Technical Communication
Engineering 100.250
Winter 2016

Visuals

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Visuals

Choosing, Finding and Using What You Need
Please describe an eggbeater
Here’s one…

When do you use visuals?

When you need to teach people about something that’s difficult to put in words.
When do you use visuals?

When you need to teach people about something that’s difficult to put in words

But always recall that visuals are an adjunct, not a replacement of text.
What things might you use a visual to help you describe?

Why? Which sort of visual?
Visuals are used for two purposes

If you keep them in mind, you will know what to use
The two purposes

Informative                  Dramatic
Visuals: Two Purposes

- **Informative**
  
  www.ukbikestore.co.uk/acatalog/HPRE_M4_CALIPER.html

- **Dramatic**
  
  www.swanyachts.co.uk/
Keep in mind your purpose

- Purpose determines what visual is used

The mere fact that you can make a visual does not mean you should use one.
Purpose determines what visual is used

And even whether you use one.
Some examples of visuals

Graphs
Pictures
  Photos
  Drawings
Maps
Organizational charts

Diagrams
Exploded diagrams
Tables
Flow Charts
Some examples of graphs (charts)

- Line graphs
- Bar graphs
- Pie charts
- Flow charts
- Organizational charts
- Gantt charts
Line graph

Shows continuing data

Show the relationship between a dependent and independent variable
Line graph

X axis shows independent variable

Y axis shows dependent variable
X Axis: Independent Variable

Y Axis: Dependent Variable
What might independent variables be?
Dependent variables?
Bar graphs

Useful for showing relative amounts of different things at the same time.
Bar graphs are useful for showing relative amounts of different things at the same time.

The are good for showing big differences.
Vertical Bar Chart

Horizontal Bar Chart

[Graph showing horizontal bars labeled E, D, C, B, and A with corresponding ozone levels.]
Pie charts

Are useful to show a series of parts that add up to 100%

*But they must not have too many slices.*
As a rule, avoid 3-D pie charts

http://lilt.ilstu.edu/gmklass/pos138/datadisplay/
Can you see a problem?

http://www.math.yorku.ca/SCS/Gallery/
Can you see a problem?
Pictures

Vivid but not always informative.
But be sure that the data presented are meaningful
Make sure that data presented are meaningful

<table>
<thead>
<tr>
<th>1a: Murders* in Ten Largest US Cities, 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
</tr>
<tr>
<td>New York</td>
</tr>
<tr>
<td>Detroit</td>
</tr>
<tr>
<td>Los Angeles</td>
</tr>
<tr>
<td>Philadelphia</td>
</tr>
<tr>
<td>Houston</td>
</tr>
<tr>
<td>Dallas</td>
</tr>
<tr>
<td>Phoenix</td>
</tr>
<tr>
<td>San Antonio</td>
</tr>
<tr>
<td>San Diego</td>
</tr>
</tbody>
</table>

*Murder and non-negligent manslaughter

http://lilt.ilstu.edu/gmklass/pos138/datadisplay/sections/goodtables.htm
But be sure that the data presented is meaningful

<table>
<thead>
<tr>
<th>1a: Murders* in Ten Largest US Cities, 1998</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>----------------</td>
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</tr>
<tr>
<td>Detroit</td>
</tr>
<tr>
<td>Los Angeles</td>
</tr>
<tr>
<td>Philadelphia</td>
</tr>
<tr>
<td>Houston</td>
</tr>
<tr>
<td>Dallas</td>
</tr>
<tr>
<td>Phoenix</td>
</tr>
<tr>
<td>San Antonio</td>
</tr>
<tr>
<td>San Diego</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1b: Murder Rates* in Ten Largest US Cities, 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Detroit</td>
</tr>
<tr>
<td>Chicago</td>
</tr>
<tr>
<td>Philadelphia</td>
</tr>
<tr>
<td>Dallas</td>
</tr>
<tr>
<td>Phoenix</td>
</tr>
<tr>
<td>Houston</td>
</tr>
<tr>
<td>Los Angeles</td>
</tr>
<tr>
<td>New York</td>
</tr>
<tr>
<td>San Antonio</td>
</tr>
<tr>
<td>San Diego</td>
</tr>
</tbody>
</table>

NOTE: *Murder and non-negligent manslaughter

http://lilt.ilstu.edu/gmklass/pos138/datadisplay/sections/goodtables.htm
Numbering conventions for tables and visuals
Tables are numbered this way

Table 1

Table 2

Table 3
All other visuals are numbered this way

Figure 1

Figure 2

Figure 3
Tables and figures are numbered independently

Figure 1

Figure 2

Table 1

Figure 3

Table 2
Tables are labelled above, and all other visuals are labelled below, thus

Table 1: Color vs. Weight

<table>
<thead>
<tr>
<th>Color</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>8 lbs</td>
</tr>
<tr>
<td>Green</td>
<td>9 lbs</td>
</tr>
<tr>
<td>Blue</td>
<td>12 lbs</td>
</tr>
</tbody>
</table>

Figure 1

What are the advantages of drawings over photographs?
Maps: You should already have some idea of what they are.
“The greatest number of ideas in the shortest time with the least ink in the smallest space.”

Edwin R. Tufte on what makes an excellent visual.
Diagrams

http://www.ukbikestore.co.uk/acatalog/HOPE_M4_CALIPER.html
Tables

Good for setting out figures

Not good for showing trends
But visuals do not speak for themselves

You must title them

You must label them fully
For example, what’s this?
Beware of Excel

It will make graphs for you very easily
Beware of Excel

It will make graphs for you very easily

*It will make bad graphs for you very easily*
Excel will make bar charts like this

Why is this a poor visual?
Or like this…
Why not use a table instead?
## Selected new car prices for 2012

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercedes-Benz C Class Coupe</td>
<td>$37,220</td>
</tr>
<tr>
<td>Chevrolet Volt</td>
<td>$39,145</td>
</tr>
<tr>
<td>Cadillac CDS Coupe</td>
<td>$40,615</td>
</tr>
<tr>
<td>Maserati Gran Turismo</td>
<td>$137,300</td>
</tr>
<tr>
<td>BMW 1 Series 128i</td>
<td>$36,900</td>
</tr>
</tbody>
</table>

[http://www.nadaguides.com/Cars](http://www.nadaguides.com/Cars)
Honesty and Clarity
Wrong

SPAD S.XIII
SPAD S.XIII

Honesty: you must credit the creator or owner of any visual that you use
Honesty and clarity

Obviously, you must be honest in presenting your data

But if you are not careful you may produce a deceptive visual
A majority of residents of the red states voted for George Bush in the 2004 election, while a majority of the residents in the blue states voted for John Kerry.
Politics!

Consider the previous visual in light of these facts:

Of those who voted in the 2004 election, 50.7% voted for George Bush and 48.3% voted for John Kerry, a difference of 2.4%.
Previous map redrawn to reflect the size of states by population instead of land area

www.cscs.umich.edu/~crshalizi/election/
Texts reads: “This line, representing 18 miles per gallon in 1978, is 0.6 inches long.”

Text reads: “This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long.”

from Tufte, 1983, p. 57
“Standard deviation of batting averages for all full-time players by year for the first 100 years of professional baseball. Note the regular decline.”

adapted
Beware of Excel

It will make pie graphs from data that do not add up to 100%

It will make 3-D graphs

It will make bar graphs with too many bars
Visuals can be dangerous

Visuals can be dangerous if you rely on them without realizing that many people cannot understand them

This means they can be not only useless to the reader, but dangerous to you.
Remember: Many people have difficulty with graphs

“Another psychologist tested grownups. . . . The vast majority were unable to see what the charts and graphs were supposed to show: they couldn't even grasp general facts or spot basic trends.”

Don’t assume your reader will understand your visual.

“Try to teach people with a picture and you may find that you need a thousand words to tell them exactly what to look at and why.”

When using visuals during presentations

Keep them simple.

Observe the *Seven by Seven Rule*:

“Use no more than seven words per line of text and no more than seven lines per slide.”
Visuals are distracting during presentations (though often necessary)

- People naturally look at bright colored screens
- People often prefer the visual to the speaker
- People will try to read the text of a slide rather than listen to what you say

Therefore?
Things to avoid

Non-parallel text
The single bullet phenomenon
The list that isn’t a list
The title that doesn’t reflect what follows
More things to avoid

The general title that contains almost no information

Bullets when there really isn’t a list

Pictures and text on the same slide

Imposing, annoying slide backgrounds
Experimental Energy Content

- Gasoline
  - $\text{HHV} = 46 \pm 2 \text{ kJ/g}$
  - $35 \pm 1.5 \text{ kJ/cm}^3$
    - Specific Gravity $= 0.76$ [2]

- Diesel
  - $\text{HHV} = 49 \pm 2 \text{ kJ/g}$
  - $41 \pm 1.5 \text{ kJ/cm}^3$
    - Specific Gravity $= 0.8318$

- Experimental results are consistent with reported values [3]
- Gasoline has lower energy content per unit volume
First Problem: pointless slide themes
Problem: too much text

The frilled-neck lizard is found mainly in the northern regions of Australia and southern New Guinea. The lizard is also, on rare occasions, found in the lower desert regions of Australia. The lizard inhabits humid climates such as those in the tropical savannah woodlands. The frill-necked lizard is an arboreal lizard, meaning it spends a majority of its time in the trees. The lizard ventures to the floor only in search of food, or to engage in territorial conflicts. The lizard's environment.

https://en.wikipedia.org/wiki/Chlamydosaurus

Adapted from the Wikipedia: https://en.wikipedia.org/wiki/Chlamydosaurus
Powerpoint’s bulleting invites users to put the most concrete-- and therefore the most informative-- text at the lowest level in the smallest text.

Thus...
Level One

- Level two
- Level two
  - Level three
  - Level three
- Level two
- Level two
  - Level three
  - Level three
    • Level four
    • Level four

Consider Hayakawa’s Ladder: at what level would you expect the most information?

But which level is most imposing?
Non Parallel Text

• Very annoying
• It may confuse the audience
• Try to avoid it
• Phrases differ syntactically or grammatically

Above is an example. Can you see why?
Some Advice

- Avoid the single-bullet phenomenon.
Some Advice

• Avoid the single-bullet phenomenon.

This negative example shows the single-bullet phenomenon.
Single bullet phenomenon

• This is not it.
• This not it.
  • This is it again.
List that isn’t a list

Arduino board
TRIZ
Representative democracy
Peanut butter sandwich
This still isn’t a list

- Arduino board
- TRIZ
- Representative democracy
- Peanut butter sandwich
List that isn’t a list

• Arduino board
• TRIZ
• Representative democracy
• Peanut butter sandwich
• Ideate

Adding bullets doesn’t make it a list
Prototype Development

- TRIZ
- Ideation
- Three-D printer
- Testing
- Build second prototype
- Market research
- Metal components

Title does not cover topics (which don’t form list and are not parallel.)
Functionality

- Keyboard
- VGA monitor
- DE2 Board
- Assembly language
- Speaker
Agenda

- Problem
- Solution
- Design
- Testing

- Assessment
- Marketing
- Conclusions

A slide so general it contains little information
All sorts of things on a slide

• Bullet point 1
• Bullet point 2
• Bullet point 3

Graph which should be on its own slide

Picture which should be on its own slide
Experimental Energy Content

- **Gasoline**
  - HHV = 46 ± 2 kJ/g
  - 35 ± 1.5 kJ/cm³
  - Specific Gravity = 0.76 [2]

- **Diesel**
  - HHV = 49 ± 2 kJ/g
  - 41 ± 1.5 kJ/cm³
  - Specific Gravity = 0.8318

Experimental results are consistent with reported values [3]

- Gasoline has lower energy content per unit volume

**Conclusions about the energy content**

**Title does not accurately reflect what follows**

**Distracting color swatches**

**Single-bullet**

**Not a subtopic of The topic above**

**Single-bullet**
Concert Flute

• A tube (often of silver) consisting of three main sections
  – Head-joint
  – Body
  – Foot joint

• Has keys of one or two sorts
  – Plateau keys or American keys (closed)
  – French keys (open holes)

• Embouchure is set into lip-plate on head-joint
Concert Flute

• A tube (often of silver) consisting of three main sections
  – Head-joint
  – Body
  – Foot joint

• Has keys of one or two sorts
  – Plateau keys or American keys (closed)
  – French keys (open holes)

• Embouchure is set into lip-plate on head-joint
Parts of a Concert Flute

• A tube (often of silver) consisting of three main sections
  – Head joint
  – Body
  – Foot joint

• Keys of one or two sorts
  – Plateau keys or American keys (closed)
  – French keys (open holes)

• Head joint with embouchure set into lip-plate
Parts of a Concert Flute

Lip-Plate and Embouchure

Plateau Keys

French Keys

Head-Joint

Body

Foot Joint

www.fluteworld.com/Yamaha-YFL-481H--and--YFL-461H.html
Some visual pointers

Visuals, by themselves, are not clear.

Visuals never take the place of text; they are an adjunct to it.

Visuals need to be introduced and explained.
More visual pointers

Visuals need to be labelled properly.

If a visual is not yours, you must attribute it, or you are plagiarizing.
Visuals Summary

Decide what you are trying to convey before choosing a visual:

- Information
- Dramatic effect

If conveying information, decide which visual is the most efficient means.

Introduce the visual and then show it.

Explain to the audience what they are to understand from the visual.