SURVEY

Instructions: Choose A or B from each pair of images

Criteria: Choose the image with the most effective display of data

The peer county population totals in 2000 were:

A

Cedar (18,217), Dickinson (16,466), Poweshiek (18,852), and Union (12,282).

B

The peer county population totals in 2000 were:

<table>
<thead>
<tr>
<th>County</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td>12,282</td>
</tr>
<tr>
<td>Dickinson</td>
<td>16,466</td>
</tr>
<tr>
<td>Cedar</td>
<td>18,217</td>
</tr>
<tr>
<td>Poweshiek</td>
<td>18,852</td>
</tr>
</tbody>
</table>
Guidelines for Effective Display of Data

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for Dave’s CRP Class
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3 Ways to Display Data

• Lists: Use when you are comparing one measure across a small number of places or groups.
  ✓ Tip: Alphabetical order isn’t always the best choice. Try ordering by size instead.

• Tables: Use if you are comparing 2-5 measures across places or groups.
  ✓ Tip: In a written report, create an appendix table when you need to compare attributes across a large number of observations (e.g. 99 counties).

• Charts: Save charts for when you need to illustrate important concepts or complex data.
Example 1: Formatted Lists

- The peer county population totals in 2000 were Cedar (18,217), Dickinson (16,466), Poweshiek (18,852), and Union (12,282).

- The peer county population totals in 2000 were:
  - Union 12,282
  - Dickinson 16,466
  - Cedar 18,217
  - Poweshiek 18,852

Types of Charts

- Column and bar
- Line
- Pie
- X-Y Scatter
- Bubble
Choosing a Chart Type

• **BAR CHARTS** - to compare values over discontinuous time periods (e.g. 5-year intervals) or across different groups.

• **LINE CHARTS** - for displaying related data over a continuous time period or scale.

• **X-Y SCATTER CHARTS** – for illustrating relationships between two measures.

• **PIE, AREA, BUBBLE, and OTHER CHARTS** - use sparingly.

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Population of Iowa, 1965-2005

Graph showing the population of Iowa from 1965 to 2005 with data points and bars.
Population of Iowa, 1965-2005

Guidelines for Designing Charts

- Maintain graphical integrity
  - Dimension
  - Scale
- Keep the design simple
  - Non-data ink
  - Chartjunk

Graphical Integrity

• Dimension
  – Most charts illustrate one-dimensional values (dollars, population, etc.) Using 2-D or 3-D graphics to illustrate 1-D values can distort a viewer’s perception of differences.

• Scale
  – Where you set the minimum and maximum scale on the value axis can also influence perception.

Dimension and Perception

Try to avoid these dimensional blunders:

• Using a 2-dimensional measure (e.g. area) to compare 1-dimensional values
  – Examples: Bubble charts and multiple pie charts

• Using 3-dimensional displays to illustrate 1-dimensional or 2-dimensional data
  – Example: 3D bar and 3D column charts
Population Growth and Per Capita Income in Iowa Compared to the 10 Largest States

Don’t Be Seduced by the Bubble Chart

- What attracts your attention on this chart and why?
- How large is Iowa’s population relative to California’s population?
  - A) 20 times
  - B) 16 times
  - C) 12 times
  - D) 8 times
Average Earnings Per Job: Where would you rather work?

Dickinson vs Union

How About Now?

Dickinson vs Union
Scale and Perception

Guidelines for setting the vertical or horizontal axis scale:

- If the value can realistically equal zero, then zero might be the best choice for the minimum value.
- Do not change units mid-way along the vertical or horizontal axis.

Minimum and Maximum Scale
Change in Time Scale

Population of Iowa, 1970-2005

Design and Perception

Just because it’s the default chart design doesn’t make it the best chart design.

- Remove items that don’t add new information, a.k.a. “non-data ink.”
- Keep the design simple. Excess decoration, colors, and fill patterns can distract viewers from the story in the data.
Minimize “Non-Data Ink”

Data Ink is “…the non-redundant ink arranged in response to variation in the numbers represented.” (Tufte, 1983)

Non-Data Ink includes:
– Borders
– Tick marks
– Background
– Embellishments
– Grids
– Extra zeroes and other repetitive elements
– Anything else that uses ink without conveying new and useful information

Top 10 State by Population, 2005

- Texas
- Pennsylvania
- Ohio
- New York
- New Jersey
- Michigan
- Illinois
- Georgia
- Florida
- California
Top 10 State by Population, 2005

- California
- Texas
- Pennsylvania
- Ohio
- New York
- New Jersey
- Michigan
- Illinois
- Georgia
- Florida
- Ohio

Population

0 5000000 10000000 15000000 20000000 25000000 30000000 35000000 40000000
Top 10 State by Population, 2005

- Texas
- Pennsylvania
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- New York
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- Illinois
- Georgia
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- California
Top 10 State by Population, 2005

- Texas
- Pennsylvania
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- Illinois
- Georgia
- Florida
- New Jersey
- California

Population in Millions

Top 10 State by Population, 2005

- California
- Texas
- New York
- Florida
- Illinois
- Pennsylvania
- Ohio
- Michigan
- Georgia
- New Jersey

Population in Millions
Top 10 State by Population, 2005

- Texas
- Pennsylvania
- Ohio
- New York
- New Jersey
- Michigan
- Illinois
- Georgia
- Florida
- California

Population Comparison of Average Wage & Salary Disbursements Per Job, 2000

- Cedar
- Dickinson
- Poweshiek
- Union

Average Wage & Salary Disbursements Per Job

- $19,000
- $20,000
- $21,000
- $22,000
- $23,000
- $24,000
- $25,000
- $26,000
- $27,000
Comparison of Average Wage & Salary Disbursements Per Job, 2000

Chartjunk

“Chartjunk” is non-data-ink that creates unintentional vibration or other optical distractions in your graphics.
Population in Iowa's 10 Largest Counties

- Woodbury
- Story
- Scott
- Pottawattamie
- Polk
- Linn
- Johnson
- Dubuque
- Clinton
- Black Hawk

Color and Fill

- Your choices of color and fill can influence perception
  - Positive space vs. negative space
  - Advancing colors vs. receding colors
- Up to 8% of the male population in the United States is red-green color blind.
Using Graphics To Tell a Story

Your decisions about chart type, scale, color inclusion or omission of data and chart elements …

… all influence how graphics are interpreted.

Chart Hall of Shame