VISUAL DISPLAY OF QUANTITATIVE INFORMATION

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Introduction

- Quantitative Data Graphics
  - Visually display measured quantities by means of the combined use of points, lines, a coordinate system, numbers, symbols, words, shading, and color
- Usage of Data Graphics
  - Much more than simply substituting for small statistical tables
  - Instruments for reasoning about quantitative information
  - Most effective way to describe, explore, and summarize a set of numbers (even a very large set)
  - Of all methods for analyzing and communicating statistical information, well-designed data graphics are usually the simplest and at the same time very powerful

Visual Perception of Quantitative Information

- Channel Capacity (Miller, 1956)
  - The number of stimuli that can be perceived by humans without confusion is limited
  - Human ability to identify absolutely the magnitude of a one-dimensional stimulus is limited to approximately seven, plus or minus two items
  - Capacity expands by increasing the number of dimensions along which the stimuli can differ

- Just Noticeable Difference (JND)
  - The smallest difference that a person can detect
  - Ordering of some commonly used graphical attributes in terms of their accuracy of visual decoding of quantitative variables (Cleveland, 1987)
    - 1. position along a common scale; 2. position along identical, nonaligned scales

      3. length; 4. angle; 4-10. slope (depending on the magnitudes of two slopes, two line lengths or some other geometric aspects); 6. area; 7. volume; 8. density; 9. color saturation; 10. color hues