Topic Notes

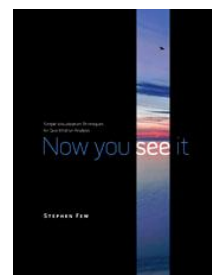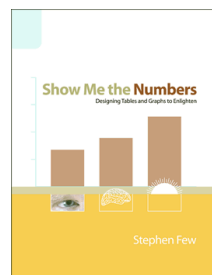# Few's Design Guidance

CS 7450 - Information Visualization
September 22, 2011
John Stasko

Today's Agenda

Show Me the **Numbers**
Designing Tables and Graphs to Enlighten

Stephen Few

Now you see it

STEPHEN FEW

Stephen Few &
Perceptual Edge

Stephen Few's Guidance

- Excellent advice for the design of tables and graphs

- Page references are from *Now You See It*

- Let's review some of his recommendations
  – We explored chapters 1-4 earlier
  – Today we examine chapters 5-12

Analytic Techniques & Practices

- Some examples he has highlighted
  – Optimal quantitative scales
  – Reference lines and regions
  – Trellises and crosstabs
  – Multiple concurrent views and brushing
  – Focus and context together
  – Details on demand
  – Over-plotting reduction

Add Reference Lines

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More Reference Lines

p. 97

Trellis Display

Typically varies on
one variable

p. 100

Crosstab

Varies across more
than one variable

p. 102

Crosstab

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Multiple Concurrent Views

Vintage
infovis

p. 107

Concurrent Views

- He calls such things *faceted analytical displays*
  – Sometimes that term is used in other ways in infovis
- As opposed to *dashboards*
  – They are for monitoring, not analysis

Overplotting

Too many data points

p. 118

Overplotting Solutions

- Reducing size of data objects
- Removing all fill color from data objects
- Changing the shape of data objects
- Jittering data objects
- Making data objects transparent
- Encoding the density of values
- Reducing the number of values
  - Aggregating the data
  - Filtering the data
  - Breaking the data into a series of separate graphs
  - Statistically sampling the data

Quantitative Data

- Fundamental visualization techniques

Time Series Data

- Patterns to be shown
  - Trend
  - Variability
  - Rate of change
  - Co-variation
  - Cycles
  - Exceptions

Time Series Visualizations

- Effective visualization techniques include...

Line Graphs

When to use:

When quantitative values change
during a continuous period of time

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Bar Graphs

When to use:

When you want to support the
comparison of individual values

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Dot Plots

When to use:

When analyzing values that are
spaced at irregular intervals of time

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Radar Graphs

When to use:

When you want to represent data
across the cyclical nature of time

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Heatmaps

When to use:

When you want to display a large quantity
of cyclical data (too much for radar)

p. 157

Box Plots

When to use:

You want to show how values are distributed
across a range and how that distribution
changes over time

p. 157

Animated Scatterplots

When to use:

To compare how two quantitative
variables change over time

p. 159

Banking to 45°

Same diagram, just drawn at
different aspect ratios

People interpret the diagrams
better when lines are around
45°, not too flat, not too steep

p. 171

Question

Which is increasing at a faster rate, hardware sales or software sales?

Log scale shows this

Both at same rate, 10%

p. 172

Patterns

Daily sales   Average per day

p. 176

Cycle Plot

Combines visualizations
from two prior graphs

p. 177

A Story

How much wine of
different varieties is produced?

p. 191-2

Pareto Chart

Shows individual contributors and increasing total

80/20 rule –
80% of effect
comes from 20%

p. 194

Bump Chart

Shows how ranking
relationships change
over time

p. 201

Deviation Analysis

Do you show the two values in question
or the difference of the two?

p. 203

Distribution Analysis Views

- Histogram
- Frequency polygon
- Strip plot
- Stem-and-leaf plot

Histogram

p. 225

Frequency Plot

p. 226

Strip Plot

p. 227

Stem-and-leaf Plot

p. 228

Comparisons

Note how first one's curve is smooth (not such a noticeable difference). Second one is more noticeable. Same data.

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Correlation Analysis

Bleah. How can
we clean this up?

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Crosstab

p. 277

Color Choice in Heatmaps

Argues that black should not be used as a middle value because of its saliency (visual prominence)
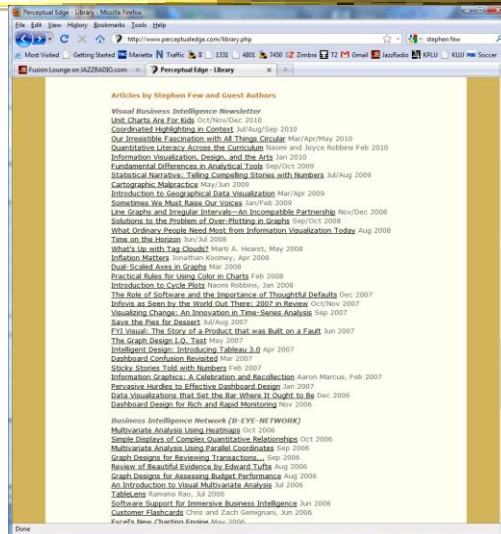
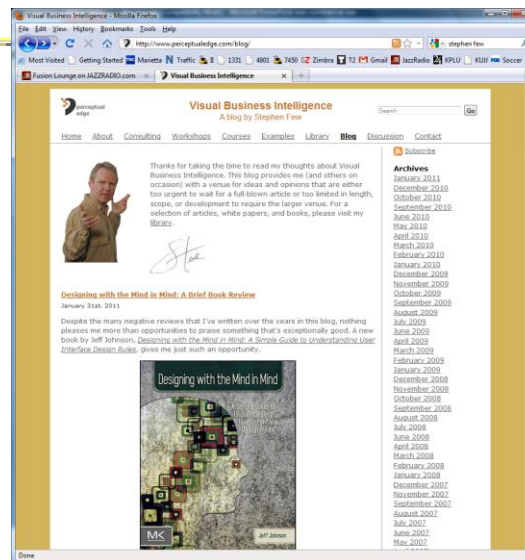Some people are red-green color blind too

p. 285-7

Further Articles

Blog

Critique It

Tracking the plunge
The sharp decline in home values has left many homeowners "under water"—owing more on their homes than their property is worth. This means that, in spite of low interest rates that would normally lead people to refinance their mortgages, many homeowners no longer have sufficient equity to qualify for refinancing.
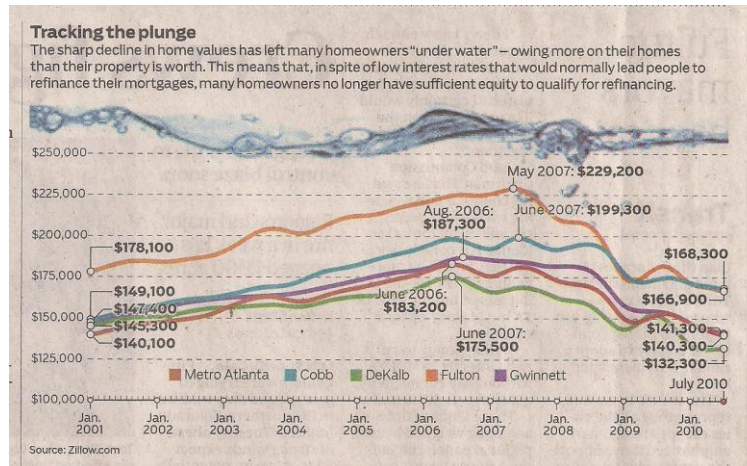
AJC, July 2010

Reminder

- HW 4 due Tuesday
  – Experience with Many Eyes

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Upcoming

- InfoVis system & toolkits
  - Reading
    - Viegas et al '07

- Commercial InfoVis systems
  - Reading
    - Spenke & Beilken '00