Critical Data Visualization:
History, Theory, and Practice

Undergraduate Seminar
Bill Rankin
Spring 2025
Tuesdays 1:30–3:20pm

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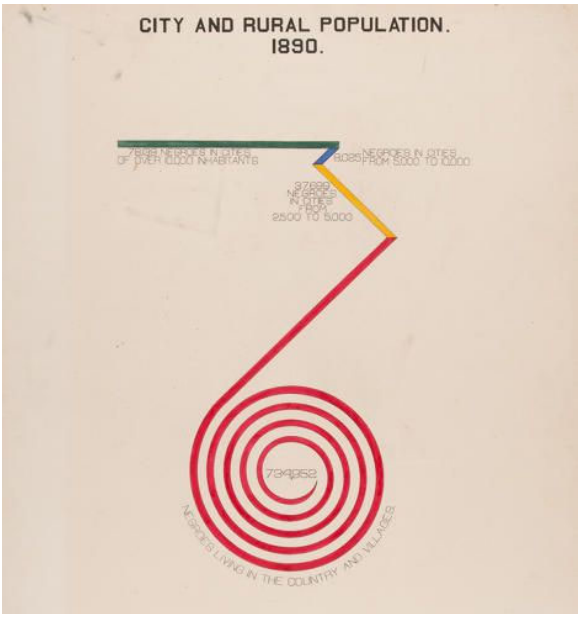

A stylized bar graph by W.E.B. Du Bois presented in Paris in 1900, showing the relative proportion of African Americans living in cities, towns, and rural areas in 1890.

Description

Today, visualization is seen as a crucial tool for understanding, navigating, and acting upon the vast amounts of data produced in contemporary society. Everything from government statistics and environmental monitoring to cell-phone tracking and online shopping are made comprehensible by becoming visual. But most data designers—and most data consumers—engage little if at all with the broader assumptions, meaning, and politics of these graphics, and the history of visualization is usually reduced to a simplistic story of cumulative progress. This seminar will instead approach visualization from a critical historical perspective. We will ask how visualization encourages certain kinds of visibility but not others, how various theories of visual communication support or undermine different forms of politics, how visualization is—or should be—embedded in specific cultures, and how the identity or the methods of the person doing the visualizing can—or should—matter.

The course is structured as a hybrid between a readings-based discussion seminar and a hands-on workshop. We will engage with scholarship about data, graphics, and visual argument since the eighteenth century, but I will also give in-class demonstrations of software and graphic-design techniques and we will use class time to present and discuss student work in a studio-like atmosphere. The reading load is less than in other humanities seminars so that students can spend significant time outside of class becoming proficient in their choice of software.

Prerequisite Skills and Mindset

Students are not expected to have prior experience either in graphic design or in the specific software we will explore in class, but everyone should be prepared and excited to approach software from a humanistic perspective. All students will be expected learn spreadsheet graphing, Adobe Illustrator, and basic ArcGIS. More advanced software and coding—including Python, R, javascript d3, etc.—will be optional.

Assignments
The main goal of the course is to learn the skills—both technical and humanistic—of critical visualization. This requires learning both how to analyze existing graphics and how to create your own.

During the first half of the semester, you will need to **email me a (very) short reading response** the night before class. Details will be given in class, but the basic idea will be to address broad themes and arguments, not just factual content. A selection of these questions will be shared anonymously with the class. During the second half of the term, you will need to **post an image and image response to the Canvas site** the night before class. Throughout the course you will also be expected to be an **active participant in discussion** and to engage constructively with other students' work.

Before spring break there will be **two short exercises** to build familiarity both with software and visual argument. The first, due on the third week of class, will use data that I provide: everyone will receive the same data, and together as a class we'll see what we can find and how it can be represented. For the second exercise, due the week before break, you'll find your own data and again present a few different visualizations. For both exercises, you will present either two or three graphics, only one of which can be a time-series graph.

The second half of the semester will be spent working toward a final project: a data-driven **visual essay** on a topic of historical or contemporary importance. This project can be designed either for print or for the web, and it will consist of a narrative sequence of both graphics and text. It must include 5–10 original graphics and 800–1,000 words of prose (maximum 1,200 words). Every student will give a fifteen-minute **presentation** of their work in progress.

These assignments will combine into your final grade:

Weekly responses	15%
Class participation	10%
First data exercise	15%
Second data exercise	15%
Final project presentation	5%
Final project	40%

Academic Integrity
Some forms of plagiarism and academic dishonesty are obvious, like turning in work that is not your own, failing to acknowledge sources, or recycling your own work in multiple classes without permission. But especially with graphics, there are many fuzzy lines as well. Where are the boundaries, for example, between being influenced by precedent, borrowing someone else's techniques, and illegitimate copying? What are the limits, if any, to repurposing others' data to new ends? Can computer code be cut-and-pasted, or must it be all be written from scratch? These cases require judgment, and we will discuss these sorts of dilemmas together in class. Egregious or repeated breaches of integrity will be referred to the Yale College Executive Committee.

SCHEDULE OF READINGS

Note: Readings marked with asterisks (*) are not available as PDFs on the Canvas site. They are either available online, as e-books through Orbis, or through 2-hour non-circulating reserves at Bass.

January 14: Course Introduction (no readings)

PART I: WHAT IS CRITICAL DATA VISUALIZATION?

January 21: Clarity, Insight, Truth, and Beauty (or, Conventional Visualization!)

* Edward Tufte, *The Visual Display of Quantitative Information* (Cheshire: Graphics Press, 1983).
Edward Tufte, "The Fundamental Principles of Analytical Design," in *Beautiful Evidence* (Cheshire: Graphics Press, 2006), 122–139.
* Axis Maps, "Visual Variables," at https://www.axismaps.com/guide/visual-variables
Jacques Bertin, *Semiology of Graphics* (Redlands, ESRI Press, 2010 [orig. 1967]), 100–137.

January 28: What is Critical?

Paulo Freire, *Pedagogy of the Oppressed* (New York: Bloomsbury, 1970 [orig. 1968]), foreword, preface, and chapter 3.
Robert H. Ennis, "Critical Thinking: A Streamlined Conception," in Martin Davies and Ronald Barnett, eds., *The Palgrave Handbook of Critical Thinking in Higher Education* (New York: Palgrave MacMillan, 2015), 31–47.
* Chad Orzel, "Critical Thinking Isn't a Thing," *Counting Atoms,* 5 July 2021, https://chadorzel.substack.com/p/critical-thinking-isnt-a-thing
Kim Fortun et al., "Pushback: Critical Data Designers and Pollution Politics," *Big Data & Society* (July–December 2016): 1–14.

February 4: Presentation and Discussion of First Visualization Exercise (no readings)
—ALL WORK MUST BE EMAILED TO ME BY FIVE A.M.—

February 11: What is Data?

Johanna Drucker, "Humanities Approaches to Graphical Display," *DHQ: Digital Humanities Quarterly* 5 (2011).
Daniel Rosenberg, "Data Before the Fact," in Lisa Gitelman, ed., *"Raw Data" Is an Oxymoron* (Cambridge: MIT Press, 2013), 15–40.
Bruno J. Strasser and Paul N. Edwards, "Big Data Is the Answer … But What Is the Question?" *Osiris 32: Data Histories* (2017), 328–345.
* Nathan Yau, "Visualizing the Uncertainty in Data," *Flowingdata,* Jan 2018, https://flowingdata.com/2018/01/08/visualizing-the-uncertainty-in-data

February 18: Feminist Data Visualization

* Catherine D'Ignazio and Lauren F. Klein, *Data Feminism* (Cambridge: MIT Press, 2020), introduction, chapters 3 and 4.

Mei-Po Kwan, "Feminist Visualization: Re-Envisioning GIS as a Method in Feminist Geographic Research," *Annals of the Association of American Geographers* 92 (2002): 645–661.

Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14 (Autumn 1988): 575–599.

* Jessica Hullman and Matthew Kay, "Uncertainty + Visualization, Explained," June 2019.
part 1: https://medium.com/multiple-views-visualization-research-explained/uncertainty-visualization-explained-67e7a73f031b
part 2: https://medium.com/multiple-views-visualization-research-explained/uncertainty-visualization-explained-part-2-continuous-encodings-967a7f7c38d0

February 25: Radical Cartography

Bill Rankin, *Radical Cartography: Visual Argument in the Age of Data* (New York: Viking, [2024]). Manuscript in progress (not for circulation!), introduction, chapters 1, 2, 3, 7, conclusion.

Severin Halder and Boris Michel, introduction to *This Is Not an Atlas* (Bielefeld: Transcript, 2018), pp. 12–21. Browse the rest of the (non-)atlas as you like.

* Cary Anderson, "The Visualization of Uncertainty," 2022?
https://www.e-education.psu.edu/geog486/node/693
https://www.e-education.psu.edu/geog486/node/831

March 4: Presentation and Discussion of Second Visualization Exercise (no readings)
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—SPRING BREAK—

PART II: SOME EPISODES IN THE POLITICS OF VISUALIZATION

March 25: What is the History of Infographics a History Of?

* GRAPHICS: Sandra Rendgen, ed., *History of Information Graphics* (Köln: Taschen, 2019).
* TEXTS: Murray Dick, *The Infographic: A History of Data Graphics in News and Communications* (Cambridge: MIT Press, 2020), introduction and chapter 3, plus chapter 4 intro and conclusion (pp. 97–98, 134–137) along with the images in chapter 4.

Michael Friendly, "The Golden Age of Statistical Graphics," *Statistical Science* 23 (2008): 502–535.

April 1: Visualizing the Color Line

* GRAPHICS: Whitney Battle-Baptiste and Britt Rusert, eds., *W.E.B. Du Bois's Data Portraits: Visualizing Black America* (Princeton Architectural Press, 2018).
* Julian Rothenstein, ed., *Black Lives 1900: W.E.B. Du Bois at the Paris Exposition* (London: Redstone, 2019).

TEXTS: W. E. B. Du Bois, "The Talented Tenth," in *The Negro Problem* (New York: James Pott & Co., 1903), 33–75.
Kevin Gaines, *Uplifting the Race: Black Leadership, Politics, and Culture in the Twentieth Century* (Chapel Hill: UNC Press, 1996), introduction and chapter 6.

April 8: The Politics of Pictographs

GRAPHICS: Otto Neurath, *International Picture Language: The First Rules of Isotype* (London: K. Paul, Trench, Trubner & Co., Ltd., 1936).

TEXTS: Christopher Burke, "Introduction" and "The Gesellschafts- und Wirtschaftsmuseum in Wien (Social and Economic Museum of Vienna), 1925–34," in *Isotype: Design and Contexts 1925–1971* (London: Hyphen, 2013), 9–102.
Eric Kindel, "'When Things Are Equal All Over the World the Symbols Can Be the Same': Isotype in West Africa," *Brazilian Journal of Information Design* 19 (2022): 1–21.

April 15: Data Doubles and Quantified Selves

* GRAPHICS: Giorgia Lupi and Stefanie Posavec, *Dear Data: A Friendship in 52 Weeks of Postcards* (New York: Princeton Architectural Press, 2016).

TEXTS: Dan Bouk, "The History and Political Economy of Personal Data Over the Last Two Centuries in Three Acts," *Osiris 32: Data Histories* (2017), 85–106.
Kevin D. Haggerty and Richard V. Ericson, "The Surveillant Assemblage," *British Journal of Sociology* 51 (Dec 2000): 605–622.
N. Katherine Hayles, "Narrative and Database: Natural Symbionts," *PMLA* 122 (Oct 2007): 1603–1608.
Tamar Sharon and Dorien Zandbergen, "From Data Fetishism to Quantifying Selves: Self-tracking Practices and the Other Values of Data," *New Media & Society* 19 (2017): 1695–1709.

April 22: The Road Ahead

GRAPHICS: Browse the projects at https://pudding.cool and read at least eight.

* TEXT: Jer Thorp, *Living in Data: A Citizen's Guide to a Better Information Future* (New York: MCD, 2021), chapters 1, 2, 3, interlude, 8, 9, 14, epilogue, and graphics throughout.

—FINAL PROJECTS DUE MAY 7 AT 11:59 P.M.—

SCHEDULE OF DEMONSTRATIONS AND PRESENTATIONS

January 14:	Basic graphing
January 21:	Basic Illustrator
January 28:	Not-So-Basic Illustrator
February 4:	First Assignment Presentations
February 11:	Basic GIS
February 18:	GIS and data: Joins, XY Data, etc.
February 25:	GIS and Illustrator
March 4:	Second Assignment Presentations
—SPRING BREAK—	
March 25:	TBD
April 1:	Final Project Presentations (4 students)
April 8:	Final Project Presentations (4 students)
April 15:	Final Project Presentations (4 students)
April 22:	Final Project Presentations (3 students)