

# Preface

Art or science? Which of these is the right way to think of the field of visualization? This is not an easy question to answer, even for those who have many years of experience in making graphical depictions of data with a view to helping people understand them and take action. When we look at beautiful hand-drawn pictures of data, carefully composed by talented individuals, we are drawn to the artistic side. In some ways those charts are discouraging; their artistic elegance implies that the creation of good visualizations is not an option for most of us. There are books that provide rules and advice on how to draw graphs. Some give general advice, suggesting that such and such is good, but this other is bad. Others give specific advice such as requiring all charts to have a title or all axes to go to zero, but these are often tied to specific visualizations and so are not general enough to qualify as scientific principles. They are valuable for describing existing visualizations, but not general enough to provide guidance for future visualizations. If you are designing something new, advice on a bar chart is not especially helpful.

In this book I want to bridge the gap and not simply give rules and advice but base these on general principles and provide a clear path between them, so that the rules and guidance fall into place naturally, due to knowledge of those principles. In terms of the art/science split, I want to advance the scientific component. There are excellent books describing artistically superb plots; however, my goal is not simply to be descriptive, but to be *prescriptive* – to allow people to start with a goal in mind and design a visualization that fulfills that goal clearly, truthfully, and actionably. Because I have an essentially scientific direction in mind, I will concentrate on reproducibility. A chart that is wonderful for exactly one data set is of little interest. It can be appreciated and enjoyed, but the important question must always be: What can I learn from this graphic that I can apply to other data? With this in mind, the examples in this book have been chosen to be realistic rather than exemplary. I have made a definite attempt not to choose data that make a picture look good, but rather to choose data for which a chart should be applicable. If the result is not perfect, I prefer to present imperfection and explore remedies rather than look for a different data source.

This book is concerned with the graphical representation of *time* data. Time is *special* – it doesn’t behave quite like other variables. It has an inherent direction and determines causality. Time can be recorded in many ways: it can be linear or cyclic, categorical or continuous. Even the written format of a piece of time data can be curiously baroque; mixtures of words, numbers, and special symbols make up the time “Monday the 13th of October, 11:45 am.” What other form of data might occur in so obscure a format? All data are recorded at a certain time, and so all data have a time component, even if it has been removed or deemed *a priori* as uninteresting. This makes time data both unique and universal, so understanding how best to portray them not only is challenging but has wide applicability.

The portrayal of time data is ubiquitous. Any newspaper will feature time-based plots; any company report will show historical data as charts. Even the gas bill for my home invites me to compare a time series of the cost of heating my home against one of average monthly temperature. Because of this generality, I have written this book to cover a range of different users. A visualization expert designing tools for displaying time will find it valuable, but so also should a financier assembling a report in a spreadsheet or a medical researcher trying to display gene sequences using a commercial statistical package. You have data, you have a goal in mind. Now all you need are the tools to graph the data and so achieve the goal. Read on!

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Visualizing Time

Designing Graphical Representations for Statistical  
Data

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