Objectives

- Computer Prototypes
- Graphic Design

Paper Prototyping Isn’t Enough

- After you’ve done your graphic design…
- Low fidelity in:
  - Look (what fits in screen, how big, …)
  - Feel
  - Dynamics
  - Response time
  - Context
- Users can’t try it without a human to simulate computer

Computer Prototype

- Interactive software simulation
- High-fidelity in look & feel
- Low-fidelity in depth
  - Paper prototype had a human simulating the backend; computer prototype doesn’t
  - Computer prototype is typically horizontal: covers most features, but no backend

What You Can Learn from a Computer Prototype

- Everything you learn from a paper prototype, plus:
  - Screen layout
    - Is it clear, overwhelming, distracting, complicated?
    - Can users find important elements?
  - Colors, fonts, icons, other elements
    - Well-chosen?
  - Interactive feedback
    - Do users notice & respond to status bar messages, cursor changes, other feedback
  - Fitts’s Law issues
    - Controls big enough? Too close together? Scrolling list is too long?

Prototyping Tools

- Faster than coding to create interface
- No debugging
- Easier to change or throw away
- Don’t let Java do your graphic design
- Focus on what you need to test
  - Prototype only that

Prototyping Techniques

- Storyboard
  - Sequence of painted (fixed) screenshots connected by hyperlinks (”hotspots”)
- Form builder
  - Real windows assembled from a palette of widgets (buttons, text fields, labels, etc.)
Storyboarding Tools

- HTML
  - image maps
- Flash
  - animation + actions
- PowerPoint
  - images + links + animation
- All these tools have scripting languages, too
  - Help orchestrate the transitions
- For high fidelity look, take screenshots of widgets from a form builder

Pros and Cons of Storyboarding

Pros
- You can draw anything

Cons
- No text entry
- Widgets aren’t active
- “Hunt for the hotspot”
  - Poor for user testing
  - Better to use heuristics

Form Builders

- HTML pages and forms
  - Natural if you’re building a web application
  - May have low-fidelity look otherwise
- Java GUI builders
  - Eclipse Visual Editor
  - Sun NetBeans, Borland JBuilder
- Other GUI builders
  - Visual Basic, .NET Windows Forms, Mac Interface Builder, Qt Designer
- Tips
  - Use absolute positioning to put widgets in place

Pros and Cons of Form Builders

Pros
- Actual controls, not just pictures of them
- Can hook in some backend if you need it
  - But then you won’t want to throw it away

Cons
- Limits thinking to standard widgets
- Useless for rich graphical interfaces

GRAPHIC DESIGN
Guidelines for Good Graphic Design

• Simplicity
• Contrast
• White space
• Balance
• Alignment

Simplicity

• "Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away." — Antoine de St-Exupery
• "Simplicity does not mean the absence of any décor… It only means that the décor should belong intimately to the design proper, and that anything foreign to it should be taken away." — Paul Jacques Grillo
• "Keep it simple." (KIS)
• "Less is more."
• "When in doubt, leave it out."

Have a good reason for everything you add

Techniques for Simplicity: Reduction

• Remove inessential elements
• Example: Handicapped Sign
  ➢ Nothing can be removed without losing meaning

Techniques for Simplicity: Regularity

• Use a regular pattern
  ➢ Same font, color, line width, dimensions, orientation
• Limit inessential variation among elements
  ➢ Differences may be deemed significant ➔ good if that’s what you’re going for

Techniques for Simplicity: Double-Duty

• Combine elements for leverage
  ➢ Find a way for one element to play multiple roles
  ➢ Navigation
  ➢ Where in document
  ➢ How much of doc displayed

Contrast & Visual Variables

• Contrast encodes information along visual dimensions
  ➢ When difference is important, highlight it

value hue texture shape position orientation size
Characteristics of Visual Variables

- How you present the differences affects how users perceive it.
- Scale: kinds of comparisons possible
  - Nominal (=)
    - List of all variables (hue, shape)
  - Ordered (<, >)
    - Ordered: position, size, value, texture granularity
    - Not ordered: orientation, hue, shape
- Quantitative (amount of difference)
  - Quantitative: position, size
  - Not quantitative: value, texture, orientation, hue, shape

Characteristics of Visual Variables

- Length: number of distinguishable levels
  - Shape is very long (infinite variety)
  - Position is long and fine-grained
  - Orientation is very short (~ 4 levels)
  - Other variables are in between (~ 10 levels)

Attention

- Recall the spotlight metaphor
  - Attention spotlight moves serially from one input channel to another
  - All stimuli within spotlighted channel are processed in parallel
- Input channel = one or more visual variables
  - e.g., position, hue

Selectivity

- Selective perception: can attention be focused on one value of the variable, excluding other variables and values?
  - Selective: position, size, orientation, hue, value, texture
  - Not selective: shape
    - More difficult to focus on just the triangles among rectangles

Experiment

- find all the letters on the left half of the page (position)
- find all the red letters (hue)
- find all the K’s (shape)

Associativity

- Associative perception: can variable be ignored when looking at other variables?
  - Associative: position, hue, value, texture, shape, orientation
  - Not associative: size, value
    - Small size and low value interfere with ability to perceive hue, value, texture, and shape
* When size is a visual variable, shapes and hues of small objects are harder to detect.

**Recall the Stroupe Effect**

- Green
- Orange
- Red
- Black
- Pink
- Blue

Interference at the *cognitive* level, not the *perceptual* level.

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**Quotes: Bringhurst & Tufte**

"Some space must be narrow so that other space may be wide, and some space must be emptied so that other space may be filled."

– Robert Bringhurst

*The Elements of Typographic Style*

"Information consists of differences that make a difference."

– Edward Tufte

*Envisioning Information*

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**Small Multiples**

- Economy of line
- Many similarities enable us to notice differences

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**Small Multiples**

*International Women’s Day*

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**Small Multiples**

*Reid Miles, Blue Note Cover*
**Techniques for Contrast**

- Choose appropriate visual variables
  - Keep in mind data you’re trying to communicate and the task users need to do with the data
  - Example: don’t use shape if there’s order
- Use as much length as possible
  - Determine min, max
  - Use whole range (with N levels within it)
- Sharpen distinctions for easier perception
  - Multiplicative scaling, not additive
  - Redundant coding where needed
  - Cartoonsish exaggeration where needed
- Use the squint test

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**Choosing Visual Variables for Display**

- **Spam flag**: nominal, 2 levels (spam or not)
- **Subject**: nominal (but can be ordered alphabetically), infinite (but maybe ~100 are active)
- **Sender**: nominal (but can be ordered alphabetically), infinite (but maybe ~100 people you know + everybody else)
- **Unread flag**: nominal, 2 levels (read or unread)
- **Date**: quantitative (but maybe ordered only matters), infinite (but ~10 levels matter: today, this week, this month, this year, older)

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**Designing Output Displays**

Title: HCI Bibliography: Human-Computer Interaction: User Interface

Summary: The HCI Bibliography (HCBIB) is a free access bibliography on Human-Computer Interaction, with over 2000 records in a searchable database. Learn more.

Keywords: HCI

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