

## Info 424

Tables and Graphs  
*Show Me the Numbers* (ch 3 & 5)  
 "Save the Pies for Dessert"

## Today's lecture

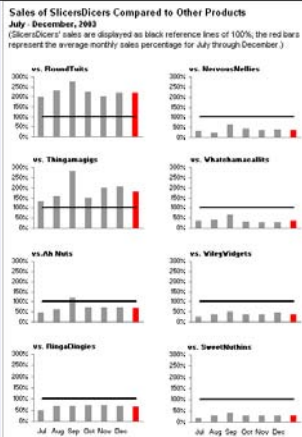
- Philosophy
- Tables vs. Graphs
- Tables
- Graphs
- Discussion
  - Vis Critiques
  - Few Exercises
  - Schedule

## Communicate

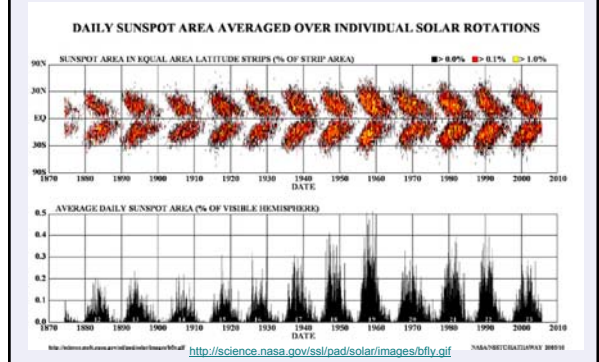
What:  
 Sales relative to other products

To whom:  
 The manager in charge

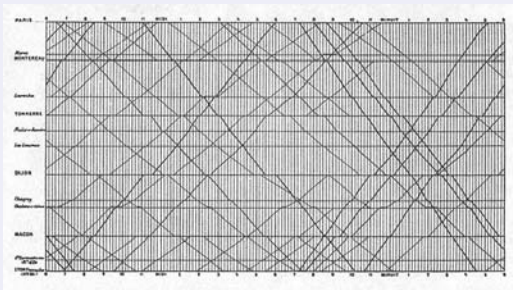
Type of graph: Deviation



## Complex yet concise



## Train Schedule



## Show the data

- Maximize the "Data-Ink Ratio"
- Data-ink = the ink used to show data
  - Data-ink ratio = data-ink/total ink used
- Process
- Erase non-data ink
  - Erase redundant data ink
  - Revise and edit

<http://www.tbray.org/ongoing/data-ink/d1/>

# Graph Design IQ Test

<http://www.perceptualedge.com/files/GraphDesignIQ.html>

## Tables vs. Graphs

**Tables**

- Rows, columns, text
- Data encoded as text
- Best for looking up precise values

**Graph**

- Area bounded by axes
- Visual objects (lines, bars, points, shapes)
- Best for showing relationships

## Review: Data

**Quantitative** (allows arithmetic operations)

**Categorical** (group, identify & organize; no arithmetic)

- Nominal
- Ordinal
- Interval
- Hierarchical

## Types of Tables

**Unidirectional**

- Quantities by category
- Sum in one direction

| Department   | Headcount  | Expenses           |
|--------------|------------|--------------------|
| Finance      | 26         | 202,202            |
| Sales        | 93         | 983,393            |
| Operations   | 107        | 933,393            |
| <b>Total</b> | <b>234</b> | <b>\$2,118,988</b> |

## Types of Tables

**Bidirectional**

- Two sets of categories (row and column)
- Values at intersection
- Crosstab (cross correlation)
- Pivot table (summary measure)

| Count of Q5: What color are your eyes? | Q5: What color is your hair? | Black    | Blue     | Brown    | Green    | Hazel    | Grand Total |
|--|------------------------------|----------|----------|----------|----------|----------|-------------|
| Black                                  |                              | 4        | 3        | 1        |          |          | 5           |
| Blonde                                 |                              |          |          |          |          |          | 3           |
| Brown                                  |                              | 1        | 4        | 7        | 1        | 1        | 14          |
| Grey                                   |                              |          | 1        |          |          |          | 1           |
| <b>Grand Total</b>                     |                              | <b>5</b> | <b>8</b> | <b>8</b> | <b>1</b> | <b>1</b> | <b>23</b>   |

## Communicate

"Period estimates of relative survival rates, by cancer site"

| Cancer site                    | Relative survival rate, % (SE) |            |            |            |
|--------------------------------|--------------------------------|------------|------------|------------|
|                                | 5 years                        | 10 years   | 15 years   | 20 years   |
| Oral cavity and pharynx        | 56.7 (1.3)                     | 44.2 (1.4) | 37.5 (1.6) | 33.0 (1.8) |
| Oesophagus                     | 14.2 (1.4)                     | 7.9 (1.3)  | 7.7 (1.6)  | 5.4 (2.0)  |
| Stomach                        | 23.8 (1.3)                     | 19.4 (1.4) | 19.0 (1.7) | 14.9 (1.9) |
| Colon                          | 61.7 (0.8)                     | 55.4 (1.0) | 53.9 (1.2) | 52.3 (1.4) |
| Rectum                         | 62.6 (1.2)                     | 55.2 (1.4) | 51.8 (1.8) | 49.2 (2.3) |
| Bladder                        | 7.5 (1.1)                      | 5.8 (1.2)  | 6.3 (1.5)  | 7.6 (2.0)  |
| bile duct                      | 4.0 (0.5)                      | 3.0 (0.5)  | 2.7 (0.6)  | 2.7 (0.8)  |
| Pancreas                       | 68.8 (2.1)                     | 56.7 (2.5) | 45.8 (2.8) | 37.8 (3.1) |
| Larynx                         | 15.0 (0.4)                     | 10.6 (0.4) | 8.1 (0.4)  | 6.5 (0.4)  |
| Lung and bronchus              | 83.0 (0.8)                     | 86.7 (1.1) | 83.5 (1.5) | 82.8 (1.9) |
| Melanoma                       | 86.4 (0.4)                     | 78.3 (0.6) | 71.3 (0.7) | 65.0 (1.0) |
| Breast                         | 70.5 (1.6)                     | 64.1 (1.8) | 62.8 (2.1) | 60.0 (2.4) |
| Cervix uteri and cervix        | 84.3 (1.0)                     | 83.2 (1.3) | 80.8 (1.7) | 75.2 (2.0) |
| NOS                            | 33.0 (1.3)                     | 48.3 (1.6) | 48.9 (1.9) | 45.6 (2.4) |
| Ovary                          | 98.8 (0.4)                     | 95.2 (0.9) | 87.1 (1.7) | 81.1 (3.0) |
| Prostate                       | 94.7 (1.1)                     | 94.0 (1.3) | 91.1 (1.8) | 88.2 (2.3) |
| Testis                         | 82.1 (1.0)                     | 76.2 (1.4) | 70.3 (1.9) | 67.9 (2.4) |
| Urinary bladder                | 61.8 (1.3)                     | 54.4 (1.6) | 49.8 (2.0) | 47.3 (2.6) |
| Kidney and renal pelvis        | 32.0 (1.4)                     | 29.2 (1.5) | 27.6 (1.6) | 26.1 (1.9) |
| Brain and other nervous system | 96.0 (0.8)                     | 95.8 (1.2) | 94.0 (1.6) | 95.4 (2.1) |
| Thyroid                        | 85.1 (1.7)                     | 79.8 (2.0) | 73.8 (2.4) | 67.1 (2.8) |
| Hodgkin's disease              | 57.8 (1.0)                     | 46.3 (1.2) | 38.3 (1.4) | 24.2 (1.7) |
| Non-Hodgkin lymphomas          | 29.5 (1.6)                     | 12.7 (1.5) | 7.0 (1.3)  | 4.8 (1.6)  |
| Multiple myeloma               | 42.5 (1.2)                     | 32.4 (1.3) | 29.7 (1.5) | 26.2 (1.7) |
| Leukemias                      |                                |            |            |            |

Rules derived from SEER 1973-98 database (both sexes, all ethnic groups).<sup>1,2</sup> NOS=not otherwise specified.

**Table 4: Most recent period estimates of relative survival rates, by cancer site**

### Better

Reorder by 5 year survival rate  
Simplify typography

|                       | Estimates of relative survival rates, by cancer site |         |         |         |
|-----------------------|--|---------|---------|---------|
|                       | % survival rates and standard errors                 |         |         |         |
|                       | 5 year   | 10 year | 15 year | 20 year |
| Prostate              | 98.8   | 95.2    | 89.1    | 81.1    |
| Thyroid               | 96.0   | 95.8    | 94.0    | 95.4    |
| Testis                | 94.7   | 94.0    | 91.1    | 88.2    |
| Melanomas             | 89.0   | 86.7    | 83.5    | 82.8    |
| Breast                | 86.4   | 78.3    | 71.3    | 65.0    |
| Hodgkin's disease     | 85.1   | 79.8    | 73.6    | 67.1    |
| Corpus uteri, uterus  | 84.3   | 83.2    | 80.8    | 79.2    |
| Urinary bladder       | 82.1   | 76.2    | 70.3    | 67.9    |
| Cervix, uteri         | 70.5   | 64.1    | 62.8    | 60.0    |
| Larynx                | 68.8   | 56.7    | 45.8    | 37.8    |
| Rectum                | 62.6   | 55.2    | 51.8    | 49.2    |
| Kidney, renal pelvis  | 61.8   | 54.4    | 49.8    | 47.3    |
| Colon                 | 61.7   | 55.4    | 53.9    | 52.3    |
| Non-Hodgkin's         | 57.8   | 46.3    | 38.3    | 34.2    |
| Oral cavity, pharynx  | 56.7   | 44.2    | 37.5    | 33.0    |
| Ovary                 | 55.0   | 49.3    | 49.9    | 49.6    |
| Leukemia              | 42.5   | 32.4    | 29.7    | 26.2    |
| Brain, nervous system | 32.0   | 14.4    | 29.2    | 27.6    |
| Multiple myeloma      | 29.5   | 16.1    | 12.7    | 10.3    |
| Stomach               | 23.8   | 13.4    | 19.0    | 17.3    |
| Lung and bronchus     | 15.0   | 10.6    | 8.4     | 6.5     |
| Esophagus             | 14.2   | 7.9     | 7.7     | 5.4     |
| Liver, bile duct      | 7.5  | 5.8     | 6.3     | 7.6     |
| Pancreas              | 4.0  | 3.0     | 3.5     | 2.7     |

[http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg\\_id=0000Jr&topic\\_id=1](http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0000Jr&topic_id=1)

### Dynamic Tables

Spreadsheets (Excel, Lotus Notes, Visicalc)  
InXight [TableLens](#)

| Product         | Units | Revenue | Profits |
|-----------------|-------|---------|---------|
| ForeWord Pro    |       |         |         |
| ForeMost Server |       |         |         |
| ForeMost Life   |       |         |         |
| ForeMost Access |       |         |         |
| ForeFinancial   |       |         |         |
| ForeCode Pro    | 1802  | 770783  | 200806  |
|                 | 1803  | 770783  | 300806  |
|                 | 1801  | 769928  | 300272  |
|                 | 2228  | 751950  | 338378  |
|                 | 1733  | 740958  | 288935  |
|                 | 2164  | 730250  | 228650  |
|                 | 1882  | 719483  | 280599  |

### Graphs

Graphs encode relationships

Types

- Nominal comparison
- Time-series
- Ranking
- Part-to-whole
- Deviation
- Distribution
- Correlation

Axes plus

- Points
- Lines
- Bars
- Area

### Nominal Comparison

Ranking  
Deviation  
Part-of-whole

### Time Series

Correlation  
Distribution

### Monitor Data in Analytical Dashboards

Discounting by Product

OFFICE SUPPLIES  
PAPER  
FURNITURE  
TECHNOLOGY

Top Products by Profitability

| Product                      | Profitability |
|------------------------------|---------------|
| Harmony Air Purifier         | 21,333        |
| Sublimedia Printer           | 12,782        |
| Letter Size Cart             | 12,565        |
| Terrazzo Double-Tier Lockers | 11,321        |
| Nexus 188                    | 9,243         |
| Economy Rollaway Files       | 6,905         |

Annual Trends

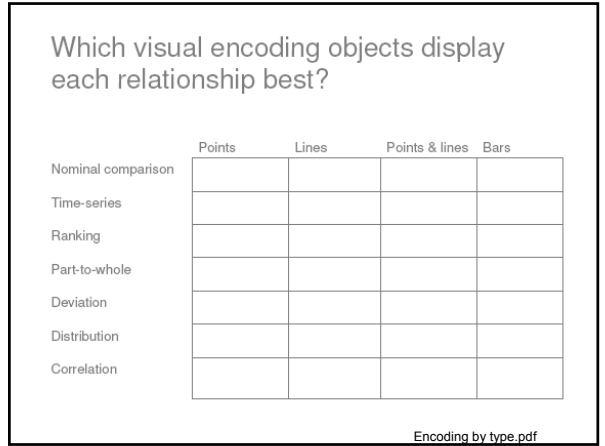
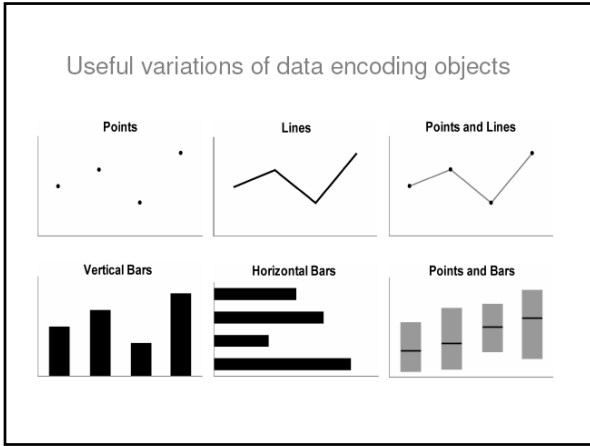
Summary by Year and Product Type

| Product Type    | 2001    | 2002    | 2003    | 2004    |
|-----------------|---------|---------|---------|---------|
| FURNITURE       | 12      | 3       | 2       | 0       |
| OFFICE SUPPLIES | \$40.6K | \$57.8K | \$5.4K  | \$3.2K  |
| TECHNOLOGY      | 53      | 27      | 40      | 38      |
| PAPER           | \$70.6K | \$51.0K | \$55.1K | \$41.3K |

### West

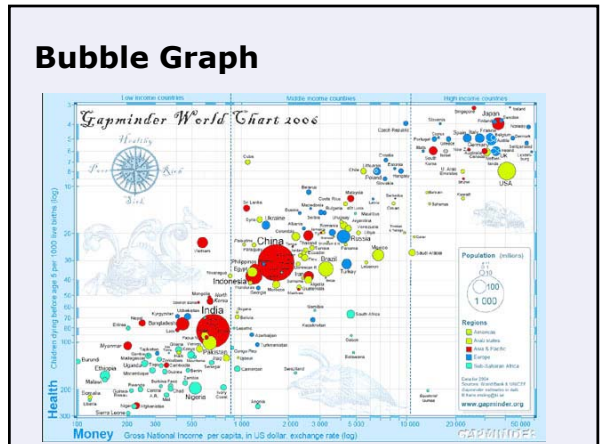
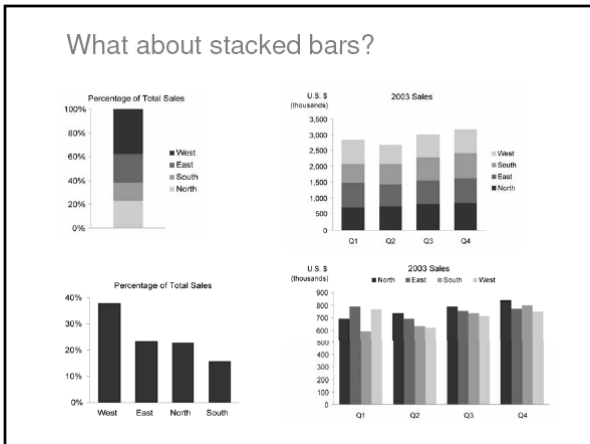
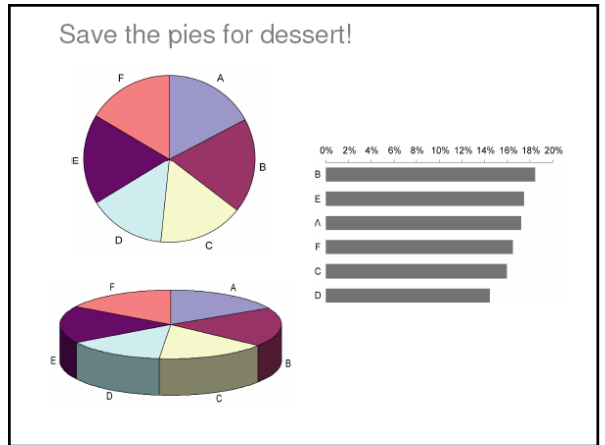
Profit vs Marketing

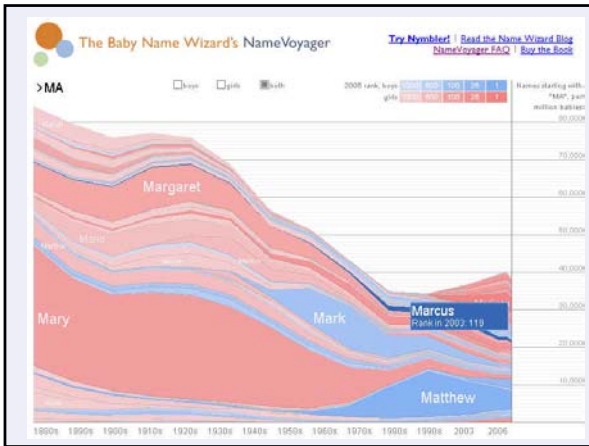
Legend: Coffee (blue), Espresso (orange), Smoothie (green), Tea (red)



## Popular Area Graphs

- Pie charts
- Stacked bars
- Bubble graphs
- Stacked graphs





## Visualization Critique

Find an example of a good visualization

Analyze it

1. Who is the intended audience?
2. What information does this visualization represent?
3. How many data dimensions does it encode?
4. List several tasks, comparisons or evaluations it enables.
5. What principles of excellence best describe why it is good?
6. Can you suggest any improvements?
7. Why do you like this visualization?

## For Today

Look at the images, discuss

- What type of graph is it?
- How many dimensions?
- Data-Ink ratio
- How could it be improved

Relationship to grade

- Don't worry
- Grade reflects effort
- Context of last week

[VisCritiques Overview](#)