

# The Routledge Companion to Digital Humanities and Art History



Edited by Kathryn Brown

# THE ROUTLEDGE COMPANION TO DIGITAL HUMANITIES AND ART HISTORY

*The Routledge Companion to Digital Humanities and Art History* offers a broad survey of cutting-edge intersections between digital technologies and the study of art history, museum practices, and cultural heritage.

The volume focuses not only on new computational tools that have been developed for the study of artworks and their histories but also debates the disciplinary opportunities and challenges that have emerged in response to the use of digital resources and methodologies. Chapters cover a wide range of technical and conceptual themes that define the current state of the field and outline strategies for future development. This book offers a timely perspective on transdisciplinary developments that are reshaping art historical research, conservation, and teaching.

This book will be of interest to scholars in art history, historical theory, method and historiography, and research methods in education.

**Kathryn Brown** is a lecturer in art history and visual culture at Loughborough University, UK.



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*Edited by Kathryn Brown*

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# CONTENTS

<i>List of Figures</i>	<i>ix</i>
<i>List of Tables</i>	<i>xiv</i>
<i>List of Contributors</i>	<i>xv</i>
 Introduction <i>Kathryn Brown</i>	 1
 <b>PART I</b> <b>Histories and Critical Debates</b>	  7
1 Digital Methods and the Historiography of Art <i>Paul B. Jaskot</i>	9
2 Blind Spot: Information Visualization and Art History <i>Johanna Drucker</i>	18
3 The Digital Transformation of Art History <i>Harald Klinke</i>	32
4 Feminist Digital Art History <i>Kathryn Brown and Elspeth Mitchell</i>	43
5 Slow Digital Art History and <i>KUbism</i> : Or, Situation Awareness and the Promise of Open-World Games <i>Koenraad Brosens, Bruno Cardoso, and Fred Truyen</i>	58

**PART II**

**Archives, Networks, and Maps 71**

- 6 Tangled Metaphors: Network Thinking and Network Analysis in the History of Art 73  
*Matthew D. Lincoln*
- 7 Digital Humanities for a Spatial, Global, and Social History of Art 88  
*Béatrice Joyeux-Prunel*
- 8 Mapping Paintings, or How to Breathe Life Into Provenance 109  
*Jodi Cranston*
- 9 Qualitative Approaches to Network Analysis in Art History: Research on Contemporary Artists' Networks 120  
*Sanja Sekelj*
- 10 *Mapping Senúfo*: Mapping as a Method to Transcend Colonial Assumptions 135  
*Susan Elizabeth Gagliardi*
- 11 X-Reception: Re-mediating Trans- Feminist and Queer Performance Art 155  
*T.L. Cowan*
- 12 Digital Methods and the Study of the Art Market 167  
*Pamela Fletcher and Anne Helmreich*
- 13 Noise Management in the Archival Ecosystem: Debating Principles for Classification 178  
*Anna Dot and Pablo Santa Olalla*

**PART III**

**Museums: Real, Virtual, and Augmented 189**

- 14 Digital Imaging Projects for Asian Art and Visual Culture: Transcultural Mediations and Collaborations 191  
*Katherine R. Tsiang*
- 15 A Field Guide to Digital Surrogates: Evaluating and Contextualizing a Rapidly Changing Resource 203  
*Emma Stanford*

16	A Service–Orientation and Open–Source Approach to Developing Virtual Museums <i>Martin White and Ben Jackson</i>	215
17	Art History, Heritage Games, and Virtual Reality <i>Erik Champion and Anna Foka</i>	238
18	Art With a Lifespan: Digital Technologies and the Preservation of BioArt <i>Christl Baur</i>	254
19	The Expanding Role of Digitized Collections: The Medici Archive <i>Alessio Assonitis</i>	266
20	Digital Languages for Art History: Audience Engagement, Virtual and Augmented Reality <i>Stefania De Vincentis and Luca Nicolò Vascón</i>	275
<b>PART IV</b>		
	<b>Computational Techniques for Analyzing Artworks</b>	<b>287</b>
21	Curation, Content, Creation: Computer Approaches to the Fine Arts <i>Javier de la Rosa and Juan-Luis Suárez</i>	289
22	Computerized Analysis of Paintings <i>James Z. Wang, Baris Kandemir, and Jia Li</i>	299
23	Digital 3D Modeling for the History of Art <i>Amy Jeffs</i>	313
24	Metadata, Material Culture, and Global Art History <i>Robert Wellington</i>	326
25	Image Processing and Computer Vision in the Field of Art History <i>Nuria Rodríguez-Ortega</i>	338
26	Pointers and Proxies: Thoughts on the Computational Modeling of the Phenomenal World <i>Alison Langmead and David Newbury</i>	358
27	Approaching Aby Warburg and Digital Art History: Thinking Through Images <i>Amanda Du Preez</i>	374



28	Analyzing Gesture in Digital Art History <i>Leonardo Impett</i>	386
29	Digital Techniques for the Study of Portuguese <i>Azulejos</i> (Glazed Tiles): Between Alice's White Rabbit and the Mad Tea Party <i>Rosário Salema de Carvalho, Rafaela Xavier, and Inês Leitão</i>	408
<b>PART V</b>		
	<b>Digital Resources, Publication, and Education</b>	<b>421</b>
30	The Database of Modern Exhibitions (DoME): European Paintings and Drawings 1905–1915 <i>Christina Bartosch, Nirmalie Mulloli, Daniel Burckhardt, Marei Döhring, Walid Ahmad, and Raphael Rosenberg</i>	423
31	The Art–Historical Catalogue in the Digital Era <i>Anne Collins Goodyear</i>	435
32	Digital Provenance, Open Access, and Data–Driven Art History <i>Anne Luther</i>	448
33	Research, Process, Publication, and Pedagogy: Reconstructing the World's Columbian Exposition of 1893 <i>Lisa M. Snyder</i>	459
34	Social Media in the Art History Classroom <i>Lauren Jimerson and Allison Leigh</i>	480
	<i>Index</i>	495

# FIGURES

2.1	William Playfair, 1821. <i>Letter on our agricultural distresses, their causes and remedies; accompanied with tables and copperplate charts shewing and comparing the prices of wheat, bread, and labour from 1565 to 1821</i>	24
2.2	W.E.B. DuBois and Thomas Calloway, graphics for the Exposition Universelle, Paris, 1900	26
5.1	The world of <i>KUbism</i> , (left) scenario for user testing and (right) <i>KUbism</i> blocks side by side: (a) the “question” block used to ask questions and verify answers; (b) two columns of vertically aligned Entity Blocks, the left column contains a block for each Place and the right column a block for each Actor; (c) Entity Block held by the player’s avatar; (d) another Entity Block; (e) Union Block; (f) Intersection Block; (g) Difference Block; (h) Entity Exploration Block; (i) Relation Exploration Block; and (j) the player avatar’s empty hand	62
5.2	The seven challenges of the authors’ task-based user study, along with an efficient path to a solution, in terms of number of steps	64
6.1	Alfred H. Barr, Jr., “Diagram of Stylistic Evolution from 1830 until 1935,” in <i>Cubism and Abstract Art</i> (1936), reprint (New York: Museum of Modern Art, 1966)	75
6.2	Stanisław Karłowski, “A Graph of Influences on Peter Paul Rubens,” in Juliusz A. Chrościcki and Vladimir P. Odinec, “On Directed Graph Models on Influences in Art Theory,” <i>Artibus et Historiae</i> 2, no. 3 (January, 1981), fig. 19	77
7.1	Première Biennale de la Méditerranée—Alexandria, 26 July 1955–15 September 1955. Birthplaces and addresses of exhibitors	91
7.2	Distribution of Amedeo Modigliani’s exhibitions from 1951 to 1960	92
7.3	The diffusion of Amedeo Modigliani’s work in individual and collective exhibitions over time (1920–1960)	93
7.4	The internationalization of Futurism (1909–1914)	95
7.5	Screenshot of a request result on the Artl@s Exhibition Catalogue Database	97
7.6	Some data taken from the Catalogue of the Kassel documenta, 1955	98

## Figures

7.7	Birth places and residences of the 114 painters exhibiting at documenta 1, Kassel, 1955	100
7.8	What quantities? Left (a): point map; Right (b): a quantitative map. GEOMAP screenshots	101
7.9	Two unpublished maps created by Julien Cavero with data gathered by Béatrice Joyeux-Prunel	103
8.1	Itinerary points for Titian's <i>Europa</i>	111
8.2	Provenance map for Titian's <i>Europa</i>	112
8.3	Locations of Titian's pastoral paintings in 1650	116
9.1	Organizational and collaborative structure of the SCCA-Zagreb Annual Exhibitions, 1993–1998	124
9.2	Visualization of cohesive groups of members of the SCCA-Network, 1993–1998	125
9.3	Institutional collaboration of the WHW curatorial collective between 2000 and 2006	129
9.4	Collaborative network of the WHW curatorial collective, 2000–2006	130
10.1	Sketch of the country of the Siéna or Senufo	136
10.2	<i>The Times</i> map of the tribes, peoples, and nations of modern Africa. Cartography by John Bartholomew & Son Ltd. London, 1972	139
10.3	Unrecorded maker(s). Drum in a style identified as Senufo, by 1957. Wood, hide, and applied color, 122.9 × 49.2 cm	140
10.4	Screenshot of the Art Institute of Chicago's "About This Artwork" page for a drum in its collection (ARTIC 1990.137), captured March 11, 2019	141
10.5	Screenshot of the Art Institute of Chicago's "About This Artwork" page for a bronze figure in its collection (ARTIC 1967.688), captured March 11, 2019	142
10.6	Man Ray [Emmanuel Radnitzky], Untitled, 1933/34. Gelatin silver print, 11.2 × 8.1 cm, private collection	145
10.7	Wooden staff labeled as "Papara. Diulla [Jula] in area of Furre [probably Fourou, Mali]." Ink drawing on paper possibly by Reinhard Hugerhoff, 12.7 × 16.8 cm	147
10.8	Names of makers recorded on 344 catalogue cards for objects identified as Senufo in the collection of the Musée Africain de Lyon in early March 2016	148
10.9	Names of people who acquired objects in the field recorded on 344 catalog cards for objects identified as Senufo in the collection of the Musée Africain de Lyon in early March 2016	149
14.1	Historical photograph of Tianlongshan Cave 18, north wall	196
14.2	Recent photograph of Tianlongshan Cave 18, north wall	197
15.1	The "Reading Establishment" of William Henry Fox Talbot and Nicolaas Henneman, where the prints for <i>The Pencil of Nature</i> were produced	204
15.2	Two facsimiles of Bodleian Library MS. Bodl. 264, fol. 2v. Left: a 2007 scan of a c. 1970 35mm slide. Right: a 2013 photo captured on a 40-megapixel digital camera	206
16.1	Original desktop interface for browsing the RCH collection	217
16.2	X3D integrated into the Virtual Museum	218
16.3	Santa Chiara Chancel Chapel with view of the virtual museum interactive to the bottom front left	219

## Figures

16.4	Santa Chiara responsive mobile first design exploiting the 3D reconstruction in X3D	219
16.5	API calls for accessing CO media and metadata for RCH	222
16.6	The Santa Chiara API Guide	223
16.7	MVC design pattern	226
16.8	MVC architecture for the Santa Chiara Virtual Museum	227
16.9	Example mobile response view of Santa Chiara VM created with the API	228
17.1	Sensorama by Morton Heilig	240
17.2	The Virtual Reality environment and avatar in 2D, digitizing ancient dance 2016, Humlab	241
17.3	“Artournament.”	245
17.4	“Panic in the Gallery.” Visitor in Room Quiz (Rococo)	246
18.1	Gina Czarnecki, <i>Heirloom</i>	256
18.2	Guy Ben-Ary, <i>cellF</i>	257
18.3	Gilberto Esparza, <i>Plantas Autofotosintéticas</i>	260
20.1	An example of various light scenes on Tintoretto’s <i>Crucifixion</i> in the Scuola Grande di San Rocco	280
20.2	Building the gigapixel image, equirectangular in the background and 100% detail in the front	282
20.3	An example of animated graphic contents the guide can show on connected devices	283
22.1	Different types of brushstrokes from classic Chinese ink paintings extracted from the paintings and used to compare the styles of different artists. The patches are from color ink paintings by Zhang Daqian (1899–1983), with color information not used in the analysis	303
22.2	Dominant colors used by an artist revealed through a statistical computing method: <i>A Sunday Afternoon on the Island of La Grande Jatte</i> (and a portion enlarged) by Georges Seurat (1884–1886); <i>Water Lilies</i> by Claude Monet (1919); and <i>The Fighting Temeraire</i> (and a portion enlarged) by J.M.W. Turner (1838)	305
22.3	Brushstrokes automatically extracted from <i>Red Cabbages and Onions</i> by Vincent van Gogh (1887)	306
23.1	From high-density point-cloud to finished model. A late medieval pilgrim souvenir associated with the shrine of St. Thomas Becket. London, British Museum, 2001,0702.1	315
23.2	Carving of Herod and Herodias, c. 1420–30. Digital replica of decorative element in the cloister of Norwich Cathedral	318
24.1	<i>Felicitas Domus Augustae</i> [The Joy of the Royal House], c. 1700, silver medal, 75 mm (diameter)	327
24.2	<i>Felicitas Domus Augustae</i> [The Joy of the Royal House], c. 1700, silver medal, reverse side, 75 mm (diameter)	328
25.1	Similar content across different styles and contexts in Jan Brueghel’s image repository	339
25.2	Vladimir Muhvich. Proyecto Engrama Oficial del Campo del Arte Uruguayo II, Montevideo, Uruguay 2015	341
25.3	Scatter plot of S from 1300 CE to 2400 CE. An increase in the average and the variance of S is observed	342

25.4	Distinguishing among different artistic styles with the complexity–entropy plane	345
25.5	Set of sixteen images grouped by the visual appearance “Vertical irregular textured” in Miquel Planas’s photograph collection	349
25.6	Left: Segmentation of Picasso’s drawing L47R (Album 7) using an intelligent system of edge detection. Right: eye-detected and manually colored basic graphic units in Picasso’s Album 7 drawings	350
28.1	Warburg’s (1905) five initial case studies for the <i>Pathosformel</i> of Orpheus	389
28.2	Extrinsic (dotted line) and intrinsic (solid line) measurements of body angles	390
28.3	Principal component analysis on the poses of the Atlas’ panel 46, capturing strongest morphological feature of the panel: the Nymph	392
28.4	Variances in the joint angles on the Atlas data set. Note that the standard deviation of the upper body is about twice that of the lower body	393
28.5	Four of the sixteen gestural clusters, plotted on the Bilderatlas map	395
28.6	Details from Baxandall’s examples for the four stages of the Annunciation, 1440–60: Disquiet (Filippo Lippi, San Lorenzo, Florence); Reflection (Fra Carnevale, National Gallery, Washington); Inquiry (Alesso Baldovinetti, Uffizi, Florence); Submission (Fra Angelico, Museo di San Marco, Florence)	396
28.7	t-SNE maps of the poses of Mary (left) and Gabriel (right)	397
28.8	Detail of a “direct visualization” of our t-SNE gesture–map, showing a detail of arm–raised Gabriels	398
28.9	Different figures are shown on the same map by altering transparency	399
28.10	Individual clusters of gestures annotated by hand	400
28.11	The Markov-like gesture network made up of nodes (representing individual poses) and weighted edges (whose weight represents the distance between poses)	401
28.12	An example route through the temporal pose-network, showing optical flow between two randomly selected poses (the start and end node)	401
28.13	Hand detection (along with body limbs and face points) with OpenPose (Cao et al., 2018). Details of <i>Adoration of the Shepherds</i> , Bartolomeo Caporali, 1477–79, Galleria Nazionale dell’Umbria, Perugia (top); <i>Apostles from the Life of Mary</i> , Baldassare Peruzzi, 1504–06, Sant’Onofrio al Gianicolo, Rome (bottom)	403
29.1	Lisbon Underground, Cais do Sodré station	409
29.2	Sintra National Palace, Magpies’ Room	415
29.3	Digital surrogates (simulating the cuerda seca technique and flat) of the Mudejar tile pattern n. P-15–16–00033, with two centers and its multiplications	416
30.1	A: Schematic depicting the three-stage pipeline employed for automated data entry. B: An example of a scanned catalogue page. C: (1) Processed scan sent to the Google CloudVision API, which returns a text extract; (2) Multiclass text classification model predicts whether or not each line meets the criteria of “complete,” “person,” “title,” and “other”; (3) Multiclass predictions used by a rules engine to extract database-compatible information fields	426
30.2	DoME’s relational data model	427
30.3	Scatter plot in DoME showing the number of page views in Wikipedia (y-axis) and the number of exhibition participations (x-axis) for all artists registered in DoME. This graph is an attempt to measure the differences	

## *Figures*

	in the popularity of artists in the early twentieth century and today.	
	Chart created with highcharts.com	430
32.1	Visualization of the collection of the Centre Pompidou, Paris, according to year of acquisition/nationality	454
33.1	The Administration Building at Chicago's World's Columbian Exposition of 1893	460
33.2	The Court of Honor in the WCE reconstruction model	461
33.3	The 2009 reconstruction of Wooded Island	466
33.4	The Transportation Building (reconstructed in 2012)	468
33.5	Top: 2011 reconstruction of the Street of Cairo. Bottom: efforts in 2014 to reconstruct Old Vienna	469
33.6	NEH-funded VSim interface supports both the creation of linear arguments in 3D space and annotations that can link to primary and secondary resources	472
34.1	Twitter post from September 1, 2016	483
34.2	Twitter post from April 2, 2014	484
34.3	Twitter post from March 19, 2014	485
34.4	Instagram post from July 19, 2016	488
34.5	Instagram post from April 24, 2017	489
34.6	Instagram post from November 10, 2017	490
34.7	Instagram post from September 9, 2017	491

# TABLE

16.1	Example MVC code structure for Santa Chiara	229
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# INTRODUCTION

*Kathryn Brown*

In 2015, Lev Manovich argued that “To ‘see’ contemporary culture requires use of computers and data science.” Importantly, however, he added that while “seeing enabled by data science may be radical in terms of its scale—how much you can see in one ‘glance,’ so to speak—it continues the humanities’ traditional methodology.”<sup>1</sup> The latter approach involves, at the very least, the comparison and detailed analysis of cultural artifacts, periods, authors, genres, themes, and techniques. Manovich’s comments capture an idea that runs throughout the present volume, namely, that research techniques drawn from the digital humanities and from art history are related to each other and can be deployed in mutually illuminating ways. They both entail acts of seeing and are equally dependent on the quality of research question that motivates the relevant analysis. To that extent, human vision and computer vision are not so far apart. While some scholars have worried that the rise of computational analytical techniques, reliance on big data, and use of quantitative research methods entail the “subordination” of art history to computer technologies, the following chapters show how the latest initiatives in digital humanities research relate to and develop key themes that are central to histories and theories of art.<sup>2</sup> Equally, if computational methods offer the possibility of examining and visualizing data in new ways, art history’s ability to interrogate the very act of looking brings an important perspective to this exercise and to our understanding of the role of the researcher within it.

The present volume offers a broad survey of intersections between digital humanities and the study of art history. Authors focus not only on new technological tools that have been developed for the study of artworks and their histories but also debate the disciplinary opportunities and challenges that have developed in response to the emergence and use of those tools. Chapters cover a wide range of technical and conceptual themes that define the current state of the field and outline strategies for future development. Contributors debate the extent to which the use of computational methods can reshape conceptions of the art-historical canon and open new branches of research. Equally, however, they explore some of the gaps that have emerged within this branch of study and consider various conceptual biases to which it has fallen prey. The points at which “computer-assisted” and “traditional” methods of analysis come apart are as important for disciplinary self-reflection as is the study of their congruence. As scholars continue to debate the advantages and limitations of integrating computational methods into humanities disciplines, this volume offers a timely perspective on transdisciplinary developments that are reshaping art-historical research, conservation, and teaching.

“Digital art history” has emerged and gathered impetus over the past two decades and is now a familiar part of the research landscape. This has led to debate about whether the field is a sub-branch of art history, a revolution of the discipline, or just a distraction from art history’s core concerns and subject matter. In 2013 Johanna Drucker drew what has become a classic distinction between “digitized art history” (“one built on the use of online resources”) and “digital art history” (“the use of analytic techniques enabled by computational technology”). The latter, she argues, is “the proper domain of *digital* art history” on the grounds that it can “reveal features of art historical artifacts in novel ways,” “extend traditional methods of observation and analysis,” and yield “different points of inquiry.”<sup>3</sup>

Although the term “digital art history” has become familiar, the decision has been made to title the present volume *Digital Humanities and Art History*. This has not been done with the aim of suggesting the existence of yet another discrete genre within this field. Nor does it seek to challenge the notion of “digital art history.” Rather it signals an intention to probe what the term “digital humanities” means in the context of art-historical research and to examine how scholars have taken up and adapted techniques from the digital humanities for the purpose of generating new analytical tools for the study of visual art. Understanding the connection between the digital humanities and art history is key to conceptualizing “digital art history.” As Jorge Sebastián Lozano has noted, “the technical possibilities of computing have not progressed at the same pace for each field,” and art history has, in many cases, taken up concepts and approaches familiar from literary studies.<sup>4</sup> Questions concerning what art historians have found useful from other disciplines and how their needs and approaches differ from other branches of humanities scholarship are discussed throughout this book.

Chapters problematize the use and impact of digital techniques, identify gaps in the management and analysis of data, and debate the ethics of various initiatives that have emerged from the digital humanities. This includes problematizing reliance on biased archival or canonical material, examining the persistence of unequal access to resources needed to undertake digital humanities projects, and revealing legacies of gender and racial prejudice in technological research and development.<sup>5</sup> Studying the emergence of new epistemological models in the digital humanities helps to stimulate questions about the ambitions of art history itself, including critical reflection on the assumptions that underpinned the emergence of this field of study.

It is also important to point out that the present volume extends beyond narrow conceptions of “art history.” Chapters showcase ways in which the use of computer technologies can stimulate new approaches to a broad set of topics ranging from the analysis of artifacts and expressive styles from contrasting geographies and time periods to themes relating to provenance, the art market, social history, heritage, museum studies, and art historiography. For reasons of space, it has not been possible to cover the full range of innovative projects that are currently being undertaken by scholars in this fast-paced field, but the breadth of examples is representative of recent developments and provides an overview of major methodological approaches and techniques. An attempt has also been made to include a range of different voices and perspectives in the volume. In consequence, contributions have been made by researchers in various branches of art history and visual culture, computer science, digital media studies and informatics, mathematics, engineering, design, software development, heritage, information services, pedagogy, museology, curating, and fine art.

The book is divided into five parts: (I) Histories and Critical Debates; (II) Archives, Networks, and Maps; (III) Museums: Real, Virtual, and Augmented; (IV) Computational Techniques for Analyzing Artworks; and (V) Digital Resources, Publication, and Education. Part I surveys a range of important debates that have shaped the intersection of art history with digital methods of analysis. These include the ways in which art historians manage and analyze data, visualize

information, and reflect on their own positions as researchers. Authors are sensitive not only to the ways in which technology is transforming the discipline of art history but also to productive ways in which such innovations connect to existing methodologies and approaches.

Part II explores some of the cornerstones of digital humanities research—archives, networks, and maps—and considers a range of practical and ethical issues that arise in the production and use of such digital tools.<sup>6</sup> Understanding how to manage quantitative and qualitative data and thinking through the implications of different mapping techniques are central to re-evaluating and, in some cases, rewriting familiar art-historical narratives. Chapters in this part of the book examine how the use of technology can bring to public attention works that have been omitted from museum collections, present hitherto underrepresented histories, and stimulate the study of new connections between artists, dealers, and the circulation of art objects. Rather than focusing solely on the answers that digital technologies can provide, chapters debate the new range of questions that such technologies can stimulate. This includes, for example, consideration of the ethical issues that arise when digitizing and making public materials that have been created by, and experienced in, small groups and communities.

Part III turns to ways in which new technologies are impacting on museum experience and curatorial strategies. As museums develop their content through techniques of augmented or virtual reality and encourage visitors to navigate collections with the help of mobile devices, the experience of art has undergone radical change. Chapters show that museums can no longer be understood as single “sites” but rather as visual, discursive, and virtual environments supported by a range of digital platforms. In particular, the intersection between digital resources and gaming offers a new kind of art experience that has the potential to engage a broader public. While digitization and online materials have the advantage of broadening access to collections, they necessarily have repercussions for the status of the art object. Against this background, authors debate potential shortcomings of computer technologies for understanding and analyzing issues of complex cultural heritage. Chapters reflect critically on the creation and use of digital surrogates and the limitations of experiencing artifacts in virtual or augmented reality. While new technologies have ushered in important mechanisms for the preservation of endangered or lost artifacts, it is also necessary to inquire into the aesthetic, cultural, and ontological consequences of replacing unique objects with digital replicas.<sup>7</sup> Many parts of the discussion are, therefore, embedded in wider critical debates that motivate the dynamic field of digital heritage and museum studies.

Part IV contains practical guidance for readers interested in using or developing computer techniques for analyzing artworks. While each part of the book combines “state of the field” chapters with discussion of specific projects and, in many cases, examples of the code used to create the relevant program, chapters in this section are specifically concerned with the use and implementation of computational tools, including the mapping of surface structures, 3D and other types of modeling, the use of metadata, image processing, and computer vision. Here—and throughout the volume—theoretical discussion is combined with practical advice and the inclusion of open-source material. Where case studies are used, contributors explain the broader significance of the relevant example, discuss the lessons learned from it, and illustrate ways in which it can impact on, or stimulate the creation of, new projects. Chapters contain, therefore, methodological guidance ranging from how to use and maximize the potential of particular technologies to the identification of pitfalls when implementing such approaches.

It is noteworthy that nearly a third of the chapters in this volume (particularly those focused on the production of new computational methods and databases) are co-authored, and that many other contributions build on and extend work undertaken by research groups. Located at the intersection of the humanities and the sciences, the use of digital methodologies in art

history has the potential to reshape the social nature of research and to introduce or strengthen collaborative working models and knowledge exchange. By including “how-to” guides, models, and samples of open-source software, it is hoped that this book will stimulate wider conversations, encourage teamwork across disciplines, and help to produce scholars who are capable of taking up and extending the latest analytical and technological methods of investigation.

Over the past decade, computational technologies have transformed not only research in art history but also pedagogical approaches to the discipline. As technology has become an integral part of daily life, so too it shapes students’ expectations about the delivery of course content, use of analytical tools, and participation in systems of communication within scholarly environments. Building on important work in this area, I considered it important to include a section that examines ways in which museum professionals and university scholars are disseminating their research, integrating technology into educational programs, and transforming students’ learning experiences.<sup>8</sup> Aspects of this discussion relate to the use of social media, the publication of open access materials, and the creation of methods of connectivity capable of stimulating innovative analytical approaches to new and established fields of study.

By giving rise to mapping and analytical tools that are capable of bringing underrepresented artistic networks and career trajectories to light or by visualizing material at a level inaccessible to human sight, computational methodologies promise to disrupt familiar histories and methods of analysis. Indeed, “disruption” is often a term that is used in a positive sense in discussions about the promise of interaction between digital and traditional humanities.<sup>9</sup> Yet digital methods are, themselves, subject to disruption and are rarely—if ever—completely “clean” or orderly. As many contributors to the present volume note, the development and use of computational tools have been shaped by the untidiness of history and the vagaries of human character: They are subject to accident, glitches, noise, and mismatches between software and hardware. Machinery itself is vulnerable to environmental hazard. As Paul Dourish and Genevieve Bell argued in 2011, “the practice of any technology in the world is never quite as simple, straightforward, or idealized as it is imagined to be. [ . . . ] Mess is always nearby.”<sup>10</sup> For Dourish and Bell, “mess” relates not only to the relationship between technology and daily life but also to the contestation of “technological realities.”<sup>11</sup> Against this background, the digitally informed methodologies discussed in this volume are—like histories of art—rooted in, and subject to, the unpredictability of human life. The ambition of this book is to examine patterns of mutual support and disruption that emerge as we navigate the productive messiness that underpins the intersection of digital humanities and art history.

## Notes

1. Lev Manovich, “Data Science and Digital Art History,” *DAH-Journal* no. 1 (2015), 14–35 (33).
2. On the “subordination” of art history to digital methods, see Claire Bishop, “Against Digital Art History,” *Humanities Futures*, Franklin Humanities Institute, accessed November 28, 2019, <https://humanitiesfutures.org/papers/digital-art-history/>: “subordinating art history [ . . . ] to computational analysis” is a method that “perpetuates uncritical assumptions about the intrinsic value of statistics.” For a discussion of art history driven by the exponential growth in amounts of data (including images and visualization), see Maximilian Schich, “Figuring Out Art History,” *DAH-Journal* no. 2 (2016), accessed November 29, 2019, <https://doi.org/10.11588/dah.2016.2.24761>.
3. Johanna Drucker, “Is There a Digital Art History,” *Visual Resources: An International Journal of Documentation* 29, no. 1–2 (2013): 5–13 (7 and 8), doi:10.1080/01973762.2013.761106.
4. Jorge Sebastián Lozano, “Digital Art History at the Crossroads,” in *Critical Approaches to Digital Art History*, eds. Angela Dressen and Lia Markey, *kunsttexte.de* 4 (2017): 1–14 (2). On the adoption of techniques from literary studies, consider, for example, the impact of Franco Moretti’s, *Distant Reading* (London: Verso, 2015). See also Pamela Fletcher’s discussion of this and other issues affecting the

- emergence of digital art history in “Reflections on Digital Art History,” *caa.reviews*, June 18, 2015, [www.caareviews.org/reviews/2726#.XbbCtjP7SV4](http://www.caareviews.org/reviews/2726#.XbbCtjP7SV4).
5. See, for example, Roopika Risam, “Decolonizing the Digital Humanities in Theory and Practice,” 2018. English Faculty Publications, Salem State University, 7, accessed November 28, 2019, [https://digitalcommons.salemstate.edu/english\\_facpub/7](https://digitalcommons.salemstate.edu/english_facpub/7).
  6. In 2011, Elijah Meeks identified the “pillars” of digital humanities as text analysis, spatial analysis, and network analysis, then adding the potential of a fourth—image analysis. “More Networks in the Humanities or Did Books Have DNA?” *Digital Humanities Specialist* (blog), Stanford University, December 6, 2011, <https://dhs.stanford.edu/visualization/more-networks/>. See also Pamela Fletcher’s discussion of this point in “Reflections on Digital Art History”; Miriam Kienle, “Between Nodes and Edges: Possibilities and Limits of Network Analysis in Art History,” *Artl@s Bulletin* 6, no. 3 (2017): 4–22.
  7. For a recent discussion of this, see Carolyn Korsmeyer, *Things: In Touch With the Past* (Oxford: Oxford University Press, 2019), 150–59.
  8. For previous work in this area, see *Digital Art History: A Subject in Transition*, eds. Anna Bentkowska-Kafel, Trish Cashen, and Hazel Gardiner (Bristol and Portland, OR: Intellect, 2005); Kelly Donahue-Wallace, Laetitia La Follette, and Andrea Pappas, *Teaching Art History With New Technologies: Reflections and Case Studies* (Newcastle: Cambridge Scholars Publishing, 2008). For more recent work, see Roger C. Schonfeld and Matthew P. Long, *Supporting the Changing Research Practices of Art Historians* (Ithaca S + R, 2014), <https://doi.org/10.18665/sr.22833>; Diane M. Zorich, “Transitioning to a Digital World: Art History, Its Research Centers, and Digital Scholarship,” A Report to the Samuel H. Kress Foundation and the Roy Rosenzweig Center for History and New Media, George Mason University (May 2012), [www.kressfoundation.org/uploadedFiles/Sponsored\\_Research/Research/Zorich\\_TransitioningDigitalWorld.pdf](http://www.kressfoundation.org/uploadedFiles/Sponsored_Research/Research/Zorich_TransitioningDigitalWorld.pdf); Stephen Bury, Ralph Baylow, Samantha Deutch, Sumita Duncan, Julie Ludwig, Ellen Prokop, and Louisa Wood Ruby, *Art History in Digital Dimensions*, Digital Art History Lab, Frick Art Reference Library, Symposium Funded by the Getty Foundation and the Samuel H. Kress Foundation (February 2017), accessed November 28, 2019, <http://dah-dimensions.org/report/>.
  9. See, for example, Janneke Adema and Gary Hall, “Posthumanities: The Dark Side of ‘The Dark Side of the Digital,’” *The Journal of Electronic Publishing* 19, no. 2 (Fall 2016), <http://dx.doi.org/10.3998/3336451.0019.201>.
  10. Paul Dourish and Genevieve Bell, *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing* (Cambridge, MA: MIT Press, 2011), 4–5.
  11. *Ibid.*, 4.

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## PART I

# Histories and Critical Debates



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# 1

## DIGITAL METHODS AND THE HISTORIOGRAPHY OF ART

*Paul B. Jaskot*

Art history is almost by definition a field that rests on “big data.” Traditional methods of training as well as interpretation—such as iconographic analysis—have required scholars to accumulate vast amounts of knowledge about visual tropes, for example. We are long familiar with thinking typologically as well as encyclopedically about forms, functions, and artists. In a word, art history has been digital art history seemingly without knowing it for some time. Yet still, digital methodologies clearly bring new challenges to the field. This chapter introduces the reader to the relationship between digital methods and art historiography. It will locate debates in the digital humanities within the debates of art history itself, to see how the one field illuminates the areas of study in the other. It will raise such questions as what is the relationship between digital methods and canonical art historiographic subjects of study? How are digital methods a critical new intervention in the theory and practice of art history? Which art-historical methodological approaches are best suited to digital epistemologies? And what is different (if anything) between digital art history and its predecessors? By focusing on these issues, I will argue for a need to concern ourselves with a more critical digital art-historical practice that is integrated with (and interrogates) long-standing art-historical subjects and interests.

But why this look backwards to historiography when the very notion of the digital seems to speak solely to the brave new world of the future? As Hubertus Kohle has recently argued, the digital humanities promises radical new results, modes of analysis, and publication. At the same time, it may very well not change the interest in fundamental human questions in the process, questions that, after all, are profound and at the core of the human experience.<sup>1</sup> If this is so, it is worthwhile to lay out those human questions and concerns at the same time that we outline the strengths and weaknesses of computational methods. In what follows, I will try to do just that. On the one hand, this chapter is concerned with the “big interests” of art history, as they can be seen in important historiographical developments over the past century. On the other, it is equally invested in the “big approaches” of computational methods that cross many different digital applications. It is only by exploring the conjuncture and divergence of these two diverse streams of thought that we can understand where that critical potential may lie.

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While art history famously claims to be one of the most interdisciplinary of disciplines, it has certain borders and specific areas of interest that define its methodologies and subjects. Some of

these are obvious: Think, for instance, of Erwin Panofsky's iconographic approach to particular complex images from early modern Europe such as Albrecht Dürer's oeuvre.<sup>2</sup> It is unlikely that anyone but an art historian would delve so deeply into the history of the form and subject matter to analyze its significance and meaning. On the other hand, other art-historical questions seem to be less clearly a matter solely of a single discipline, such as whether a set of stylistic patterns may be part of a specific cultural geography that can be defined as "German" art.<sup>3</sup> Aside from particular methodological debates in the field and trends in subjects of study, there are nevertheless some larger patterns in art-historical interests that have crossed almost all periods and times.

First, art historians are interested in typologies. Classification of groups and types is foundational to art history, as it is to many disciplines. Notably, the question of a group style and specific artistic genres were seen as crucial points as the field initially developed its subject of study in the late nineteenth and early twentieth centuries. Heinrich Wölfflin's interest in identifiable chronological and culturally specific styles is the most obvious place to start. For Wölfflin, looking at vast numbers of examples of early modern European art required the analytical ability to characterize them effectively through categories like "Renaissance" and "Baroque" or "Italian" versus "German."<sup>4</sup> While Wölfflin's samples were by today's standards small and often relied on easily accessible museums near where he taught (such as the Alte Pinakothek in Munich), his range of visual knowledge was nevertheless impressive for the period and complemented by relatively new modes of presentation such as side by side photographic comparisons. He was joined in this attempt to characterize art by others such as Alois Riegl, who, in a quite different approach, developed a distinctive analysis of Dutch portraiture. He, too, thought that artworks could be described in more collective terms through gesture and composition in order to analyze the dynamic relationship between artwork and audience, for example.<sup>5</sup>

Such early art-historical typologies have since been roundly criticized as too hermetic, emphasizing a narrow canon that pretends to be universal in its claim as a stable notion of "art history," among other points of critique.<sup>6</sup> While important, these criticisms often glide over the point that the very subject of art history needed to be defined in this early period, however faulty that initial work proved to be. Since then, though, typological thinking has also been used effectively and critically to relate artworks to social systems by, for example, Richard Krautheimer, in his studies of the formal and ideological influence of early Christian church plans on later European building.<sup>7</sup> In digital humanities, scholars have emphasized the importance of developing typologies to establish entirely new areas of knowledge, especially from marginalized groups, as a form of what Kim Gallon calls the "technology of recovery."<sup>8</sup> The power of typological thinking is, of course, its ability to characterize a field by organizing its subject; that method can be as dangerous in forming an unyielding canon as it can be critical in blasting open a set range of problems by introducing entirely new categories of evidence. In this regard, typological thinking is as much a part of the foundations of a field as it is of its latest (digital) critique.

Second, art historians are also interested in visual form, not only in individual works but at scale. Early attempts by Roger Fry, for example, to define a Post-Impressionist style can be put in this category as well as the centuries-long practice of connoisseurship in the study and analysis of Chinese art.<sup>9</sup> In either case, close looking and characterization of form is coupled with the categorization of visual patterns. What constitutes "style" in a visual sense was countered by other art historians who began to think of style in more social terms, as in the work of Meyer Schapiro in his fundamental essay "Style."<sup>10</sup> Formal critique at the scale of a definition of "style" can often be as theoretical as it is based on visual evidence, as in the case of Rosalind Krauss's argument for sculpture in the "expanded field."<sup>11</sup> As with close reading in literature, formalist art historians in the post-1968 world have faced criticism that visual analysis for its own sake is

ahistorical and ultimately subjective. More recently in the digital era, we can speak of Franco Moretti's concept of distant reading as a critique of the limitations of analysis that fetishizes the close exploration of form, among other criteria.<sup>12</sup> Such recent debates indicate that the question of the scale of evidence at the basis of the analysis is an important point of consensus or disagreement when one considers the validity of an argument driven by visual evidence.

Third, art historians are interested in subject matter. Since Panofsky, the study of the significance of iconography has weighed heavily on art historians who focus on painting, sculpture, print, and photography, among other media. Panofsky's influential theory and method of iconographic analysis emphasized understanding the subject matter chosen within the history of that subject matter's depiction.<sup>13</sup> The result of this method means that the art historian must have as thorough a knowledge of other depictions of the same subject as she does of the object under investigation. As with other foundational approaches, the limitations of iconography have been well noted by subsequent generations, even while the importance of understanding the broader patterns in the content and context of subject matter choices have extended into important works in diverse areas such as the study of Chinese painting, feminist art history, and the ideological critique of art.<sup>14</sup> For all of these approaches, art historians concern themselves with locating the significant meaning of a work of art by placing it in dialogue with dozens if not hundreds of others.

And finally, art historians are interested in the social world in which art functions. From the initial biographical approach of Giorgio Vasari in the sixteenth century to the emphasis on social class and art in the works of Frederick Antal or Arnold Hauser, the place of an artwork in time has been an important criterion for many art historians across a diverse theoretical spectrum. In these cases, emphasis on the social requires an art historian to research vast areas of human history and experience covering ever more terrain at both the micro level of the work and the artist and at the macro level of the social system. While systemic questions have been especially of interest to Marxist art historians like Schapiro and Hauser,<sup>15</sup> specific social research extended in the post–World War II era to the broader field of art history through institutional studies of the global spread of national art academies, interest in artists beyond the white male canon, and a more diverse geography of art.<sup>16</sup> Art historians have also been critical of this work, particularly on the question of the role of mediation between the meaning of a work and its social context, as in the famous critique of Hauser by Ernst Gombrich.<sup>17</sup> These criticisms, though, have not dampened the continued interest of a wide array of art historians across the discipline in seeing the most crucial question in art history as how artworks and artists interact with social environments and systems. Such an interest has also been taken up in digital analysis as well.

This excursus on (mostly) old white men of art history helps us to see key patterns and trends in the discipline that are well known and established. I have intentionally emphasized the two eras of the first decades of the twentieth century and the post–World War II moment in order to draw out the point that these subject areas carry over in art history beyond specific methodological trajectories or periods. Not surprisingly, scholars today of diverse theoretical positions continue to be concerned with these areas. Of course, these are not the only fields of art-historical interest, but they are ones that cut through more than a century of historiography; in addition, they are also interests that depend methodologically on what constitutes “big data” in art history. These issues intersect with evidence—visual, social, or otherwise—at scale, unlike much of the theoretically driven art history that focuses on questions of representation. In this sense, they are the ones that can be most closely associated with the work of the digital humanities, and they are the trends that can engage most productively with digital methods.

As with the historiography, not all digital methods are equally well suited to art-historical questions and current debates. The relationship between the two intellectual fields is strategic

and selective, not transparent. There are, though, at least three dominant areas in which the two clearly and productively intersect

First, digital methods favor large scalable questions that require big data. While there are few art-historical data sets that constitute “big data” in the typical digital humanities sense, the issue of evidence at scale and how to analyze it is obviously important to all four areas of art-historical inquiry just described.<sup>18</sup> In particular, the potential for mobilizing computational strategies to analyze thousands or even millions of images addresses historiographic concerns at the foundation of the field as well as its most recent interests. Being able to extend our data sets infinitely certainly brings us back to the issue of characterization and typology. It also shows potential, as Lev Manovich has shown, in analyzing form in new ways.<sup>19</sup> The sheer number of sources and images available in the last decade because of digitization in and of itself offers a real challenge to our analyses that is quickly becoming the norm.<sup>20</sup> The rapid expansion of art-historical evidence, while daunting in terms of our current methodological strategies and the overall *lack* of integration of computational methods across the discipline, also holds great promise for critical scholarship. For example, the ability to use new computational methods to analyze large bodies of visual evidence from cultures without extensive print traditions or, complementarily, the ability to highlight through sheer number the contributions of art-historical actors of marginalized class, ethnicity, or gender status allow for new challenges to an all-too market-driven choice of subject matter standard in the field.<sup>21</sup>

Second, digital methods deal with networks. Few issues have been as important to many of the categories of art-historical interest than the relationship between artists, artworks, and artistic movements. Such an interest has only increased with the growth of art-historical scholarship over the last century. This comes not only from scholars invested in formal issues or the social embeddedness of art, but also those who question such visually or historically driven research in favor of more theoretically inclined work influenced by epistemologies of representation. In the latter category, the question of affiliations, relationships, conceptual or personal connections, or the status of one body of work among many all still hinge on some concept of a network.<sup>22</sup> Of course, digital methods favor the former much more than the latter, and they have already shown rich potential in analyzing market systems or social relationships.<sup>23</sup> The complexity of the historical evidence as well as the ability to structure that evidence for computational analysis greatly favor these kinds of questions. In this regard, again, it is a matter of which parts of art-historical debate are most suited to developing computational approaches in the humanities.

Finally, digital methods allow for a more complex spatial analysis. The fundamental importance of spatial analysis to art history—from, for example, the physical object in space to the spread of vast artistic networks over diverse geographies—makes this aspect of the discipline in many ways the most productive point of intersection with digital methods.<sup>24</sup> Spatial computational methods can both examine large-scale spatial data but also have a morphological power to visualize this data analytically, such as in the early digital example of “Mapping Gothic France.”<sup>25</sup> As indicated in the sources cited previously, these new digital methods extend questions that have been addressed in other ways in the historiography, especially questions of typological patterns over space and time or the movement of objects and artists through different cultural and social geographies. The deep art-historical interest in spatial questions (especially typological, formal, and social) intersects with the equally rich explosion of computational modes of spatial analysis. Rapid developments in Geographic Information Systems (GIS), 3D modeling, photogrammetry, and other digital approaches to space make this a particularly important area for the intersection of art-historical concerns and computational methods now and into the future.<sup>26</sup>

In laying out broad areas of interest in the art historiography as well as intellectual fields in digital analysis, we have seen how there are important overlaps especially in regards to art-historical evidence at scale. In stepping back from the mutual areas of interest, however, there are two opposing and equally problematic ways of thinking about the rapid rise in digital methods in relation to art-historiographical interests: on the one hand, the tyranny of the object; on the other, the dominance of the system. For example, a “big data” project might include all the possible data that could be gathered about a single work of art. Such a project could require hundreds of hours, large teams, and of course vast amounts of financial support.<sup>27</sup> As a result, this approach has the potential to limit our ability economically and institutionally to expand our inquiry into other areas of art-historical concern that may or may not be as relevant to a particular object. It could, therefore, favor iconography at the expense of the social. In contrast, “big data” also could favor a broad, systemic approach to millions of art-historical data points.<sup>28</sup> This result could easily limit an understanding of the particularity of an artist or artwork and reduce individual histories to pure abstraction.

And yet, more productively, if we focus on the database as the actual element that mediates between the computational method and the art-historical subject, we can also conceive of a more critical potential of such an intersection of interests, especially when large art-historical data sets come into play. The database used to structure this evidence can be conceived more dialectically than the impossible opposition of tyranny and domination just discussed. A database ontologically maintains the individual status of the evidence—artwork, artist, iconography, or any other category one wishes—within an environment that is structured for digital analysis. Such a method thus allows for both an individual and systemic approach to art-historical questions. In this sense, the database has the great potential to open up another debate in a difficult but important art-historical question: How do we connect the (singular) work of art to its social (systemic) significance? The database helps us think about that mediation in entirely novel ways even while it allows for the visualization of the relationship between the individual element and the “big data” of a system as absolutely the center of its concern. This takes us into some of the most critical questions of art history, especially those raised by the social history of art. The social history of art is an historiographic area that in particular has much to gain from a developing art-historical interest in computational methods.

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As the last point makes clear, I am arguing that digital methods intersect with the field of art history in particular ways. As with any approach, it is better suited to answering some questions more than others, taking on some subjects at the expense of others, and promoting particular intellectual areas of the discipline. The important issue is thus which art-historical question is of greatest concern to the scholar. The digital response to some questions may be deeply positivist and reactionary, as many of our critics assume. At the same time, it can respond to others by, for example, opening up completely new areas of the field for critical analysis that have been overlooked by market-driven canons.

We may thus be at a very new beginning, or rather returning to a new foundational moment.<sup>29</sup> In some sense, we need to go back to such fundamental work by scholars such as Wölfflin to rethink what the very core substance of our field is, and constituting that through new methods and approaches. This will of necessity be partial and require the collaborative work of many art historians. It will result in incomplete analyses, promissory notes that await ever larger data sets and more appropriate computational methods. And yet, if we want change in the field to contribute to a broad social function of scholarship—which is after all the goal



of a critical digital humanities—we have the potential through these means radically to reorient historiographic debates, make visible what has been rendered invisible, and address art–historical questions of true significance to an analysis of individuals and systems. Still, dialectically speaking it must be noted that such a power can also be used to ossify the most canonical and narrow of subjects and interests with a massive concentration of social, institutional, and financial resources. As with any intellectual and political debate, it is up to us to explore what computational methods are capable of and for which art–historical and social interests. By doing so, we may identify their critical potential to disrupt the discipline’s all-too-frequent subservience to a dominant culture.

## Acknowledgment

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## Notes

1. Hubertus Kohle, “Die Geisteswissenschaften und das Digitale: Ein Quantensprung oder *business as usual*?” in *#DigiCampus: Digitale Forschung und Lehre in den Geisteswissenschaften*, ed. Harald Klinke (Munich: Open Publishing LMU, 2018), 17.
2. Erwin Panofsky, *The Life and Art of Albrecht Dürer* (Princeton: Princeton University Press, 1955). In an elegant recent play off Panofsky’s method and a novel new analysis, see also Mitchell B. Merback, *Perfection’s Therapy: An Essay on Albrecht Dürer’s Melancholia I* (Brooklyn: Zone Books, 2017).
3. Thomas DaCosta Kaufmann, *Toward a Geography of Art* (Chicago: University of Chicago Press, 2004).
4. Developed most famously in Heinrich Wölfflin, *Principles of Art History: The Problem of the Development of Style in Early Modern Art (Hundredth Anniversary Edition)*, trans. Jonathan Blower (Los Angeles: Getty Publications, 2015). For a thorough and critical recent evaluation of Wölfflin and his influence in the broader art–historical context, see Evonne Levy, *Baroque and the Political Language of Formalism (1845–1945): Bruckhardt, Wölfflin, Gurlitt, Brinckmann, Sedlmayr* (Basel: Schwabe Verlag, 2015).
5. Alois Riegl, *The Group Portraiture of Holland*, trans. Evelyn Kain (Los Angeles: Getty Publications, 1999). See also Wolfgang Kemp’s excellent introduction to this translation.
6. The epistemological limits of typologies have been most effectively criticized by Michel Foucault as in *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Books, 1970); see, especially, the chapter on classification. Poststructuralist art historians have pointed to this and other work to condemn typological methods that inevitably result in canon formations, which exclude specific discursive and representational strategies and interpretations. See broadly on this point, Michael Anne Holly, *Past Looking: Historical Imagination and the Rhetoric of the Image* (Ithaca, NY: Cornell University Press, 1996).
7. Richard Krautheimer, “The Carolingian Revival of Early Christian Architecture,” *Art Bulletin* 24 (1942): 1–38.
8. Kim Gallon, “Making a Case for the Black Digital Humanities,” in *Debates in the Digital Humanities 2016*, eds. Matthew K. Gold and Lauren F. Klein (Minneapolis: University of Minnesota Press, 2016), 42–49.
9. For an extended exemplar of Fry’s work, see Roger Fry, *Cézanne: A Study of His Development* (London: L. & V. Woolf, 1927). For China, see, among many examples, Ankeney Weitz, *Zhou Mi’s Record of Clouds and Mist Passing Before One’s Eyes: An Annotated Translation* (Leiden: Brill, 2002).
10. Meyer Schapiro, “Style,” in *Anthropology Today*, ed. Alfred L. Kroeber (Chicago: University of Chicago Press, 1953), 287–312.
11. Rosalind Krauss, “Sculpture in the Expanded Field,” *October* 8 (Spring 1979): 30–44.
12. Franco Moretti, *Distant Reading* (London: Verso, 2013). For a highly productive recent critique of Moretti, see Carolyn Lesjak, “All or Nothing: Reading Franco Moretti Reading. A Review of *Distant Reading* and *The Bourgeois: Between History and Literature* by Franco Moretti,” *Historical Materialism* 24, no. 3 (2016): 185–205.

13. The classic first text in English is Erwin Panofsky, "Jan van Eyck's Arnolfini Portrait," *The Burlington Magazine* 64, no. 372 (March 1934): 117–19, 122–27.
14. While in very different keys from Panofsky, innovative scholars in these areas include James Cahill, *Hills Beyond a River: Chinese Painting of the Yüan Dynasty, 1279–1368* (New York: Weatherhill, 1976); Carol Duncan, "Virility and Domination in Early Twentieth-Century Vanguard Painting," in *Feminism and Art History: Questioning the Litany*, ed. Norma Broude and Mary D. Garrard (London: Harper & Row, 1982), 292–313; Patricia Leighton, *Re-Ordering the Universe: Picasso and Anarchism, 1897–1914* (Princeton: Princeton University Press, 1989).
15. See an overview in Andrew Hemingway, "Marxism and Art," in *Oxford Bibliographies* (Oxford: Oxford University Press, 2014), accessed July 12, 2018, doi:10.1093/obo/9780199920105-0023.
16. Interesting examples of these trends include Jean Charlot, *Mexican Art and the Academy of San Carlos, 1785–1915* (Austin: University of Texas Press, 1962); Anne Sutherland-Harris and Linda Nochlin, *Women Artists 1550–1950* (New York: Alfred Knopf, 1976); George Kubler, *Mexican Architecture of the Sixteenth Century* (New Haven: Yale University Press, 1948).
17. An interesting recent review of this debate can be found in Jim Berryman, "Gombrich's Critique of Hauser's *Social History of Art*," *History of European Ideas* 43, no. 5 (2017): 494–506.
18. Drucker discusses this potential for changing the nature of iconographic analysis, for example, in her seminal article Johanna Drucker, "Is There a 'Digital' Art History?," *Visual Resources* 29, no. 1–2 (March–June 2013): 5–13.
19. Most recently in Mehrdad Yazdani, Jay Chow, and Lev Monovich, "Quantifying the Development of User-Generated Art During 2001–2010," *PLoS One* (August 8, 2017), accessed July 15, 2018, <https://doi.org/10.1371/journal.pone.0175350>.
20. To this point, see Harald Klinke, "Vorwort: Die digitale Transformation in den Geisteswissenschaften," in *#DigiCampus: Digitale Forschung und Lehre in den Geisteswissenschaften* (Munich: Open Publishing LMU, 2018), esp. 3–4.
21. Paul B. Jaskot, "Digital Art History as the Social History of Art: Towards the Disciplinary Relevance of Digital Methods," *Visual Resources* 35, no. 1–2 (March–June 2019): 21–33.
22. Compare how groups and affiliations have been treated in, for example, Thomas Crow, *Painters and Public Life in Eighteenth-Century Paris* (New Haven: Yale University Press, 1987); Amelia Jones, *Body Art/Performing the Subject* (Minneapolis: University of Minnesota Press, 1998).
23. See, for example, Matthew Lincoln and Abram Fox, "The Temporal Dimensions of the London Art Auction, 1780–1835," *British Art Studies* 4 (November 28, 2016), accessed July 15, 2018, <http://britishartstudies.ac.uk/issues/issue-index/issue-4/london-art-auction-1870-1835>. For social relationships, see the example of women's artist collaboratives analyzed in Joanna Gardner-Huggett, "Extrapolating Influence: The Challenges of Mapping the History of ARC and Artemesia Galleries, Chicago (1980–1985)," *Historical Geography* 45 (2017): 37–65.
24. I have made this argument previously in Paul B. Jaskot, "Commentary: Art-Historical Questions, Geographic Concepts, and Digital Methods," *Historical Geography* 45 (2017): 92–99.
25. Stephen Murray, Andrew Tallon, and Rory O'Neill, "Mapping Gothic France" (2010), accessed July 12, 2018, <http://mappinggothic.org/>.
26. For an overview, see Ian N. Gregory and Paul S. Ell, *Historical GIS: Technologies, Methodologies, and Scholarship* (Cambridge: Cambridge University Press, 2009). See also the foundational work of Anne Kelly Knowles in this area, including Anne Kelly Knowles, ed., *Past Time, Past Place: GIS for History* (Redlands, CA: ESRI Press, 2002).
27. See, for example, the impressive Ghent Altarpiece project, "Closer to Van Eyck" (2011), Accessed July 12, 2018, <http://clostertovaneyck.kikirpa.be/>.
28. Maximilian Schich, Chaoming Song, Yong-Yeol Ahn, Alexander Mirsky, Mauro Martino, Albert-László Barabási, and Dirk Helbing, "A Network Framework of Cultural History," *Science* 345 (2014): 558–62.
29. Benjamin Zweig has argued that we need to see the long history of digital's relation to art history well before the internet. I agree with this important point, although I do think, as my chapter implies, that we also need to emphasize the last decade as a new moment in the re-evaluation of what constitutes digital art history. Benjamin Zweig, "Forgotten Genealogies: Brief Reflections on the History of Digital Art History," *International Journal for Digital Art History* 1 (2015): 38–49.

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## 2

# BLIND SPOT

## Information Visualization and Art History

*Johanna Drucker*

Visual images participate in the production and transmission of knowledge in many disciplines. In the sciences, they serve particular roles in generating and representing research.<sup>1</sup> In the arts, they express cultural scenes, preoccupations, and values. In communications, they argue and persuade. Graphic recording of direct observation goes back into prehistory. The configuration of the heavens and the physical features of mega-fauna, for instance, provoked some of the earliest recorded graphic expressions. The extension of human sight by technological means, first by telescope and microscope, then radar, sonar, and magnetic resonance imaging, has been augmented more recently by computational processing into visualizations. The images of subatomic traces in cloud chambers, or use of electron microscopy, or photon lithography at the nanoscale intensify the prosthetic effects of techno-vision. Many of these processes work beyond the scale of human perception. Others create images that have no relationship to a visual object. Among these are the many visualizations of data that populate the graphic world with charts and graphs and diagrams.

Critical attention to the role of images in knowledge production has a substantial history in science and technology studies.<sup>2</sup> Even a short list of outstanding scholarship by authors Peter Galison, Lorraine Daston, Bruno Latour, Karen Knorr-Cetina, Alina Paine, David Freedberg, and others concerned with the connection of visibility and knowledge shows the intellectual vibrancy and seriousness of this critical engagement.<sup>3</sup> In addition to attention to specific practices and topics (such as Claudia Swan's work on botanical illustration), newer work (such as Lev Manovich's or my own) addresses the ways imaging technologies have expanded the cultural role of analogue and digital visualization.<sup>4</sup> Critical reflection on the intimate connection of seeing and knowing reflects philosophical engagement with epistemology: the premises on which justified claims for true belief can be assessed and argued. Questions of resemblance, difference, describing, and mimesis are central to the investigation of the links between cognition, perception, and conventions of graphical presentation in scientific images, but so are concerns rooted in hermeneutic, rather than empirical, frameworks.<sup>5</sup> Visual epistemology is not only a matter of accuracy of iconic resemblance, legibility of symbols, or authority of indexical connection. The rhetorical structure of argument is equally important to the creation and communication of knowledge. The interpretative dimensions of knowledge are integral to its authority and constitution. Attitudes about what constitutes an image of a specimen or map of the movement of planets are as ideologically charged and hermeneutically rich as those concerned with, for

instance, portraiture in any culture or period. *How* something is depicted always reveals at least as much as *what* is shown.

In general, less scholarly attention has been paid to diagrammatic and schematic graphical forms of expression, than to pictorial ones. But charts, graphs, and data visualizations are increasingly subject to historical and critical study.<sup>6</sup> The use and awareness of large data have expanded exponentially, and information visualizations have become ubiquitous, easily produced on common platforms. These graphic and schematic forms have their own histories, only some of which overlap with that of iconography. The imprint of the domains within which they originate still functions as part of the structuring principles on which they produce meaning.<sup>7</sup> Trees imply consanguinity to establish legitimate pedigree. Grids structure content types as discrete, defined categories for accounting purposes. Circular and radial forms imply wholeness of the original phenomena in business applications. Bar charts and scatter plots distance quantitative information from sources in human experience for the purpose of demographic and bureaucratic analysis and management. And x-axes are almost always used to plot change over time in alignment with Western conventions of reading sequence from left to right.<sup>8</sup> In each instance, the semantics of structure operate almost invisibly, so familiar and encoded are the instructions for reading.

Graphic designers, scholars working in digital humanities, and also those in the history of science, have taken to tracking circles, bar charts, pies, and trees to supply them with origin myths and to recover lost or abandoned projects.<sup>9</sup> In his 1958 work, *Logic Machines and Diagrams*, Martin Gardner linked graphical forms, conceptual organization and workings, and conditions of invention.<sup>10</sup> For example, he showed what the medieval Kabbalist Ramon Lull's volvelles made possible and how they differed from modern combinatorics processes. The mechanics of signification and the intellectual roots of graphical practices became apparent through Gardner's analysis. In a more curatorial approach, Edward Tufte's compendia provide a rich array of examples and a good descriptive vocabulary for specimens of what he terms "the visual display of quantitative information."<sup>11</sup> How-to books offer manuals of techniques and guidelines, such as *Show me the Numbers* (2004) by Stephen Few or *Statistical Graphics* (1983) by Calvin Schmid.<sup>12</sup> Coffee-table collections like Manuel Lima's *Visual Complexity* (2011) and Anthony Grafton and Daniel Rosenberg's *Cartographies of Time* (2010) present myriad examples culled from a rich historical inventory.<sup>13</sup> Also, art associated with dataflow and visual complexity finds its way into galleries and museums. But little of this work is underwritten with critical investigation of historical conditions or intellectual traditions. Almost none asks how graphical knowledge is related to ideology or how the epistemological assumptions structuring the images are expressed.

Work in art history is curiously sparse in these studies and debates. Why? James Elkins's *The Domain of Images* (1998) was a pioneering application of art-historical principles to the analysis of scientific images.<sup>14</sup> John Bender and Michael Marrinan's *The Culture of Diagram* (2010) offers another exception to the general rule, as does S.K. Heninger Jr.'s *The Cosmographical Glass* (1977).<sup>15</sup> Bender and Marrinan situated the concept of the "diagram" within eighteenth-century intellectual activities as a basic organizing principle of knowledge, using the French *Encyclopédie* as their main focus. Heninger's study placed Renaissance diagrams in the history of mathematics, showing the connections and tensions between classical geometry, Pythagorean theory, and emerging humanist constructs.

In another exception, *Prints and Visual Communication* (1953), William Ivins made a case for the way changes in print technology in the Renaissance increased specificity in the depiction of plant species.<sup>16</sup> His careful attention to the syntax of engraving practices—and their graphic qualities—linked observational and inscriptional aspects of visualization. He showed how refinement of line, tone, and approaches to rendering and the manipulation of metal plates

and the needles, roulettes, and burins that inscribed them, changed the communicative capacity of botanical reproductions. Ivins did not isolate scientific images from those of other graphic works, and his inclusive discussion emphasized a tension between mechanical methods and aesthetic principles. He argued that techniques of increased precision could advance the certainty on which medical knowledge depended. He also argued that the replication of information and its circulation in printed multiples made it effective in stabilizing knowledge through shared references. But even supplementing these titles with lists of other published articles, or occasional conference proceedings, shows how limited the bibliography on diagrammatic forms remains by contrast to that on art in natural history, let alone, art history more broadly.

The question of “why” art history has not engaged more with information visualizations is largely rhetorical of course. More interesting is what the art-historical insight into these works might offer. The parallel question—what art history has to gain by this engagement—will also weave through this discussion. Perhaps the answer is that the field’s engagement with visual epistemology changes from a soft “social” knowledge—of cultural trends, social relations, political events, and so on—to a far more ambitious place in the analysis of epistemology itself. What are knowledge claims and how do images make them? With these preliminaries in place, we can turn to the specific challenges of information visualizations.

Charts and graphs are conceptual objects, not representational ones. They have no referent in the visual world and bear no morphological resemblance to specimens or phenomena observed. They are rooted in practices of statistical mathematics put to the purpose of demographic, political, commercial, or other analyses. They are also images whose aesthetic features participate in visual communication as surely as other prints and visual works. Oddly, they lose their stature *as images* by virtue of their *work* in the (apparent) service of knowledge production. The implication is that their forms are determined by their purpose and thus not worthy of consideration on visual grounds. We don’t look *at* them, but *through* them for their information. But if this line is drawn between epistemological images and art-historical ones on the grounds that the former serve empirical science and the latter are expressions of cultural conditions, we create a false binary. Art-historical methods could engage these graphical works differently—not as expressions of data (assessed as good, bad, inadequate, or indifferent in their degree of success) but as visual works whose properties are part of larger conditions of conception, execution, and ideological effect.

In the late eighteenth century, William Playfair created some still justly renowned graphical expressions of political statistics. His work often serves as a starting point for the history of modern information visualization.<sup>17</sup> Playfair, as various scholars have pointed out, did not invent his graphical forms wholesale.<sup>18</sup> Coordinate systems, for instance, had been developed by Descartes more than a century earlier.<sup>19</sup> As a focus, Playfair’s work has the advantage of being familiar to many and much-studied. The work is highly aesthetic—it makes optimal use of the late eighteenth-century graphic arts to create rhetorically persuasive arguments whose import is as much bound to formal values as to intellectual ones. In other words, skill of presentation, as much as accuracy of information, makes Playfair’s work appealing and enduring. These qualities also give it the potency to address ways visual epistemology *works* in hermeneutic terms. The Playfair plates are assertions of justified true belief. They make statements about how knowledge is produced and of what it consists. They are not the unmediated presentation of information, let alone simple correlations between graphics and phenomena in the world.

Playfair’s first major publication was the 1786 *Commercial and Political Atlas and Statistical Breviary*. The term “Atlas” in his title asserts an association with cartographic methods. An atlas is a compendium of graphical expressions of interpretations of physical, geographical phenomena, and is fundamentally hermeneutic from the outset. Graphical projections of space are

constructed projections, not unmediated representations of territory. They are distortions made through mathematical calculation, not observation.

The graphical features of the plates in the 1786 edition of the *Atlas* are professionally engraved and hand-colored. In addition to the line, column, and area features, they contain texts engraved in a recognizable business hand of the period as well as others that imitate printed type. The depicted medallion on which the explanatory title is inscribed attaches itself like a plaque to a building front, official in its public declaration. This hybrid approach to text was common to engraved book title pages in the period, and the style, size, scale for reading, and other graphic features situate these images among several realms. First, they are clearly designed to circulate in book format (as opposed to broadsides or popular ballads or newssheets). Many well-known painters in the period also made works designed to be produced and presented in book publications, such as John Martin and J.M.W. Turner, to name just two. The medium of engraving thus provided common ground for fine art and informational graphics. They are technologically indistinguishable. The muted earth-tone color palette used to tint Playfair's images is very close to that used in coloring Turner's landscapes of sea, sky, land, and clouds. Playfair is credited with being the first person to conceive of color-coding a chart, though tinting pictorial prints was a widespread practice.<sup>20</sup> But these images also belong to a larger system of visual print artifacts within commercial and legal frameworks. The handwriting on the plates is the same as that which would have appeared on written documents passed across a desk for accounting transactions, or bills of sale, lading, or other official and commercial purposes.<sup>21</sup> The graphical codes of the business hand (masculine, round, and clear, was distinguished from the more delicate italic models used by women) immediately place these images in a commercial context.<sup>22</sup>

When Playfair's work is read diachronically, solely within a lineage of information graphics, rather than synchronically, in relation to a broad array of graphic images, the approach isolates him from the graphical languages through which his work would have been read by his contemporaries. In that diachronic reading, he is a pioneer inventor in a linear narrative of progress. But read in his own context of media, the notion that Playfair's graphics are "informational" while Turner's or Martin's are "imaginative" starts to break down. A binary between imagined illustrations for fictional works and medical ones might hold, but images that accompanied travel narratives or naturalists' accounts of rambles and views are harder to sort into clearly opposed categories of imagined versus reported sights. Playfair's images are not, of course, "naturalistic" and have no prior visual object on which they can be based. They belong to the graphical realm of quantitative tables, nautical charts, and account ledgers which they clearly resemble through shared features.

Beginning with Playfair's work, information graphics are often assessed on whether they are adequate or inadequate to the task of communicating data.<sup>23</sup> That approach already assumes that the value of the image is determined by its ability to communicate a pre-existing referent. The "information" of the image is understood as equivalent to the values contained in the mathematical table of which it is an expression. Transparency and accuracy are equated, as if data have an ideal form and the purpose of the graph is to express it.<sup>24</sup> The graphic is assumed to be legible solely as an efficient and accurate expression of data. Aesthetic properties are perceived as mere elements of period style—attractively generating nostalgia—not as structuring principles and assumptions about knowledge production.

This approach ignores the provocative features that come into play in an *aesthetic reading* of graphical objects. The statement is deliberate. The point is not simply, merely, to shift visualizations into the category of aesthetic objects, the goal is to show how, as aesthetic objects, they provoke a reading in accordance with the terms of critical hermeneutics. What *kind* of knowledge do these information visualizations express and how, in so doing, do they extend the boundaries



of art history by their inclusion? This question opens the way to read Playfair and any of the wide range of information visualizations produced into the present through the same problematic conditions as those through which we read other works of art. The work is a hermeneutic object, fraught with interpretative qualities and dimensions of contingent and co-dependent relations of form to interpretation within cultural codes of production and reception. How is an information visualization to be understood as an epistemic object if it is *not* assessed in terms of the accuracy of alignment between referent and expression? In an aesthetic reading, attention to “accuracy” is replaced with attention to ways of knowing, and assumptions about how that process is inscribed in graphical modes of expression. In other words, reading information visualizations as arguments structured graphically is a radically different approach from reading them as representations. Graphics *make* knowledge, they do not simply represent it. An information visualization is *not a picture*. The common statement that information visualizations are “metrics expressed as graphics” misses the point that they are also reifications of misinformation—that is, that they make declarative statements that hide the complex life cycle of decisions on which their production depends.<sup>25</sup> Data do not exist in raw form.<sup>26</sup>

With this critical frame in mind, we can turn again to the plates of the *Atlas*. Playfair did not deal in probabilities, but in presumed actualities. His images are depictions of that which he takes to be “what is,” that is, a seemingly unproblematic representation of quantitative information, such as the relation of one value to another across time, whether that is wages, prices, imports, or exports. Playfair’s methods have their conceptual foundation in a burgeoning managerial culture, in a shift toward larger scale bureaucratic control of information and its consequences. They represent a way of “knowing” economic patterns and values over a period of time. The notion of extracting “data”—quantitative values of specific phenomena in the cultural world—from the complex of transactions among multiple domains and then presenting it in compact form as a means of making such information both legible and tractable arose within a rapidly changing economic environment. The very act of extraction and representation in a graphic form is an ideologically inflected epistemological act. It suggests that knowledge can be constituted through these processes of parameterization and reduction—and asserts that the graphic presentation is itself a legible and uncomplicated instrument of knowledge dissemination. The graphic convention presupposes that after the transformation of complex phenomena into metric values, the graphic is simply a report, an account in visual form.

The canonical images from Playfair’s *Atlas* make use of continuous line chart conventions that had been in (albeit infrequent) use for centuries.<sup>27</sup> Playfair was articulate about the extent to which the “graphical method appeals to the eye” and provided a “way of simplifying the tedious and complex.”<sup>28</sup> The same statements are used in the present to describe (and justify) the presentation of quantitative information in graphical form. The host of issues hidden by the term “simplify”—such as the obfuscation of intellectual models of data production, rhetoric of graphical means, and glossing of statistical techniques—were no more apparent to Playfair’s audience than they are to anyone reading a chart produced from the library of displays in a standard spread sheet application.

With the work of John Graunt and William Petty, Playfair’s built on the cultural transformations of early modern statehood.<sup>29</sup> Graunt’s *Natural and Political Observations Made upon the Bills of Mortality* (1662) and Petty’s *Treatise of Taxes and Contributions* (1662) were foundational for the development of the field known as “political arithmetic.”<sup>30</sup> Ian Hacking’s work on the emergence of ideas of probability details the development of ideas of chance and inference within scientific and economic theory starting even earlier, in the fifteenth century.<sup>31</sup> The term “statistics” derives from *stasticum collegium* (Council of State) and thus associates the concept directly with bureaucratic techniques of government management.<sup>32</sup> Insofar as Playfair made

any pioneering contribution, it was in the “use of graphs to represent empirical historical data” rather than “abstract mathematical functions.”<sup>33</sup> His goal was to communicate, not to calculate new findings. The climbing rates of numeracy, though slower than those of literacy, play a part in the publication of these plates as the knowledgeable audience for them increased.<sup>34</sup>

The print context for Playfair’s work, including the use of copperplate engraving and scientific treatises, tracks back to the fifteenth century, but the notion of vetted professional knowledge production coincided with the establishment of Royal Academies in the seventeenth century. Though Playfair was far from being an academician, he worked at least briefly with James Watt, who was a Fellow of the Royal Society.<sup>35</sup> The professional context is important in positioning Playfair’s graphics, since popular prints (satiric, topical, political) circulated widely on their own, while illustrations, engraved title pages, and technical drawings in manuals for medical, engineering, mathematical, and other fields appeared in serial and bound publications like the *Atlas*.<sup>36</sup> His originality was synthetic rather than expressive.<sup>37</sup> Though Playfair’s work spawned a host of imitators, the popularity in information graphics was not a steady upward climb, as charted by Friendly.<sup>38</sup>

Playfair’s graphical work always depends on tables of individual data points. Methods of “curve fitting and interpolation,” introduced a few decades earlier by Johann Lambert, are employed to create smooth lines of change plotting variables against each other (generally using the x-axis to chart time).<sup>39</sup> Playfair’s much reproduced 1821 chart “Showing at One View the Price of the Quarter of Wheat and Wage of Labor by the Week” (Figure 2.1) for a 250-year span makes use of a number of different scales and methods of grouping time periods (by century, by monarch, by decades). The wheat price values are determined by the average in five-year divisions, while the information that shapes the curve of the line depicting wages is taken on a weekly basis. This discrepancy is amplified by the graphic, where the wheat prices are shown in bars that stair step up and down the graph, and the wages are shown as a single continuous line. Aside from the basic violation of graphic grammar—making a continuous line from discrete data points—the graphic displays some interesting features. The stair-step pattern of the bars makes for a skyline effect, and the fade-out below the hard-edged rectangular forms at the top creates a sense of fading mist, as if the wheat city floated on a sea of smoke and fog. This floating sensation disconnects the skyline from the wages, which have an aspirational upward curve, but one that never approaches the value of the wheat. The area below the curve has a solid tone and the use of color in tinted versions turns the upward sloping line purple-pink and the area below it aquamarine. This lightness contrasts with the ominous stacks of the dark, jagged edge of the skyline above, which hovers with threatening mechanical force in contrast to the organic harmony of the line. Mood and atmosphere are palpable. Data presentation is not neutral.

As already mentioned, tinting of engravings was common. Color in medical and botanical illustrations in this period had become saturated, even lurid in some instances. Lorraine Daston, in a study of “epistemic images” mostly from the eighteenth century, argues that the use of color was increasingly disparaged in scientific works where they intersected with the classification of species.<sup>40</sup> Carl von Linneaus was particularly disturbed by the extent to which the depiction of individual specimens in color was misused to proliferate species identifications.<sup>41</sup> According to Daston, Linneaus urged illustrators to keep to the basic structural features of “Number, Shape, Position, and Proportion.”<sup>42</sup> Color was to be confined to the decorative depiction of flora, in those images and prints designed for delight and amusement rather than for scientific purposes. Color even came to be associated with a “hermeneutics of deception.”<sup>43</sup> The down-played tones in Playfair’s prints speak more authoritatively than vivid color would.

The enunciative force of Playfair’s graphics is reinforced by the forward-facing orientation of the plate and print. The images declare themselves to be mere statements of fact, in part because

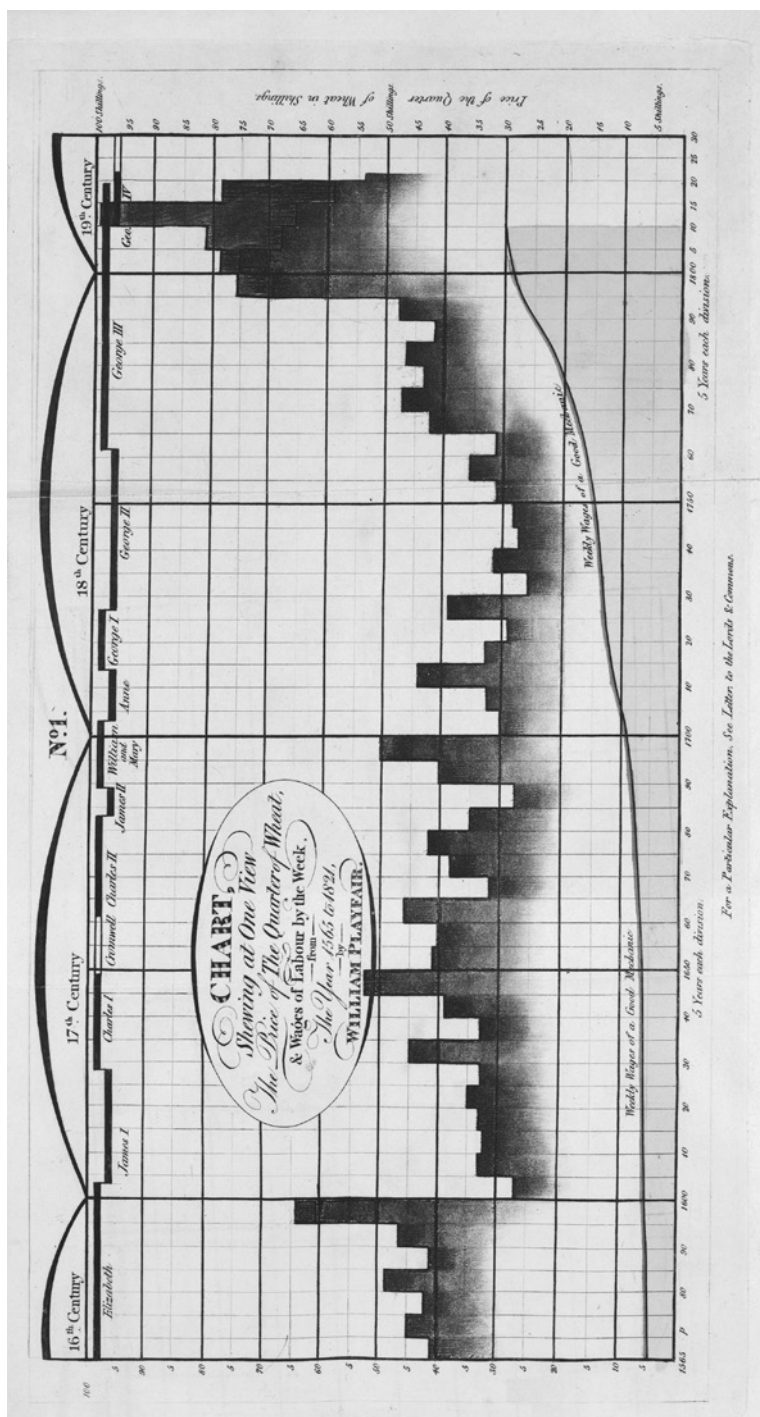


Figure 2.1 William Playfair, 1821. Letter on our agricultural distresses, their causes and remedies; accompanied with tables and copperplate charts shewing and comparing the prices of wheat, bread, and labour from 1565 to 1821.

they differentiate themselves entirely from those created within the perspectival conventions of pictorial prints. Because they refuse the conventions used for scenes, vignettes, stories, and tales, Playfair's images function very differently in their truth claims from those of illustrational or pictorial works. They are meant to be read as plain statements of facts. Their layout, like those of technical drawings in isomorphic projection or of botanical and biological specimens in cross sections correlated across views (back, front, sliced), makes clear that Playfair's plates are fully rational in their conception and production. Their assertion of truth claims is not based on the legibility of figures, believability of circumstance, or correlation to the expectations of a reader/viewer looking into the proscenium of a pictorial frame, but on the treatment of surface with regular metrics and standardized values. The graphic is without spatial depth. The very flatness proclaims its honesty—declares its incapacity to lie. The work speaks directly, and its viewer is addressed in such a way that no position can be identified. We are not in a point-of-view system but merely offered an account, a balance sheet, as if its claims were self-evident.

We could extend this argument with an infinite number of other examples. But one useful addition is W.E.B. DuBois's set of sixty graphics created in 1900 for a presentation at the Pan-African Conference in London.<sup>44</sup> As Josh Jones has argued, these charts, with their hand-drawn lettering and graphics, are vivid cultural artifacts. The iconographic force of the works is striking. To show the growth of the percentage of the "Negro" [sic] population of the United States between 1800 and 1890, DuBois (and his team at Atlanta University) devised an image of a small-scale United States in black silhouette sitting inside the red (in the original) outline border of the continental States (Figure 2.2). The scale of the images increases, and though the percentages appear to drop (from one-fifth to one-eighth), the size of the black figure within the body of the country grows.<sup>45</sup> The multiple graphics show different aspects of Black experience—the "Routes of the American Slave Trade from Africa to South America/Brazil and to Georgia," or "The percentage of Negro Business Men in the United States," and other graphic presentations of information. They are rhetorically striking. The geometric language of the "Business Men" looks like a modern painting, decades in advance of the work of Piet Mondrian or Kasimir Malevich, engaging the language of abstraction for potent social ends. Likewise, the spiral forms that contrast the "Value of Household and Kitchen Furniture Owed by Georgia Negroes" in another one of the many images anticipates the vivid tones of pop and minimalist paintings from the 1960s. These inventions are clear statements, interventions in a bureaucratic system that typically muffled information in conventional presentations of dull gray tones. DuBois's team invented a striking graphical language as an act of disruption to communicative norms. Its interventions enact an avant-garde shock effect to "make strange" the normalized facts of racism and give them potency. How should we look at these images except through the lens of art history?

Compare these hand-lettered and hand-painted images with those published in 1914 by Williard Brinton in another classic work, *Graphic Methods for Presenting Facts*.<sup>46</sup> Brinton's book, published by the Industrial Management Library, was a textbook to guide government graphics offices. It is filled with graphics produced by technical instruments such as ruling pens and straightedges. Later editions added red to the original monochrome palette of halftone patterns and shading techniques. The handmade quality of DuBois's graphics evidences a passionate rhetoric in sharp contrast to the dispassionate style of those in Brinton's pages. DuBois's graphics speak volumes about the need to produce arguments in graphic form as a force for social change. The graphic features make the case for the Atlanta University research group.<sup>47</sup> Each image feels like a statement arrived at through considerable effort, consideration, and careful reflection, not simply a mechanical translation. Brinton's bureaucratic graphics express an administered culture in muffled tones.

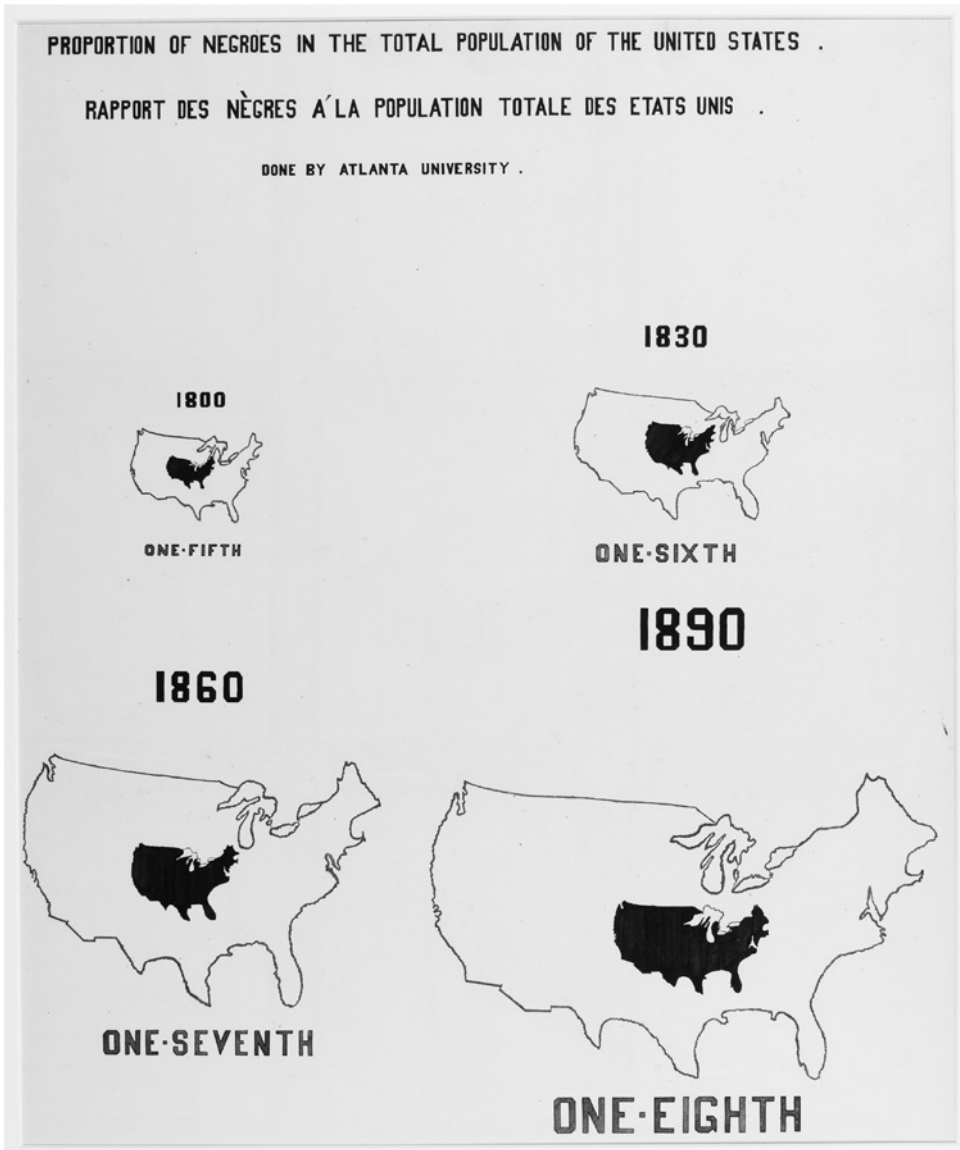


Figure 2.2 W.E.B. DuBois and Thomas Calloway, graphics for the Exposition Universelle, Paris, 1900.

Source: Library of Congress, LC-11931, no. 42.

Treating Playfair's works, or those of DuBois, or Brinton, or any of the many practitioners, anonymous or named, as images whose ingenuity at presenting information in graphical form, or whose qualities of presentation, are to be gauged simply in terms of accuracy of data imaging, keeps them in a category apart from art-historical ones. These are not empirical images. They are graphic presentations of hermeneutic processes, interpretative statements formulated within social conditions. They participate in cultural history as images.