ROCKPORT

Design for Information offers an integrative approach to learning basic principles for the visual presentation of information. The book surveys current visualizations that are analyzed for their content (information) as well as for their methods of presentation and design strategies (design). Chapters are organized around case studies that, working as sounding boards, provide the context for scrutinizing information design principles and discussion of the histories, theories, and best practices in the field. The selections represent a fraction of the effective graphics that we encounter in this burgeoning field, offering the reader an opportunity to extend the study to solutions in other fields of practice.

The book encourages three different levels of knowledge acquisition: historical, theoretical, and practical, with guidelines for the construction of visualizations. ***Design for Information*** provides readers with critical and analytical tools that can benefit the design process of visualizing data. Ultimately, the book promotes visual literacy while developing a practical design lexicon in the context of visualization of information.

About the Author

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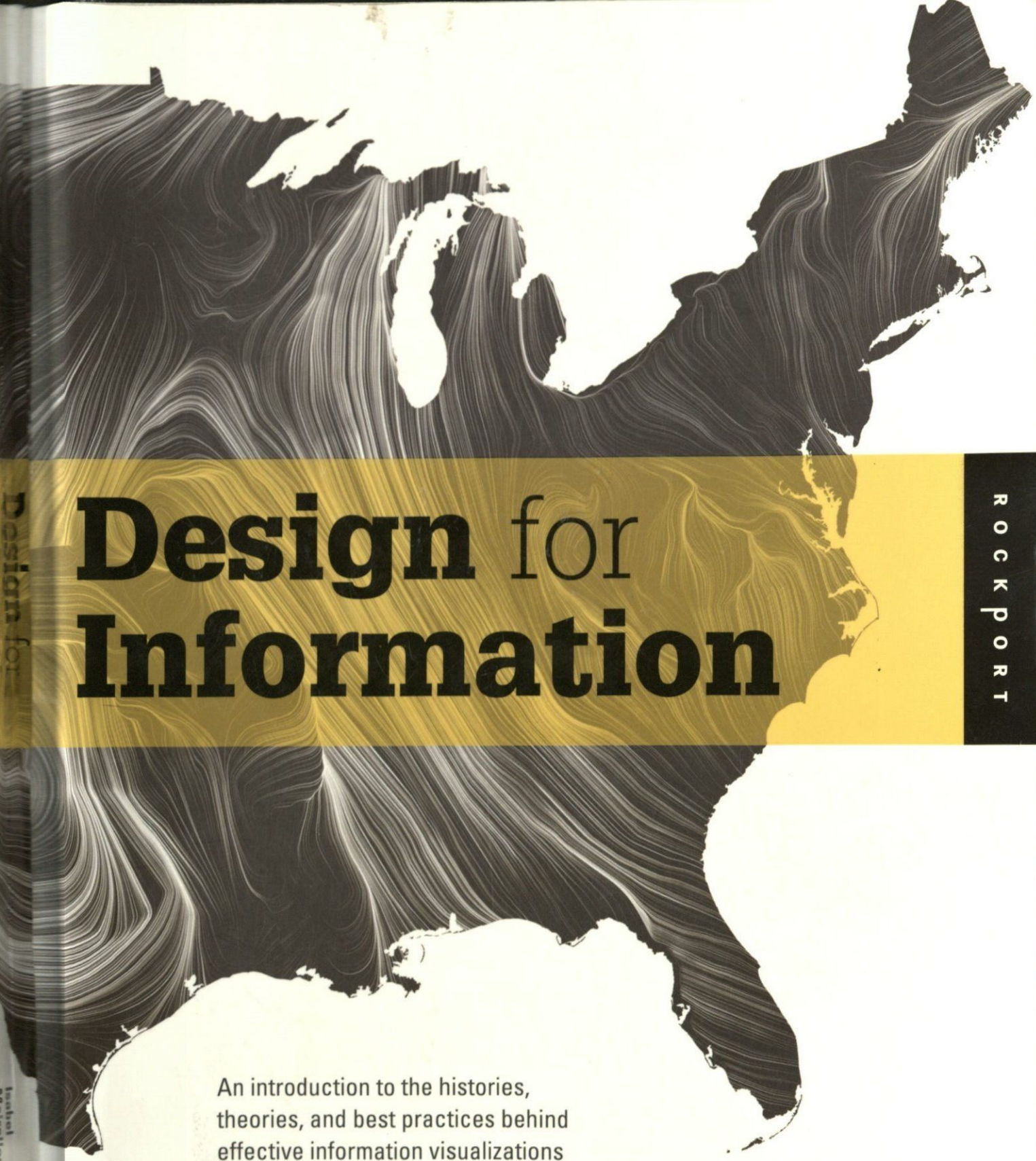


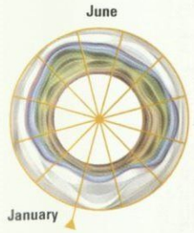
Design for Information

ROCKPORT

An introduction to the histories, theories, and best practices behind effective information visualizations

Isabel Meirelles

INTRODUCTION



Fernanda Viégas and Martin Wattenberg, U.S.: "Flickr Flow," 2009.

The circular flow of colors represents the Boston Common over time, with summer at the top, and time proceeding clockwise. After collecting photographs of the park at Flickr, Viégas and Wattenberg applied their own algorithm to calculate the relative proportions of different colors seen in the photos taken in each month of the year. The final output is a visual experiment whose materials are color and time.

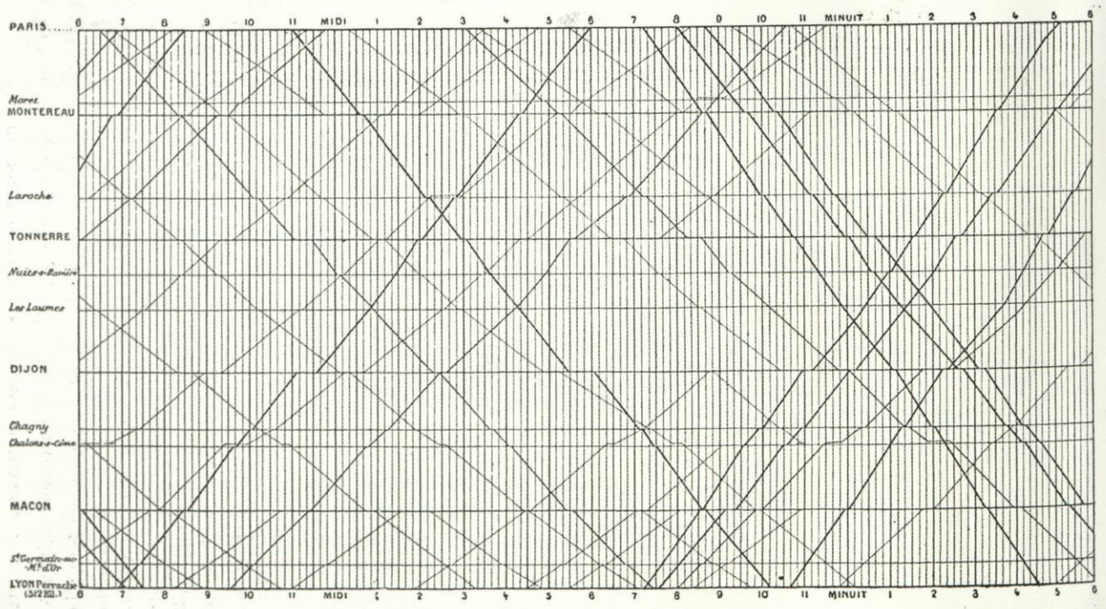
INTRODUCTION

Design for Information offers an integrative approach to learning basic methods and graphical principles for the visual presentation of information. The book surveys current visualizations that are analyzed for their content (information) as well as for their methods of presentation and design strategies (design). The objective is to provide readers with critical and analytical tools that can benefit the design process of visualizing data.

Chapters are organized around a main visualization that, working as a sounding board, provides the context for scrutinizing information design principles. The selection criteria considered visualizations that are representative of relevant graphical methods and, most important, can serve as a platform for discussions on the histories, theories, and best practices in the field. The selections represent a fraction of effective visualizations that we encounter in this burgeoning field, offering the reader an opportunity to extend the study to solutions in other fields of practice.

John Ogilby, U.K.: The Road from London to the City of Bristol, 1675.

This map was published in the *Britannia*, which is considered the first national road-atlas in Europe. The atlas presents over 100 folio-sized route maps in England and Wales. Michael Dover explains, "The maps, of seventy-five major roads and cross-roads, totalling 7,500 miles (12,500 kilometers), were presented in a continuous strip-form and, uniquely, on a uniform scale at 1 inch (2.5 cm) to a mile (1.6 kilometers). Of the hundred sheets of roads, most depicted a distance of about 70 miles (112 kilometers) on one sheet. The road is shown as a series of parallel strips. The surveyors noted whether the roads were enclosed by walls or hedges, or open, local landmarks, inns, bridges, (with a note on the material of construction), fords and sometimes cultivation in the countryside on either side of the road."[3]



Etienne-Jules Marey, France: Paris–Lyon Train Schedule, 1885.

The graphic uses a method attributed to the French engineer Ibry, in which lines represent distances traveled in relation to the time taken to traverse them. At a glance, we learn several levels of information, from the micro level of a specific line and time in which trains stop at a particular city, to a macro-level comparison between speeds of trains in both directions, to and from Paris.

Harry Beck, U.K.: London Tube Map, 1933.

The method devised by Beck has been used all over the world to communicate subway systems. Note the use of only two angles to represent all lines as well as the equidistance between stations.

I firmly believe that a full understanding of how others have solved (design) problems enables one to successfully develop a set of skills that may be deliberately accessed for use in expert and productive ways.

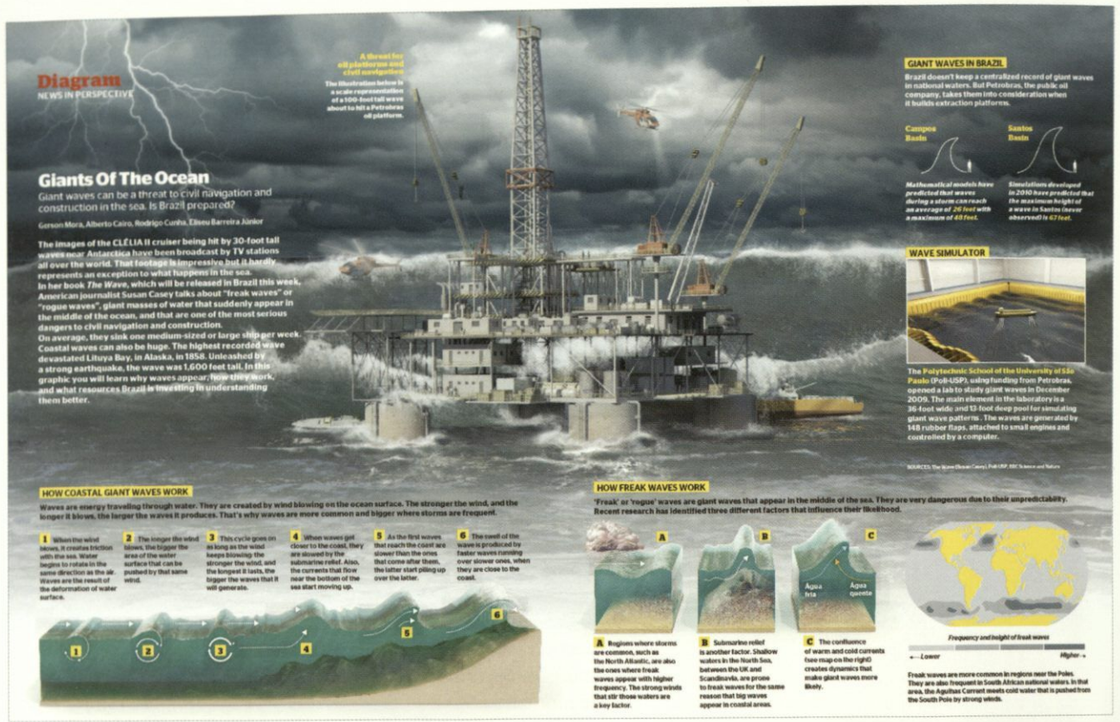
SKILLS

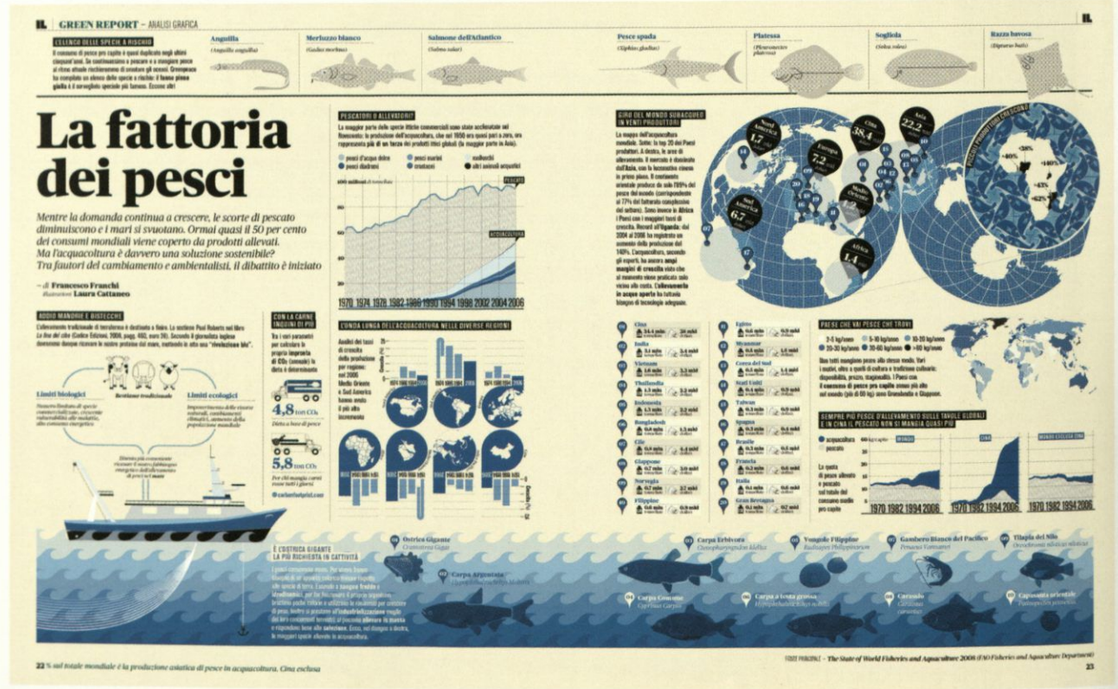
Representing multidimensional information structures in a two-dimensional visual display is not trivial. The design process requires both analytical and visual/spatial methods of reasoning. Graphic design in general, and information design in particular, depend upon cognitive processes and visual perception for both its creation (encoding) and its use (decoding). If the decoding process fails, the visualization fails.

Understanding the constraints and capabilities of cognition and visual perception is essential to the way we visualize information. From cartography to computational methods, from statistics to visual perception, skills are examined in the context of the selected visualizations.

My goal is to bridge the technical requirements with the design aspects of visualizations, with an emphasis on the latter. To this end, I bring established scientific theories to clarify and enhance how we organize and encode information, including suggested readings and sources for further investigation. It is my hope that this book will help broaden the dialogue and reduce the gap between two communities—designers and scientists—and foster problem-solving skills in designing for information.

Although this book targets design students, it can be helpful to students in other disciplines involved with visualizing information, such as those in the (digital) humanities and in most of the sciences. This book encourages three different levels of knowledge acquisition: theoretical, historical, and practical, with guidelines for the construction of visualizations. Ultimately, this book promotes visual literacy while developing a practical design lexicon in the context of visualization of information.





Gerson Mora, Alberto Cairo, Rodrigo Cunha, and Eliseu Barreira, Brazil: Infographic on "Giant Waves," 2010.

The magazine spread describes the phenomena of giant waves, from their formation to how they affect offshore oil platforms. Translated from Portuguese from the original infographic published in *Revista Época*.

Francesco Franchi (art director) and Laura Cattaneo (illustration), Italy: "Green Report and Global Report," 2009

The infographic describes the state of world fisheries and aquaculture. In *IL–Intelligence in Lifestyle*, Number 11 (Settembre 2009): 22–23.

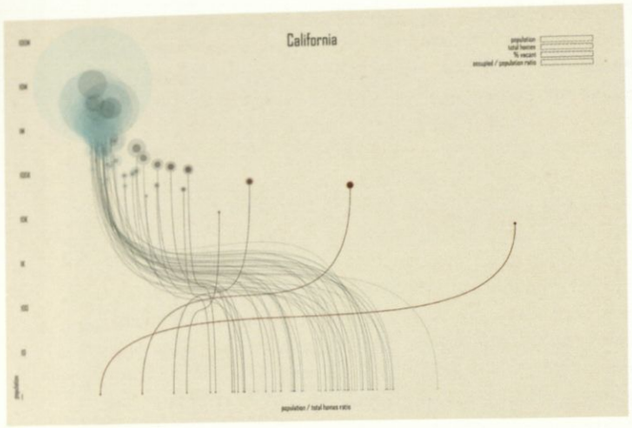
A FEW DEFINITIONS

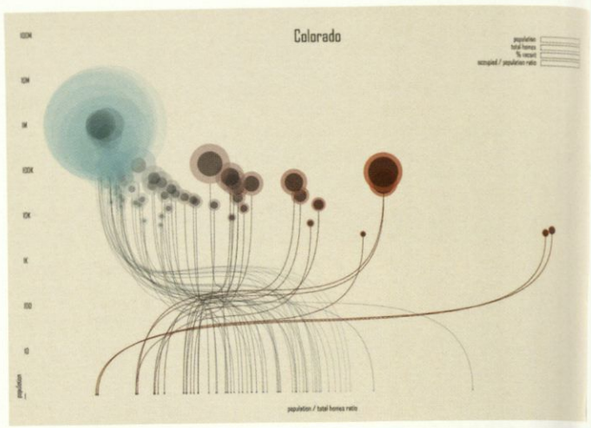
The graphic design community mostly uses two terms for the visual displays of information: **infographics** and **information design**. In a nutshell, infographics stand for visual displays in which graphics (illustrations, symbols, maps, diagrams, etc) together with verbal language communicate information that would not be possible otherwise. Infographics can range from early scientific illustrations of the human body to modern representations of how the brain functions, from early route maps and train schedules to the emblematic London subway map. Journalism as well as technical and pedagogical books employ established practices that traditionally have used infographics to explain complex information and tell stories. From the familiar weather map to visual explanations of natural phenomena and recent facts, infographics help us better understand the news around us.

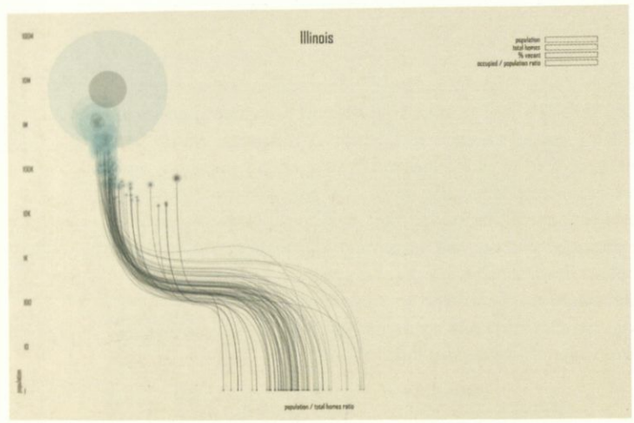
Information design, on the other hand, is broadly used to describe communication design practices in which the main purpose is to inform, in contrast to persuasive approaches more commonly used in practices such as advertising. Infographics is one of the possible outputs within the large information design discipline. Other possible outputs involve the design of systems, which can be exemplified by information systems, wayfinding systems, and visualizations of statistical data. All examples share the common objective of revealing patterns and relationships not known or not so easily deduced without the aid of the visual representation of information. Traditionally, infographics and design of systems were static visual displays. With the advances and accessibility of technology, we currently see an expanding practice in interactive and dynamic visual displays for information.

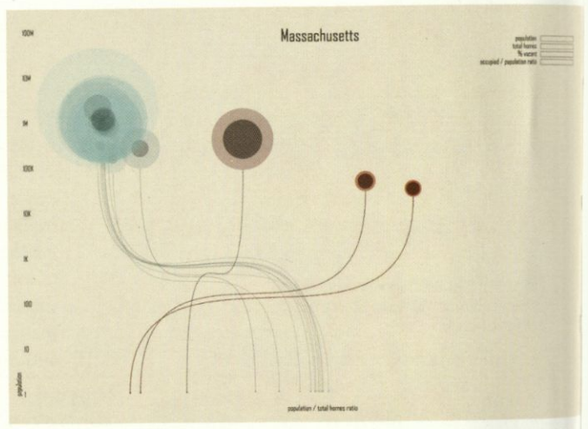
Bureau Mijksenaar, Netherlands: Digital interactive wayfinding system for Amsterdam RAI, 2010.

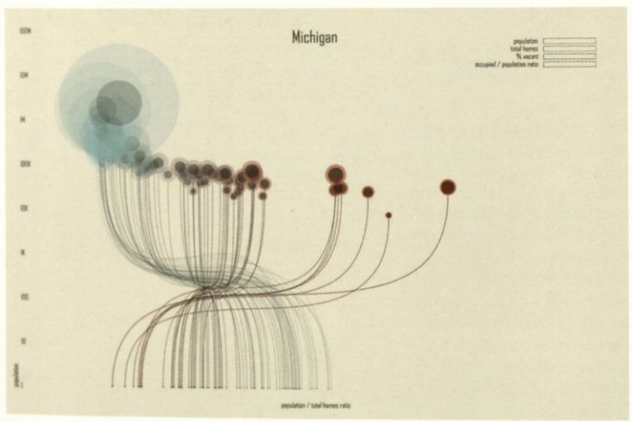
Amsterdam RAI is an exhibition and convention center with 500 events, 12,500 exhibitors, and 2 million visitors a year. Because of the changing character of the center (type of event, exhibition size, entrances in use, facilities), Mijksenaar developed a digital interactive wayfinding system with customized information about current events and facilities. RAI Live combines event and exhibition signage with the possibility to give every exhibition its own character (look and feel) and show content (advertising, promotion, and infotainment). This exhibition signage can be altered and placed as desired according to the actual demands of the exhibitors.

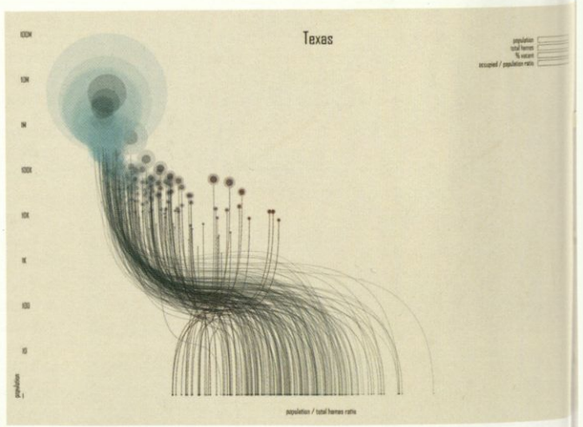












Jan Willem Tulp, Netherlands: "Ghost Counties," 2011

This project, by Tulp, a Dutch information visualizer, won the visualization challenge organized by visualizing.org and Eyeo Festival: "Create an interactive portrait of America by visualizing the 2010 Census data." "Ghost Counties" was developed using Processing environment and plots data for all counties in the United States by state. Each circle stands for a county, where the size of the outer circle represents the total number of homes and the size of the inner circle represents the number of vacant homes. The visualization uses a scatterplot technique with a double *x*-axis. The first *x*-axis represents the number of vacant homes per population, which is then connected with curved lines to the second *x*-axis, which shows the population-to-home ratio. In most cases, the second *x*-axis is the inverse of the first *x*-axis, but not always. The *y*-axis measures the population size. The number of vacant homes is color coded by a blue-red sequence, where blue represents few vacancies and red represents many vacancies. Interaction with the bubbles brings additional statistics at the top right corner. The visualization reveals some interesting insights, such as counties that have more homes than people or counties that have more than 50 percent vacant homes.

http://tulpinteractive.com/projects/ghostcounties

Data visualization and **information visualization** are terms often found within the scientific community to refer to "the use of computer-supported, interactive, visual representations of abstract data to amplify cognition," according to *Readings in Information Visualization: Using Vision to Think* by Card et al.[1]

Independent of the term, the analytical methods, the media, and the source field of knowledge, I use information design and information visualization interchangeably in this book. The focus is on visual displays in which graphical approaches play a central role in communicating information in a meaningful way. Information visualizations are ubiquitous and critically important to understanding several fields today. With the omnipresent access to large amounts of data, computational techniques have become integral to the burgeoning practice of visualizing data. This book briefly introduces the programming languages, techniques, and algorithms used in the selected visualizations, and points to additional resources for further study.

DESIGNING FOR INFORMATION

Another point of discussion between the design and the scientific communities relates to the purpose of visualizations, whether they serve as a means to communicate stories and research findings or as a platform for data manipulation and exploration. The selected visualizations cover both functions, and rather than dwelling on the distinctions, the projects are examined in relation to how they help produce knowledge.

Visual displays of information can be considered cognitive artifacts, in that they can complement and strengthen our mental abilities.[2] I examine the visualizations in relation to the cognitive principles underlying them, which can be a combination of the following:

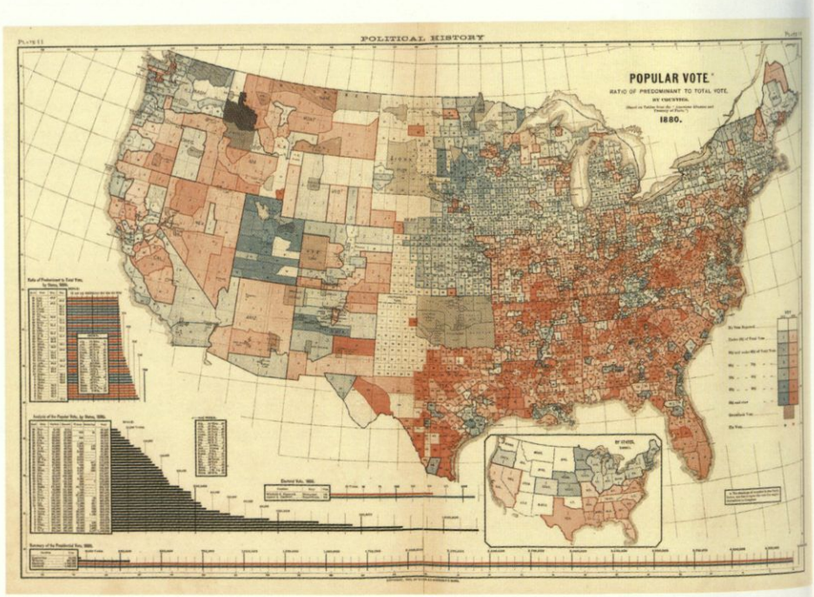
- to record information;
- to convey meaning;
- to increase working memory;
- to facilitate search;
- to facilitate discovery;
- to support perceptual inference;
- to enhance detection and recognition;
- to provide models of actual and theoretical worlds;
- to provide manipulation of data.

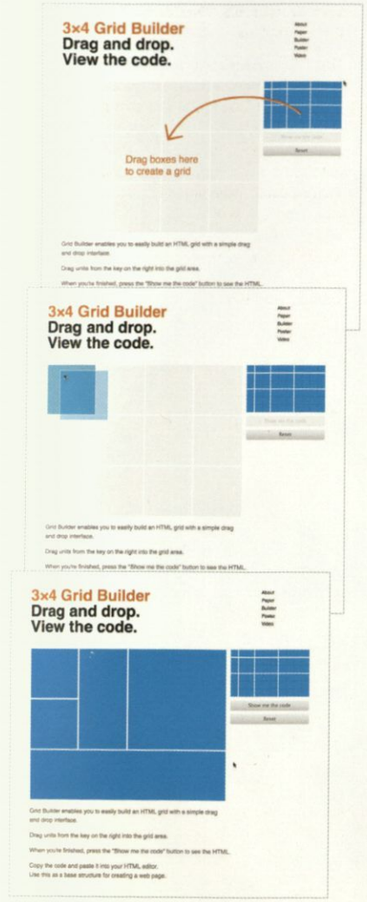
Mark Newman, U.S.: "Presidential Election Cartogram," 2012.

The 2012 presidential election cartogram shows county-level election results, where the sizes of counties are rescaled according to their population. The map uses not just the two party colors, red (Republican) and blue (Democrat), but also shades of purple in between to indicate percentages of votes. The result is a country more evenly divided politically. Mark Newman, Center for the Study of Complex Systems at the University of Michigan, used the diffusion method of Gastner and Newman to make this cartogram.

Fletcher W. Hewes and Henry Gannett, U.S.: *Statistical Atlas of the United States*, 1883.

This map in Scribner's *Statistical Atlas of the United States* shows the popular vote in 1880 mapped according to the ratio of predominant to total vote by counties.

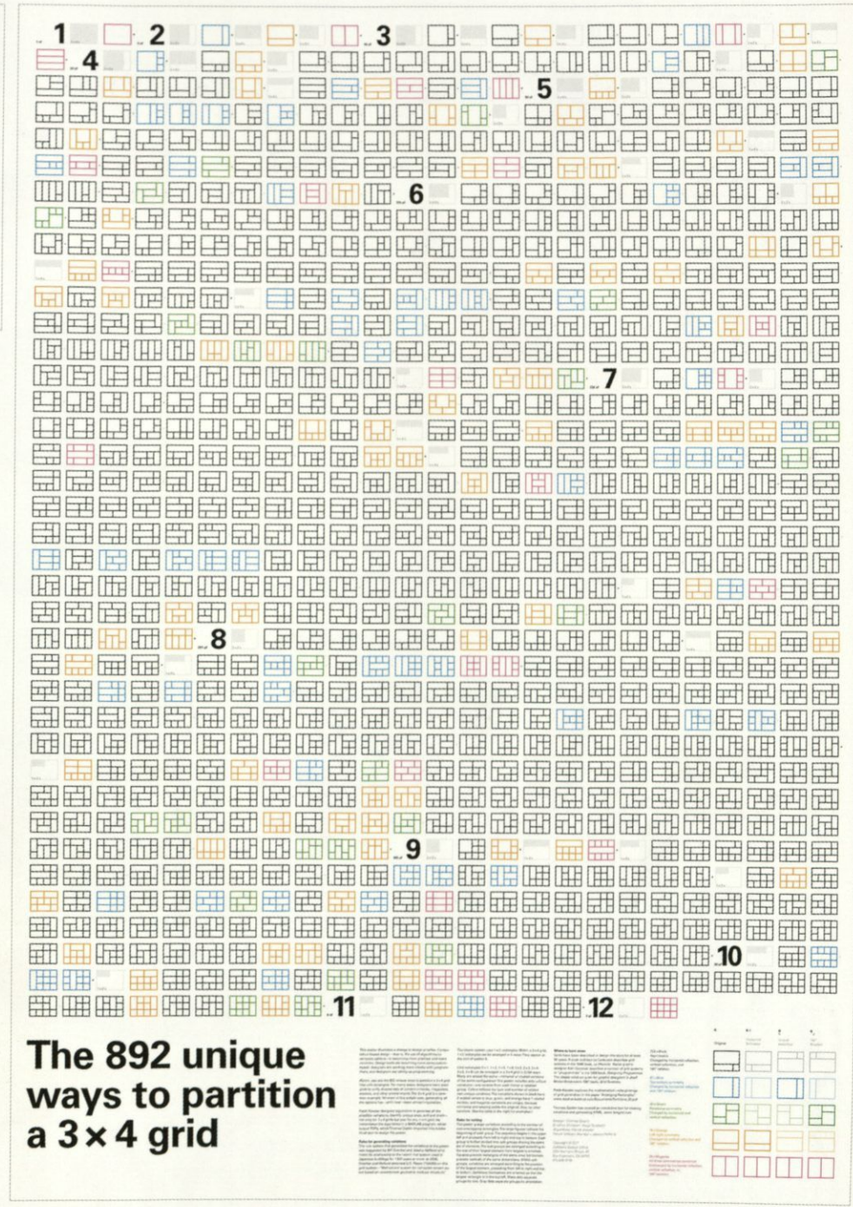




Hugh Dubberly (creative direction), Thomas Gaskin (design), and Patrick Kessler (algorithms) Patent belongs to William Drenttel and Jessica Helfand, U.S.: "3 x 4 Grid," 2011.

The poster presents the 892 unique ways to partition a 3 × 4 grid into unit rectangles. The website introduces a grid builder that allows anyone to build an HTML grid with a drag-and-drop interface. The project "illustrates a change in design practice. Computation-based design—that is, the use of algorithms to compute options—is becoming more practical and more common. Design tools are becoming more computation-based; designers are working more closely with programmers; and designers are taking up programming."[4]

www.3x4grid.com



First Chapter

The Origin of Species
Charles Darwin
Fourth Edition, 1866

Last Chapter

Complete Organism

Chapters

Subchapters

Paragraphs

Sentences

(En)tangled Word Bank

Greg McInerny & Stefanie Posavec