# Technical Communication

## SELECTING VISUAL ELEMENTS

# Visual Aids

- Psychology
  - *Good* = Increase strength of your message by repeating it.
    - Ex: Repeat text.
  - *Better* = Increase strength of message by repeating it in a different form.
    - Ex: Text + visual element

Questions:

1. How to make a visual aid effective

2. When to use the visual aid

3. How to select the best type of visual element
   - Ex: Pie chart, bar graph, line graph

4. How to integrate the visual aid into the text

# Making a Visual Aid Truly Visual

- ## Goal of visual aid
  - Reader apprehends more information, more quickly.

- ## Ex: Text

We 2 compares the results of Ensemble EM-DD with $\tau = 25$ and $\tau = 1$ with the results from Accio, EM-DD when using the AvgAll method (Zhang et al. (2002)), and from the original EM-DD algorithm. In all of these results, the training data consisted of 8 random positive and 8 random negative examples. For all AUCs reported, we repeat each experiment with 30 random selections of the positive and negative examples and use these to compute the average AUC and the 95%

confidence intervals for the AUC. For Ensemble EM-DD there are $5 \cdot 32 \cdot 5 \cdot 4 = 3200$ runs of of EM-DD. However, we stop the gradient search when the NLDD value changes by less than 1.0 (without any negative impact on the results).

In 15 of the 25 categories either Ensemble EM-DD with $\tau = 25$ or $\tau = 1$ performed significantly better than the three existing algorithms. Furthermore, there were no categories where any existing algorithm outperforms both Ensemble EM-DD with $\tau = 25$ and $\tau = 1$. If one considers just Ensemble EM-DD with $\tau = 25$, it is significantly better than all previous algorithms in 13 of the 25 categories, with just two where it performs statistically worse than any of the existing algorithm. We believe that by automatically selecting $\tau$ we will be able to create a single algorithm to will perform better than either selecting $\tau = 25$ or $\tau = 1$.

# Making a Visual Aid Truly Visual (con't)

- Ex: Table

| Category | GEM-DD | GEM-DD minus Hypothesis Combining | GEM-DD minus Dynamic Scaling | GEM-DD minus Mult Init Scales | GEM-DD minus Normalize | EM-DD |
|---|---|---|---|---|---|---|
| FabricSoftenerBox | $97.9 \pm 0.5$ | $96.9 \pm 0.7$ | $95.8 \pm 0.7$ | $97.7 \pm 0.5$ | $95.6 \pm 1.9$ | $65.8 \pm 5.6$ |
| CheckeredScarf | $94.3 \pm 1.4$ | $89.2 \pm 3.3$ | $92.2 \pm 1.4$ | $95.2 \pm 1.7$ | $89.3 \pm 1.6$ | $56.1 \pm 3.8$ |
| GreenTeaBox | $94.1 \pm 1.7$ | $88.7 \pm 3.2$ | $90.3 \pm 2.7$ | $91.4 \pm 3.0$ | $87.5 \pm 3.1$ | $54.2 \pm 2.6$ |
| CokeCan | $93.9 \pm 1.1$ | $90.8 \pm 1.7$ | $93.3 \pm 1.2$ | $94.1 \pm 1.1$ | $92.3 \pm 1.5$ | $57.0 \pm 3.8$ |
| WD40Can | $92.6 \pm 2.2$ | $86.5 \pm 2.8$ | $93.9 \pm 1.2$ | $92.9 \pm 2.6$ | $85.3 \pm 3.2$ | $53.6 \pm 2.5$ |
| FeltFlowerRug | $91.9 \pm 1.4$ | $89.5 \pm 1.8$ | $90.3 \pm 1.2$ | $92.4 \pm 2.0$ | $84.1 \pm 2.5$ | $60.5 \pm 2.8$ |
| GoldMedal | $91.8 \pm 3.5$ | $88.2 \pm 4.1$ | $91.1 \pm 2.5$ | $85.9 \pm 3.7$ | $77.5 \pm 5.1$ | $64.4 \pm 3.9$ |
| AjaxOrange | $91.8 \pm 2.1$ | $88.9 \pm 3.0$ | $93.1 \pm 2.1$ | $93.2 \pm 2.0$ | $90.0 \pm 3.8$ | $79.9 \pm 3.2$ |
| JuliesPot | $89.9 \pm 2.0$ | $82.7 \pm 5.4$ | $83.4 \pm 4.4$ | $83.7 \pm 3.8$ | $80.1 \pm 2.7$ | $71.5 \pm 3.0$ |
| TranslucentBowl | $88.6 \pm 3.4$ | $84.1 \pm 4.4$ | $82.0 \pm 4.2$ | $78.0 \pm 5.0$ | $73.2 \pm 4.5$ | $60.7 \pm 4.6$ |
| SpriteCan | $88.2 \pm 1.2$ | $81.5 \pm 3.2$ | $86.6 \pm 1.4$ | $86.2 \pm 1.8$ | $77.6 \pm 3.1$ | $65.4 \pm 4.5$ |
| SmileyFaceDoll | $87.2 \pm 2.6$ | $81.6 \pm 3.4$ | $91.2 \pm 1.5$ | $83.3 \pm 3.2$ | $81.5 \pm 4.2$ | $60.9 \pm 4.4$ |
| DirtyRunningShoe | $86.7 \pm 2.0$ | $83.0 \pm 2.2$ | $85.4 \pm 1.9$ | $88.8 \pm 1.8$ | $80.2 \pm 1.9$ | $74.1 \pm 4.6$ |
| DataMiningBook | $86.7 \pm 3.0$ | $83.0 \pm 3.7$ | $80.7 \pm 2.9$ | $83.3 \pm 2.9$ | $70.8 \pm 3.4$ | $57.4 \pm 3.3$ |
| BlueScrunge | $86.7 \pm 3.1$ | $82.7 \pm 4.0$ | $85.8 \pm 3.6$ | $73.5 \pm 3.6$ | $67.3 \pm 3.3$ | $82.1 \pm 3.5$ |
| CandleWithHolder | $84.3 \pm 2.3$ | $79.7 \pm 4.2$ | $85.2 \pm 1.7$ | $84.5 \pm 2.7$ | $67.4 \pm 3.2$ | $63.7 \pm 4.6$ |
| GlazedWoodPot | $82.9 \pm 3.8$ | $77.8 \pm 4.8$ | $57.2 \pm 3.6$ | $71.3 \pm 3.6$ | $64.0 \pm 3.3$ | $81.5 \pm 6.5$ |
| DirtyWorkGloves | $80.0 \pm 3.1$ | $75.4 \pm 4.1$ | $77.8 \pm 2.3$ | $81.2 \pm 2.9$ | $66.2 \pm 2.9$ | $72.0 \pm 5.1$ |
| Apple | $80.0 \pm 4.2$ | $77.9 \pm 4.4$ | $65.8 \pm 4.7$ | $72.9 \pm 3.2$ | $61.4 \pm 3.1$ | $66.8 \pm 7.0$ |
| CardboardBox | $78.3 \pm 3.1$ | $76.3 \pm 4.3$ | $73.4 \pm 2.9$ | $78.5 \pm 3.1$ | $71.4 \pm 3.9$ | $68.9 \pm 4.8$ |
| Banana | $76.9 \pm 3.8$ | $68.5 \pm 4.5$ | $70.7 \pm 4.2$ | $67.4 \pm 3.9$ | $64.6 \pm 3.8$ | $87.1 \pm 5.7$ |
| StripedNotebook | $76.9 \pm 4.7$ | $74.6 \pm 4.9$ | $74.9 \pm 3.1$ | $76.3 \pm 5.0$ | $69.5 \pm 3.6$ | $55.1 \pm 2.0$ |
| RapBook | $65.5 \pm 2.9$ | $60.2 \pm 2.8$ | $54.4 \pm 2.5$ | $66.4 \pm 3.1$ | $57.6 \pm 1.8$ | $61.3 \pm 3.9$ |
| WoodRollingPin | $64.7 \pm 1.8$ | $61.4 \pm 3.0$ | $55.7 \pm 2.5$ | $64.7 \pm 2.1$ | $58.7 \pm 2.1$ | $55.9 \pm 2.7$ |
| LargeSpoon | $57.6 \pm 1.6$ | $55.8 \pm 1.7$ | $50.3 \pm 2.2$ | $56.3 \pm 1.5$ | $57.8 \pm 3.0$ | $56.6 \pm 3.4$ |
| Average | 84.4 | 80.2 | 80.0 | 81.6 | 74.8 | 65.3 |

Table 3.2: Comparison of GEM-DD and its component to EM-DD on the SIVAL database. All experiment performed with 8 randomly select positive and 8 randomly selecting negative examples. Each entry gives the mean and 95% confidence intervals for the AUC. These results are shown graphically in figure 3.4.

# Making a Visual Aid Truly Visual (con't)

- Ex: Graph
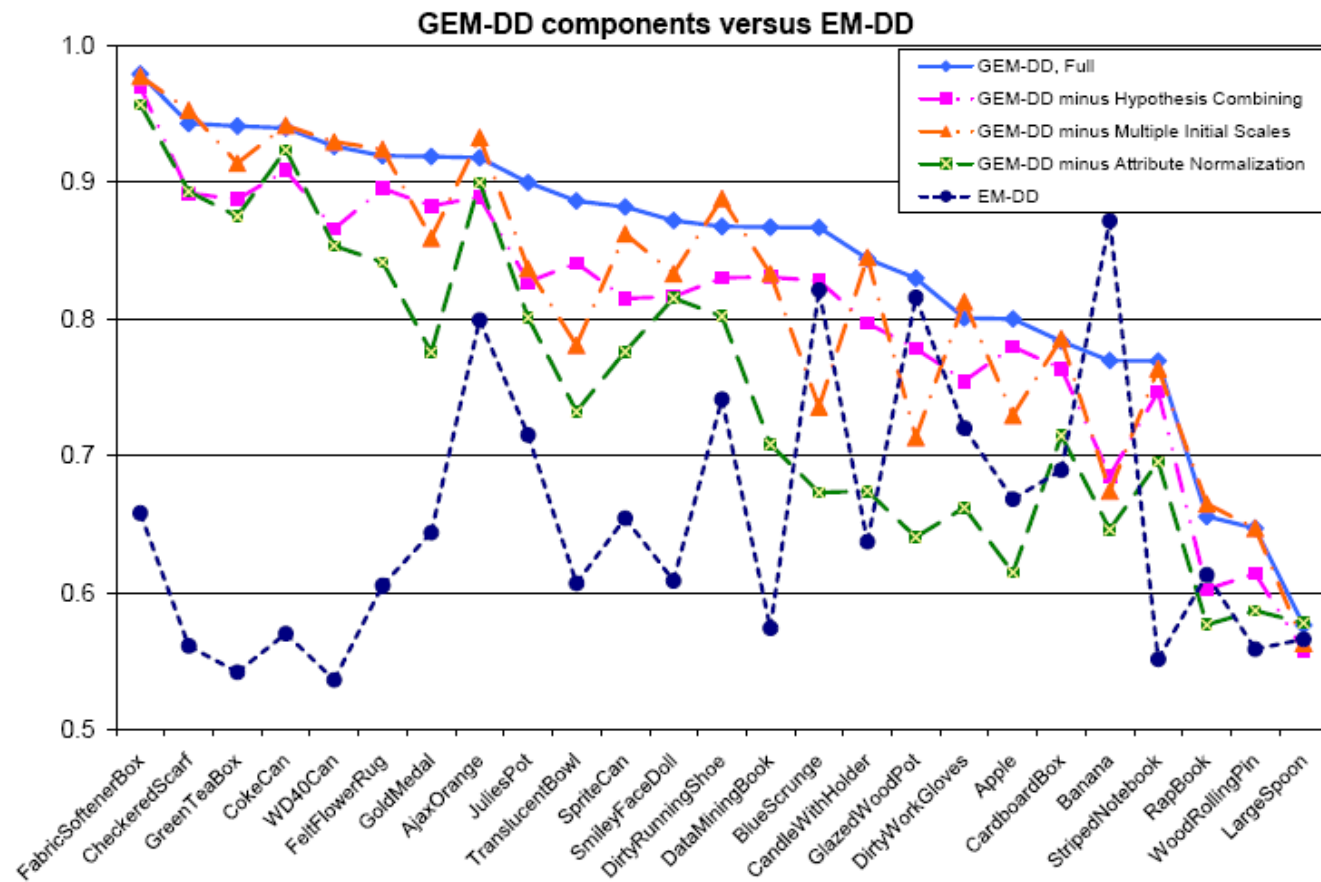
# Deciding When to use a Visual Aid

- Principles – when to use a visual aid
    1. When words alone would be either impossible or quite inefficient for describing a concept or an object
    2. When a visual aid is needed to underscore an important point, especially a summary
    3. When a visual element is conventionally or easily used to present data.

# Visual Aid for Describing/Clarifying

- Text is often insufficient to describe an idea or object
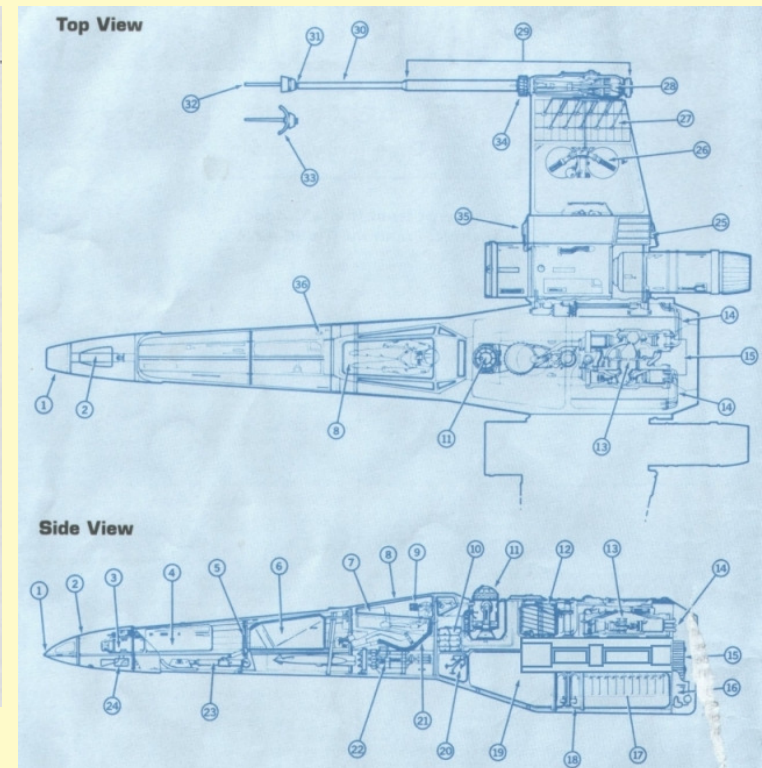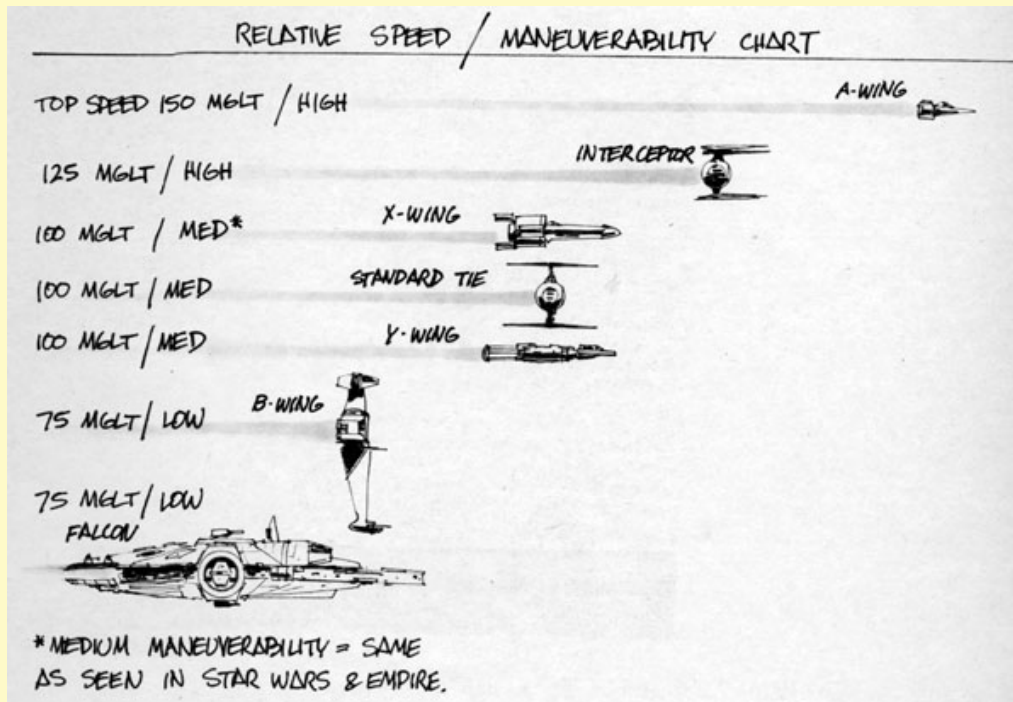
# Visual Aid for Highlighting Important Points

- Summary of ideas you have presented

- Emphasize important ideas for the reader

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Neighbors($I$)
    For each $x \in I$     //$x$ is a segment in $I$
       For each $p \in x$     //$p$ is a pixel in $x$
         For each $j \in \{North, East, South, West\}$
           If $N_j(p) \in y$ for $y \neq x \Rightarrow$ vote for $y$
           If $N_j(p) \in$ image border $\Rightarrow$ vote for $x$
           If $N_j(p) \in x \Rightarrow$ do not vote
    For each direction $j$
       $N_j(x) =$ segment with the most votes

Figure 4.2: $I$ is the set of segments in the image, and $N_j(p)$ is pixel neighboring $p$ in cardinal direction $j$.
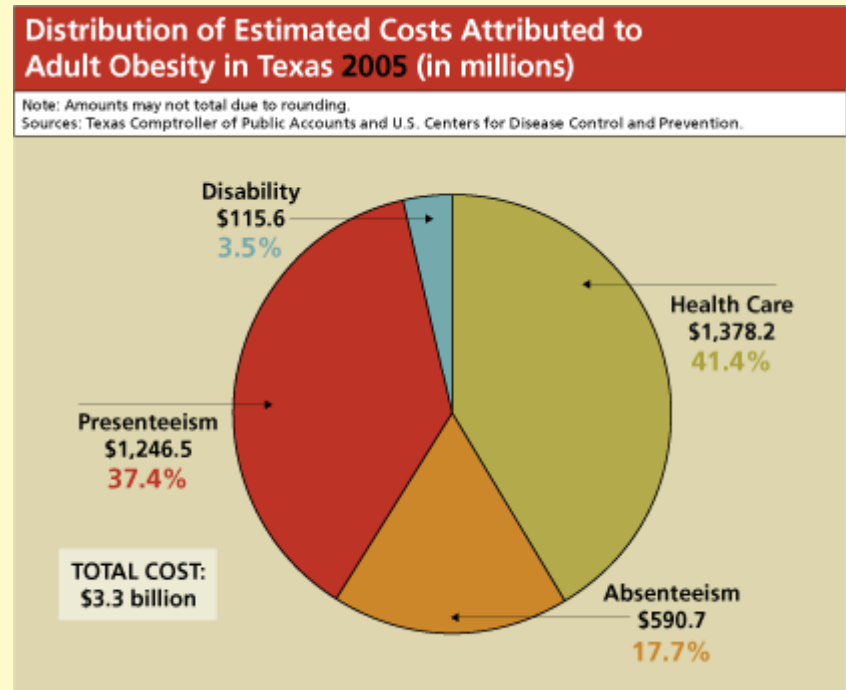
**Flow Chart**
For Building and Publishing a Website

Domain Name

Web Host

Build Web

Publish Web

Update Web
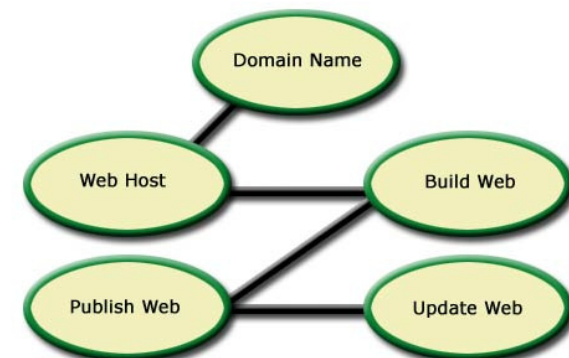
# Visual Aid for Easy Presentation of Data

- Some types of data are always presented as visual aids
  - Cost summaries
  - Budget calculations
  - Frequency spectra
  - Electrical circuits
  - ect...

- Always present these types of data as visual aids
  - Reader will expect it.

**Distribution of Estimated Costs Attributed to Adult Obesity in Texas 2005 (in millions)**

Note: Amounts may not total due to rounding.
Sources: Texas Comptroller of Public Accounts and U.S. Centers for Disease Control and Prevention.

Disability
$115.6
3.5%

Health Care
$1,378.2
41.4%

Presenteeism
$1,246.5
37.4%

TOTAL COST:
$3.3 billion

Absenteeism
$590.7
17.7%

# Conventions of Visual Perception

- **Western**
  - ○ Left-to-right
  - ○ Top-to-bottom
- **Functions**
  - ○ Display of axis
- **Labels**
- **Legends**
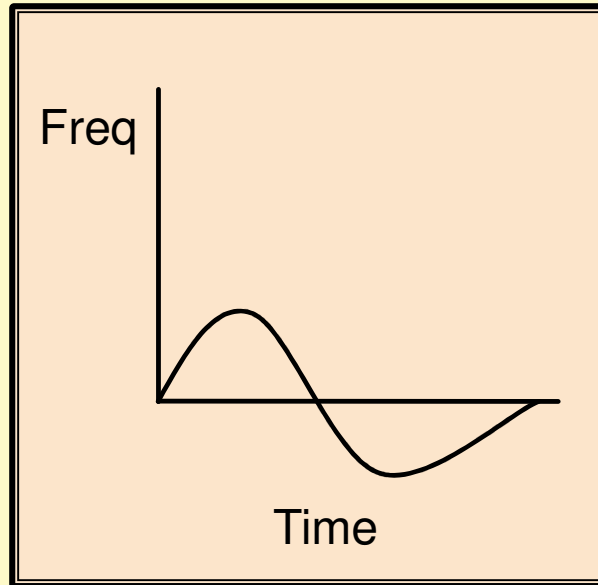


Conventional
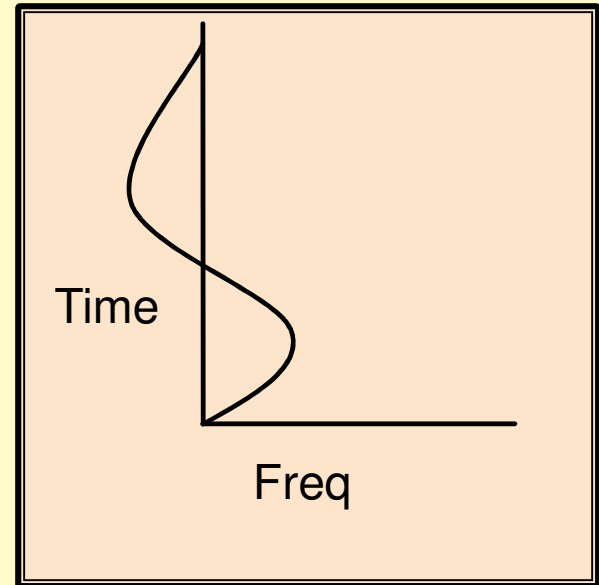


Unconventional

# Selecting the Best Type of Visual Aid

- Line graphs

- Bar graphs

- Pie diagrams

- Tables

- Photographs

- Line Drawings