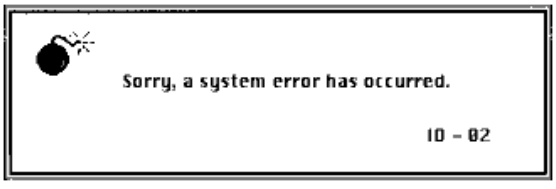
Conceptual Models II

CS160: User Interfaces

Maneesh Agrawala and Jeffrey Nichols

Error Messages



Error Dialog Boxes

Why are they problematic?

How related to locus of attention?

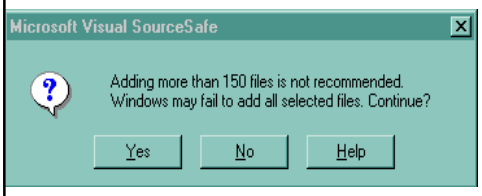
Error Dialog Boxes

Why are they problematic?

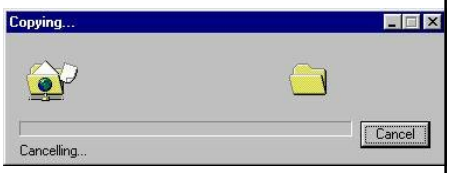
How related to locus of attention?

What are the alternatives?

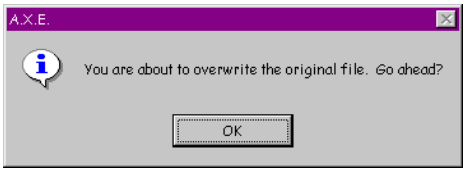
- Make errors as impossible as possible
  - Pull down of state codes rather than typing in codes …
  - Handle all possible types of input



Umm, thanks for the warning, but what should I do?



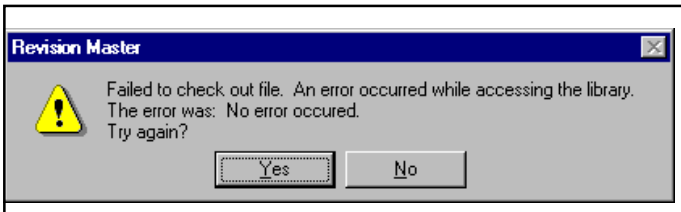
What happens when you cancel a cancelled operation?



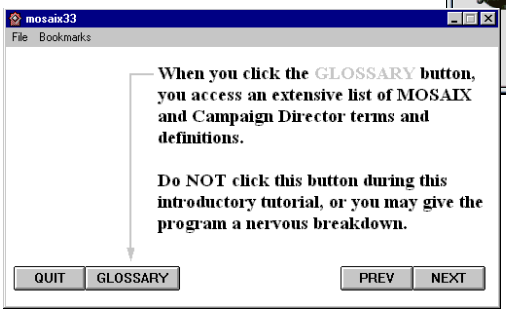
Do I have any choice in this?

Uhhh… I give up on this one

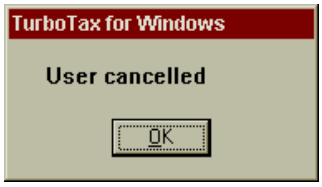
Slide adapted from Saul Greenberg

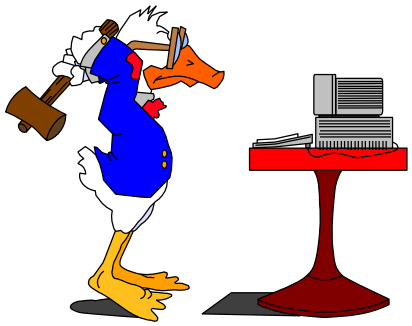


Inane Dialog Boxes



Slide adapted from Saul Greenberg

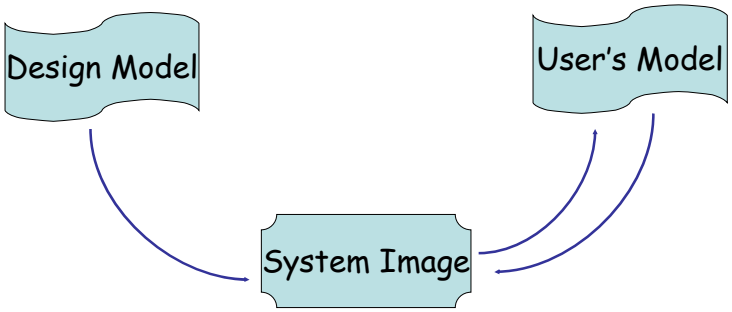




“HIT ANY KEY TO CONTINUE”

Slide adapted from Saul Greenberg

Review: Conceptual Models



- Designers model may not match user's model
- Users get model from experience & usage
  - Users only work with system image, not with designer
- What if the two models don't match?

Review: Design Principles

1. Make controls visible

Review: Design Principles

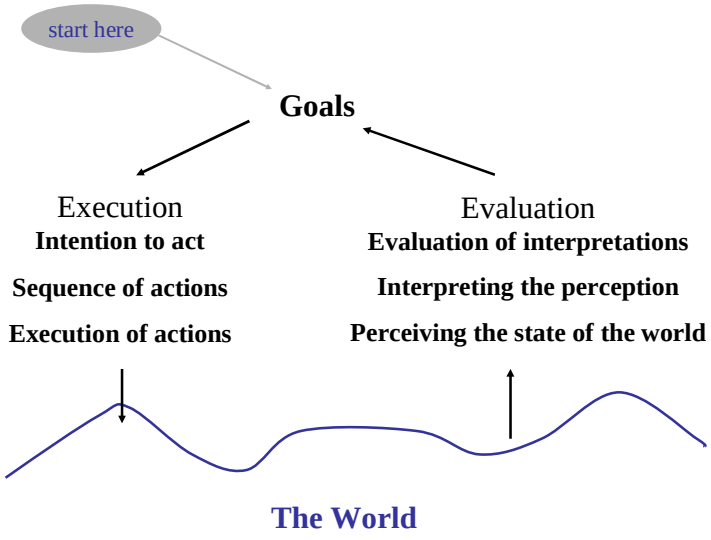
2. Make sure mapping is clear

Mercedes Seat Adjustment

Review: Design Principles

3. Provide feedback

Review: The Action Cycle



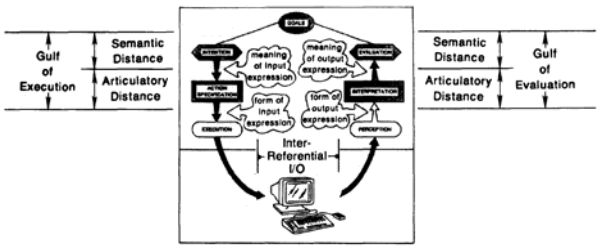
Review: Direct Manipulation

Direct Manipulation

- An interface that behaves as though the interaction was with a real-world object rather than with an abstract system

Central ideas

- Visibility of the objects of interest
- Rapid, reversible, incremental actions
- Manipulation by pointing and moving
- Immediate and continuous display of results



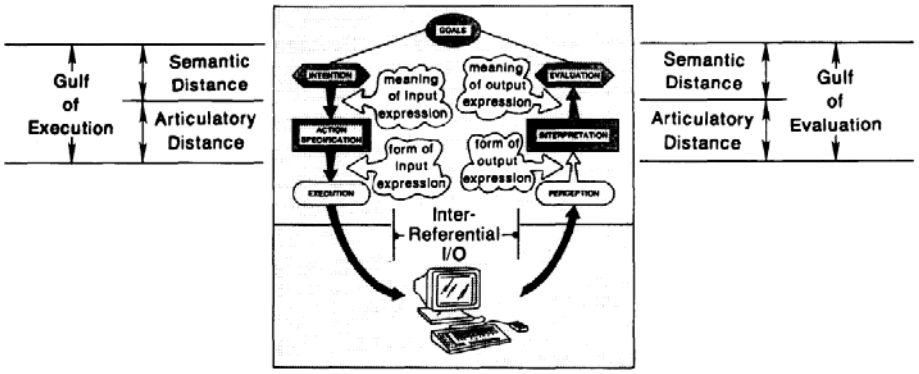
Review: Gulfs of Exec. & Eval.

Gulf of Execution

- Match description level of interface language to level at which person thinks of the task (often interface is much lower)

Gulf of Evaluation

- Match output to the form user requires for checking that goals have been met



Distances

Semantic distance

- Semantic distance reflects the relationship between the *user's intentions* and the *meaning of expressions* in the interface languages.

Articulatory distance

- Articulatory distance reflects the relationship between the *physical form* of an expression in the interaction language and its *meaning*.

Calculator Example

User intention
- What is 5 + 5?

Semantic distance vs. articulatory distance?

Infix Calculator
- Press '5', '+', '5', '='

Post-fix Calculator
- Press '5', '5', '+', '='

Which gulf are we talking about?

Due Today (before class)

Contextual Inquiry and Task Analysis
(hand in the paper copy)

Design Assignment: Cell Phone Music Player
(hand in paper copy in section)

Individual Programming Assignment
(due Mar 2)

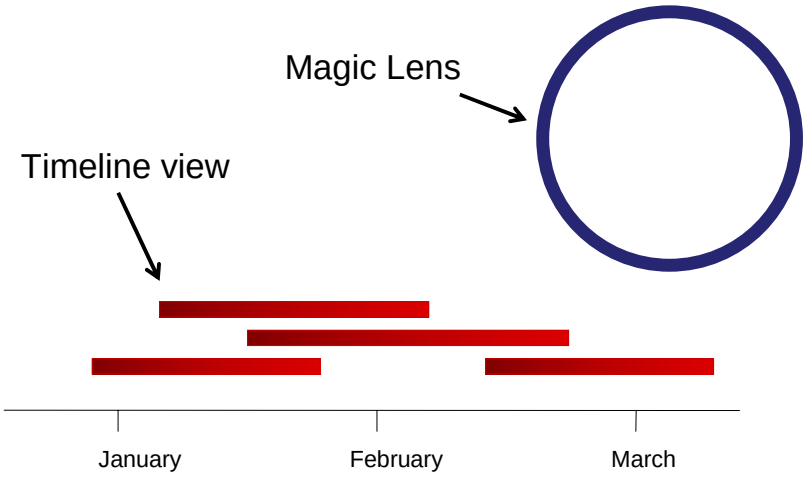
Design and Implementation Components

- Sketches of 3 alternatives, pick a favorite
- "Discount" user studies in section (Feb 25-26)
- Write up what you learned from the study
- Note how you changed your interface as a result
- Implement user interface

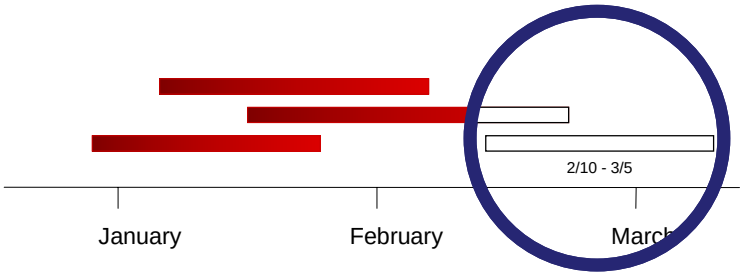
Application area: Project Management/To-Do List

- Items should have start and end date
- Traditional to-do list checklist view
- Timeline view
- Magic lens

What is a magic lens?



What is a magic lens?



Topics

- Metaphor in User Interfaces
- Cognition (Jef Raskin)
- Modes

Metaphor in User Interfaces

Metaphor

Definition

The transference of the relation between one set of objects to another set for the purpose of brief explanation

Lakoff & Johnson

- "...the way we think, what we experience, and what we do every day is very much a matter of metaphor."
- in our language & thinking - "argument is war"
  - …he attacked every weak point
    ... criticisms right on target
    ... if you use that strategy

Metaphors can highlight some features, suppress others

- There is some systematicity to the transference

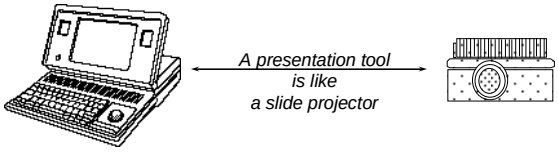
Interface Metaphors

Purpose

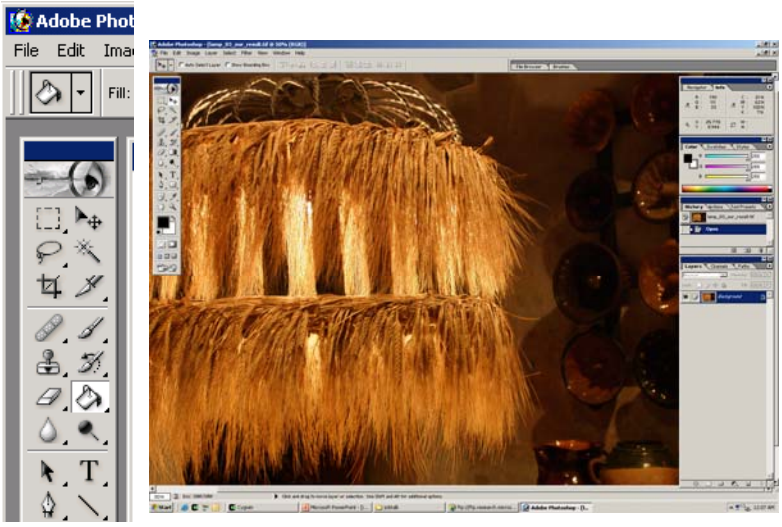
- Function as natural models
- Leverages knowledge of familiar, concrete objects/experiences
- Transfer this knowledge to abstract tasks and concepts

Problem

- Inaccurate or naive conceptual model of the system



The Painting Metaphor



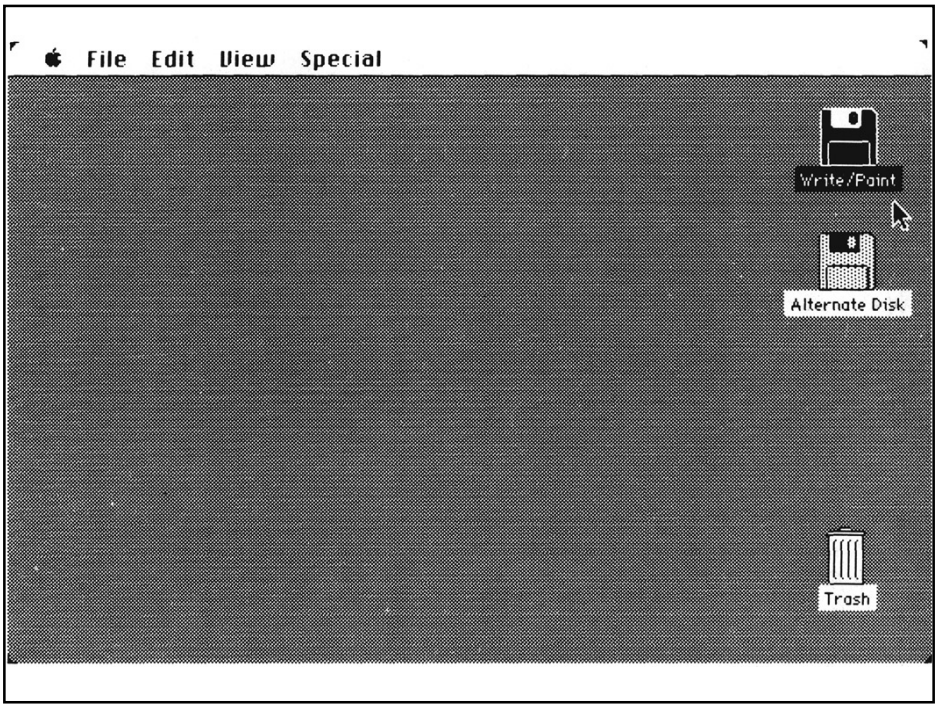
The Desktop Metaphor

Started at Xerox PARC

- Xerox Star
- Bitmapped screens made it possible

Not meant to be a real desktop

- Idea is to organize information in a way to allow people to use it in the way they use information on their desktops
- Allow windows to overlap – make the screen act as if there were objects on it



Microsoft Bob's Desktop Metaphor

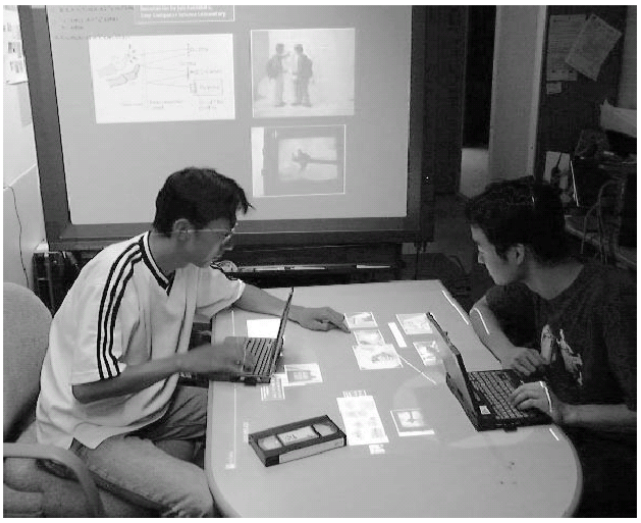
Bob's "Living Room" Metaphor

3D Desktops

[Robertson 2000]

Sun's Looking Glass

Going Further



[Rekimoto 2000]

Metaphor Caveats

Metaphor Caveats

Too limited
- The metaphor restricts interface possibilities

Too powerful
- The metaphor implies the system can do things it can't

Too literal or cute
- Makes it difficult to understand abstract concept

Mismatched
- The metaphor conveys the wrong meaning

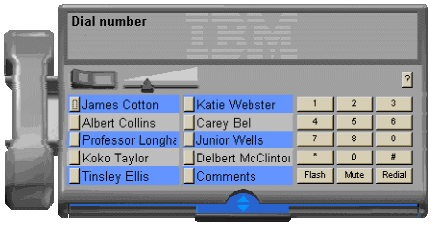
Mismatched Metaphors

What is being controlled here?

Misused Metaphors

Direct translations

- Software CD player that requires turning volume knob with mouse
- Software telephony solution that requires the user to dial a number by clicking on a simulated keypad
- Airline web site that simulates a ticket counter!



Southwest Airlines Home Gate

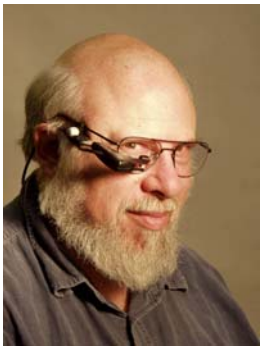
The Home of Southwest Airlines on the World Wide Web

Guidelines for Design

Good Metaphors

- Capture essential elements of the event / world
- Deliberately leave out / mute the irrelevant
- Appropriate for user, task, and interpretation

Cognition



Jef Raskin

Cognitive Engineering

Ergonomics:

- Accounts for statistical variation of human variability
  - Design a car seat that fits 95% of the population
- Says that designing products that interact with us physically is reasonable straightforward

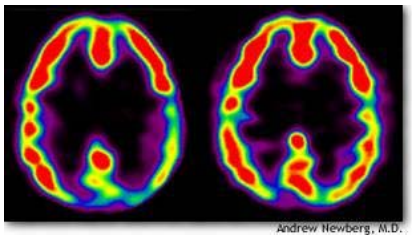
Cognetics: Ergonomics of the mind

- Study of the "engineering scope of our mental abilities"
- This is the applied side of cognitive science

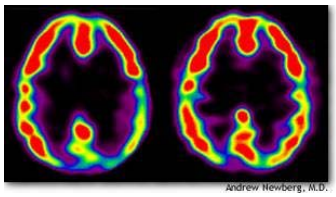
Cognitive Conscious / Unconscious

Examples?

- What is the last letter in your first name?
  - You know it but weren't consciously accessing this information a moment ago, but now you are.
- How do your shoes feel right now?
- How did "The Shining" make you feel?
- Having a name on the "tip of your tongue"



Locus of Attention



What is it?

- An idea/object/event about which you are intently and actively thinking
- The one entity on which you are currently concentrating
  - You see and hear much more
  - E.g., background noise

Why locus?

- Focus implies volition; locus not always consciously control
- Attention can be either active or "going with the flow"

Locus of Attention

Why is it important for HCI?

- Cannot be conscious of more than one task at a time
- Make the task the locus of attention
- Beware of the power of mental habits
  - Repetitive confirmations don't work
- Take advantage of it
  - Do pre-loading while user thinking about next step
  - Streamline resumption of interrupted tasks

Modes

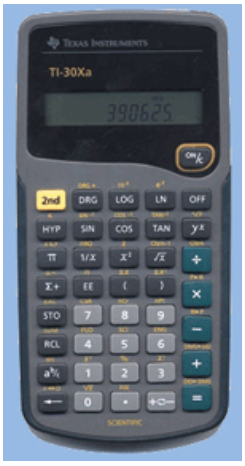
Modes: Definition

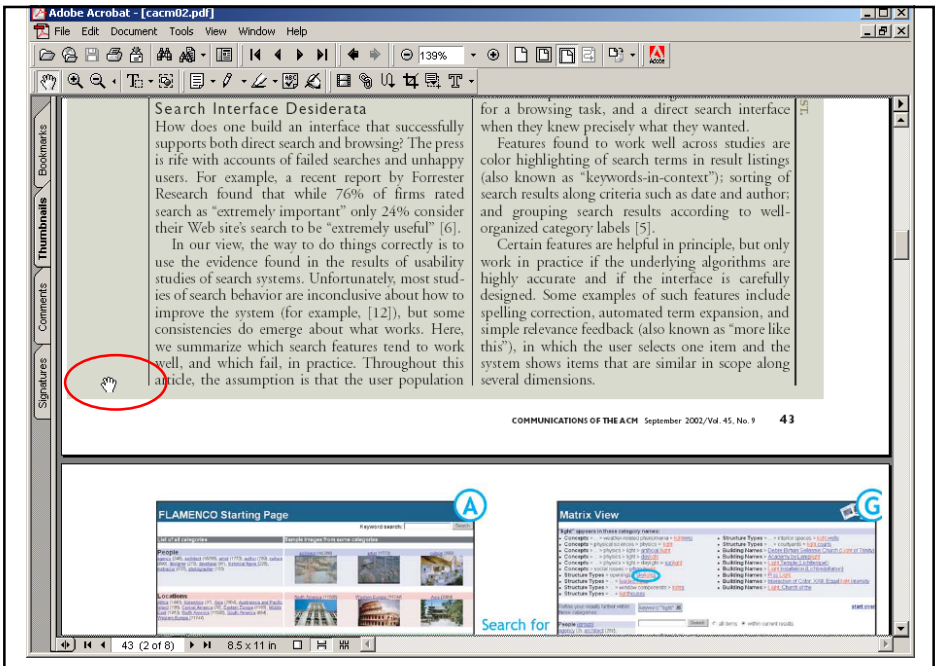
What are they?

Modes: Definition

What are they?

- The same user actions have different effects in different situations.
- Examples?
  - Keycaps lock

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Search Interface Desiderata
How does one build an interface that successfully supports both direct search and browsing? The press is rife with accounts of failed searches and unhappy users. For example, a recent report by Forrester Research found that while 76% of firms rated search as "extremely important" only 24% consider their Web site's search to be "extremely useful" [6].
In our view, the way to do things correctly is to use the evidence found in the results of usability studies of search systems. Unfortunately, most studies of search behavior are inconclusive about how to improve the system (for example, [12]), but some consistencies do emerge about what works. Here, we summarize which search features tend to work well, and which fail, in practice. Throughout this article, the assumption is that the user population for a browsing task, and a direct search interface when they knew precisely what they wanted.
Features found to work well across studies are color highlighting of search terms in result listings (also known as "keywords-in-context"); sorting of search results along criteria such as date and author; and grouping search results according to well-organized category labels [5].
Certain features are helpful in principle, but only work in practice if the underlying algorithms are highly accurate and if the interface is carefully designed. Some examples of such features include spelling correction, automated term expansion, and simple relevance feedback (also known as "more like this"), in which the user selects one item and the system shows items that are similar in scope along several dimensions.
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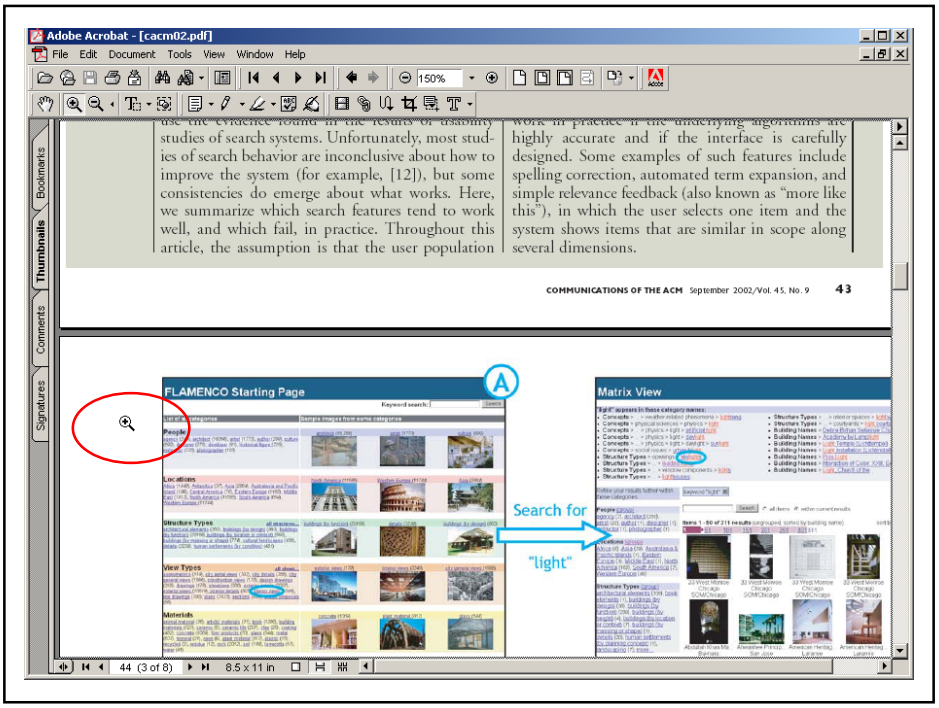
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Using Modes in Interfaces

When are they useful?

- Temporarily restrict users' actions
- When logical and clearly visible and easily switchable
  - Drawing with paintbrush vs. pencil
  - Autocorrect (if easy to switch the mode)

Why can they be problematic?

- Big memory burden
- Source of many serious errors

How can these problems be fixed?

- **Don't use modes – redesign system to be modeless**
- Redundantly visible

Redesigning to Avoid Modes

Setting the time on a clock

Modal

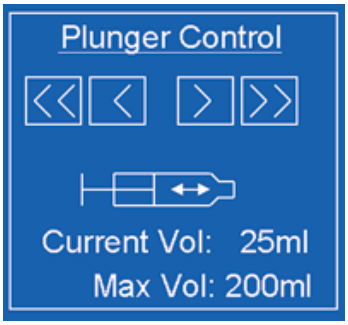
Redesigning to Avoid Modes

Setting the time on a clock

Modeless

Modes are Sometimes Good

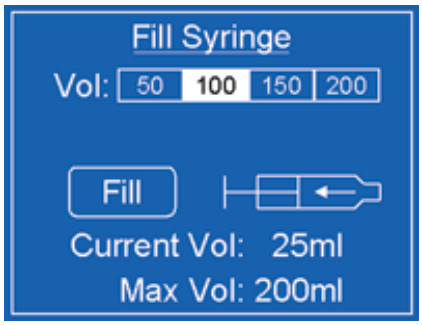
Fill and empty syringe



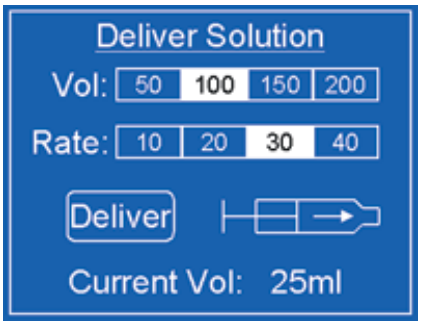
Modeless

Modes are Sometimes Good

When task requires switching modes, interface may also contain modes



Fill Mode



Deliver Mode

Quasimodes

Set ***and hold*** a mode via conscious, continuous action

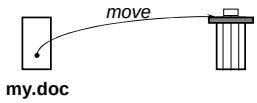
- Shift key to capitalize (vs. Caps Lock)
- Foot pedal that must remain pressed
- Pull down menus
- Muscle tension reminds users they are holding a mode

Also known as "spring-loaded modes"

Noun-Verb *VS* Verb-Noun

Noun-Verb: Select object, *then* do action

- Emphasizes 'nouns' (visible objects) rather than 'verbs' (actions)



Advantages

- Closer to real world
- Modeless interaction
- *Actions* always within context of object
  - inappropriate ones can be hidden
- *Generic commands*
  - the same type of action can be performed on the object
  - e.g. drag 'n drop:

Summary

Metaphor

- Leverages knowledge of familiar objects & experiences
- Transfer this knowledge to abstract tasks and concepts
- Easily mismatched or misused so be careful!

Cognition (Jef Raskin)

- Locus of attention – where you consciously attend

Modes

- Can create memory issues and cause serious errors
- Avoid modes in your designs!

Next Time

Model View Controller and Event Driven UIs in Flash/Flex

- Reading to be posted soon

Individual Programming Assignment Due Mar 2

- Design sketches to be shown in section Feb 26