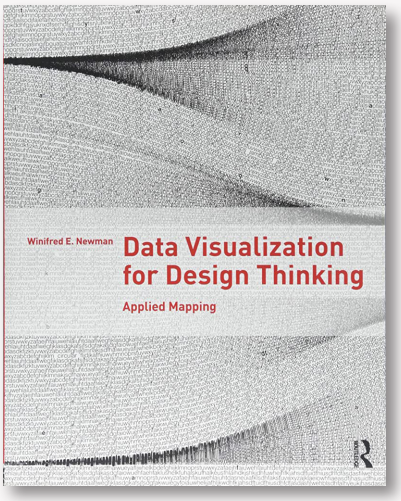

DATA VISUALIZATION FOR DESIGN THINKING: APPLIED MAPPING

By Winifred E. Newman

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Review by: Mike Wissner (he/him), The Pew Charitable Trusts

The propagation and increased accessibility of mapmaking technologies has drawn many people to explore their cartographic abilities without formal education or training in recent years. At the same time, traditionally trained cartographers have recognized a lack of attention given to cartographic design in university-based geography and GIS programs. This concern was discussed by Siewe Siewe and John McIntosh in their 2021 NACIS presentation, *The Disappearing Art of Cartography*. The overlap of design and mapping is the world where *Data Visualization for Design Thinking*: *Applied Mapping* lives. The book's stated intention is to help "designers make better maps" (x). The author aims to present mapmaking as applied research in order to elucidate the interconnections of "representation, thinking, technology, culture, and aesthetic practices" (x), and the discussions in the book span this vast spectrum. **Dr. Newman's website** describes her research interests as concentrating on "space perception, ecological psychology, and neuroaesthetics with active research in neuromorphic architecture, mapping and data visualization, STEM learning environments and histories of technology and science." The reader should know in advance that *Applied Mapping* goes to great lengths to incorporate all these elements within its pages.

The book has an introduction and four main chapters. The introduction runs forty-two pages and begins with a section on some historical theories of map production. The author acknowledges the importance of geographic data representation and its increasing relevance in the field of design: "if the number of recent books on maps, graphics for maps, and software used to produce them is any indication, maps are quickly becoming a significant representational technology in the design arsenal" (6). But the ideas immediately go deeper, touching on both the epistemology and ontology of mapping, as well as debating image versus representation in photography. It only briefly comes back around to maps before introducing ideas on semiotic structures, in one example, utilizing "B.W. Betts' representations of human psychology through geometrically abstracted figures resembling flowers" (10) . The subsections throughout the lengthy introduction reach across topics one might expect in a text on data visualization and mapping, ranging from the familiar—like "Complexity and Legibility" and "The Role of the Mapmaker"—to others that are less intuitive, such as "Socialist London(s)" and "Revolutionary France."

In Chapter 1, "Maps as Objects of Explanation," Dr. Newman delves into "maps as artifacts: semiotic, representational, social, historical and otherwise" (44), detailing some of the design decisions cartographers must make. In describing one major challenge of cartography, she writes that:

> Part of the challenge in using maps as tools in design is paying attention to their *intertextuality* broadly considered in so far as the terms of a given map allow. Mapmakers shouldn't be expected to manage this with ease or as a syncretic procedure

> without residual traces, but designers making effective maps hone their observations and direct their desires. (48)

Further along in the chapter, subsections discuss "Mathematical Correspondence" and "Philosophical Correspondence." In "Mathematical Correspondence," the author sets the tone by explaining that "often cartographers use correspondence and index as synonyms referring generally to the key in a map" (57), while then admitting that "a robust definition of correspondence admits to a special complexity when correspondence is applied to a spatial milieu" (57). This is not typically the experience of practitioners of cartography, yet the author expounds that

> in order not to get caught in the web of relativism where agreement is possible, or realism/materialism where a general rule of nature is given priority over mind (physical over the biological), I opted for a mathematical and then proto-phenomenological approach looking carefully at Husserl on the problem of correspondence and intersubjectivity. (57)

As we can see, the reader is assumed to already be familiar with the works of Edmund Husserl (a German philosopher who is credited with establishing the school of phenomenology), whose ideas are discussed further along in the chapter, in the "Philosophical Correspondence" subsection.

Chapter 2, "Terms of the Map," is probably the part most approachable to a practicing cartographer. The subsections in this chapter stay more in the lane of defining, translating, and describing concepts of applied mapmaking, in the traditional sense. This portion of the book is most akin to what a student of geography may learn in undergraduate or introductory courses on cartography or geographic information design. There are, for example, ample figures depicting how projection is relative to purpose. Interesting discussions of perspective drawing tie in a bit of art history: "Perspective drawing is a form based in the rules of geometry allowing us to represent spatial depth on a two-dimensional surface, in short, a map" (90). Some impressive and intricate images of Dr. Newman's former students' work in this realm are included here.

The third chapter is titled "Maps as Power, Identity, and Utopia," and touches on many of the critical topics concerning equity, identity, power dynamics, and inclusion/exclusion that NACIS members have increasingly explored in recent years. Much of this chapter harmonizes well with the ideas in Mark Monmonier's *How to Lie with Maps* (2018). Discussions here utilize visual examples such as Betty Ng's *Disneytopia*, a representation of spaces designed for consumption, and Jeremy Bentham's *Panopticon*. The cartographer's familiar comparison of the Gall-Peters projection to Mercator is made in Figures 3.12 and 3.13 (148).

The first actual case study in "Case Studies," the book's final chapter, does not appear until the reader is more than twenty pages in. The initial portion is dedicated to a background discussion that, while relevant and interesting, not only assumes a substantial baseline knowledge about architecture, but makes numerous digressions into art history as well. There is, for example, a deep dive into the use of perspective by the Renaissance architect and surveyor Filippo Brunelleschi, and its relation to spatial projection. It is discussed as a form of mapping, through "a closer examination of the instrumentality of one of the views Brunelleschi constructed in the Piazza della Signoria looking toward the Palazzo Vecchio" (194). The author appears to assume these architectural landmarks are well known to the reader—and although a photograph of the palace is provided some pages later, it is not referenced in this discussion. In fact, the photo only comes after a detailed description of how Fibonacci's rod method of measurement contributed to perspective painting. This involved measuring building height via measured strips of parchment along a vertical rod—in much the same way an artist will eyeball proportions of a figure or scene against their pencil or brush handle—and contributed towards greater accuracy in spatial representations.

The first case study presents an interesting data visualization exercise where a student uses a photograph taken in the Florida Everglades and converts it to a series of representative mesh grids that are distorted on different axes based on pixel values derived from their color value. Newman explains that "The final mapping informed the design of an artificial canopy intended to mitigate or augment the natural canopy of the Florida site" (213). This useful example was a welcome reprieve from the meandering esoteric theoretical discussions tightly packed into the principal chapters. The other case studies are also intriguing, and lay a concrete foundation for understanding the author's broad definition of "mapping."

Dr. Newman's goal with *Data Visualization for Design Thinking* is, as she writes in her preface, "to help designers working with built environments make better maps" (x). Judging as an applied geographer and cartographer who has worked wholly in two-dimensional space, I recognize that the book provides a loose framework for understanding foundational concepts of mapping and cartography. However, despite the provision of a substantial number of inspiring figures, graphics, and data visualizations, this book is, at its core, a dense, scholarly text that is aimed at a niche audience well-versed in architectural and physical design concepts, and with the theoretical underpinnings of perception and representation.

There is much inspiration to be found in the well-documented descriptions of the historical advancement of different approaches to mapping varied perceptible phenomena. However, despite the thoughtful lessons contained within its pages for anyone looking to do applied graphic design and data visualization, the book seems to land somewhere between a historical reference/instructional manual for (spatial? graphical?) designers, and a coffee table book for data visualization nerds.

The reception and effectiveness of this book depends heavily on the audience and the context in which it is read. It contains substantial jargon with lengthy sentences of highly abstract theorizing. As a curious geographer with a background in spatial research, I could easily see myself digging into individual subsections with highlighter and pen in acute anticipation of heady discussions at the following week's seminar with fellow graduate-level colleagues. But to try to read this book individually and ruminate on the theories presented here is like trying to act out Shakespeare alone in a windowless room. *Applied Mapping*'s cerebral topics are ripe for dissection and debate amongst groups of practitioners of different types of spatial representation with certain knowledge prerequisites or experiences already fulfilled. Cartographers will find much interesting fodder for discussion here, but without an active and engaged book club to return to each week, the takeaways from this book are fleeting and amorphous.

For NACIS members who regularly attend the annual conference, this book is the opposite of Practical Cartography Day. In fact, the use of the term "Applied Mapping" in the title is only a nominal reference to the geospatially intensive work many NACIS members focus on. This is not meant to indicate that Dr. Newman's work is without merit for a working cartographer—only that the reader should understand that in this book "map" is a loosely defined design term rather than something from the more concrete and orthodox definition. While there is no doubt that any number of NACIS members embrace the many-sided idea of mapping central to Newman's book, and enjoy "thinking outside the neatline," any potential reader should be forewarned that this is strong medicine.

As already mentioned, this is not a book easily read in isolation (during a global pandemic, for example). There is a clear need for extended discussion section by section to really absorb the knowledge and concepts within these pages. Each subsection is thoroughly detailed and assiduously researched. However, for someone not immediately entrenched in the theory, the introduction is a slog and many of the sections feel exceedingly digressive. For example, perspective drawing in art is brought up as a precursor to map projections in Chapter 2 and then again given a thorough accounting in the introduction to the case studies in Chapter 4. Many ideas pertaining to mapping are repeated at seemingly random points throughout, then left in the dust of the barrage of philosophical argot. Arriving at Chapter 4's case studies section feels a relief. As a reader with zero background in design, it would have been useful to have started here.

However, the case studies chapter are also demonstrative of a more pervasive design issue that I didn't recognize until the very end. *Applied Mapping* is clearly a textbook meant to be accompanied by guided conversations and informed instruction, but on its own it seems to ignore some of the basic design principles that are discussed in the book itself. Organization, taxonomic hierarchy, and visual perception are all topics given specific attention throughout the nearly three hundred pages—yet the actual presentation of the material is rigidly uniform and difficult to navigate from a UX perspective; bolded subsection headings are the lone blazes along *Applied Mapping's* labyrinthine trail. I think most people can easily conjure memories of grade school science textbooks chock full of images, diagrams, and other visuals of the scientific world. Those texts frequently utilize a variety of not-so-subtle graphic design strategies to better organize and present what would otherwise be crowded text too opaque for most students. For example, color-coded call-out boxes with micro-examples are one way to break up text while providing on-topic reinforcement to the subject matter. No such visual cues are provided to orient the reader in this book.

That a more approachable experience might be achieved breaking up the individual chapters into graphically distinct sub-sections is exemplified by the discussion of *The Geological Investigation of the Alluvial Valley of the Lower Mississippi River* map on pages 92 and 93. As it stands, the body of the chapter's text, which includes a thoughtful and nuanced discussion of the map, runs on the left hand page, while on the right is a full page graphic and its description. The lessons, takeaways, and other interesting observations are buried—some in the text and others in the graphic's description. Had this discussion been broken out as a distinct block, it could have been more coherent and complete, and more easily assimilated as a package.

Most of the figures and diagrams have brief descriptions, but many (like Figure 4.41 on page 230) have substantial discussions that take up to a half page of space. There is clearly much valuable information and interpretation within the lengthy figure descriptions, but why one graphic gets a deeper exploration than another is never clear. I would contend that each chapter would benefit from a deep dive on a few figures rather than the rarely interrupted river of graphics we are given—with no hint as to which deserve real focus and reflection, and which are merely a visual reference. That this design strategy is deliberate is demonstrated by a visit to the book's companion website that provides little insight into the learning objectives of the subsections, meager links to online examples, and a few paragraphs selected from the introduction by way of explanation.

The visuals provided throughout the volume are often quite intricate, but in many cases they are oddly placed and their text is illegibly small. While I acknowledge that the author and layout designer were working within the confines of tight two-dimensional page real estate, the way that so many figures were crammed into so small a space does a disservice to both the work and the book. Actually mapping out the pages so that figures print on pages adjacent to the relevant text would make the book a lot more user friendly. For example, the text on page 91 refers to Figure 2.8 (a beautiful map of Amsterdam by Joan Blaeu) which is located and captioned a full ten pages later. Similarly, the reader is left to wonder why the Blaeu map (Figure 2.8) is discussed before Figures 2.1 and 2.2 are even mentioned (91). Absent a more user-centric layout, the reader is required to make an extremely meticulous examination of the text in order to make it referable over time. This lack of organizational flow is present throughout the book and can be stultifying. Perhaps the book's next edition could benefit from some restructuring around a more deliberate visual "mapping."

There is no doubt that putting together *Data Visualization for Design Thinking*: *Applied Mapping* was a monumental effort, but, to this geographer and cartographer, the result is clearly flawed. While it is totally possible that students of architecture and design may find some of my observations irrelevant, as someone who makes maps without any formal design instruction, I found the book an impressive piece of work that is overly complicated and intellectually baroque. I would love to one day take a class with Dr. Newman and pick apart some of the ideas contained within *Applied Mapping*. Until then, the concepts of applied mapping for data visualization design thinking will continue to reside mostly below my subconscious.

REFERENCE

Monmonier, Mark Stephen. 2018. *How to Lie with Maps*. Chicago: The University of Chicago Press.