Human-Computer Interaction
Round 8

So you’re building an app to fly an airplane.
You might build this:

...when users really need this:

From Tapworthy
Today

- Universal design highlights
- Exercise
- Graphic design
- Exercise discussion
- Mid-term course evaluations
- Research papers

17: Design

- Due in two weeks

  http://www.ccs.neu.edu/home/intille/teaching/HCI/IndividualAssignments.html#17

T5: Paper Prototyping #2

- Big deal ... Get going!
16: Heuristics
- What did you think?

Universal Design Principles
- equitable use
- flexibility in use
- simple and intuitive to use
- perceptible information (redundancy)
- tolerance for error
- low physical effort
- size and space for approach and use

Multi-modal Interaction
- E.g.: Captcha
  [http://www.google.com/recaptcha/learnmore](http://www.google.com/recaptcha/learnmore)
- Channels
  - Increase bandwidth
  - Beware of interference
  - Emphasize if redundant
Multi-modal Interaction

- E.g. Sound
  - Keyclicks reduce errors
  - Gamers and sound

- E.g. Speech
  - Pros?
  - Cons?

Speech Recognition Problems

- Different people speak differently:
  - accent, intonation, stress, idiom, volume, etc.
- The syntax of semantically similar sentences may vary.
- Background noises can interfere.
- People often “ummm.....” and “errr.....”
- Words not enough - semantics needed as well
  - requires intelligence to understand a sentence
  - context of the utterance often has to be known
  - also information about the subject and speaker
  - e.g. even if “Errr.... I, um, don’t like this” is recognised, it is a fairly
    useless piece of information on it’s own

Evaluating websites

- http://webaim.org/simulations/screenreader
- http://www.paciellogroup.com/resources/contrast-analyser.html#download
- http://www.paciellogroup.com/resources/wat-ie-about.html
Speech Recognition: useful?

- Single user or limited vocabulary systems
  - e.g. computer dictation
- Open use, limited vocabulary systems can work satisfactorily
  - e.g. some voice activated telephone systems
- General user, wide vocabulary systems ...
  ... still a problem
  - Great potential, however
  - When users hands are already occupied
    - e.g. driving, manufacturing
  - For users with physical disabilities
  - Lightweight, mobile devices

Speech Synthesis

The generation of speech

Useful
- Natural and familiar way of receiving information

Problems
- Similar to recognition: prosody particularly

Additional problems
- Intrusive - needs headphones, or creates noise in the workplace
- Transient - harder to review and browse

Speech Synthesis: useful?

Successful in certain constrained applications when the user:
- is particularly motivated to overcome problems
- has few alternatives

Examples:
- screen readers
  - read the textual display to the user
    utilised by visually impaired people
- warning signals
  - spoken information sometimes presented to pilots whose visual and haptic skills are already fully occupied
Non-Speech Sounds: useful?

- Dual mode displays:
  - Information presented along two different sensory channels
  - Redundant presentation of information
  - Resolution of ambiguity in one mode through information in another
- Sound good for
  - Transient information
  - Background status information

Auditory Icons

- Use natural sounds to represent different types of object or action
- Natural sounds have associated semantics which can be mapped onto similar meanings in the interaction
  - e.g. throwing something away
  - the sound of smashing glass
- Problem: not all things have associated meanings
- Additional information can also be presented:
  - Muffled sounds if object is obscured or action is in the background
  - Use of stereo allows positional information to be added

Earcons

- Synthetic sounds used to convey information
- Structured combinations of notes (motives) represent actions and objects
- Motives combined to provide rich information
  - compound earcons
  - multiple motives combined to make one more complicated earcon
Earcons (ctd)

- Family earcons
  similar types of earcons represent similar classes of action or
  similar objects; the family of “errors” would contain syntax
  and operating system errors

- Earcons easily grouped and refined due to
  compositional and hierarchical nature

- Harder to associate with the interface task since
  there is no natural mapping

Handwriting Recognition

- Problems
  - Personal differences in letter formation
  - Co-articulation effects

- Breakthroughs:
  - Stroke not just bitmap
  - Special “alphabet” – Graffeti on PalmOS

- Current state:
  - Usable – even without training
  - But many prefer keyboards!

Gesture

- Applications
  - gestural input - e.g. “put that there”
  - sign language

- Technology
  - data glove
  - position sensing devices and motion sensing devices (Wii)
  - Kinect

- Benefits
  - natural form of interaction - pointing
  - enhance communication between signing and non-signing
    users

- Problems
  - user dependent, variable and issues of coarticulation
Users with disabilities

- visual impairment
  - screen readers, SonicFinder
- hearing impairment
  - text communication, gesture, captions
- physical impairment
  - speech I/O, eyegaze, gesture, predictive systems (e.g. Reactive keyboard)
- speech impairment
  - speech synthesis, text communication
- dyslexia
  - speech input, output
- autism
  - communication, education

Older adults

- No evidence averse to new tech
- Lack familiarity
- May fear learning
- People live longer
  - More disposable income
  - More time
  - More independence
- More than half people over 65 have a disability

Other Considerations

- Age groups
  - older people e.g. disability aids, memory aids, communication tools to prevent social isolation
  - children e.g. appropriate input/output devices, involvement in design process
- Cultural differences
  - influence of nationality, generation, gender, race, sexuality, class, religion, political persuasion etc. on interpretation of interface features
  - e.g. interpretation and acceptability of language, cultural symbols, gesture and colour
Elements of Graphic Design

When you design, do not allow the spacing between elements to “just happen.” Develop an active awareness of the spatial relationships that are occurring between the components of a layout or image. Practiced consciously, this awareness quickly becomes second-nature to a designer or artist.
Typography

Serif versus Sans Serif
Use Serif fonts for printed paragraphs
Use Sans Serif for low-res displays

Typography

Fonts come in families.
When mixing multiple serif or sans serif fonts, try to stay within the family.

Medium
UltraLight
Condensed bold

Typography

When in doubt, use Helvetica.
Typography

When in doubt, use Helvetica.

(not Comic Sans)

Typography

Don’t *OVER-EMPHASIZE*
There is no reason, ever, to combine italics, boldface, underscore, or UPPERCASE or other form of emphasis in a single word or passage.

Capitalization

DON’T SHOUT
Unless you really mean it.
Capitalization

Mixed Cased
This is almost always the right choice, unless you are writing a whole sentence. Also, learn the standard practices for Title Case.

Capitalization

Be consistent!
One of the easiest traps to fall in is to inconsistently apply capitalization to user interface elements (labels, forms). Always proof-read your designs.
Grouping

Make stuff easy to find.
When controls or information relate to each other, putting them in close proximity reduces searching behavior for the user.

Grouping is all about organization.

Organize

Organize is a vital strategy for everything in the user interface. It is essential that controls or information related to each other be placed in close proximity.

Elements of Graphic Design

Chunking

Chunking is a way to make the ideas of a design on the DVD obtainable in a more manageable size.

Organize into bite-size chunks.
Groups

Elements of Graphic Design

Boxes and Borders
Can help tie things together, while organizing space to aid searching and avoiding an overwhelming visual landscape.
Alignment

Use the invisible grid
Always break down your page or screen into manageable sections before you begin to add content
Alignment
Grids impose order

Alignment
Flush Left, Ragged Right
Make this your mantra for text.

Unless you have only one piece of text on a page, don't use center alignment.
Aligning text to the edge of a page or screen provides an anchoring effect.
Color

Color is extremely powerful.
It's also easy to abuse.
Color

Color is extremely powerful. It's also easy to abuse.

Like this: Are your eyes hurting yet? Avoid isoluminent colors for text on background.

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Color

As in everything else… Keep your color choices simple until you feel you are ready to be more adventurous.

Black white and grey are always safe, but work best with a single accent color.

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Color

Be careful with saturation. The bright, fully saturated primary colors are great when used sparingly, but chose more subdued values when combining multiple hues.
Color

Choose a color palette
Visit the internet oracle of color choices:
http://colorschemedesigner.com/

Play around with the various types of color combinations: monochromat
Iconography

Elements of Graphic Design

We are surrounded by hundreds of graphic symbols and logos, often without realizing it. These symbols are used to convey information quickly and effectively. Graphic symbols are often used in advertising, packaging, and product design. They can be simple or complex, but they all serve the same purpose: to communicate a message in a clear and concise way.

Iconography is the study of graphic symbols and their meanings. It is an important aspect of graphic design, as it helps designers create effective and meaningful designs. In order to create successful and meaningful icons, designers must understand the history and cultural context of the symbols they use.

For example, the red and blue logos used by Coca-Cola and Pepsi are iconic symbols that are recognized worldwide. However, these logos were not always as successful as they are today. When Coca-Cola introduced its iconic red and white logo in 1894, it was not as popular as the blue and white logo used by Pepsi. It wasn’t until the 1950s that the Coca-Cola logo was adopted by the company and became an iconic symbol of the brand.

Icons are often used to represent ideas or concepts that are difficult to express in words. For example, the symbol for a computer mouse is a simple icon that is widely recognized. Customers can easily identify the function of a product by looking at the icons used on its packaging.

In conclusion, iconography is an important aspect of graphic design. By understanding the history and cultural context of the symbols they use, designers can create effective and meaningful designs that communicate messages clearly and effectively.
Iconography

Don’t settle for clip art. You can make great designs by simply combining basic shapes and tweaking typography.

The greatest, most memorable logos are often the simplest.

Iconography

Iconography

Iconography
Iconography

Simplicity

Keep it simple, okay?
The best way to make sure people will actually use your application is to get rid of the clutter, focusing on the high-level objectives of the user.
Remove

The most obvious way to simplify is to remove what’s unnecessary.

How not to do it

Cutting features can be a bloody process.

Focus on what’s core

Customers choose basic improvements over value-added extras.
Decisions

Users are happier when their choices are limited.

Options and preferences

Mainstream users don't like the burden of setting options and preferences.

Visual clutter

Before

After

- Use heading or hit return to start a new paragraph.
- Use smaller text size like 10 or 11pt.
- Increase the spacing between lines of text by adding a 16pt line height.
White Space
White Space

Graphic designers love white space.

Just because you have a lot of space you can fill with text does not mean you should. People don't like to feel cramped, plus there are a lot of other ways you can express content without making people spend a lot of time reading it. Edit. Respect white space.
White Space

Edit. Respect white space.

Final words
Final words

From Robin Williams

“Graphic Design is all about CRAP.”

Robin Williams
C.R.A.P.

Contrast

C.R.A.P.

Contrast
Repetition

C.R.A.P.

Contrast
Repetition
Alignment
C.R.A.P.

Contrast
Repetition
Alignment
Proximity

C.R.A.P.

Contrast

This is contrast.

C.R.A.P.

Contrast

This is contrast. Use sparingly.
C.R.A.P.

Contrast
This is contrast. Use sparingly.

C.R.A.P.

Repetition
Repeated elements, such as headings, color and shapes can unify a design.

C.R.A.P.

Alignment
Make your designs rational
C.R.A.P.

Proximity
When things have a related function, group them together. Keeping things together implies relationship, and prevents “floating in space.”
Research Papers - Graphic Design, Tangible Int., Games

- Harrison et al., Kineticons: Using Iconographic Motion in Graphical User Interface Design, CHI 2011 (Presenter: Serkan Okur)
- Badshah et al., Interactive Generator: A Self-Powered Haptic Feedback Device, CHI 2011 (Presenter: Chen Chu)
- Andersen et al., Placing a Value on Aesthetics in Online Casual Games, CHI 2011 (Presenter: Utsav Shah)

To do

- Have a great break!
- Read and take notes
  - Nielsen Ch 6, 7, 1)
  - Olympic Message System (Gould on Blackboard)
  - Models (Dix Ch 12).
- Do Individual Homework I7 – Design
- Do Team Homework T5 – Paper Prototyping 2
- Be ready to implement...