

# Interaction – Pointing, Selecting and Direct Manipulation

Lecture 13

## Outline

- Direct Manipulation
- Enabling Direct Manipulation
- Interaction Devices
- Direct Manipulation Idioms

## Direct Manipulation

- What is “direct manipulation”?

## Direct Manipulation

- What is “direct manipulation”?
- Three critical components of Direct Manipulation
  1. Visual representation of the objects in the application
  2. Visual and gestural mechanisms for acting on the representations
  3. Immediate feedback on the results

## Idioms of Direct Manipulation

- Pointing
- Selecting
- Drag and drop
- Control manipulation
- Palette tools
- Object manipulation (move, resize, ...)
- Object connections

## Mouse

- What are key characteristics of the mouse?
  - What makes a “mouse” a mouse?

## Mouse

- What are key characteristics of the mouse?
  - What makes a "mouse" a mouse?
- Movement reflected on screen with pointer
- Button
- Additional buttons
- Scroll wheel

## Mouse



## Other pointing options?

- What are some other pointing options?
- What are \*essential\* aspects that make a pointer (mouse) useful?

## Trackball, Joystick, Track pad



## Screen, Gesture



## Mouse Idioms

- Point
- Hover (point, keep pointer stationary)
- Click (depress left mouse button, release)
- Right-click (depress right mouse button, release)
- Drag (point, depress left button, move mouse, release)
- Double-click (click, click)
- Chord (depress left button, depress right button, release, release)
- Meta-click (hold meta-key, click)
- Control-click (hold control-key, click)

## Alt, Meta, Command ... Keyboard modifiers



## Pliancy and Hinting

- What does it mean if something is pliant?

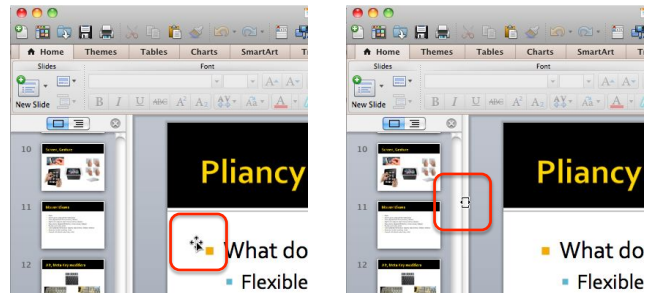
## Pliancy and Hinting

- What does it mean if something is pliant?
  - Flexible, pliable, manipulatable

## Pliancy and Hinting

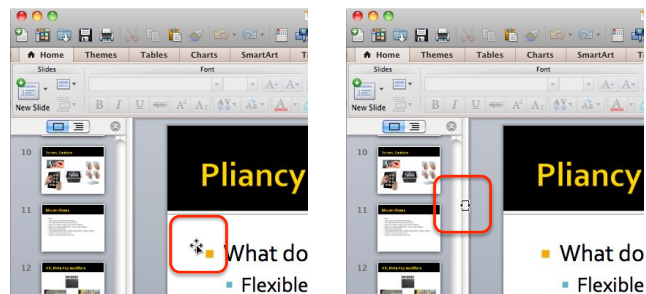
- What does it mean if something is pliant?
  - Flexible, pliable, manipulatable
- How can we suggest that something is pliant?

## Pliancy and Hinting



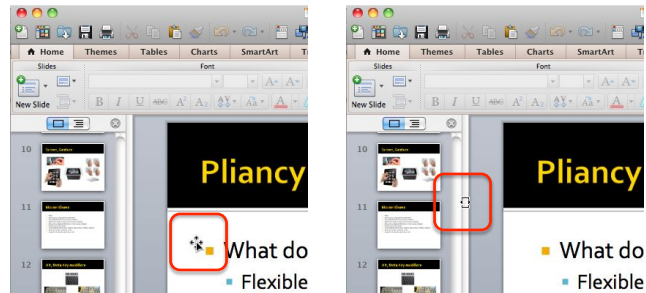
- What is being suggested in each case?

## Pliancy and Hinting



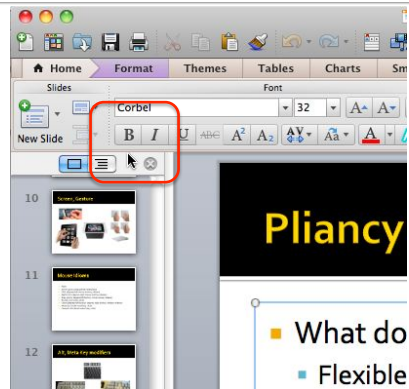
- What is being suggested in each case?
- What is another name for this?

## Pliancy and Hinting

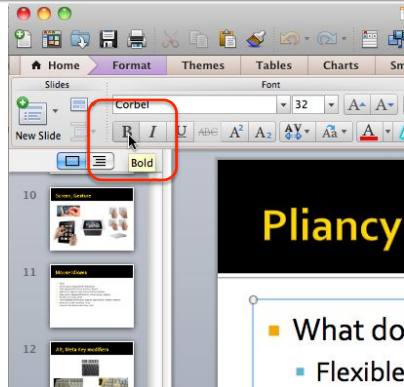


- What is being suggested in each case?
- What is another name for this?
- What are some other examples?

## Pliancy and Hinting

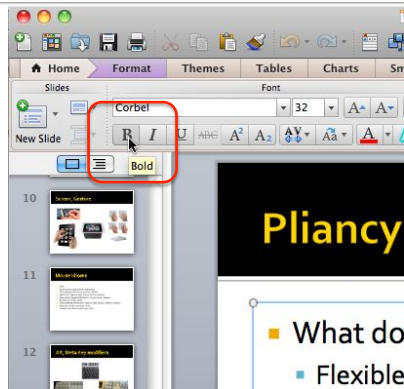


## Pliancy and Hinting



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## Pliancy and Hinting



- There are two hints here – what are they?

## Selecting

- What is 'selecting'?

## Selecting

- What is 'selecting'?
  - Selection of an object
  - Selection of a menu
  - Selection of a control
- How do we indicate a selection?

## Selecting

- What is 'selecting'?
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- How do we indicate a selection?
  - Highlighting, aura, shading – possibly other visual interaction cues – mentioned earlier

## Selection Idiom

- Selection is an “object-verb” idiom
  - Identify an object or data and then take an action on that
- What are types of selecting?

## Selection Idiom - Types

- Discrete Selection
  - Select one item at a time – smallest useful element
- Contiguous Selection
  - Items that are together
- Additive Selection
  - Add new items to a previously selected set
  - Allows a disjoint, noncontiguous, selection
- Unselection
  - Remove items from the selected set
  - Mutual exclusion, only some items can be selected together

## Drag and Drop

- Two different idioms for D&D

## Drag and Drop

- Two different idioms for D&D
  - More explicit – move the object
    - What is an example of this?
  - Slightly implicit – take an action on the object
    - What is an example of this?

## Drag and Drop

- How to indicate D&D?
  - What are the issues for indicating that D&D is possible?

## Drag and Drop

- How to indicate D&D?
  - Source indicator
    - How can you show something as draggable?
  - Target indicator
    - How do you show something as receptive to a drop?
  - Completion indicator
    - How do you show that the action completed?

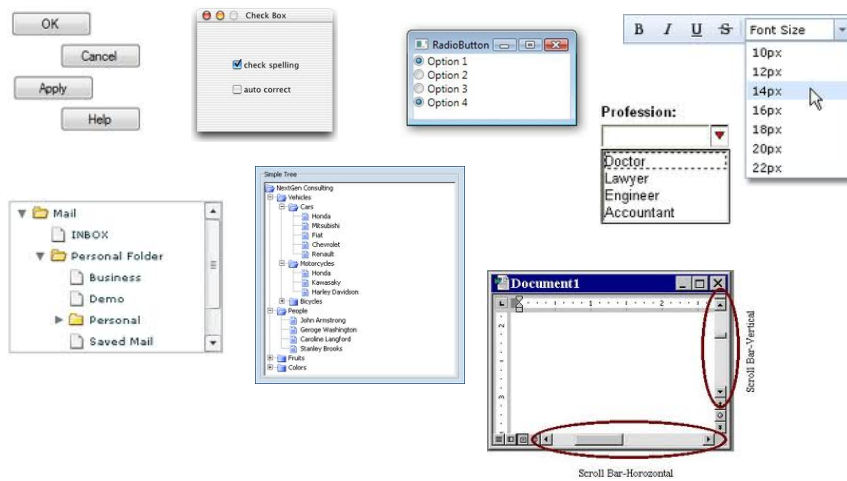
## Control Manipulation

- What is a control?

## Control Manipulation

- What is a control?
- How many types of controls are there?

## Control Manipulation



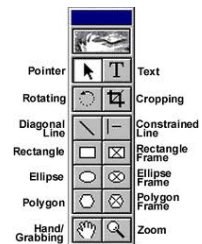
## Palette Tools

- Early applications had tool palettes



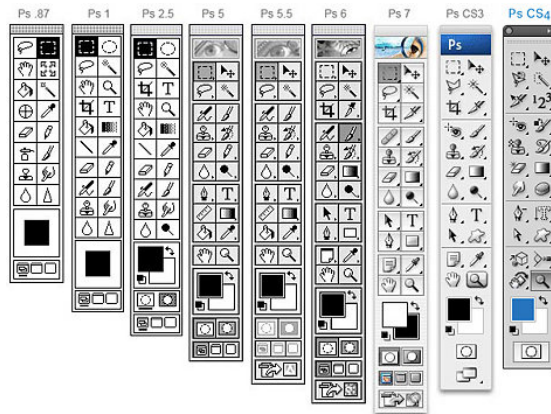
## Palette Tools

- Early applications had tool palettes
- Palettes are quite common
  - How does a palette work?
  - What happens when you pick a tool?
- Are “ribbons” a tool palette?
- Are toolbars a tool palette?



## Palette Tools

- Palettes have changed over time ...



## Other Selection

- Object Manipulation
  - Resizing, reshaping
- Challenges for 3D
  - Perspective, shadow, depth
  - Solid walls, boundaries

