

Part I

An Introduction To Visualization

Part I of this book consists of four chapters. [Chapter 1](#) provides a commonsense review of visualization. We briefly examine mathematics, reading, and science teaching for clear and obvious uses of visualization. The commonsense view is that visualizations provide realistic depictions of the world. Closer examination reveals, however, that for many visualizations realistic depiction is neither their function nor intention. Indeed, they work precisely because of their abstraction and idealization. [Chapter 2](#) provides a history of how visualization entered psychology, beginning with Sir Francis Galton's explorations in the 1890s and tracing a line of research into the twenty-first century and of how it has developed in science, with a reconstruction of views on the use of visualization in scientific writing from Galileo to the twentieth century. The chapter also traces how scientific visualizations become tied closely to computers, but shows how similar issues in creating and interpreting visualizations remain, despite the changing technologies for producing them. [Chapter 3](#) deals with a core issue for the volume—how contemporary theorists conceptualize visualization. The first two questions we address in the book are answered: (1) How is visualization defined in the literature? (2) What constitutes a good visualization, and what is necessary for individuals to interpret and evaluate them? The chapter also outlines the data sources and methods that were examined in answering all five questions. Twenty-eight distinct definitions of visualization were identified in the literature. However, these definitions pointed to a more parsimonious three-fold distinction between visualization objects, introspective visualizations, and interpretative visualizations that simplifies the discussion. Also, we found several useful guidelines, rather than clear-cut rules for dealing with colour, realism, relevance, interactivity, animation, and other characteristics of visualizations that can affect their quality and effectiveness. [Chapter 4](#) looks at the basic mechanisms at work in visualization and shows where there is agreement and where there is disagreement in our understanding of how visualization can work in human cognition. Three alternative theories are presented and discussed and some of their implications for the production of visualization objects are explained.