Cs467
Zooming
Color, Perception, Gestalt
Assignment
Shneiderman’s Taxonomy of Information Visualization Tasks

Overview: see overall patterns, trends
Zoom: see a smaller subset of the data
Filter: see a subset based on values, etc.
Detailed on demand: see values of objects when interactively selected
Relate: see relationships, compare values
History: keep track of actions and insights
Extract: mark and capture data
The yellow dots above are homes in the DC area for sale. You may get more information on a home by selecting it.

You may drag the 'A' and 'B' distance markers to your office or any other location you want to live near.

Select distances, bedrooms, and cost ranges by dragging the corresponding slider boxes on the right.

Select specific home types and services by pressing the labeled buttons on the right.
Tasks that involve large information spaces overwhelm workspaces that do not support efficient use of space and time. For example, case studies indicate that information often contains linear components, which can result in 2D layouts with wide, inefficient aspect ratios. … The Perspective Wall technique takes advantage of hardware support for 3D interactive animation to imitate the architecture of the eye system. It folds a 2D layout into a 3D wall that smoothly integrates a region for viewing details with perspective regions for viewing context. This intuitive distortion of the layout provides efficient space utilization and allows smooth transitions of views. Analysis of the Perspective Wall technique indicates a threefold improvement over simple 2D visualizations. The resulting visualization supports efficient use of space and time.
Perspective wall by Mackinlay et al. 1991
Semantic Zooming
https://www.youtube.com/watch?v=62KcJ09k7cE

Speed Dependent Zooming
A Year of Dryer Lint

https://www.youtube.com/watch?v=4kvTKh3rAJs&feature=youtu.be

Rick Valentin and Rose Marshack
(Took class in 2004)

A Family Portrait – brief discussion of what’s to come
1. Perception

*awareness of the elements of environment through physical sensation* <color perception>

*consciousness*

*quick, acute, and intuitive cognition*

2. Cognition

*the act or process of knowing including both awareness and judgment*
A vital foundation for interactive-systems designers is an understanding of the cognitive and perceptual abilities of users (Wilkens 2000).

The human ability to interpret sensory input rapidly and to initiate complex actions makes modern computer systems possible. In milliseconds, users recognize slight changes on their displays and begin to issue streams of commands. (Shneiderman 2005)
Cognitive and Perceptual abilities:

• Personality differences
• Variations in physical abilities and physical spaces
• Cultural and international diversity
• Users with disabilities
• Older adult users
• Designing for and with children
Human Cognitive Processes:

- Short-term and waking memory
- Long-term and semantic memory
- Problem solving and reasoning
- Decision making and risk assessment
- Language communication and comprehension
- Search, imagery, and sensory memory
- Learning, skill development, knowledge acquisition, and concept attainment
Factors affecting perceptual and motor performance

- Arousal and vigilance
- Fatigue and sleep deprivation
- Perceptual (mental) load
- Knowledge of results and feedback
- Monotony and boredom
- Sensory deprivation
- Nutrition and diet
- Fear, anxiety, mood, and emotion
- Drugs, smoking, alcohol
- Physiological rhythms
Design as Applied Perception
Because the luminance channel has a far greater capacity to respond to visual detail, it is essential that whenever detailed information must be conveyed there should be luminance contrast between foreground and background.

 Ideally, 10:1 light-to-dark ratio
If a symbol is to be made clearly distinctive, it must be made different from all the surrounding symbols in terms of some *simple* basic attribute.
Gestalt Grouping

• Proximity
• Good Continuity
• Symmetry
• Similarity
• Common Fate
• Common region
• Connectedness
LIU
Mapping attributes of visual characteristics of a visual object. Thus, object shape, color, and surface texture can all be varied to represent attributes of some complex information construct. (Wilkens)
Test with colorblindness simulators: color oracle, Photoshop
Ponzo Illusion
1. Color for Graphic Design

color models

which models to use

blending, transparency
Color

• Why is it important?

• Different color models

Introduction to color
(from course notes of Andries Van Dam Oct. 20, 2005, Brown University)

Color.pdf
• Dynamic queries, starfield displays, and the path to Spotfire
(http://www.cs.umd.edu/hcil/spotfire/)

• Treemaps
(http://www.cs.umd.edu/hcil/treemap-history/index.shtml)

• Sage CMU
(http://www.cs.cmu.edu/Groups/sage/sage1.html)

• Zoomable interfaces – Pad++
(http://www.cs.umd.edu/projects/hcil/pad++/)

• Non-linear magnification
(https://www.cs.indiana.edu/ftp/techreports/TR455.pdf)

• Geography of Cyberspace
(http://personalpages.manchester.ac.uk/staff/m.dodge/cybergeography/geography_of_cyberspace.html)

Atlas of Cyberspace
(http://www.kitchin.org/atlas/)
Affordances

Over the Top Webpages

Hard to Interpret Visualizations
From Smashing Magazine - color theory and practical examples (for the web):

The Meaning of Color

Understanding Concepts and Terminology
http://www.smashingmagazine.com/2010/02/02/color-theory-for-designers-part-2-understanding-concepts-and-terminology/

Creating Your Own Color Palettes
http://www.smashingmagazine.com/2010/02/08/color-theory-for-designer-part-3-creating-your-own-color-palettes/

Links recommended by UIUC
Student Jessica Metro
Design Project #1: Design a visualization using data from personal communication (i.e. email, SMS, FB inbox messages, personal communication within a large group etc.). Within your presentation, include a storyboard showing the dynamics of your visualization from beginning to end (i.e. how one logs in, how transitions occur, etc.)

Include the following:
• describe the motivation for creating this visualization
• describe the intended audience for this visualization
• describe the main questions you plan to answer/understand with this visualization
• describe the tools, analysis will you need to help answer your questions
• list any related work that may exist online (citations including papers read for class)
• in the storyboard, show the visualization flow from beginning to end.
General:

1) Does this submission describe the motivation for creating this visualization? (2 pts)

2) Does this submission describe the intended audience for this visualization? (2 pts)

3) Does this submission describe the main questions/problems the students plan to answer/understand with their visualization? (2 pts)

4) Does this submission suggest tools, analysis needed to help answer the above questions? (2 pts)

5) Does the storyboard show the visualization flow from beginning to end? (2 pts)

6) Did this submission incorporate material presented in class, from the readings or from outside sources? (2 pts)
Clarity:

1) Is the problem being addressed clear? (3 pts)

2) Is the approach the students are using to address this problem clear? (5 pts)

3) Does the storyboard present a clear and cogent presentation of their story -- does it have a coherent organization and flow? (5 pts)
Effectiveness:

1) Could the given design answer the students' main question(s)? (5 pts)

Novelty:

1) Is the approach novel? [note, not every approach needs to be novel - but we encourage you to explore visualizations that have not been already created]. (3 pts)