The Art of Data Presentation

Raj Jain
Washington University in Saint Louis
Saint Louis, MO 63130
Jain@cse.wustl.edu

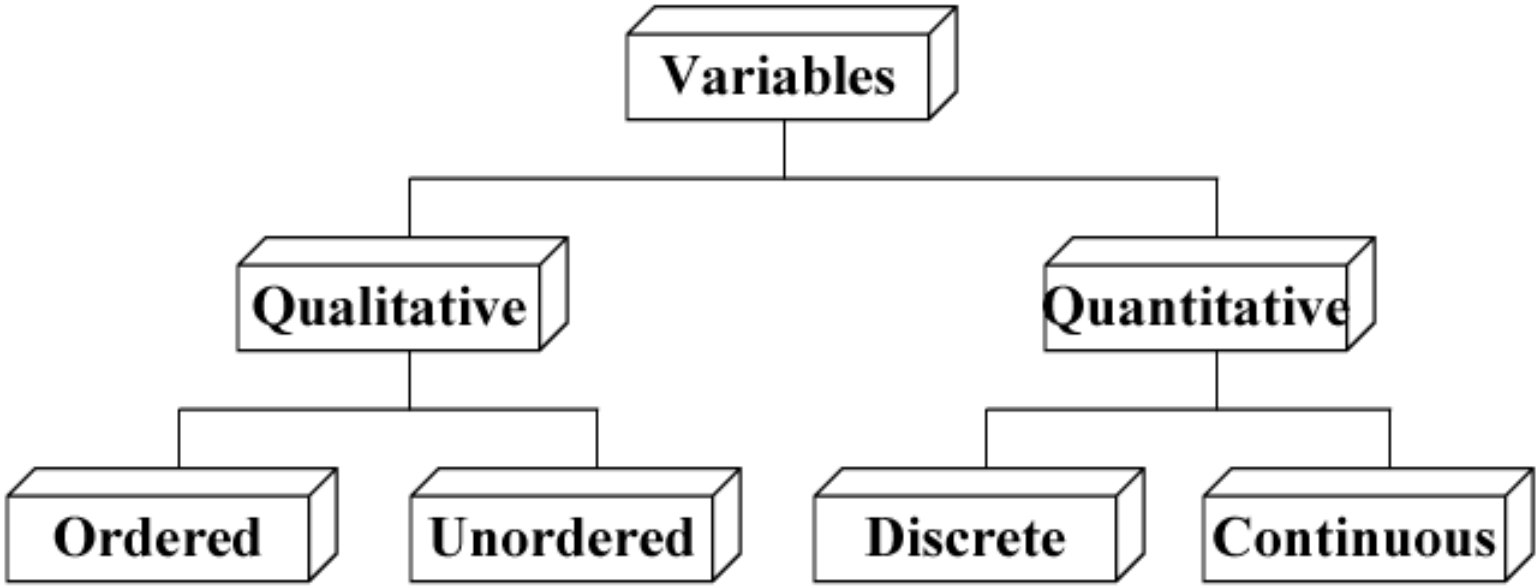
These slides are available on-line at:

http://www.cse.wustl.edu/~jain/cse567-15/

Overview

- Types of Variables
- Guidelines for Preparing Good Charts
- Common Mistakes in Preparing Charts
- Pictorial Games
- Decision Maker's Games

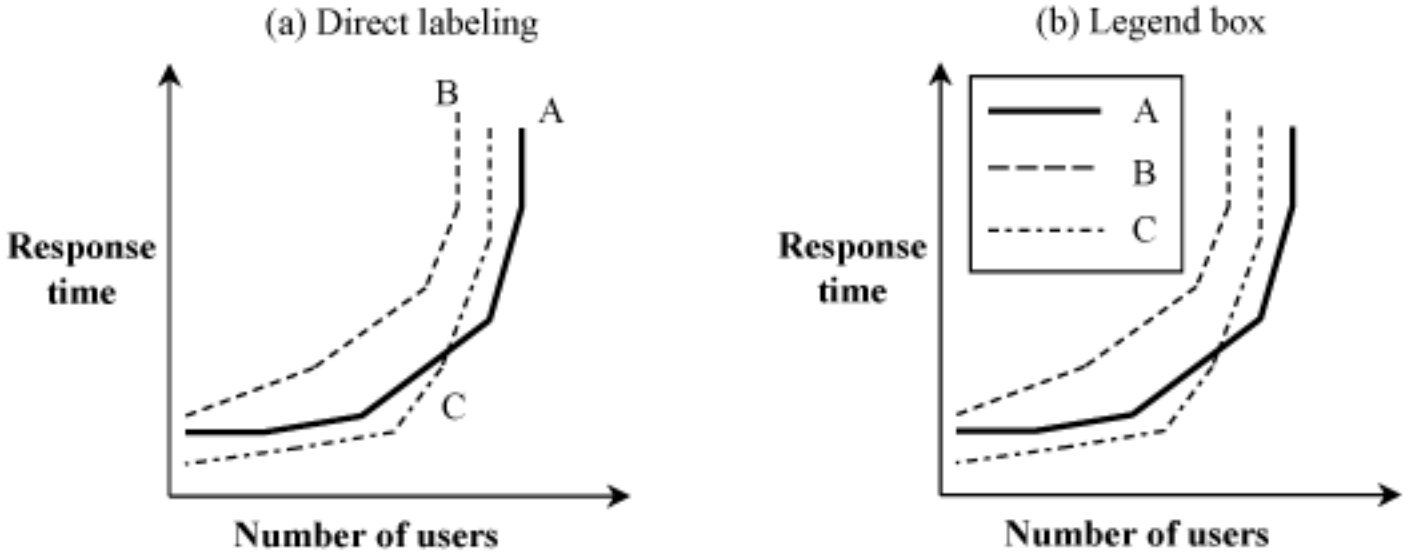
Types of Variables



- Type of computer: Super computer, minicomputer, microcomputer
- Type of Workload: Scientific, engineering, educational
- Number of processors
- Response time of system

Guidelines for Preparing Good Charts

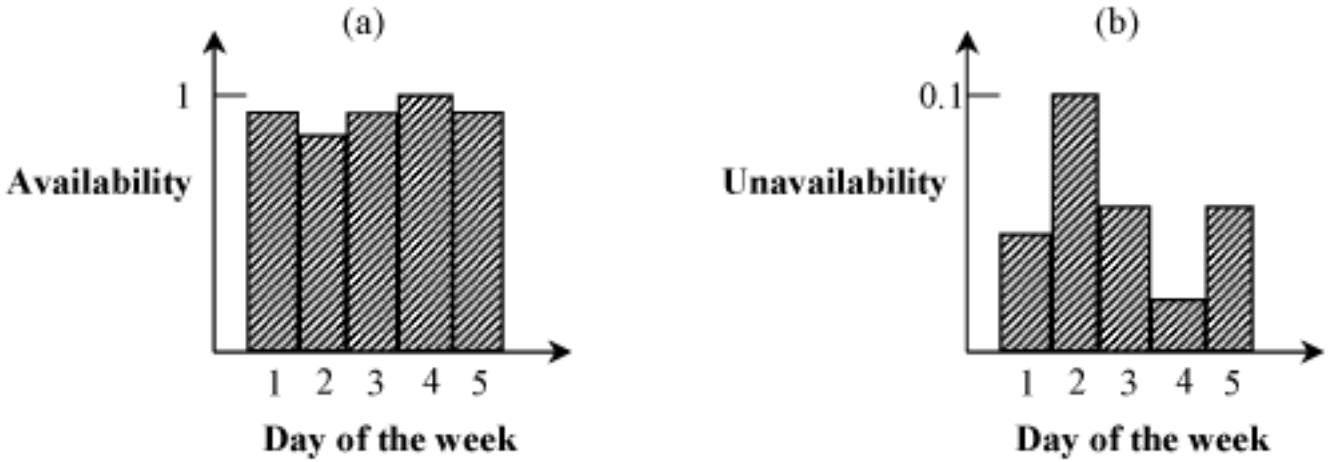
- Require minimum effort from the reader
  Direct labeling vs. legend box



- Maximize Information: Words in place of symbols
  Clearly label the axes

Guidelines (cont)

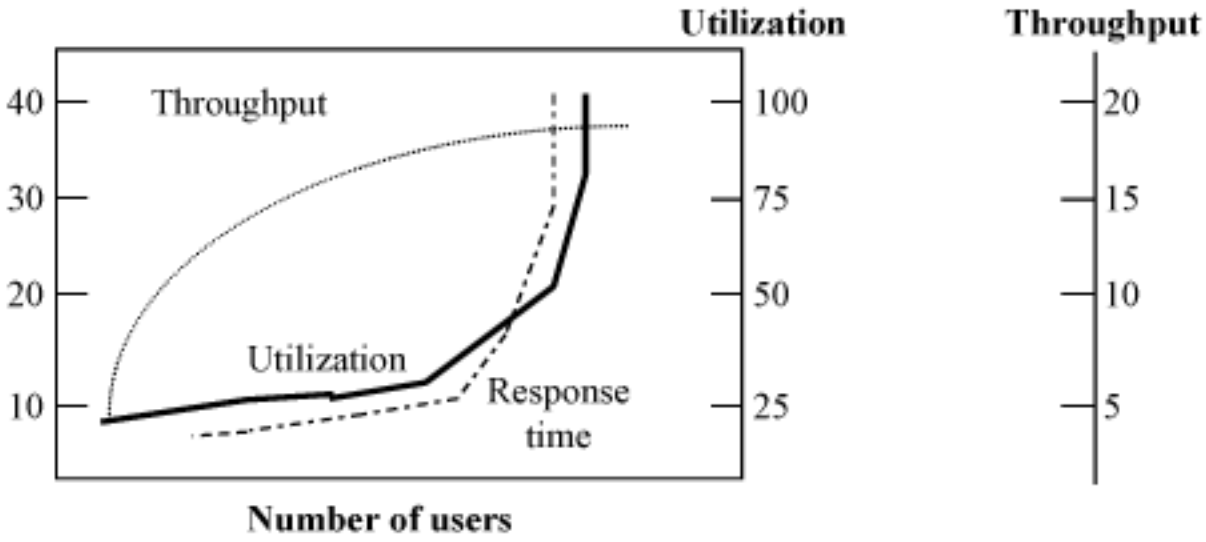
- Minimize Ink: No grid lines, more details



- Use Commonly accepted practices: origin at (0,0) Independent variable (cause) along x axis, linear scales, increasing scales, equal divisions
- Avoid ambiguity: Show coordinate axes, scale divisions, origin. Identify individual curves and bars.
- See checklist in Box 10.1

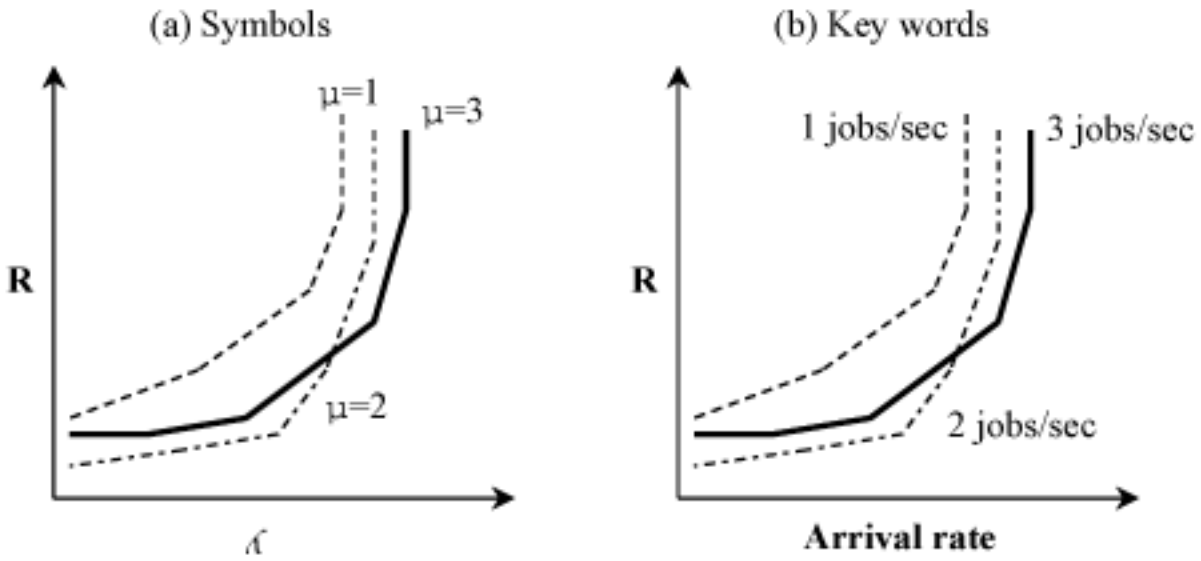
Common Mistakes in Preparing Charts

- Presenting too many alternatives on a single chart
  Max 5 to 7 messages ⇒ Max 6 curves in a line charts, no more than 10 bars in a bar chart, max 8 components in a pie chart
- Presenting many y variables on a single chart



Common Mistakes in Charts (Cont)

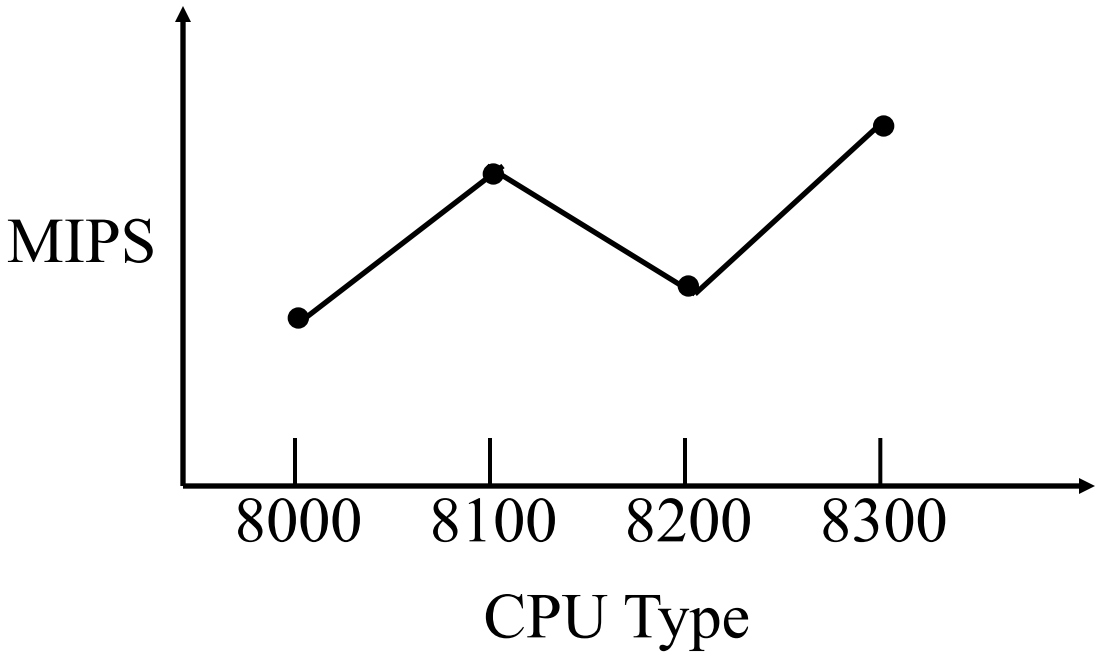
- Using symbols in place of text



- Placing extraneous information on the chart: grid lines, granularity of the grid lines
- Selecting scale ranges improperly: automatic selection by programs may not be appropriate

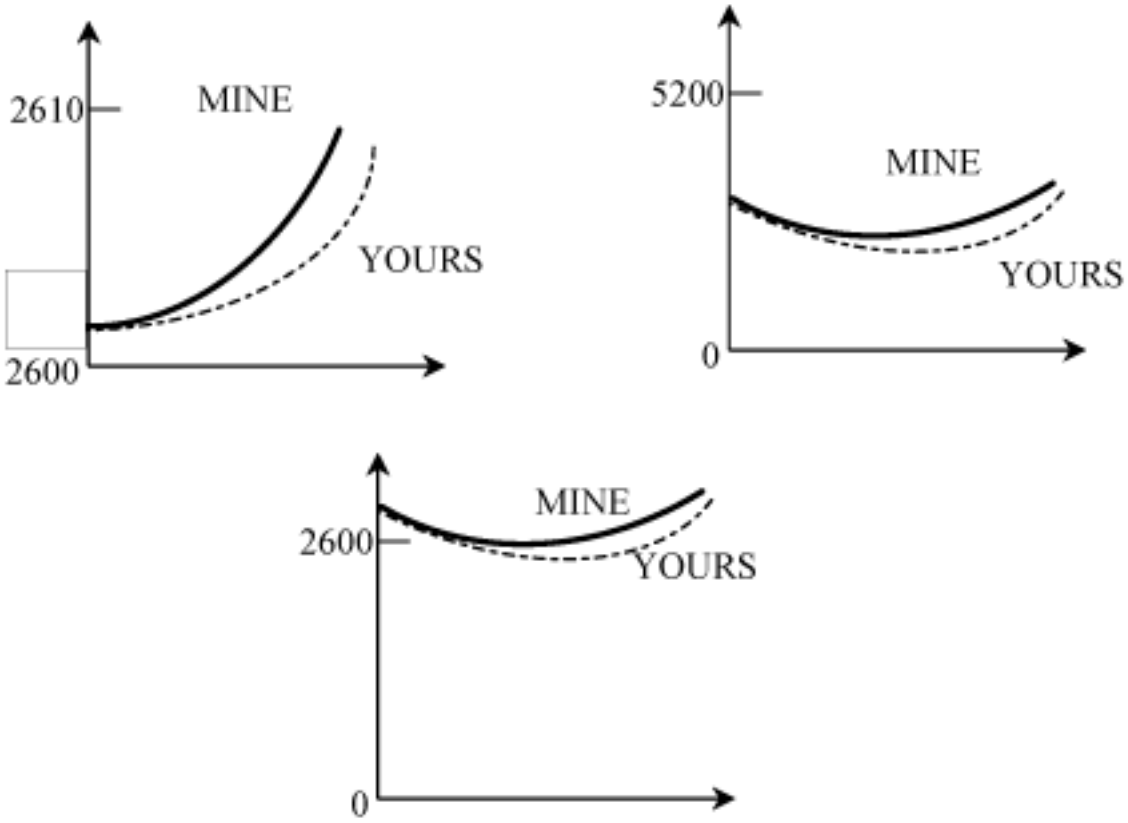
Common Mistakes in Charts (Cont)

- Using a line chart in place of column chart:
  Line ⇒ Continuity



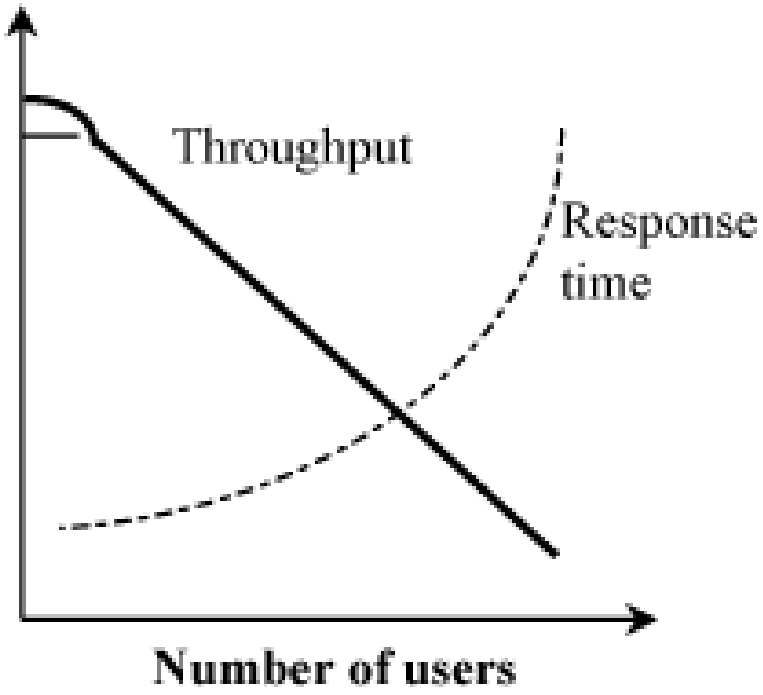
Pictorial Games

- Using non-zero origins to emphasize the difference
  Three quarter high-rule ⇒ height/width > 3/4



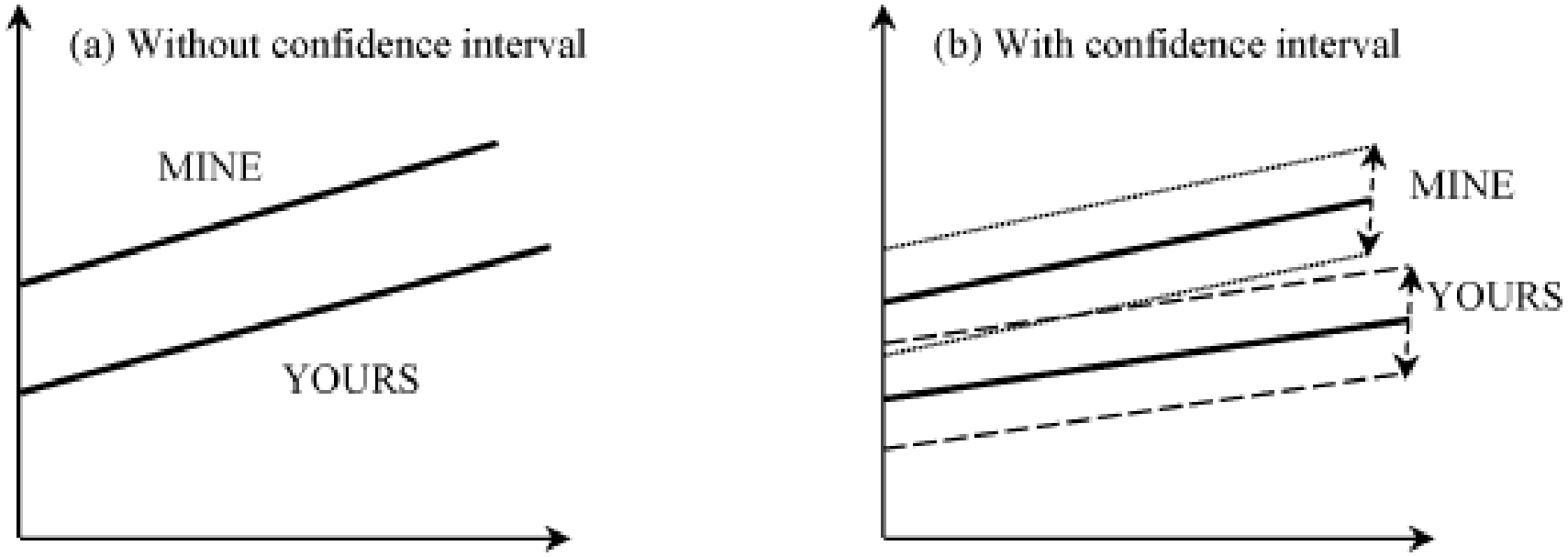
Pictorial Games (Cont)

- Using double-whammy graph for dramatization
  Using related metrics



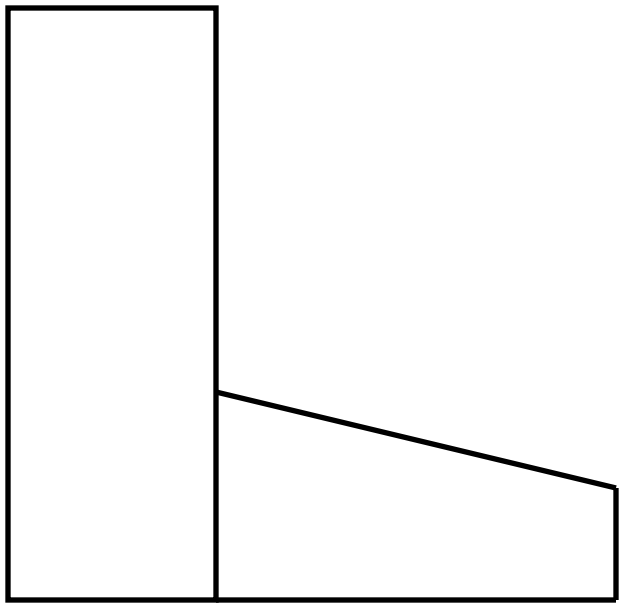
Pictorial Games (Cont)

- Plotting random quantities without showing confidence intervals

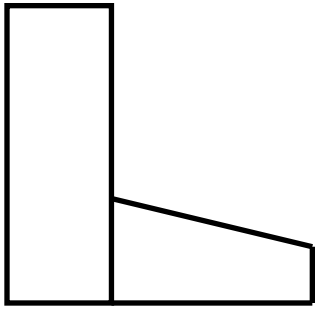


Pictorial Games (Cont)

- Pictograms scaled by height



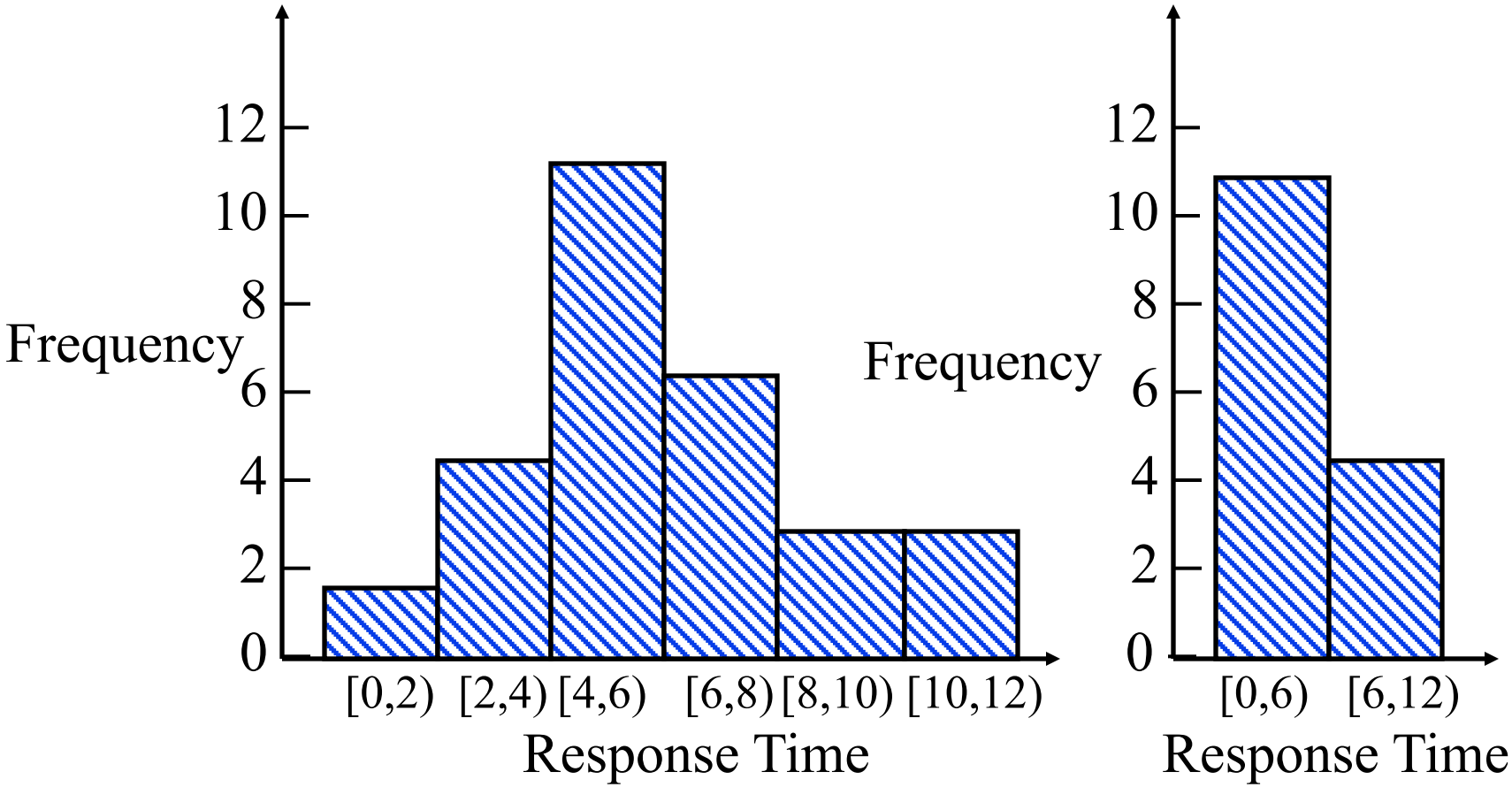
Mine
Performance = 2



Yours
Performance = 1

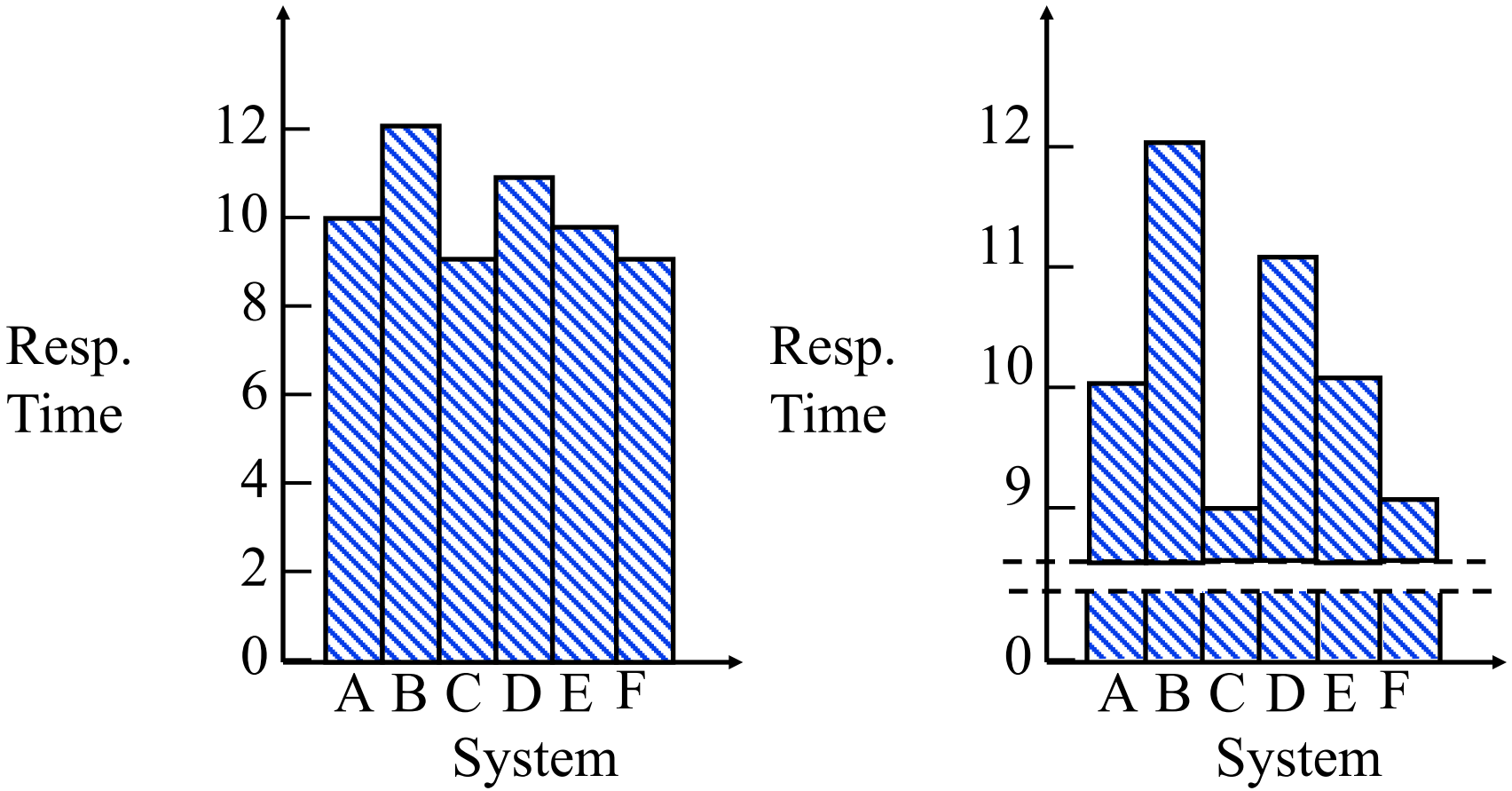
Pictorial Games (Cont)

- Using inappropriate cell size in histograms

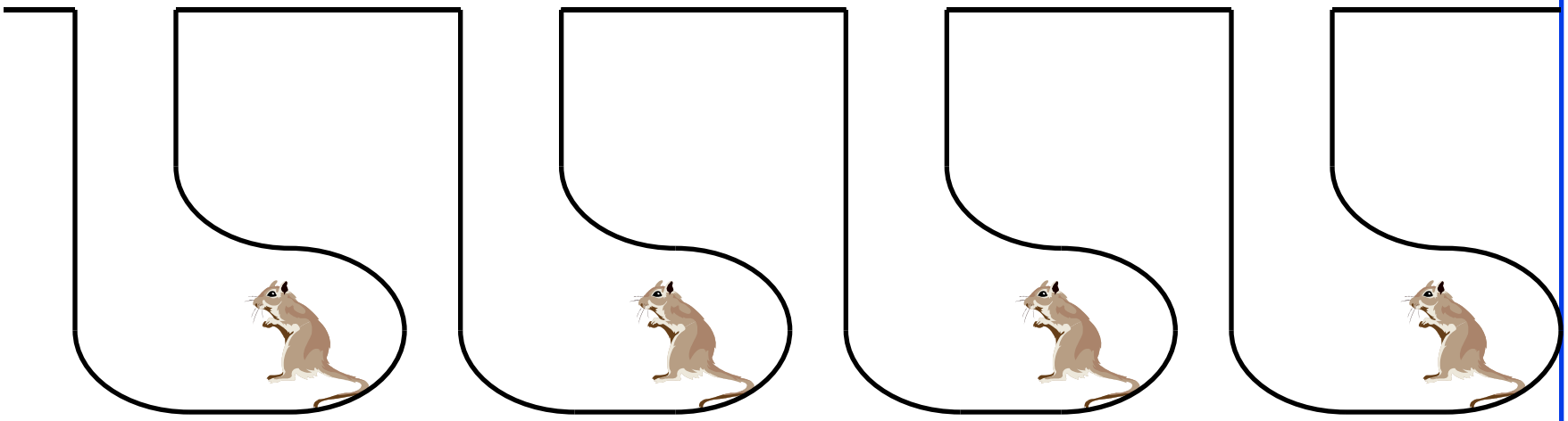


Pictorial Games (Cont)

- Using broken scales in column charts



Performance Analysis Rat Holes

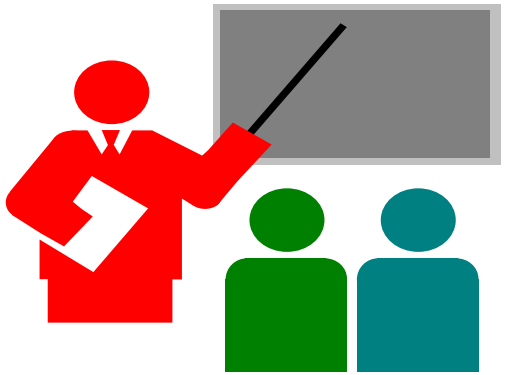


Reasons for not Accepting an Analysis

- This needs more analysis.
- You need a better understanding of the workload.
- It improves performance only for long IOs/packets/jobs/files, and most of the IOs/packets/jobs/files are short.
- It improves performance only for short IOs/packets/jobs/files, but who cares for the performance of short IOs/packets/jobs/files, its the long ones that impact the system.
- It needs too much memory/CPU/bandwidth and memory/CPU/bandwidth isn't free.
- It only saves us memory/CPU/bandwidth and memory/CPU/bandwidth is cheap.

See Box 10.2 on page 162 of the book for a complete list

Summary



1. Qualitative/quantitative, ordered/unordered, discrete/continuous variables
2. Good charts should require minimum effort from the reader and provide maximum information with minimum ink
3. Use no more than 5-6 curves, select ranges properly, Three-quarter high rule
4. Workload, metrics, configuration, and details can always be challenged. Should be carefully selected.

Exercise 10.1

What type of chart (line or bar) would you use to plot:

a. CPU usage for 12 months of the year
b. CPU usage as a function of time in months
c. Number of I/O's to three disk drives: A, B, and C
d. Number of I/O's as a function of number of disk drives in a system

Homework 10: Exercise 10.2

- List the problems with the following charts