

# Information Presentation

## HCI Lecture 14

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# Outline

Information Presentation

Screen Design

Aesthetics

Exercise

References

# Interface Design Roadmap

Conceptual Design

Physical Design

Interaction Modes

Navigation Design

Dialogue Design

**Information Presentation**

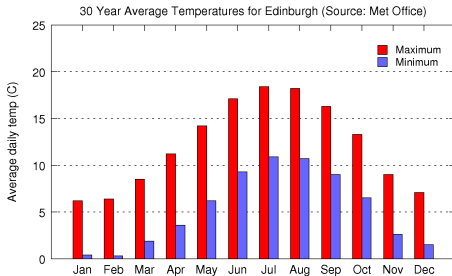
**Screen Layout**

- ▶ **Information Presentation** is a wide topic; we give an overview of common ways of presenting data.
- ▶ **Screen Design and Layout** impinges on information presentation, but also interaction and graphic design.

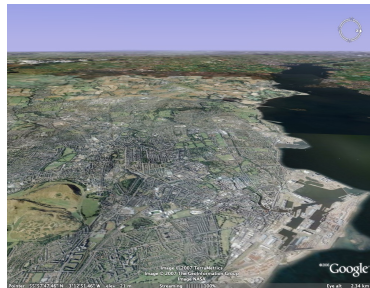
# Information Presentation

- ▶ Interfaces give feedback or display results
  - ▶ maybe *rich*, multi-modal (e.g., touch, sound, ...)
- ▶ **Visualisation** is the study of techniques for presenting data.

2D: indicative, statistical representations



3D: complex numerics, physical space on various scales



# Presentation Principles

- ▶ Purpose matters
  - ▶ lookup values or see trends
  - ▶ precise (technical, scientific) or indicative (reporting)
  - ▶ application type: document or web page, custom app, *dashboard*
- ▶ Paper presentation techniques are a guide
- ▶ ... but interactivity can be added
  - ▶ e.g., re-ordering columns, zooming, changing formats
  - ▶ ... this softens design choices
  - ▶ ... but also can allow for making a pig's ear!

# Library of Presentation Methods

- ▶ Lists
  - ▶ horizontal: sorted, tabulated
  - ▶ bulleted
  - 3. enumerated
- ▶ Tables and charts
- ▶ Graphs
  - ▶ line graphs, scatter graphs
  - ▶ histograms (bar graphs)
  - ▶ ... use *categorical scales*: nominal, ordinal, interval
- ▶ Structural graphs and trees
  - ▶ hierarchical or connected nodes
  - ▶ animations and drag-and-drop rearrangement

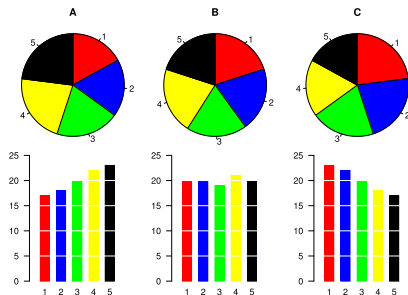
These are traditional and well-known methods but have many variations.

# Tag Clouds (weighted lists)

ambient darkwave **death metal** disco doom metal downtempo drum and bass dub easy  
listening ebm electro **electronic** electronica emo experimental  
favorite favorite songs **favorites** favourite favourites female female vocalist **female**  
**vocalists** finnish **folk** folk metal french fun funk german good goth gothic gothic  
metal gothic rock grindcore grunge guitar **hard rock** **hardcore** heavy metal hip  
hop **hip-hop** hiphop house idm **indie** indie pop **indie rock**  
**industrial** industrial metal **instrumental** j-pop j-rock **japanese** **jazz** jpop jrock latin  
lounge love male vocalists mellow melodic death metal **metal** metalcore minimal  
new age **new wave** noise nu metal oldies piano polish **pop** pop punk pop rock post-hardcore  
post-punk **post-rock** power metal progressive progressive metal **progressive rock**  
psychedelic psychedelic rock psytrance **punk** punk rock rap reggae rnb  
**rock** russian sad screamo **seen live** sexy shoegaze

# Pie charts: controversial

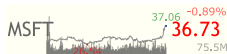
- ▶ Highly popular and attractive
- ▶ But poor presentation method
  - ▶ hard to judge area/angle
  - ▶ hard to relate segment size
  - ▶ ... need extra labels
- ▶ 3D effects even worse:
  - ▶ “wasted” use of dimension
  - ▶ distorts sizes
  - ▶ risks distorting text





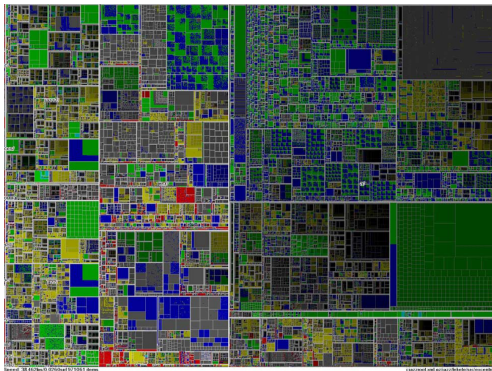
# Sparklines and Small Multiples

- ▶ Sparklines introduced in Tufte (2006)
  - ▶ “data-intensive, design-simple, word-size graphics”
  - ▶ deliberately no scales!
  - ▶ x-axis usually time
  - ▶ display current key value with history context
  - ▶ e.g.: blood glucose level, manufacturing defects, ...
- ▶ Multiples: repeated presentations of different data with the same design. Coined by Tufte (1990).
  - ▶ Repetition adds an extra (categorical) dimension
  - ▶ Understanding transfers from first to rest



# Treemaps





- ▶ Introduced by Johnson and Shneiderman (1991)
  - ▶ 2D display of large hierarchical/categorised datasets
  - ▶ Rectangle size encodes a quantity; is zoomable
  - ▶ Colour (saturation) encodes a category (quantity)






[This image is from Fekete and Plaisant (2002)]

# Interactive visualisation for the masses

**Try Our Featured Visualizations**

|                                                                                                                                                                                         |                                                                                                                                                                             |                                                                                                                                                                        |                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>U.S. Teen Births in 2003</b></p>  <p>Births to teenagers, per thousand.</p> <p>by Sonic[pvd]</p> | <p><b>Topic Hub scatterplot</b></p>  <p>Visualizing Many Eyes itself.</p> <p>by srmoon</p> | <p><b>National Parks Bubbles</b></p>  <p>Land area of the parks.</p> <p>by srmoon</p> | <p><b>Brazilian Constitution</b></p>  <p>Re-written in 1988, after 20 years of military rule</p> <p>by Fabioff3</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Featured Topic Hubs** (dive into a topic of interest, or create a hub of your own)

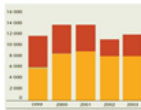
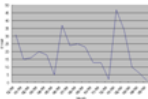
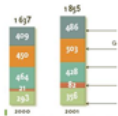
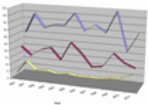
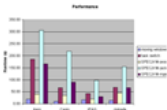
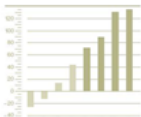
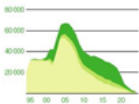
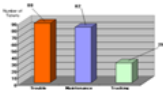
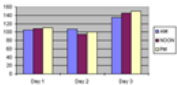
|                                                                                                                                                     |                                                                                                                                                              |                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Transportation</b><br/>Planes, trains, and automobiles!</p> |  <p><b>Decision 2008</b><br/>The presidential campaign in infographics.</p> |  <p><b>OECD Factbook 2007</b><br/>Official statistics.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|

This is IBM's Many Eyes service:

http:

//services.alphaworks.ibm.com/manyeyes/home

# Designing Charts in Excel 2007



[See <http://blogs.msdn.com/excel/archive/2006/07/12/663801.aspx>]

# Screen Layout Principles

- ▶ Process:

- ▶ **Ask**: what is the user doing?
- ▶ **Think**: what information, comparisons, orders
- ▶ **Design**: form follows function

- ▶ Tools:

- ▶ item grouping and spacing

Ard Vark  
6 7

- ▶ item order

Aspinall, David  
Webb, Barbara

- ▶ decoration

**fonts** and boxes

- ▶ white space

- ▶ alignment

| <b>Surname</b> | <b>Forename</b> |
|----------------|-----------------|
| Aspinall,      | David           |
| Webb,          | Barbara         |

## Grouping and structure

- ▶ Logically grouped  $\Rightarrow$  physically grouped

### Online invoice

#### **Billing details**

Name:

Address: ...

Credit card: ...

#### **Delivery details:**

Name

Address: ...

Delivery time:

---

#### **Order details**

Item

...

# Ordering and Decoration

- ▶ **Ordering** should follow “natural” ordering
  - ▶ inherits cultural (language; computer system) constraints
  - ▶ more noticed areas: top-left, center if given whitespace
- ▶ **Decoration** on screen
  - ▶ use boxes to group logical items
  - ▶ use fonts for emphasis, headings
  - ▶ . . . but not too many: strive for simplicity

# Alignment

- ▶ We read from left to write (English & European)  
⇒ align on the left.

Willy Wonka and the Chocolate Factory  
Winston Churchill - A Biography  
Wizard of Oz  
Xena - Warrior Princess

*rather than*

Willy Wonka and the Chocolate Factory  
Winston Churchill - A Biography  
Wizard of Oz  
Xena - Warrior Princess

- ▶ For **names**: often scanning for surnames

|                                |
|--------------------------------|
| David Aspinall<br>Barbara Webb |
|--------------------------------|

BAD

|         |          |
|---------|----------|
| David   | Aspinall |
| Barbara | Webb     |

OK

|                                  |
|----------------------------------|
| Aspinall, David<br>Webb, Barbara |
|----------------------------------|

OK



## Alignment, continued

► For **numbers**:

- ▶ visually: long number = big number
- ▶ align decimal points or right-align integers

|         |       |         |          |
|---------|-------|---------|----------|
| 56123   | 56123 | 56123   | 56123.00 |
| 97151.2 | 97151 | 97151.2 | 97151.20 |
| 57.2498 | 57    | 57.2498 | 57.25    |
| 1035    | 1035  | 1035    | 1035.00  |
| 49312.5 | 49313 | 49312.5 | 49312.50 |

BAD

OK

OK-ish

OK

► For **dialog boxes**

- ▶ align entry fields for different label widths

|          |                      |
|----------|----------------------|
| Name:    | <input type="text"/> |
| Surname: | <input type="text"/> |

BAD

|          |                      |
|----------|----------------------|
| Name:    | <input type="text"/> |
| Surname: | <input type="text"/> |

OK

# Space

- ▶ Additional space usually helps good design



- ▶ ...but sometimes we need to fill it
  - ▶ in tables, use *leaders* or highlight alternate rows

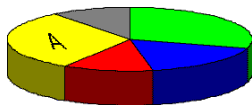
Cat number .....A14567

# Aesthetics and utility

- ▶ aesthetically pleasing designs
  - ▶ increase user satisfaction and improve productivity
- ▶ beauty and utility may conflict
  - ▶ mixed up visual styles  $\Rightarrow$  easy to distinguish
  - ▶ clean design, little differentiation  $\Rightarrow$  confusing
  - ▶ backgrounds behind text
    - nice to look at, but hard to read
- ▶ but aesthetics can help usability
  - ▶ e.g. the design of the counter
  - ▶ in consumer products – key differentiator
- ▶ many of these lessons have been (re)-learned in web design

# Colour and 3D

- ▶ both often used very badly!
- ▶ colour
  - ▶ older monitors limited palette; defined colour names limited
  - ▶ colour over-used because “it is there”
  - ▶ beware colour blind
  - ▶ use sparingly to reinforce other information
- ▶ 3D effects
  - ▶ good for physical information and some graphs
  - ▶ but if over used . . .  
e.g. text in perspective: old mistake was on 3D pie charts



# Aspects of internationalisation

- ▶ localisation & internationalisation
  - ▶ changing interfaces for particular cultures/languages
  - ▶ globalisation: choose symbols that work everywhere
- ▶ more than language change. . .
  - ▶ also changes sizes, left-right order etc.
- ▶ and deeper issues
  - ▶ cultural assumptions and values
  - ▶ e.g., meanings of symbols

tick and cross:



# Graphic Design IQ

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

# References



J.-D. Fekete and C. Plaisant.

Interactive information visualization of a million items.

In *IEEE Symposium on Information Visualization, INFOVIS*, pages 117–124, 2002.



Brian Johnson and Ben Shneiderman.

Tree-maps: a space-filling approach to the visualization of hierarchical information structures.

In *VIS '91: Proceedings of the 2nd conference on Visualization '91*, pages 284–291, Los Alamitos, CA, USA, 1991. IEEE Computer Society Press.



Edward Tufte. *Envisioning Information*.

Graphics Press, 1990.



Edward Tufte. *Beautiful Evidence*.

Graphics Press, 2006.

See also:

- ▶ Dix et al, Chapters 5 (5.7) and 20 (20.4).
- ▶ Tufte's website: <http://www.edwardtufte.com>