# Design considerations – 1

- Visual Interface Design
- Direct Manipulation
- Navigation

Shneiderman, 6th Edition, chapters 7-11
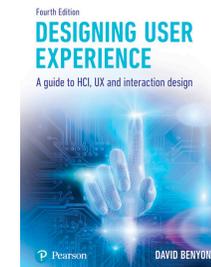
Benyon, 4th ed. chapter 12

Visual Interface Design

- The **user interface (UI)** consists of everything in the system that people come into contact with, whether that is physically, perceptually or conceptually.

- UX designers need to deliver a compelling UI that draws people in and engages them in the interaction.

- So UX designers need to know **principles and guidelines** applied in interface design for delivering usable and engaging UX.

- In this unit, we focus on **visual aspects**, while in the next on design considerations for other modalities (speech, etc.) and collaborative interaction.

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Physical interaction

- Physically people interact with systems in many different ways, such as by **pressing buttons, touching a screen, moving a mouse** over a table so that it moves a cursor over the screen, clicking a mouse button and rolling their thumb over a scroll wheel.

- We also interact physically through other senses, notably sound and touch, but we defer a discussion of these modalities for later.

Perceptual interaction

- Perceptually people interact with a system through **what they can see**, hear and touch.

- The visual aspects of interface design affects what people will see and notice on a screen.

- Buttons need to be big enough to see and they need to be labelled in a way that is understandable for people.

- Instructions need to be given so people know what they are expected to do

Conceptual interaction

- Conceptually people interact with systems and devices through knowing what they can do and knowing how they can do it, i.e. employ a '**mental model**' of what the service or device is and how it works.

    – People need to know that certain **commands** exist that will allow them to do things.

    – They need to know that certain **content** is available and the form that it takes.

    – They need to now how to **navigate** to particular content

    – They need to be able to see an **overview of things** and focus on particular areas.

UI design

- The interface designer should tackle the physical, perceptual and conceptual aspects of the interface

- Most personal computers, phones, handheld and tablets have **graphical user interfaces (GUIs)** (software platforms: Mac OS X and iOS, Microsoft Windows and Google's Android).

- Underlying these GUIs are user interfaces without the graphical elements (**command languages**).

Command languages

- A language composed chiefly of a set of commands or operators, used especially for communicating with the operating system of a computer.

- To interact with a device using a command language, the user types a command such as 'send', 'print', etc., and supplies any necessary data such as the name of a file to be sent or printed.

- unix shell or dos command are examples of command languages.

- Command languages suffer from the problem that **users have to recall** the name and the syntax of particular commands. In the next section

The enigmatic c:\> prompt in MSDOS

Command languages

- An advantage of command languages is that they are quick to execute and, particularly, if there are only a few commands, people using them frequently will remember them.

- Commands can be spoken which makes for a very convenient interface, particularly if the user is concentrating on something else.

- **Spoken commands** are very convenient for in-car systems, for example.

- Spoken commands to search for items or to set reminders are available from Google Now, Apple's Siri or Alexa from Amazon.

Challenge

Don Norman (2007) argues that commands have a number of benefits. However, a key issue is that the system must be in the correct mode to recognize and react to the commands. For example, in the science fiction series Star Trek, people have to alert the computer when they wish to enter a command, for example the captain might say 'Computer. Locate Commander Geordie Laforge'. If they did not do this, the computer would not be able to distinguish commands intended for it from other pieces of conversation. Is it always necessary?

Graphical user interfaces

Graphical user interfaces

- **Graphical user interfaces (GUIs)**, which are found on every personal computer, smart phones, on touchscreen displays etc., have been first introduced in the 1980s.

- During the 1980s and 1990s, a number of different designs of GUIs were produced, but gradually, Windows and Apple Macintosh came to dominate the GUI operating system market.

- Google Android has challenged them but the basic functions and icons of a GUI are currently fairly well defined.

Graphical user interfaces

- The most prevalent of the GUIs is the WIMP interface such as Windows or OS X.

- **WIMP** stands for **"windows, icons, menus and pointers"**.

- A window is a means of sharing a device's graphical display resources amongst multiple applications at the same time.

- An icon is an image or symbol used to represent an object or app.

- A menu is a list of commands or options from which one can choose.

- A pointing device – mouse or fingers on mobile smartphones and tablets., or pens and stylus.

The ubiquitous GUIs

TFT-LCD Monitor 15''/17''/19'' or smaller size/bigger size Touch screen Surface

Acoustic Wave (SAW) resistive touch /Infrared touch / Capacitive touch

Self service check out
(IKEA)

Athens Transport
ticket machine

KMY 8506G health kiosk

A historical note: The Xerox Star

- It is widely recognized that every graphical user interface owes a debt to the **Xerox Star** workstation, launched as the 8010 Star information system in 1981.

- It was designed to be used by **office workers** and other professionals to create and manage business documents such as memos, etc.

- The Star's designers took the perspective that people were primarily interested in their **jobs** and not in computers per se.

- Thus from its inception, a central design goal was to make use of representations of **objects that would be easily recognizable** from an office environment

The Xerox Star

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Menus

- Applications of interactive systems make use of menus to organize and store the commands that are available.

- Menus are also familiar on mobile phones, touchscreen kiosks and, of course, restaurants where the available options for the customer are listed on a menu.

- Menus are also used extensively on websites to structure information and to provide the main method of navigation of the site's content.

- Items are chosen from the menu by selecting them with the pointer.

Menus

- A typical **hierarchically organized menu** has various options and are arranged under a top-level topic (filter) and in turn have series of submenus, also called **cascading menus**.

- Another frequently encountered form of menu is the **pop-up**. A pop-up menu is distinguished from a standard menu in that it is not attached to a menu bar in a fixed location (hence the name). Once a selection is made from a pop-up menu, the menu usually disappears. In this case, it includes a number of options that are not simple commands, so it is more usually referred to as a panel.

- Also, in this case, it is also a **contextual menu**. The make-up of contextual menus varies according to the context (hence their name) from which they are invoked. If a file is selected, the contextual menu offers file options. If instead a folder is selected, folder options are displayed.

Pointers

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τσίμπημα
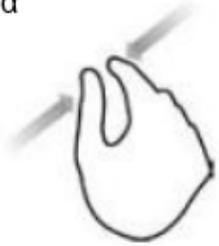
SPREAD
άπλωμα
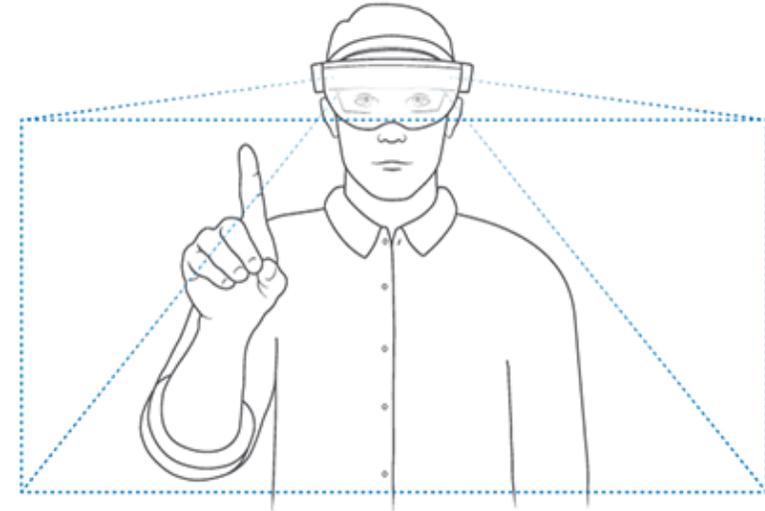
- The most common is the **mouse** but **joysticks** are also common, for example in game controllers, **touch pads** control and the pointer laptop computers.

- On mobile phones and tablets, a **stylus** is often provided as the pointer and on touchscreen systems **the finger** is used.

- Remote pointers include the **Wii wand** and other infrared pointers, for example, for doing presentations.

- Gesture can be used with Microsoft Kinect or gestures in augmented reality and virtual reality systems.

Interface design considerations

- Modern GUIs have as part of their make-up a range of widgets including buttons and radio buttons, sliders, scroll bars and checkboxes.

- Designing a GUI for an application does not guarantee that the finished system will be usable. Indeed, given the ease with which GUIs can be created with modern development tools, it is now very simple to create unusable interfaces.

- This problem is well recognized and has resulted in the creation of **style guides** that provide a range of advice to the interface developer.

- Style guides exist for the main operating systems, or platforms, **Microsoft Windows 10**, **Mac OSX** and **iOS**, and **Android**.

Design guidelines

- Guidelines operate at the level of individual widgets. For example, Android provide detailed advice about how large to make certain widgets and Apple say that any button should be no smaller than 44 pixels square.

- There are development environments available for creating apps on all the main platforms.

- These allow developers to use standard icons, menus and other features and to emulate how designs will look on a number of different devices such as a 5 '' smartphone or a 10 '' tablet.

Interface widgets

- **Radio buttons**
  - Use a series of radio buttons to allow people to make exclusive choices – think about the buttons on a radio: you can listen to FM or AM at any one time but not both.
- **Checkboxes**
  - Checkboxes should be used to display individual settings that can be switched (checked) on and off. Use a group of checkboxes for settings that are not mutually exclusive (that is, you can check more than one box). Apple iOS uses switches in a similar way.

Gender *

◉ Female

○ Male

○ Other

○ (Disabled option)

Choose expertise

☑ PHP
☐ Java
☑ HTML
☑ CSS
☐ Bootstrap

Save

Task: selection of sorting keys for database records

Discuss this design, propose a better design

Challenge

- You are designing an email client which – amongst other things – allows people to:

  - Set a series of preferences for incoming mail (download large files on receipt, display first two lines of message body, reject mail from senders not in address book, alert when new mail received ...).

  - Set a colour scheme for the email application (hot colours, water colours or jewel colours).

- Would you use radio buttons or checkboxes for these?

Toolbars
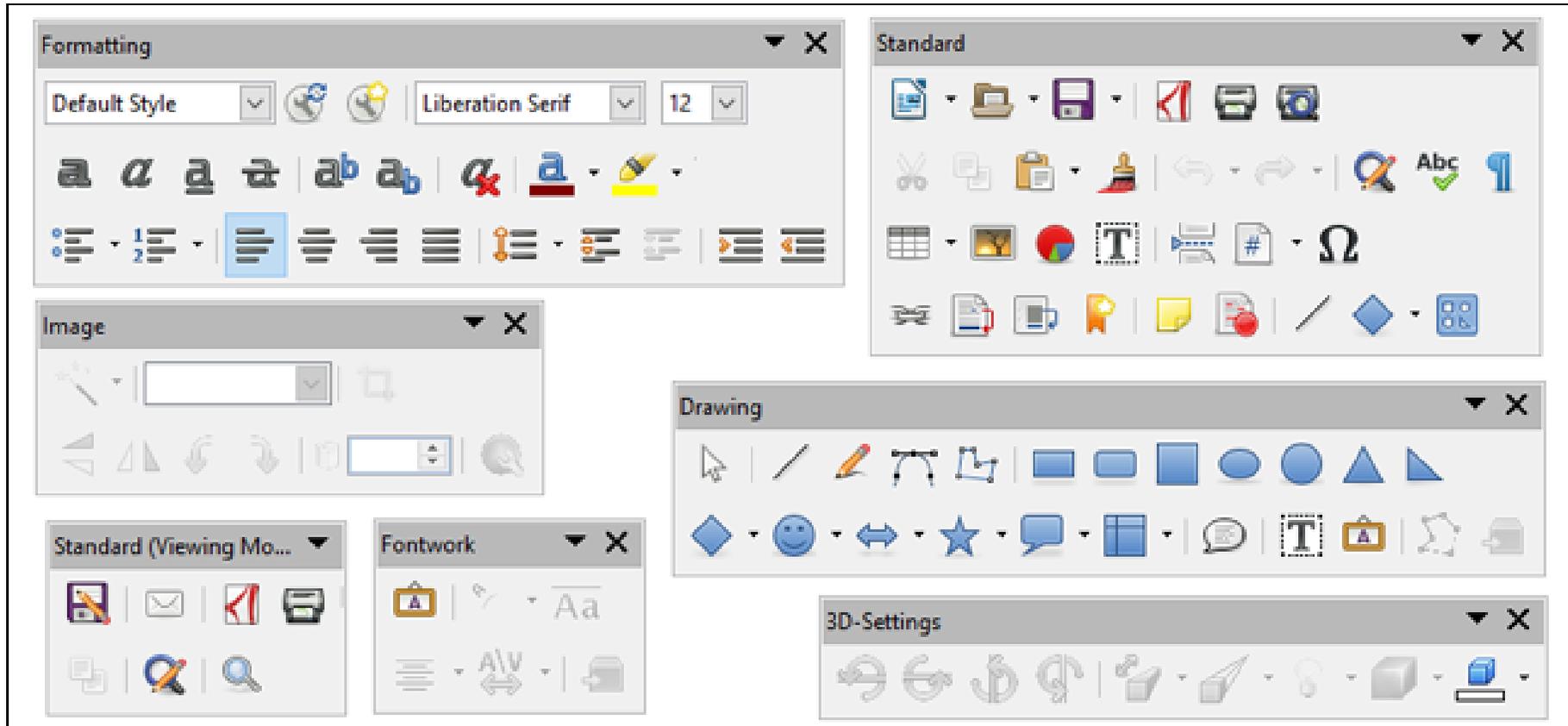
Toolbars of LibreOffice

Toolbars

- A toolbar is a collection of buttons grouped according to function, they are **conceptually identical to menus**.

- The buttons are represented as icons to give an indication of their function.

- Passing the pointer over an icon will usually trigger the associated 'tool tip', which is a short textual label describing the function of the button.

- Toolbars are also configurable: their contents can be changed and one can choose whether or not they are displayed.

- Hiding toolbars helps make the best use of the display resources.

List boxes

- List boxes take a variety of forms, and within these forms, they offer different ways of viewing the contents – as lists (with more or less detail), as icons or as thumbnails (little pictures of the files' contents).
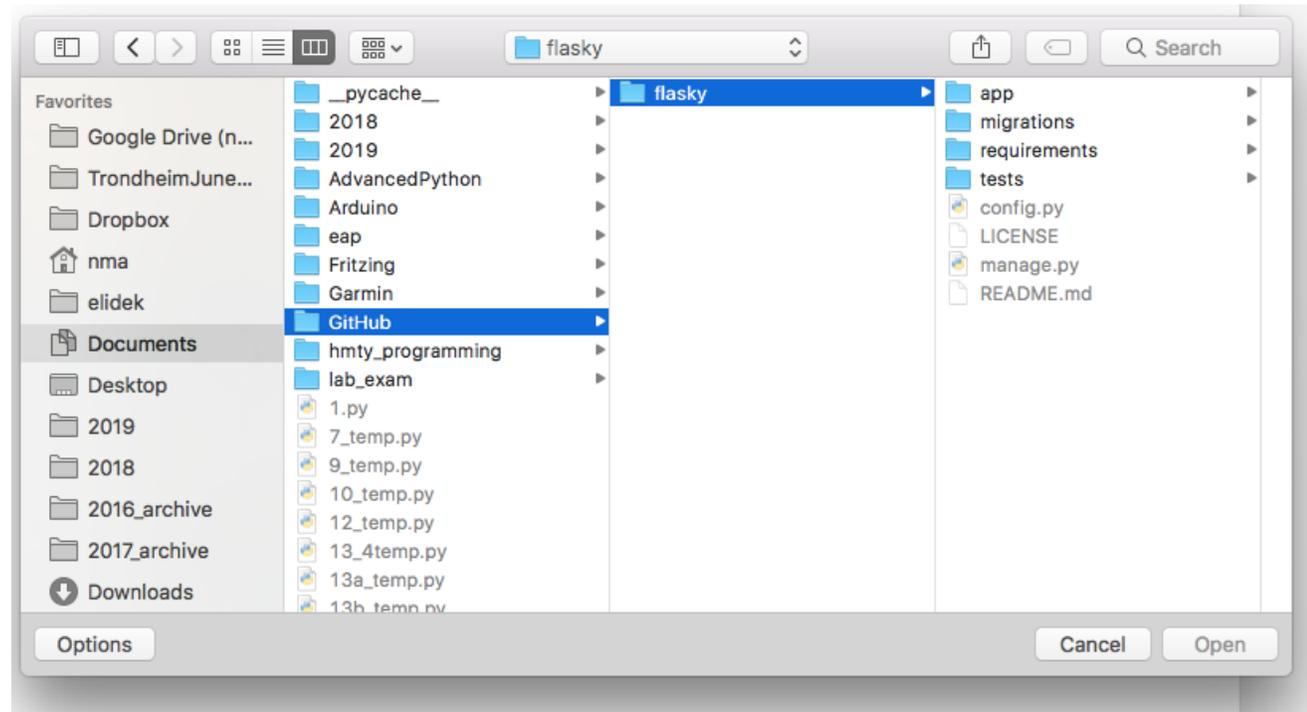
Sliders
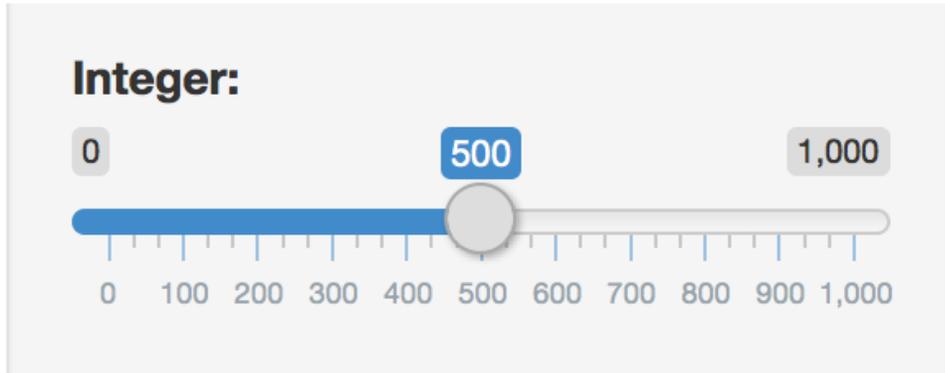
Name	Value
Integer	500
Decimal	0.5
Range	200 500

Integer:

0   500   1,000

0   100   200   300   400   500   600   700   800   900   1,000

- A slider is a widget that can return analogue values: rather than setting, say, the volume to 7 on a scale of 10, people can drag a slider to a position three-quarters of the way along a scale.

- Sliders are ideally suited to controlling or setting such things as volume or brightness or scrolling through a document

Form fill

- Form filling is an interface style that is particularly popular with web applications, used when **structured information** is required, such as name and address.

- The individual boxes are called fields and are frequently marked with an asterisk (*) to indicate that an entry is mandatory.

- This particular interface is a hybrid as it contains other widgets too, including pull-down menus.

- They can sometimes be automatically updated from a set of structured data. Examples of structured information include :

  – An individual's name and postal address required for mail order services

  – Travel details, for example the airport from which one is flying, intended destination, time and date of departure

  – Number of goods, for example 10 copies of a product.

Wizards

- Wizard is a style of interaction that leads people step-by-step through a series of questions and answers, list selection and other kinds of widgets to achieve a task.

- Wizards are used for example to install hardware, applications and updates to operating systems.

- The great strength of wizards is that they present complex tasks in small structured steps.
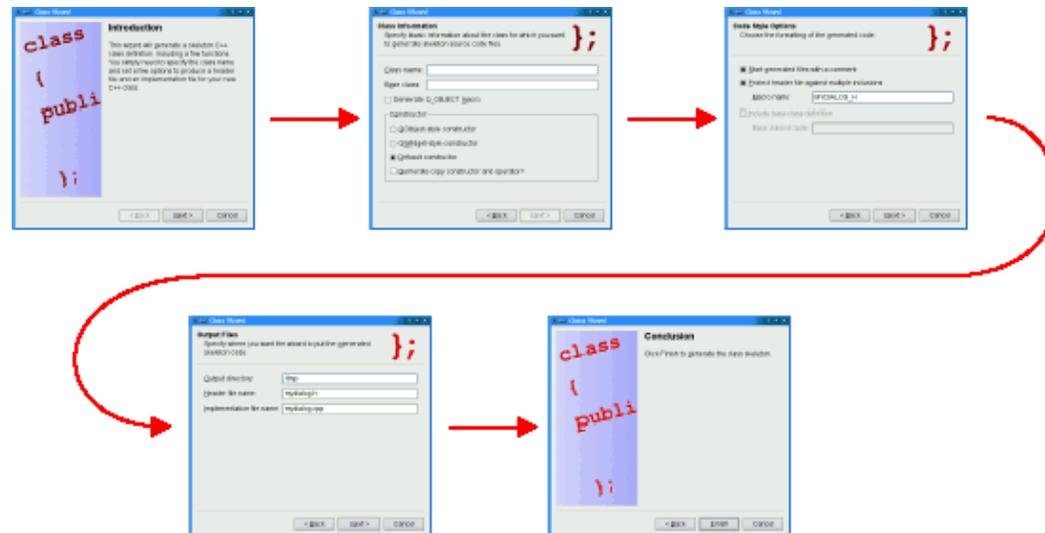
Alerts
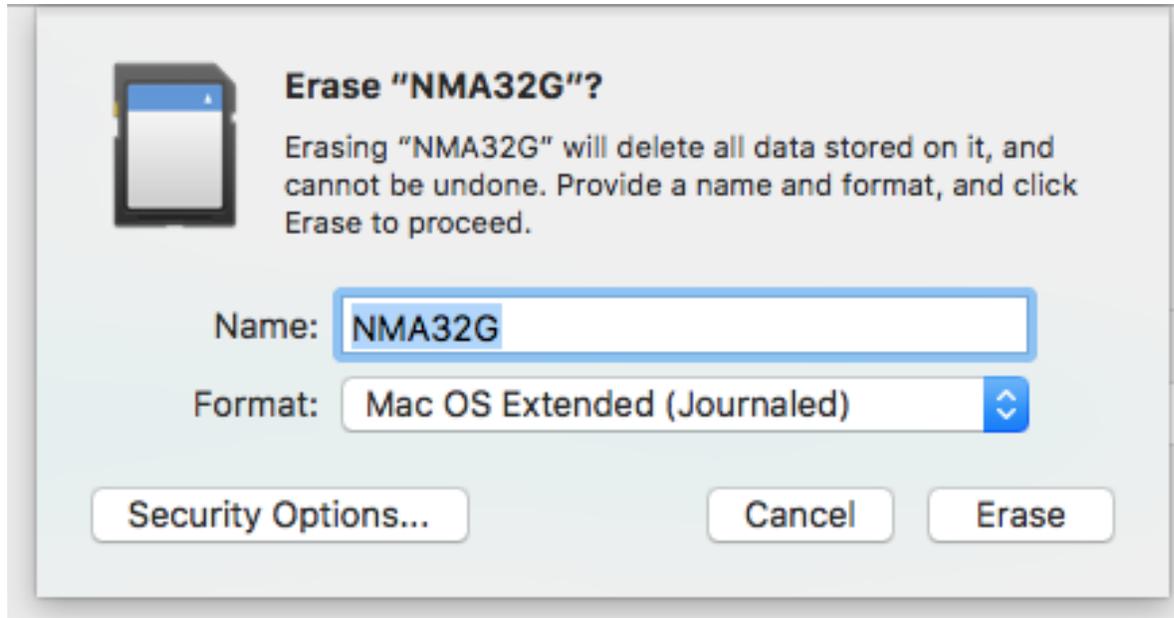
This is an example of an alert dialog box
following selection of a "disk erase" option

Attracting attention

- Attracting attention is a simple enough matter – flash a light, use some other form of animation or ring a bell to direct attention at that stimulus.

- This has to be done in a way that:

  – Does not distract us from the main task, particularly if we are doing something important, such as flying an aircraft or operating a complex or hazardous tool.

  – In certain circumstances, can be ignored while in other circumstances cannot and should not be ignored.

  – Does not overwhelm the user of a system with more information than they can reasonably understand or respond to.

Design language of visual interface

- Cooper *et al.* (2007) argues that visual interface design is a central component of UX design as it combines graphic design, industrial design and visual information design.

- Designers need to know about graphic design, such as what shape, size, colour, orientation and texture screen objects should be.

- Designs should have a **clear and consistent style** (a design language)

- The design language will be learnt and adopted by people, so they will expect things that look the same to behave the same, and, conversely, if things behave differently, make sure they look different.

Guidelines / considerations

- Cooper recommends developing a grid system to help structure and group objects at the interface. Wireframes are used to provide visual structure.

- Some guidelines are result of our understanding of the psychology of people.

- Example is a number of **'laws' of visual perception have been developed by the 'gestalt' school**.

- Perception research also provides us with other fundamental aspects of people's abilities that should be considered when designing visual interfaces.

Using proximity to organize

- One of the Gestalt principles of perception is the observation that objects appearing close together in space or time tend to be perceived together.

Using proximity to organize: example
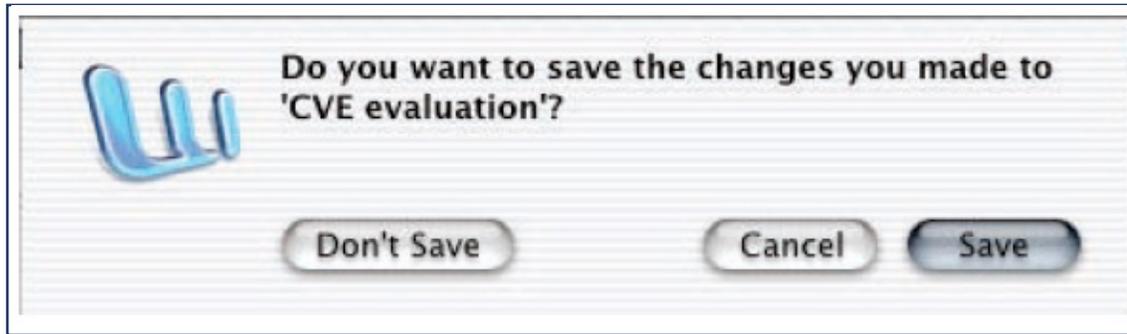
(a)
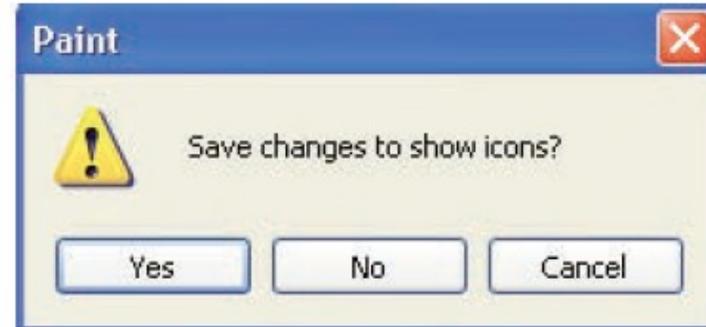
(b)

- In (a) the Cancel and Save buttons are grouped away from the option Don't Save.

- This has the effect of seeing the two commands – Save and Cancel – as a pair and clearly separating from the potentially ambiguous Don't Save.

Using similarity to organize

- A second Gestalt law we consider is that of **similarity**.

- A screenshot of the contents of a folder follows. All of the files are ordered alphabetically, starting at the top left.

- The PowerPoint files are perceived as a contiguous block. This stands in sharp contrast to the file icons
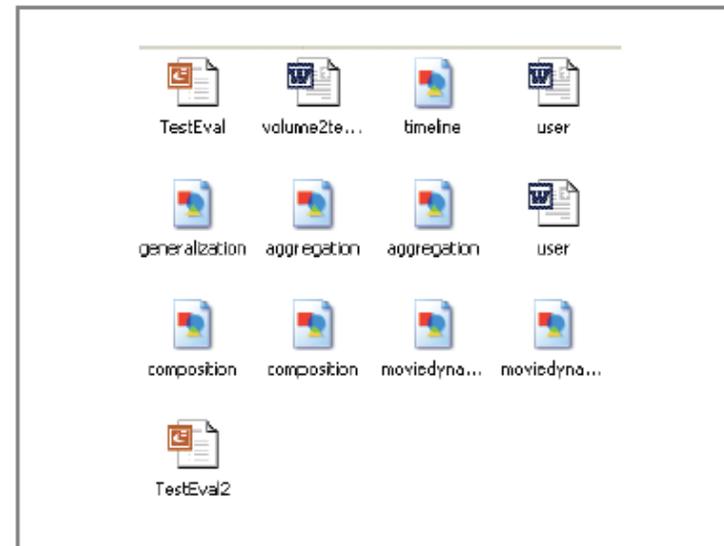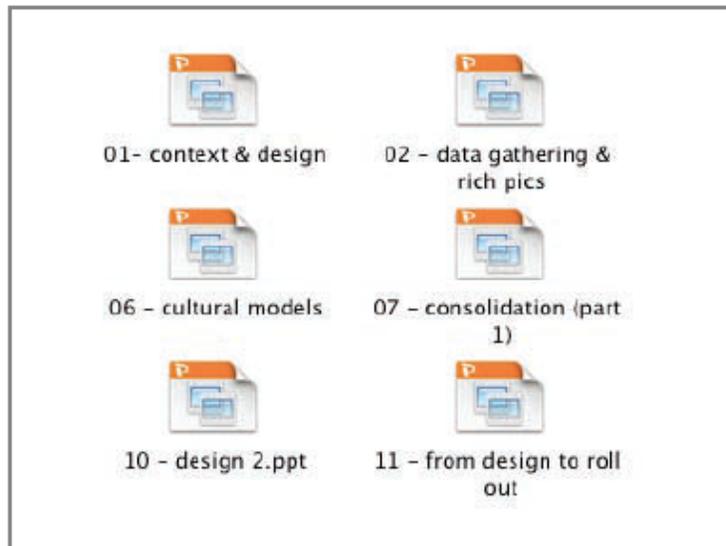
Using continuity to connect disconnected elements

- A third Gestalt law is **continuity**.

- Disconnected elements are often seen to be part of a continuous whole.

- In the figure part of finder window scrollbar is shown that indicates that there is more documents to be seen below the current windowful.

- The length of the slider is an indication of how much of the total document is visible. The slider indicates that about 80 per cent of the document is visible.
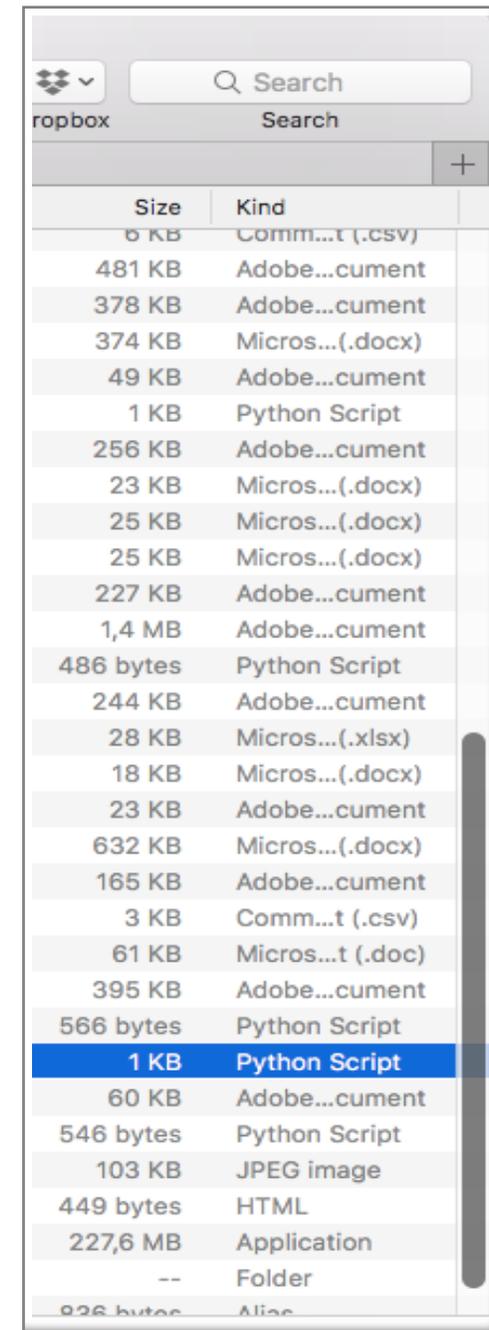
Unit 07.2 Direct Manipulation and Immersive Environments

Topics

1. Introduction

2. What is Direct Manipulation?

3. Some examples of Direct Manipulation

4. 2D and 3D Interfaces

5. Teleoperation and Presence

6. Augmented and Virtual Reality

Direct manipulation

- A **direct manipulation** interface is one where graphical objects (2d or 3d) are directly manipulated with a pointing device (mouse, users' figure, etc.).

- This is distinguished from the **'command language'** style.

- This approach to interaction was first demonstrated by Ivan Sutherland in the Sketchpad system.

- This concept was envisioned by Alan Kay of Xerox PARC in a 1977 article about the Dynabook (Kay and Goldberg, 1977).

- The first commercial systems were the Xerox Star (1981), the Apple Lisa (1982) and Macintosh (1984).

- Ben Shneiderman (1982) coined the term 'direct manipulation'

Direct manipulation

Example of direct manipulation is driving a car.

To turn left, the driver simply rotates the steering wheel to the left. The response is immediate and the scene changes, providing feedback to refine the turn.

Consider how difficult it would be trying to accurately turn a car by typing or saying a command "**turn left 30 degrees**" or selecting it from a menu.

Principles of Direct Manipulation

1. Continuous representations of the objects and actions of interest with meaningful visual metaphors.

2. Physical actions or presses of labeled buttons, instead of complex syntax.

3. Rapid, incremental, reversible actions whose effects on the objects of interest are visible immediately.

Attributes of Direct Manipulation (1 of 4)

- Novices can learn basic functionality quickly, usually through a demonstration by a more experienced user

- Experts can work rapidly to carry out a wide range of tasks, even defining new functions and features

  – Knowledgeable intermittent users can retain operational concepts

  – Error messages are rarely needed

- Users

  – Immediately see whether their actions are furthering their goals, and, if the actions are counterproductive, they can simply change the direction of their activity

  – Experience less anxiety because the interface is comprehensible and because actions can be reversed easily

  – Gain a sense of confidence and mastery because they are the initiators of action, they feel in control, and they can predict the interface's responses

Attributes of Direct Manipulation

- One way of trying to understand and categorize the direct manipulation metaphor is by looking at the translational distance between users and the **representation of the metaphor**, which will be referred to as strength

  – Strength can be perceived along a continuum from weak to immersed

  – This can be further described as the level of indirectness between the user's physical actions and the actions in the virtual space

Strength of direct manipulation metaphor

- **Weak** - early video game controllers

- **Medium** - touch screens, multi-touch

- **Strong** - data glove, gesturing, manipulating tangible objects

- **Immersive** - virtual reality, oculus rift

https://www.oculus.com/en-us/press-kit-hardware/

Intuitive and learned actions

PINCH   SPREAD

τσίμπημα   άπλωμα

- Multi-touch allows new actions to be assigned to various combinations of finger touches

  – The 2-finger actions like zoom in/out are intuitive, but others must be learned and take longer to discover

  – This accounts for why a young child can easily learn to tap, change screens, and touch on a tablet (the intuitive actions), but does not have the skills to rearrange the icons on the screen (the learned actions)
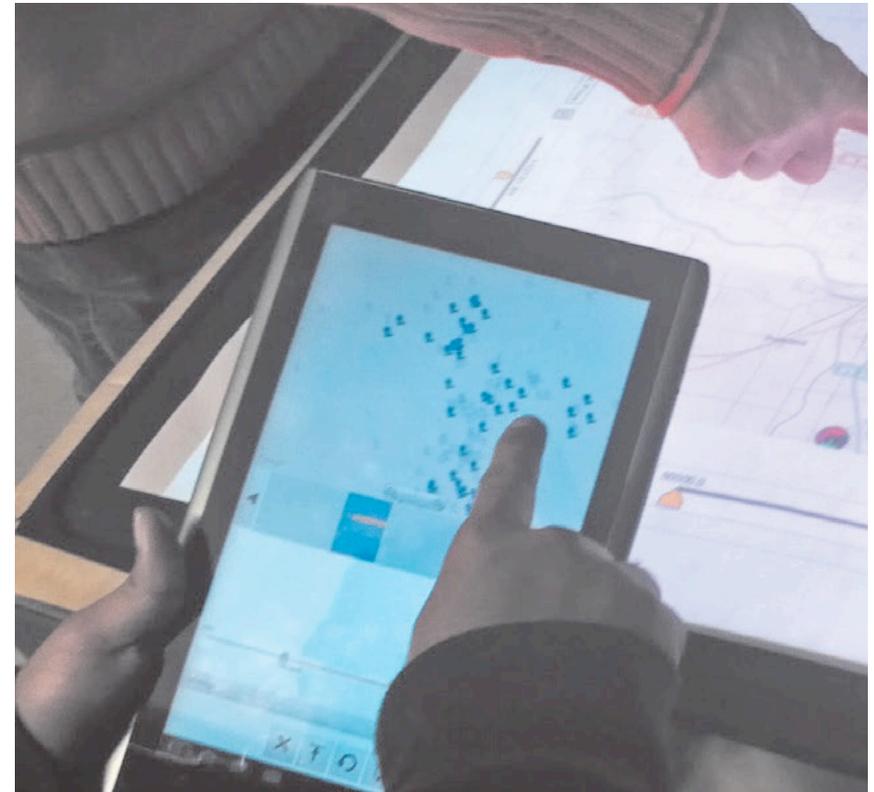
Direct Manipulation Systems (example)

- Three users working concurrently on a large tabletop touch device.
  - They can use their hands and fingers to manipulate the objects on the device
  - Note the use of the different hand gestures

# Direct Manipulation Systems (example)

- Auto-fabricated molecular models tracked with the Augmented Reality Toolkit (from the University of Washington Human Interface Technology Lab)

- A video camera captures the molecule's position and orientation, enabling the molecular modeling software to display information such as the attractive/repulsive forces surrounding the molecule

A tangible user interface for molecular biology, developed in Art Olson's Laboratory at The Scripps Research Institute

https://www.youtube.com/watch?v=gZxK6j4JTHQ&feature=emb_logo&ab_channel=CENOnline

Direct Manipulation Systems (example)

- Google StreetView of the inside of a University Center at Nova in Florida

- On the bottom is a scrollable image of other views on campus. In the left hand corner is a static map showing the physical location of the campus

- Users can move the "person" to a different location on campus and the views will change accordingly
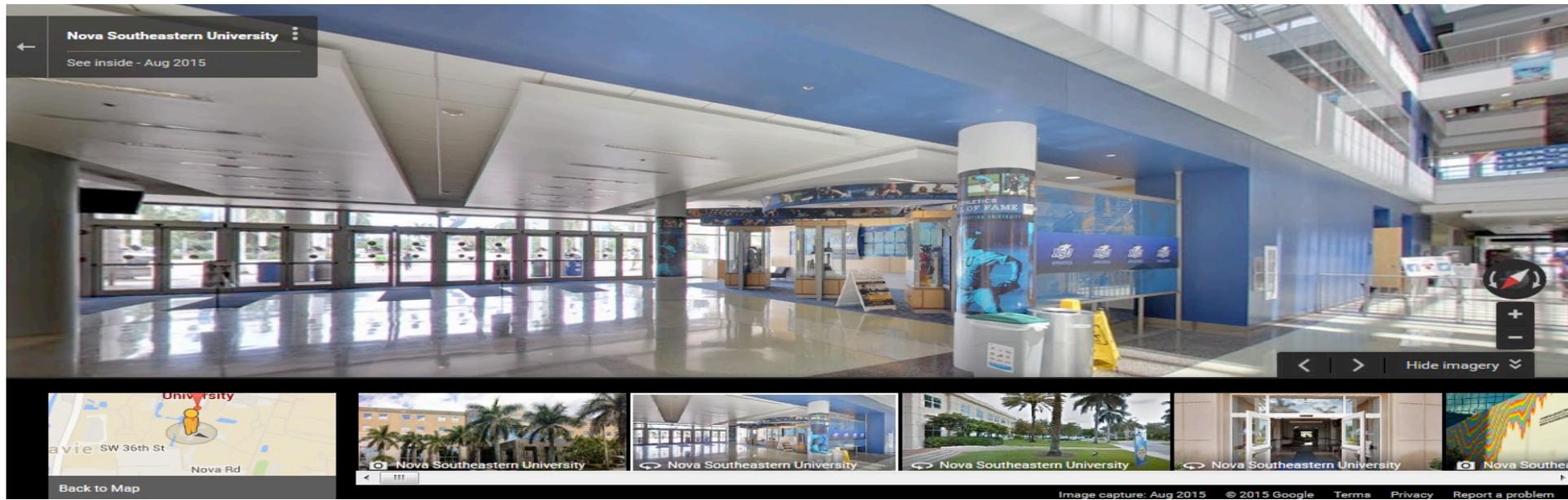
Direct Manipulation Systems example

The user playing World of Warcraft, using both her keyboard and mouse, while hearing sounds of the game via her headset

game controllers

Direct Manipulation examples : computer aided design

A 3·D virtual CAD representation helps designers lay out office space

http ://www. floored .com.
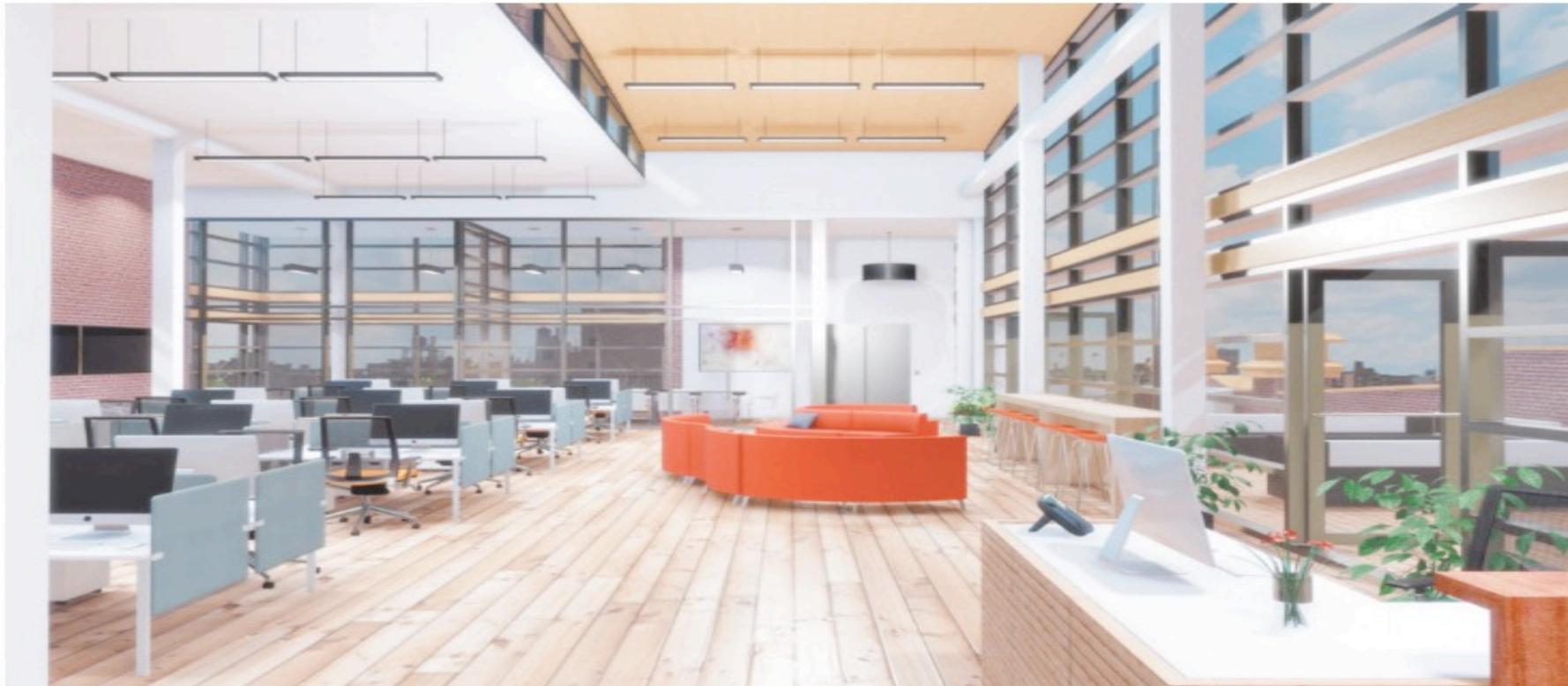
Problems with direct manipulation

- Spatial or visual representations can be too spread out, so designs may force valuable information off of the screen

- Users must learn the graphical representations

- The visual representation may be misleading

- Typing commands with the keyboard may be faster

2D and 3D Interfaces

- "Pure" 3D interfaces have strong utility in some contexts, for example:

  – Medical

  – Product design

  – Scientific visualization

- In some situations, 2D may actually be preferable to simplify interactions

- The power of 3D interfaces lies in applying them in the appropriate domain or context where the added dimension provides more understanding and improves task outcomes

3D example from medical imagery

By using a medical simulation inserted into a large scale visualization (using CAVE technology) of 3D model, physicians were able to find a solution, that would not have been possible without doing the actual surgery

Features for effective 3D Interfaces

— Use occlusion, shadows, perspective, and other 3D techniques

— Minimize the number of navigation steps for users to accomplish their tasks

— Keep text readable

— Avoid unnecessary visual clutter, distraction, and reflections

— Simplify user movement

— Organize groups of items in aligned structures to allow rapid visual search

Guidelines for enhanced 3D features

– Provide overviews so users can see the big picture

– Allow teleoperation

– Offer X-ray vision so users can see into or beyond objects

– Provide history keeping

– Permit rich user actions on objects

– Enable remote collaboration

– Give users control over explanatory text and let users select details on demand

– Offer tools to select, mark, and measure

Guidelines for enhanced 3D features

– Implement dynamic queries to rapidly filter out unneeded items

– Support semantic zooming and movement

– Enable landmarks to show themselves even at a distance

– Allow multiple coordinated views

– Develop novel 3D icons to represent concepts that are more recognizable and memorable

Teleoperation and Presence

- **Teleoperation/Remote control**

- Example: Home-automation applications, extend remote operation of various devices to security and access systems, energy control, and operation of appliances.

- Complicating factors

  - Time delays

  - transmission delays

  - operation delays

  - Incomplete feedback

  - Feedback from multiple sources

  - Unanticipated interferences

Example: telehealth cart otoscope

- Real-time tympanic (ear) membrane exam

- On screen is Physician Assistant who, from a remote location, can see and evaluate the patient and provide an appropriate plan of care

Example of sharing screen

- ImmerseBoard allows two users to be co-located and work on the same shared screen (Higuchi et al., 2015).
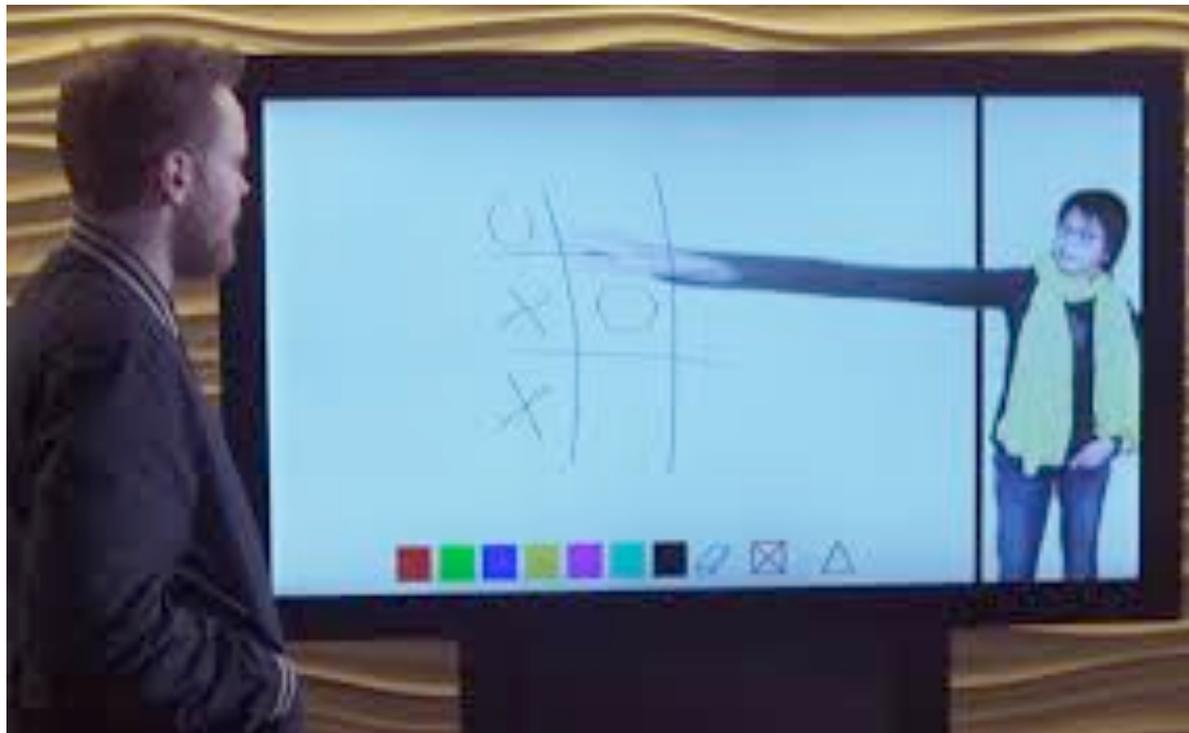
Augmented and Virtual Reality
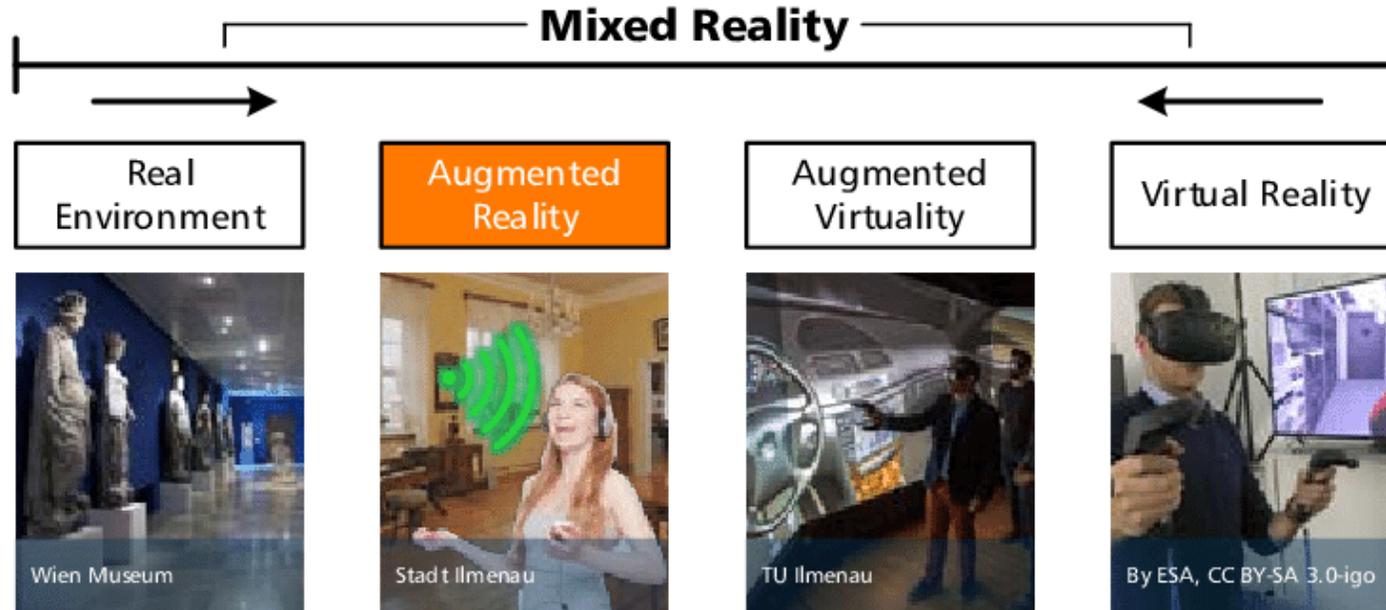
- **Virtual reality** breaks the physical limitations of space and allow users to act as though they were somewhere else

- **Augmented reality** shows the real world with an overlay of additional overlay

Milgram et al.

Augmented and Virtual Reality

Augmented and Virtual Reality (example)

- Homeowner can fix plumbing problem, with guidance and direction from plumber

- Plumber (actually Dad) and plumbing problem are not in the same location, but by use of augmented reality, both people can clearly see the problem and give directions as to how to resolve it
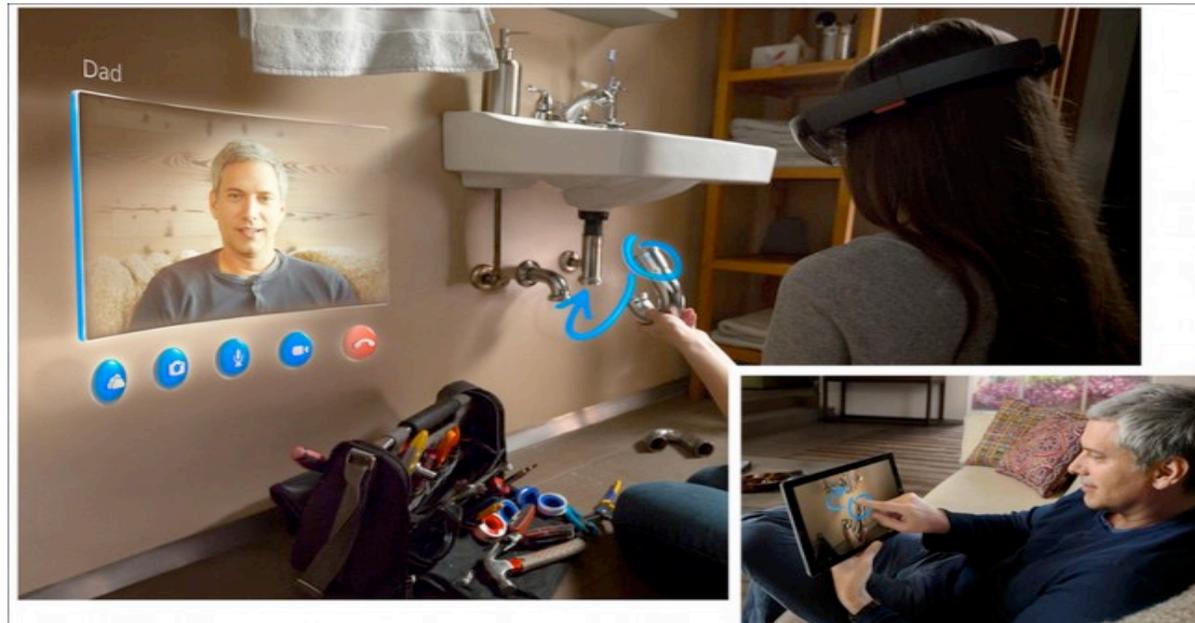
Augmented and Virtual Reality example

- Using augmented reality overlays, various points of interest can be shown on a mobile phone. Icons represent the type of place (food, shopping, etc.) and distances from the current location . Links are provided to user reviews - **HERE City Lens app**
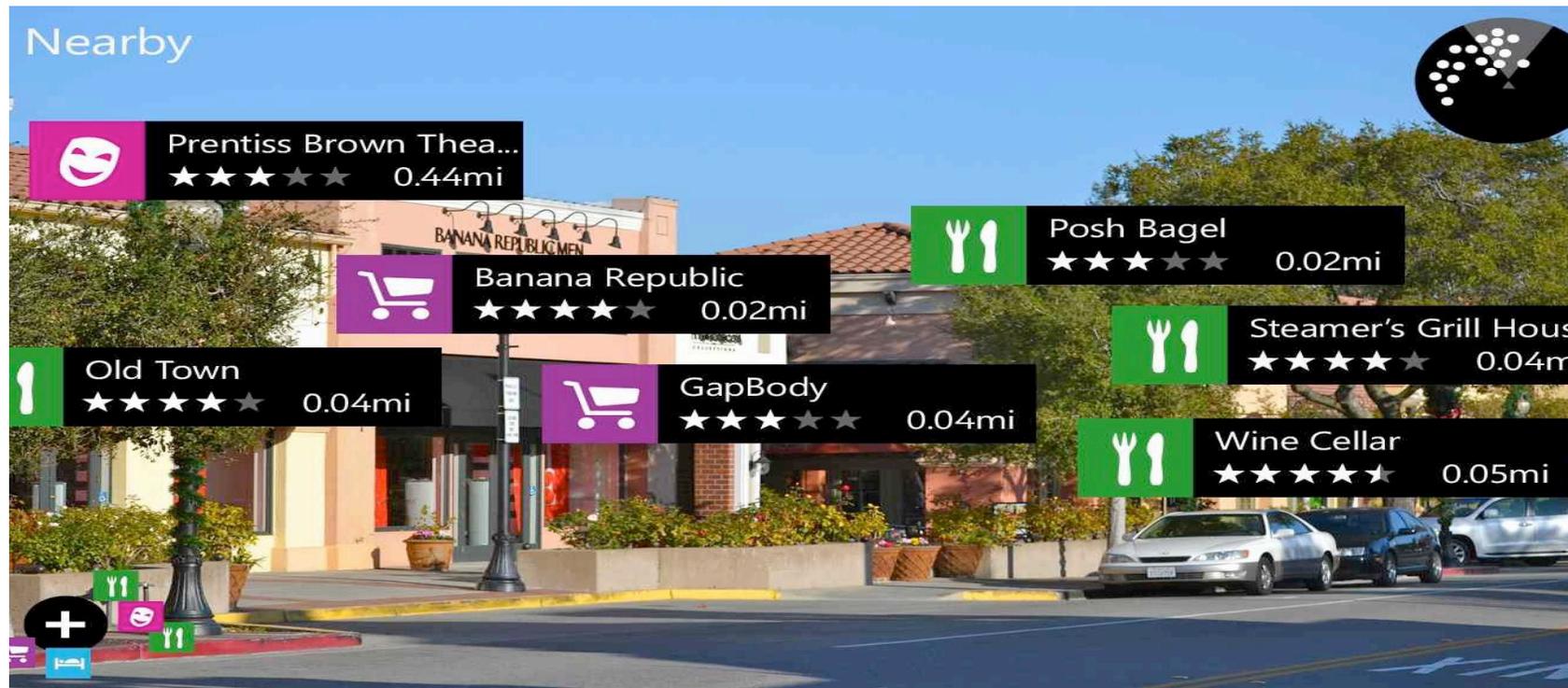
Augmented and Virtual Reality example

- Customers can use their personal mobile devices to pull up objects from the IKEA Catalog and see how the various items would look in their own house

Navigation

B. Shneiderman et al.,
chapter 8

Fluid Navigation

Topics

1. Introduction

2. Navigation by selection

3. Small displays

4. Content Organization

5. Audio menus

6. Form fill-in and dialog boxes

Introduction to navigation

- Support for user navigation enables users to know where they are and to steer themselves to their intended destination

- It allows getting work done or having fun through a series of actions, like sailors who steer their boat to a harbor

Examples of navigation

- Successful operation of interactive applications, such as installing a mobile app, completing an on-line survey, or purchasing a train ticket (**task navigation**)

- Finding information on a website or browsing social media (**web navigation**)

- Selecting the correct action needed in a desktop application (**command menu navigation**)

Design issues for effective navigation

Effective interfaces emerge only after careful consideration of and testing for numerous design issues, such as:

- task-related organization
- phrasing of items
- sequence of items
- graphic layout and design
- responsive design to adapt to various sizes of devices
- shortcuts for knowledgeable frequent users
- online help and error correction

Bailly, G., Lecolinet, E., Nigay, L., Visual menu techniques (2015)

Selection

- Menu bars, pop-up menus, toolbars, palettes and ribbons

- Shortcuts and gestures for rapid interaction

- Linear versus simultaneous presentation

example #1

For an extra $5
you can add a gift wrap
selected from dozens of choices

Add gift wrap   No thanks

A simple menu with two choices. A short explanation is provided. Buttons are large enough to be easy to select and have informative labels, and one answer has been highlighted as the most likely answer.

Selection

- Radio Buttons and Checkboxes

Does anyone in your household currently smoke?

- ◯ Yes, someone does
- ● No, no one does
- ◯ Not sure

What treatment would you like to discuss with a nurse?

- ☐ Surgery
- ☑ Physical therapy
- ☑ Medication
- ☐ Acupuncture (not available in your area)

Selection – mobile app examples

- Two examples of simple menus. On the left, the **NatureNet** citizen science app shows the nine functions of the main menu.

- On the right, the **Zoombies, Run!** app lists the possible missions of Season 1 of the immersive running game
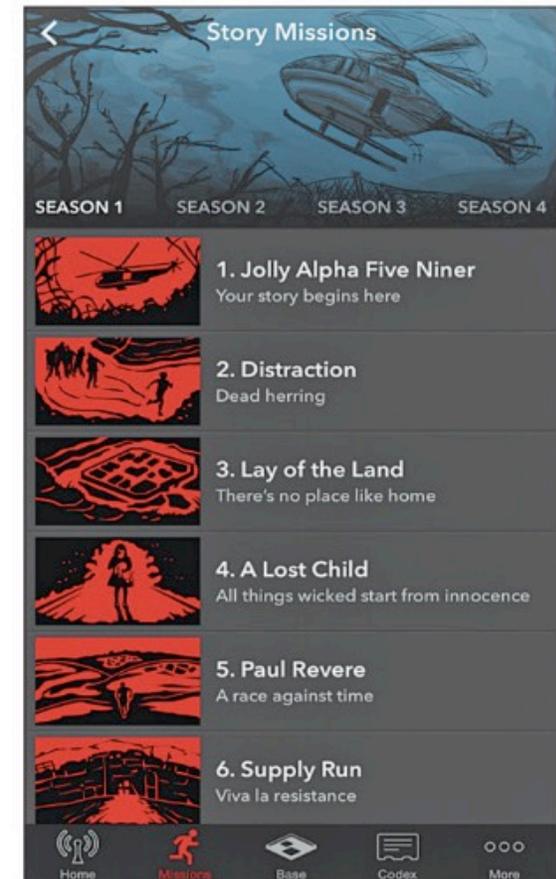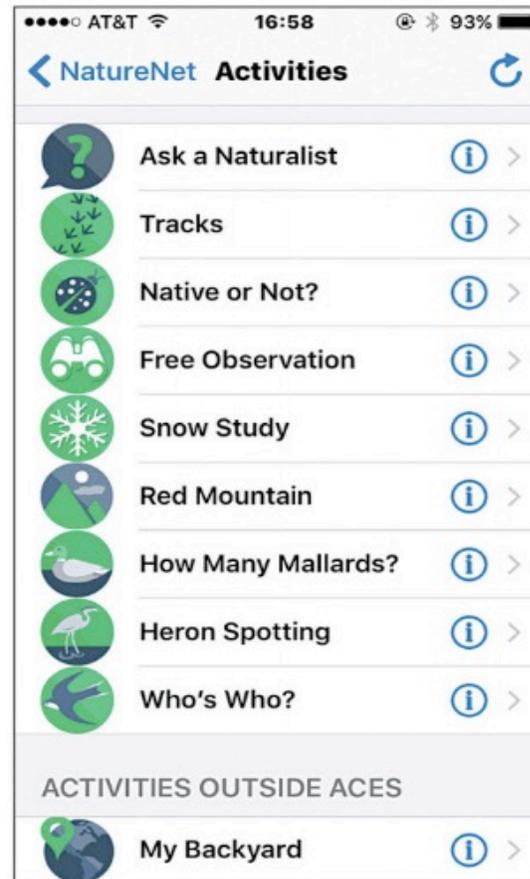
Navigation By Selection: pull-down menu

discuss design of the Edit menu in PowerPoint
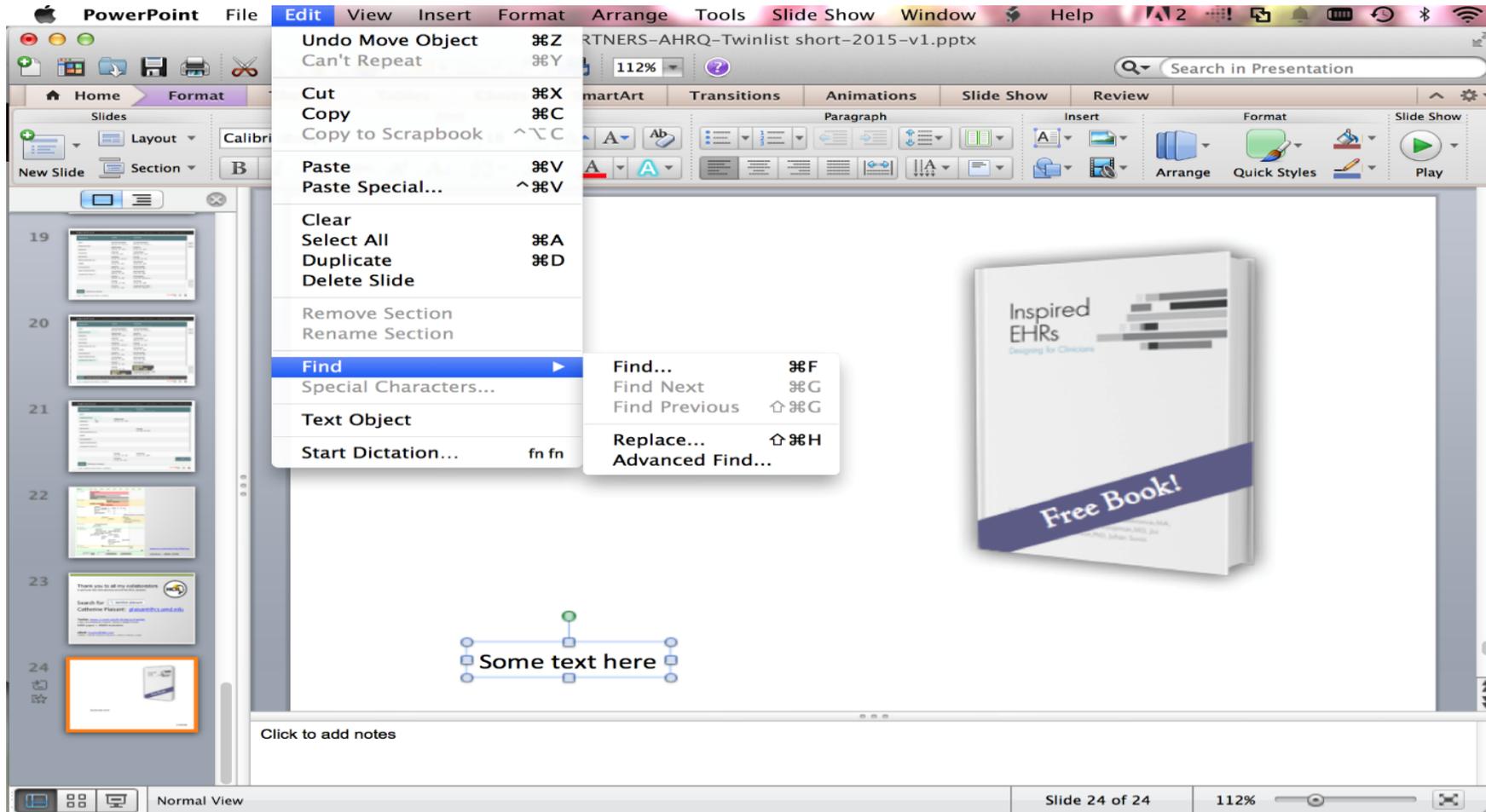
Navigation By Selection in mobile apps
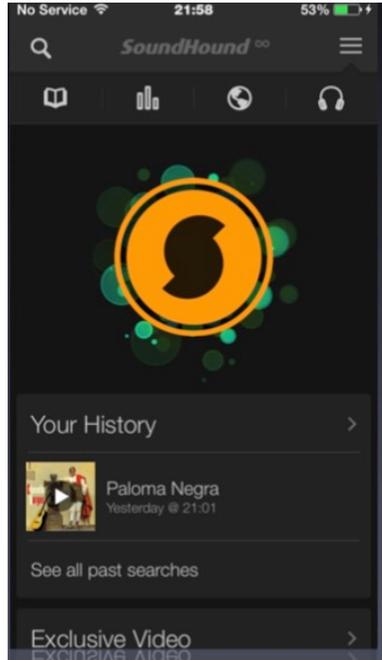
A
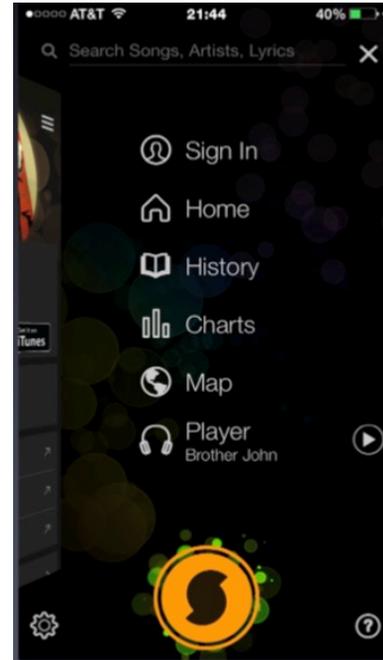
B
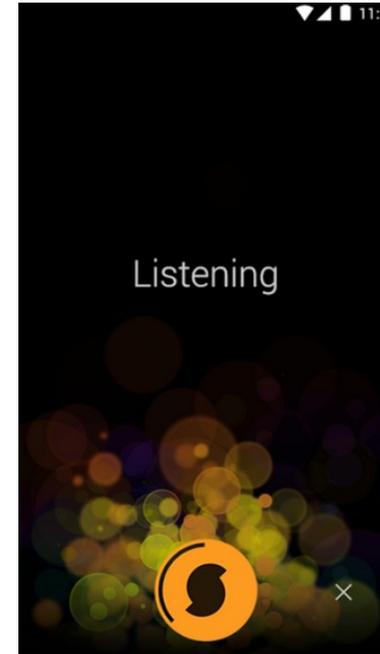
C

Hamburger menu icon

- The main menu of Soundhound has only 6 items, but it is still too much to be displayed on every page

- A main menu "hamburger" icon appears at the top right of all appropriate pages, but not in the recording screen C, where only the X close icon is visible

common gestures and their effect

TAP
χτύπημα

DRAG/SLIDE σύρσιμο
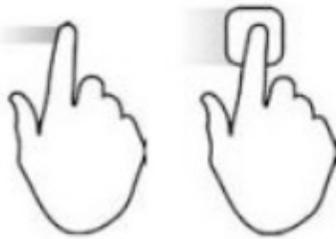
HOLD
κράτημα

PINCH
τσίμπημα

SPREAD
άπλωμα

FLICK ("FLING")
τίναγμα

NUDGE
σκούντημα

D. Saffer, Designing Gestural Interfaces, O Reilley, 2008.

common gestures and their effect

- Tap: select

- Long press: varied, from magnified cursor (iOS) to showing a tooltip (Windows 8)

- Double tap: varied, e.g. zoom (iOS)

- Small swipe: varied, e.g. move location or order of objects, reveal a delete button

- Large swipe: usually scroll

- Rapid swipe or fling: fast scroll with inertia

- Pinch and spread: zoom in and out

- Variation with two or more fingers: varied effects

Two-dimensional mega menus
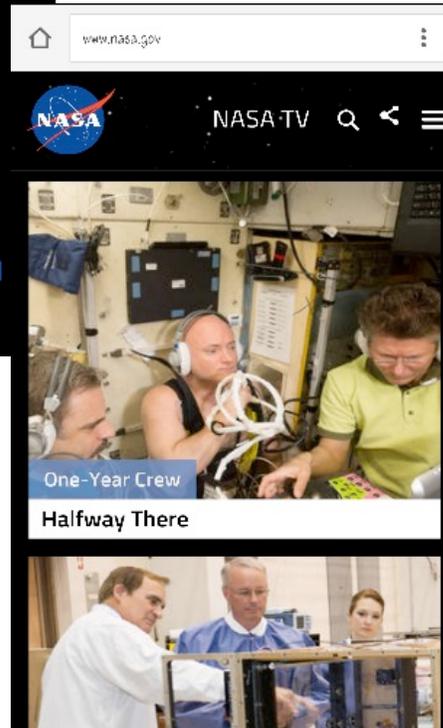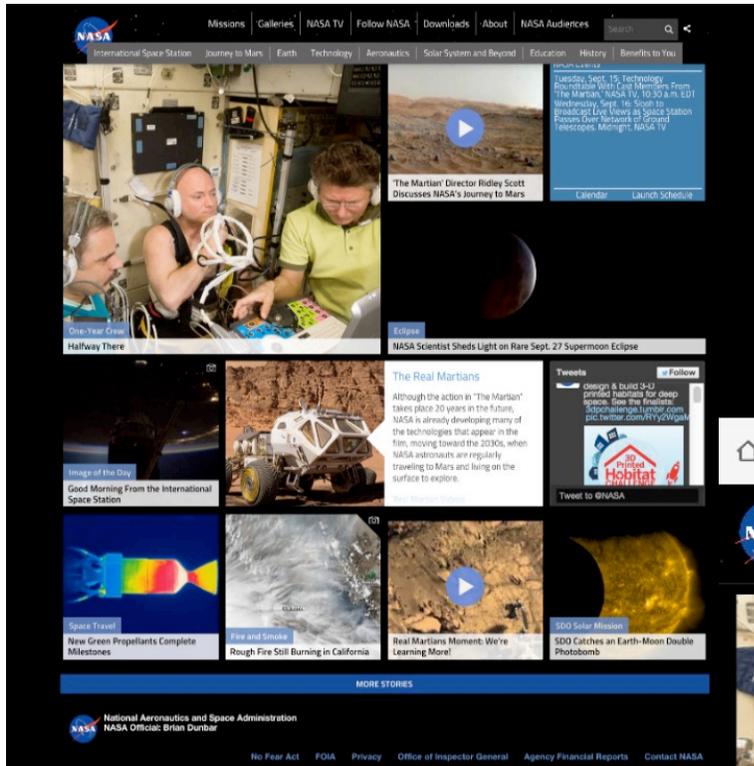
- The NASA website consists of a large scrollable two-dimensional menu
  - Below the main menu each square or rectangle is a large button
  - Scrolling gives access to dozens of items easily updated and rearranged
  - This adaptive grid design scales down nicely to the small displays
- This is the same webpage displayed on an Android phone
  - The grid now appears as a single column of items

Two-dimensional mega menus

Example of mainly textual 2-dimensional mega menu (craigslist home page), American Classified advertisements website

Menus for long lists

item selection slider

- Sliders and alpha-sliders

  – When items consist of ranges or numerical values, a slider is a natural choice to allow the selection of a value

  – The alpha-slider uses multiple levels of granularity in moving the slider thumb and therefore can support tens or hundreds of thousand of items

Menus of user-generated content
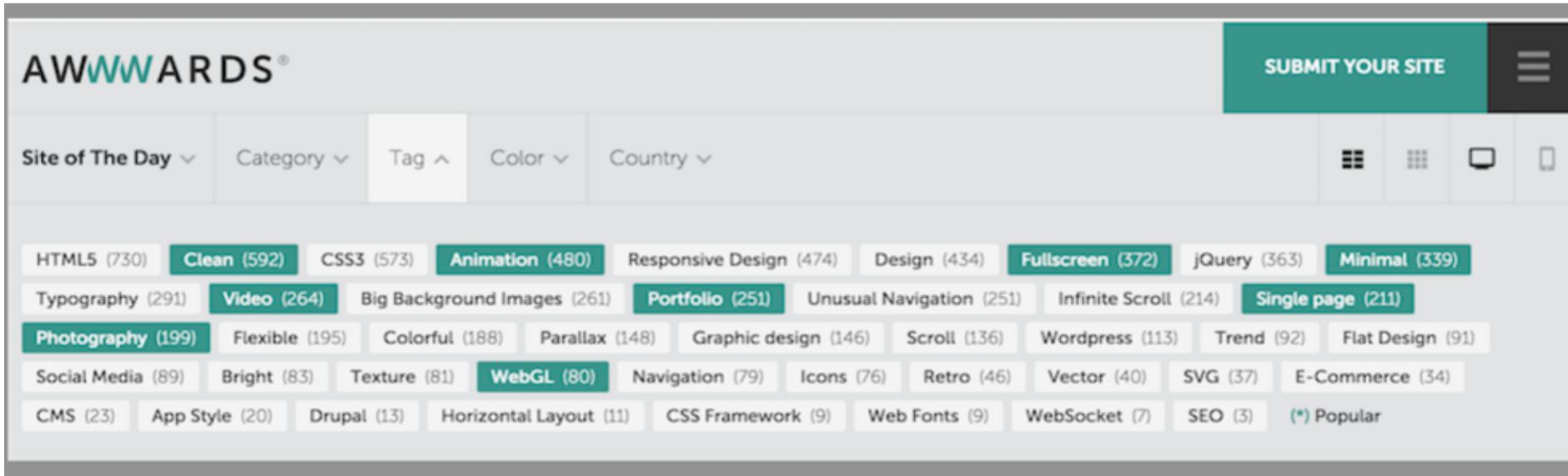

- http://www.awwwards.com gives awards to a large number of websites, which are tagged - number of items is important

- A tag index at the top of the page displays all the tags, sorted by total count. The counts are indicated in parenthesis

- The green colored tags are the popular tags that have been selected more often (which most likely will lead to even more selection)

linear vs simultaneous selections

Wizards are example of linear selection structures

Faceted search is an example of simultaneous selections.

The example allows shoppers looking for tents to narrow the list of results by indicating their choices in the simultaneous menus on the left:
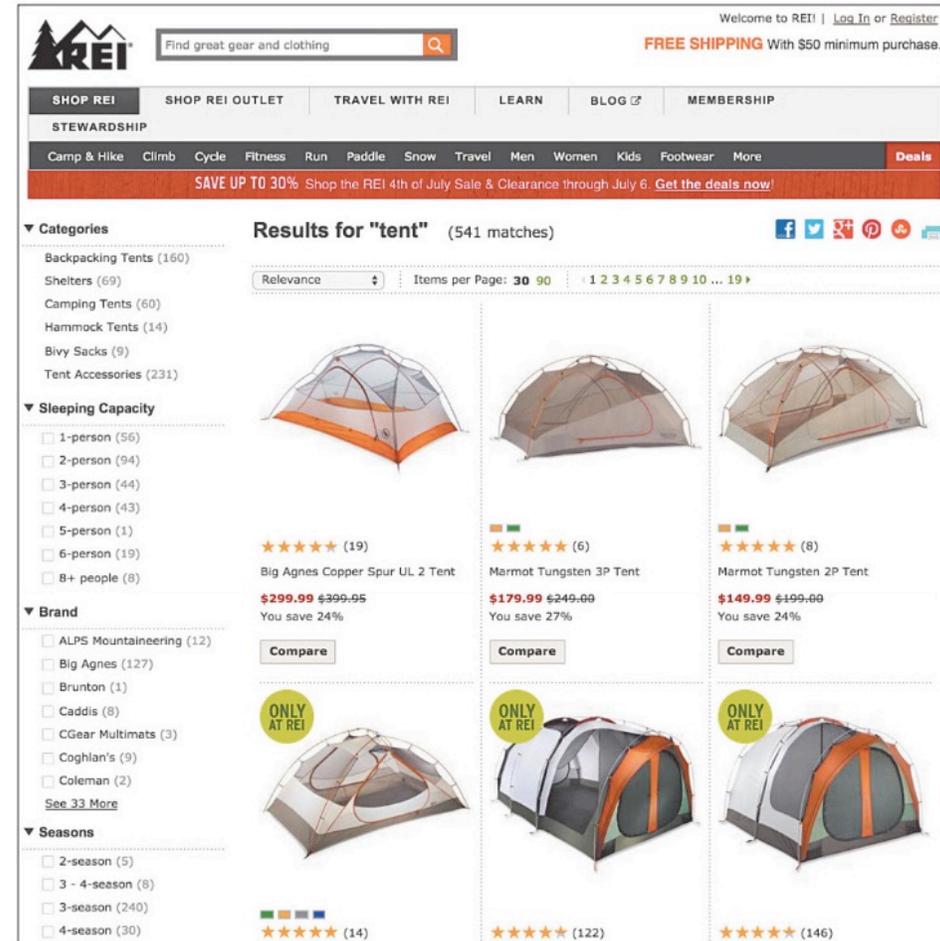
Small Displays

- Small devices have very focused functionalities and few selectable areas.

- Discoverability is often an issue

- Question: linear or simultaneous selections?

Design for small displays

1. Simplify, "less is more"

2. Strive to reduce or eliminate data entry

3. Learnability is key

4. Consider frequency of use and importance

5. Plan for interruptions

6. Use of contextual information/ avoid data entry

7. Make clear what is selectable and what is not

8. Leave room for scroll and swipe gestures to avoid inadvertent actions

9. Consider relegating less important functions to other platforms

Menu Organization

- Organizing menus in a meaningful structure results in faster selection time and higher user satisfaction – see restaurant menus

- Approaches:

  - **Linear sequence** (e.g. in a wizard or survey)

  - **Hierarchical structure** that is natural and comprehensible (e.g. a store split into departments)

  - **Network structure** when choices may be reachable by more than one path (e.g. websites)

Menu Organization Design

Tree-structure: designers can form categories of similar items, e.g. online grocery markets divided into produce, meat, dairy, etc. further divided into vegetables, fruit, etc. for produce, and milk, cheese, etc. for dairy

Breadth versus depth: the depth (number of levels) of a menu tree depends in part on the breadth (number of items per level)

Networks: choices may be reachable by more than one path, e.g. websites for online shopping that provide access to banking information from both the personal profile and the checkout section of a link structure

Menu Organization example

Rules for forming menu trees

- Use task semantics to organize menus

- Limit the number of levels (i.e. prefer broad–shallow to narrow–deep)

- Create groups of logically similar items: e.g. Level 1: countries, Level 2: states, Level 3: cities

- Form groups that cover all possibilities: e.g. Age ranges: [0–9] [10–19] [20–29] and [>= 30]

- Make sure that items are non-overlapping: e.g. use "Concerts" and "Sports." over "Entertainment" and "Events"

- Arrange items in each branch by natural sequence (not alphabetically) or group related items

- Keep ordering of items fixed (or possibly duplicate frequent items in dedicated section of the menu)

Guidelines for menu organization

- ## Sequence, phrasing and layout

- Typical lists are alphabetically ordered, but categorical lists may be useful

- Principles of menu-list sequencing apply, e.g. sequencing menu items by frequency of use can be more useful than sequencing by category or alphabetical order

Example of adaptive split menu
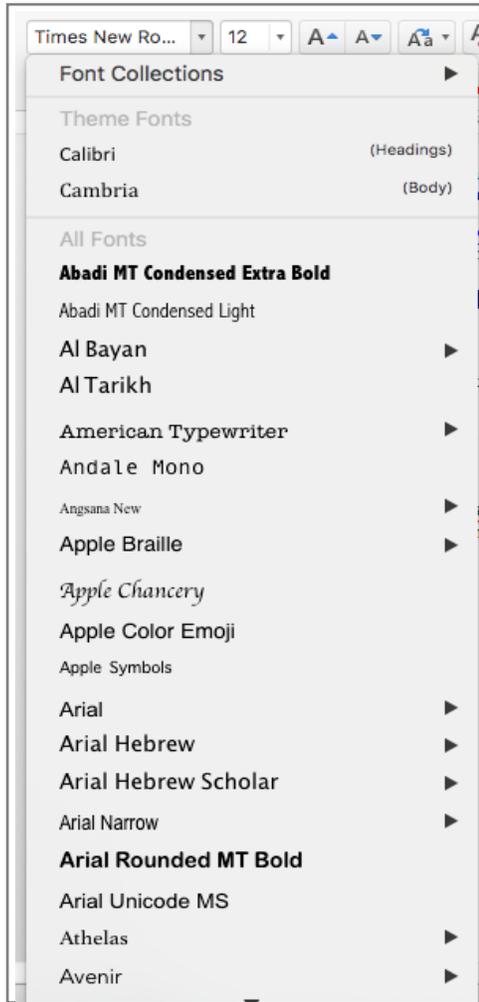
A font-selection menu in Microsoft Office,

- It lists the theme fonts and then the recently used fonts near the top of the menu (as well as in the full list), making it easier to quickly select the popular fonts
- A thin line separates the sections

Phrasing in menus

- **Use familiar and consistent terminology.**

  - Carefully select terminology that is familiar to the designated user community and keep a list of these terms to facilitate consistent use

- **Ensure that items are distinct from one another**

  - Each item should be distinguished clearly from other items.

Which phrases are more distinguishable?

- Slow tours of the countryside

- Journeys with visits to parks

- Leisurely voyages

A
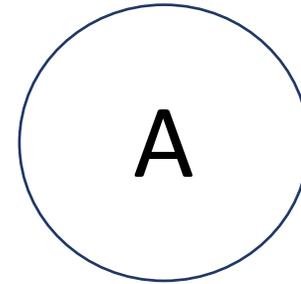
- Bike tours

- Train tours to national parks

- Cruise-ship tours

B
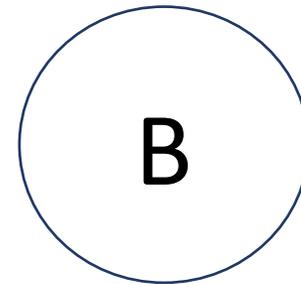
Phrasing in menus

– **Use concise phrasing**

  ▪ Review the collection of items to ensure consistency and conciseness. Users are likely to feel more comfortable and to be more successful with "Animal," "Vegetable," and "Mineral" than with "Information about animals," "Vegetable choices you can make," and "Viewing mineral categories"

– **Bring the keyword to the fore**

  ▪ Try to write menu items such that the first word aids the user in recognizing and discriminating between items - use "Size of type" instead of "Set the type size." Then, if the first word indicates that this item is not relevant, users can begin scanning the next item

Indicate position in menu structure

BROWSE BY TOPIC
Sports, Recreation & Leisure
Baseball
Baseball Cards 1887-1914

- The set of headers from the Library of Congress collections webpages gives a clear indication of progress down the tree

  – When users want to do a traversal back up the tree or to an adjoining menu at the same level, they will feel confident about what action to take
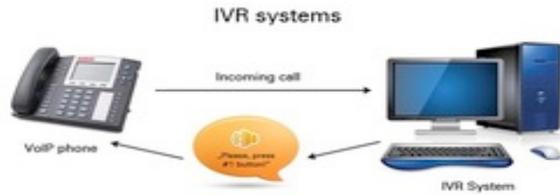
Audio Menus

- For **Interactive Voice Response (IVR) systems**, instruction prompts and lists of options are spoken to users, who respond by using the keys of a keyboard, phone, or by speaking

  – Complex and deep menu structures should be avoided

  – Dial-ahead capabilities allow repeat users to skip through the prompts.

  – A way to repeat the list of options and an exit mechanism must be provided

Form fill-in

Create an IEEE Account [?]

* Required field

Provide your personal information

* Given/First name:

Catherine

Middle name:

* Last/Family/Surname:

Plaisant

Enter e-mail address & password

The e-mail provided here will be the username of your account.

* E-mail address:

cplaisant@

⚠ › The e-mail address provided is not in a valid e-mail format (for example: j.doe@nomail.com). Please try again.

* Re-enter e-mail address:

* Password:

•••••••••••••

✓ Your password is good

* Confirm password:

Passwords must be between 8 and 64 characters, and include at least one number.   More...

Set security questions

For your security, IEEE Accounts are required to have two security questions and answers.

* Security question 1:

Select

* Type your answer:

* Security question 2:

Select

* Type your answer:

> Privacy & Opting Out of Cookies

Create Account and Continue Joining   > Cancel

97

Form fill-in example

[(http://www.ieee.org)](http://www.ieee.org)

- This form fill-in allows users to enter information when joining the IEEE Society

- Fields are grouped meaningfully, and field-specific rules such as password requirements are provided next to the fields

- The data is validated as soon as it is being provided (opposed to being validated when the form is submitted) and error messages explain how to correct the problem

Form Fill-in considerations

1. Meaningful title.
2. Comprehensible instructions.
3. Label the fields.
4. Limit data entry.
5. Explanatory messages
6. Error prevention.
7. Error recovery.
8. Immediate feedback.
9. Logical grouping and sequencing of fields.
10. Visually appealing layout of the form.
11. Familiar field labels
12. Consistent terminology and abbreviations
13. Visible space and boundaries of the dataentry fields
14. Convenient cursor movement.
15. Required fields clearly marked.
16. Privacy and data sharing information.
17. Accessibility
18. Completion signal.

Dialog Boxes
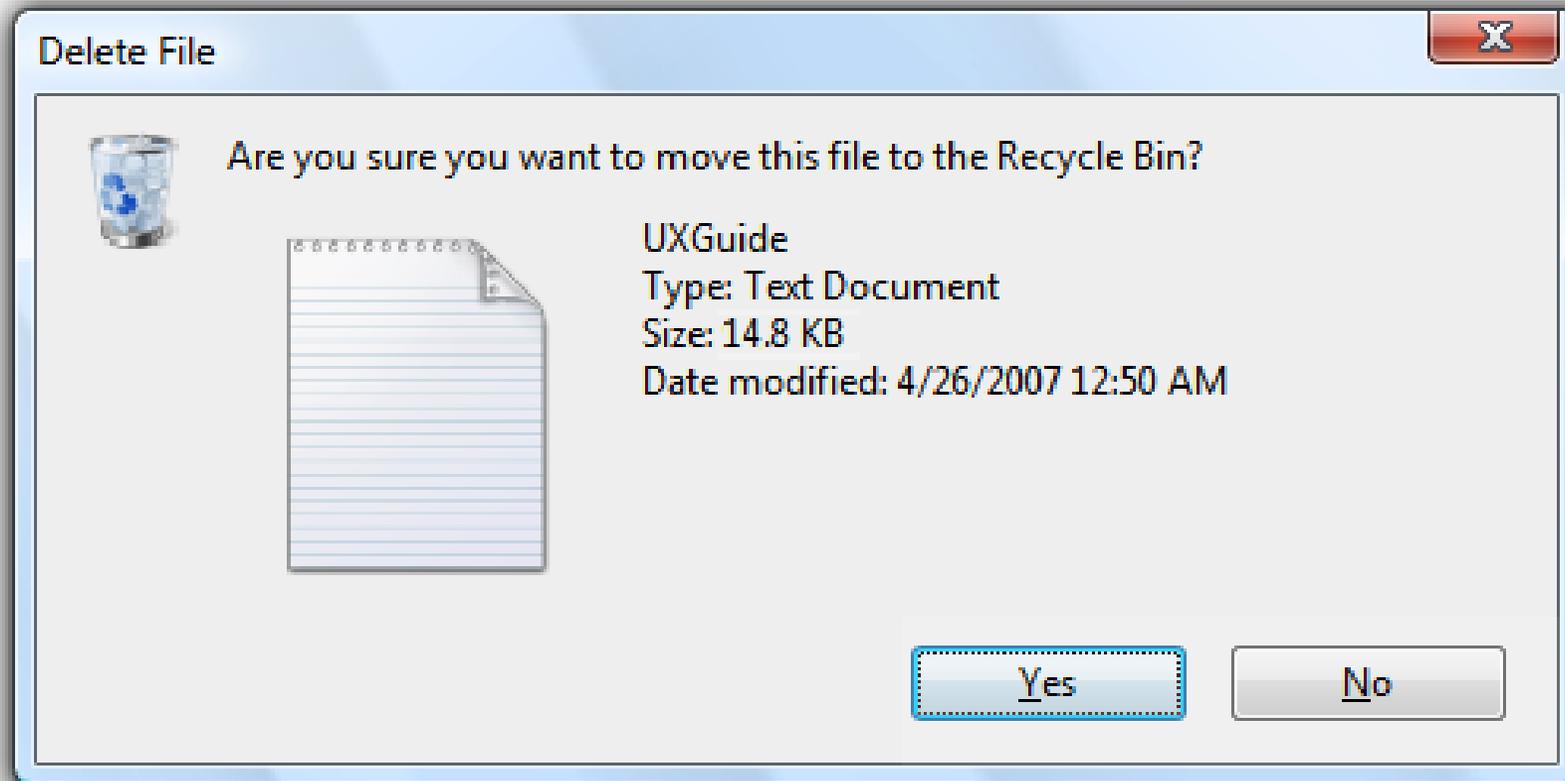
Dialog Box
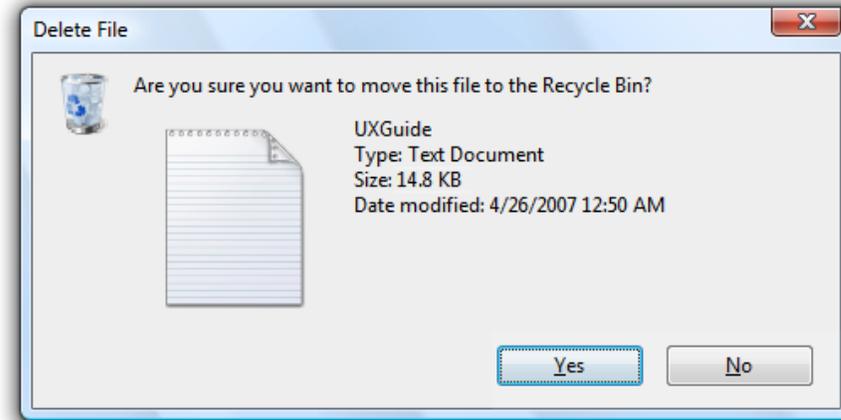
- This dialog box includes a binary menu with two choices (Yes or No)

- The blue highlighting on Yes indicates that this selection is **the default** and that pressing Return will select it

- Specific **keyboard shortcuts** can be made available

- **Escape** closes the dialog box

- Typing the letter 'N' will select 'No' as indicated by the underlined letter 'N'

Dialog Box example

A dialog box used to alert clinicians who try to prescribe the drug Warfarin because it increases the risk of bleeding in patients already on aspirin.

Signal Word
Provide clear visual cues and type of alerts

Nature of hazard
Provide succinct reason for the alert

Actions
Provide a list of actions to respond to the alert

User Feedback
Provide ability to capture user feedback

⚠ WARNING! Drug - Drug Interaction

Warfarin - Aspirin
Increased risk of bleeding ⓘ guidelines

Management

Aspirin — Keep **Aspirin**, do not order Warfarin

Warfarin — Keep **Warfarin**, cancel Aspirin

Override — Order both **Warfarin and Aspirin** ☐ Confirm override
Check INR frequently and advise patient for warning signs of bleeding

Cancel

Provide feedback on this alert

Data Entry with Dialog Boxes

- **Dialog Boxes**   **Internal layout guidelines**
  1. Meaningful title, consistent style
  2. Top-left to bottom-right sequencing
  3. Clustering and emphasis
  4. Consistent layouts (margins, grid, white space, lines, boxes)
  5. Consistent terminology, fonts, capitalization, justification
  6. Standard buttons (OK, Cancel)
  7. Error prevention by direct manipulation

Data Entry with Dialog Boxes

- **Dialog Boxes** - **External Relationship**

  1. Smooth appearance and disappearance

  2. Distinguishable but small boundary

  3. Size small enough to reduce overlap problems

  4. Display close to appropriate items

  5. No overlap of required items

  6. Easy to make disappear

  7. Clear how to complete/cancel