation of the present in Dinshaw, *How Soon Is Now? Medieval Texts, Amateur Readers, and the Queerness of Time* (Durham: Duke University Press, 2012), 7.

10 Maltby, "New Cinema Histories."

11 Ian Christie, *The London Project*, accessed March 12, 2016, <http://londonfilm.bbk.ac.uk/>.

12 Karel Dibbets, *Film in The Netherlands from 1896*, accessed March 12, 2016, <http://www.cinemacontext.nl/>.

13 Daniel Biltereyst and Lies Van de Vijver, *Gent Kinemastad*, accessed March 12, 2016, <http://www.cims.ugent.be/research/past-research-projects/gent-kinemastad>.

14 Luc Pauwels, *Visual and Digital Cultures Research Centre (ViDi)*, accessed March 12, 2016, <https://www.uantwerpen.be/en/rg/vidi/projects-and-publica/projects/>.

15 Richard Maltby et al., *Australian Cinemas Map*, accessed March 12, 2016, <http://auscinemas.flinders.edu.au/>; Deb Verhoeven, Colin Arrowsmith, and Alwyn Davidson, *Cinema and Audiences Research Project*, accessed March 12, 2016, <http://caarp.edu.au/>.

16 Gordon Barr and Gary Painter, *Scottish Cinemas and Theatres Project: Scottish Cinemas Database*, accessed March 12, 2016, <http://www.scottishcinemas.org.uk/database.html>.

17 Daniela Treveri Gennari, et al., *Italian Cinema Audiences*, accessed March 12, 2016, <http://italiancinemaaudiences.org/>.

18 Robert C. Allen, *Going to the Show: Mapping Moviegoing in North Carolina*, accessed March 12, 2016, <http://docsouth.unc.edu/gtts/>.

19 Deb Verhoeven, Colin Arrowsmith, Bronwyn Coate, and Alwyn Davidson, *Cinema Cities Index*, accessed March 12, 2016, <http://cinemacities.com/>.

20 Deb Verhoeven, Colin Arrowsmith, Bronwyn Coate, and Alwyn Davidson, *Film Impact Ratings*, accessed March 12, 2016, <http://www.reelmeasures.com/>.

21 See Deb Verhoeven, Alwyn Davidson, and Bronwyn Coate, "Australian films at large: expanding the evidence about Australian cinema performance," *Studies in Australasian Cinema* 9, no.1 (2015): 7–20.

- 22 Georgina Born, "Making Time: Temporality, History and the Cultural Object," *New Literary History* 46, no. 3 (Summer 2015): 381.
- 23 Alwyn Davidson and Deb Verhoeven, "Bad Hobbits Die Hard: How to make a better Top 10 movie list," *The Conversation*, last modified December 10, 2014, accessed March 12, 2016, <https://theconversation.com/bad-hobbits-die-hard-how-to-make-a-better-top-10-movie-list-35247>.
- 24 Abdullah Uz Tansel, "Temporality in Databases," in *Advances in Information Systems*, ed. Tatyana Yakhno (Berlin: Springer-Verlag Berlin Heidelberg, 2004), 1.
- 25 Timothy Scott Barker, *Interfaces: Studies in Visual Culture: Time and the Digital: Connecting Technology, Aesthetics and a Process Philosophy of Time* (Lebanon: University Press of New England, 2012), 162.
- 26 Peter-Paul Koch, *Fluid Thinking*, accessed March 12, 2016, http://www.digital-web.com/articles/fluid_thinking/.

BIBLIOGRAPHY

- Allen, Robert C. *Going to the Show: Mapping Moviegoing in North Carolina*. Accessed March 12, 2016. <http://docsouth.unc.edu/gtts/>.
- Anderson, Chris. "The End of Theory: The Data Deluge Makes the Scientific Method Obsolete," *Wired*. Last modified June 23, 2008. Accessed March 12, 2016. <http://www.wired.com/2008/06/pb-theory/>.
- Barker, Timothy Scott. *Interfaces: Studies in Visual Culture: Time and the Digital: Connecting Technology, Aesthetics and a Process Philosophy of Time*. Lebanon: University Press of New England, 2012.
- Barr, Gordon and Gary Painter. *Scottish Cinemas and Theatres Project: Scottish Cinemas Database*. Accessed March 12, 2016. <http://www.scottishcinemas.org.uk/database.html>.
- Bilteyst, Daniel and Lies Van de Vijver. *Gent Kinemastad*. Accessed March 12, 2016. <http://www.cims.ugent.be/research/past-research-projects/gent-kinemastad>.
- Born, Georgina. "Making Time: Temporality, History and the Cultural Object." *New Literary History* 46, no. 3 (Summer 2015): 361–86.
- boyd, danah and Kate Crawford. "Critical Questions for Big Data: Provocations for a Cultural, Technological, and Scholarly Phenomenon." *Information, Communication & Society* 15, no. 5 (2012): 662–79.

- Burdick, Anne, Johanna Drucker, Peter Lunenfeld, Todd Samuel Presner, and Jeffrey T. Schnapp. *Digital Humanities*. Cambridge: MIT Press, 2012.
- Christie, Ian. *The London Project*. Accessed March 12, 2016. <http://london-film.bbk.ac.uk/>.
- Davidson, Alwyn and Deb Verhoeven. "Bad Hobbits Die Hard: How to Make a Better Top 10 Movie List." *The Conversation*. Last modified December 10, 2014. Accessed March 12, 2016. <https://theconversation.com/bad-hobbits-die-hard-how-to-make-a-better-top-10-movie-list-35247>.
- Dibbets, Karel. *Film in The Netherlands from 1896*. Accessed March 12, 2016. <http://www.cinemacontext.nl/>.
- Dinshaw, Carolyn. *How Soon Is Now? Medieval Texts, Amateur Readers, and the Queerness of Time*. Durham: Duke University Press, 2012.
- Frame, Janet. *In the Memorial Room*. Melbourne: text publishing, 2013.
- Gibbs, Frederick W. and Trevor J. Owens. "Hermeneutics of Data and Historical Writing." In *Writing History in the Digital Age*, edited by Jack Dougherty and Kristen Nawrotzki. Ann Arbor: University of Michigan Press/Digital Culture Books (Online), 2013. <http://writing-history.trincoll.edu/data/gibbs-owens-2012-spring/>.
- Hitchcock, Tim. "Academic History Writing and the Headache of 'Big Data.'" *Historyonics*. Last modified January 30, 2012. Accessed March 12, 2016. <http://historyonics.blogspot.com/2012/01/academic-history-writing-and-headache.html>.
- "Imagination in the Light of Nature (Terence McKenna)." YouTube video, 1:37:13, from a presentation at the Earth Trust Benefit, October 2nd, 1992. Posted by "Deus Ex Mckenna ~ Terence Mckenna Archive." July 9, 2011. <https://youtu.be/IERPnScenBM?t=8m14s>.
- Koch, Peter-Paul. *Fluid Thinking*. Accessed March 12, 2016. http://www.digital-web.com/articles/fluid_thinking/.
- Maltby, Richard, Dylan Walker, and Mike Walsh. "Digital Methods in New Cinema History." In *Advancing Digital Humanities: Research, Methods, Theories*, edited by Paul Arthur and Katherine Bode, 95–112. Hampshire: Palgrave Macmillan, 2014.
- Maltby, Richard, et al. *Australian Cinemas Map*. Accessed March 12, 2016.

- <http://auscinemas.flinders.edu.au/>
- Maltby, Richard. "New Cinema Histories." In *Explorations in New Cinema History: Approaches and Case Studies*, edited by Richard Maltby, Daniel Biltereyst, Philippe Meers, 3–40. Oxford: Wiley-Blackwell, 2011.
- Pauwels, Luc. *Visual and Digital Cultures Research Centre (ViDi)*. Accessed March 12, 2016. <https://www.uantwerpen.be/en/rg/vidi/projects-and-publica/projects/>.
- Tansel, Abdullah Uz. "Temporality in Databases." In *Advances in Information Systems*, edited by Tatyana Yakhno, 1–3. Berlin: Springer-Verlag Berlin Heidelberg, 2004.
- "The *Economist* Explains: The Backlash against Big Data." *Economist*. Last modified April 20, 2014. Accessed March 12, 2016. <http://www.economist.com/blogs/economist-explains/2014/04/economist-explains-10>.
- Treveri Gennari, Daniela, et al. *Italian Cinema Audiences*. Accessed March 12, 2016, <http://italiancinemaaudiences.org/>.
- Verhoeven, Deb. "New Cinema History and the Computational Turn." In *WCCA 2012: "Beyond Art, Beyond Humanities, Beyond Technology: A New Creativity"*, edited by Claudio da Rocha Brito, Melany M. Ciampi, Luis Amaral, and Rosa Vasconcelos. Guimarães: COPEC-Science and Education Research Council, 2012.
- Verhoeven, Deb, Alwyn Davidson, and Bronwyn Coate, "Australian Films at Large: Expanding the Evidence about Australian Cinema Performance." *Studies in Australasian Cinema* 9, no.1 (2015): 7–20.
- Verhoeven, Deb, Colin Arrowsmith, and Alwyn Davidson. *Cinema and Audiences Research Project*. Accessed March 12, 2016. <http://caarp.edu.au/>.
- Verhoeven, Deb, Colin Arrowsmith, Bronwyn Coate, and Alwyn Davidson. *Cinema Cities Index*. Accessed March 12, 2016. <http://cinemacities.com/>.
- . *Film Impact Ratings*. Accessed March 12, 2016. <http://www.reelmeasures.com/>.