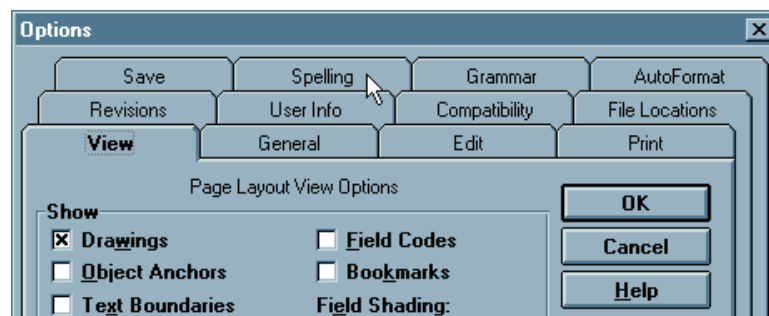
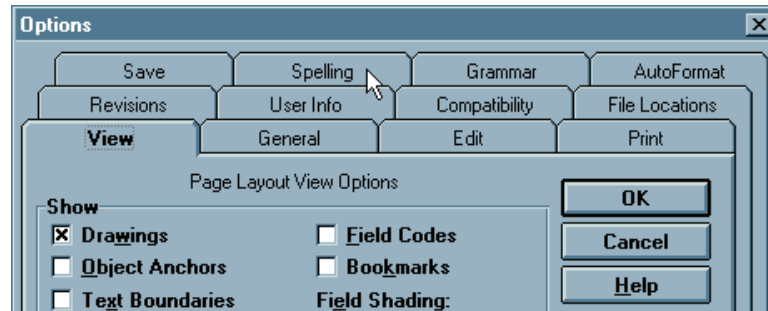


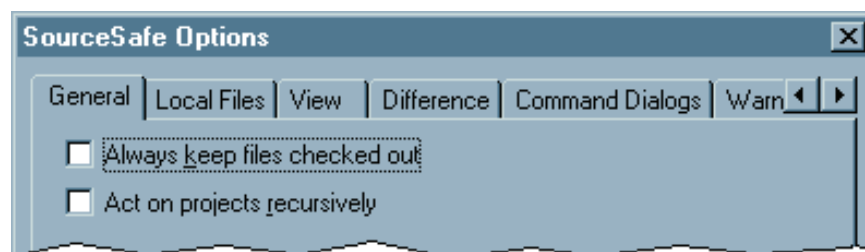
Conceptual Models I

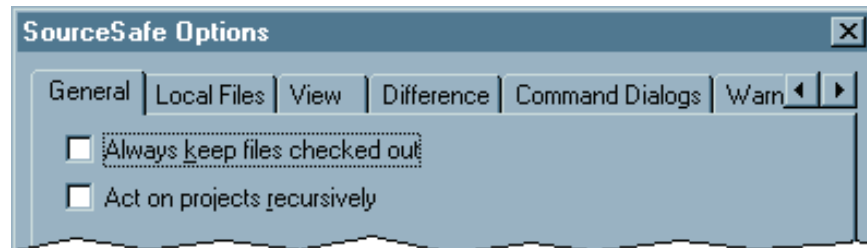
CSI60: User Interfaces
Maneesh Agrawala



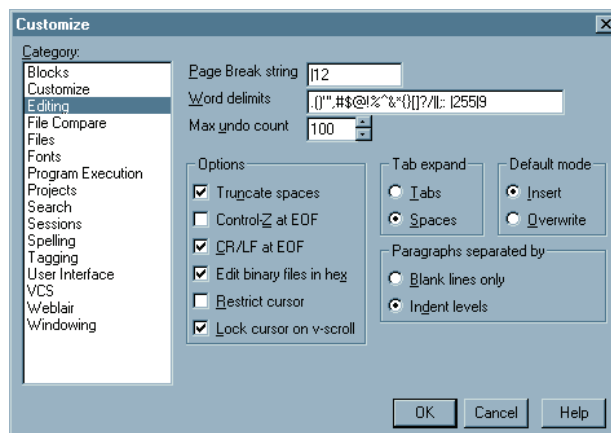


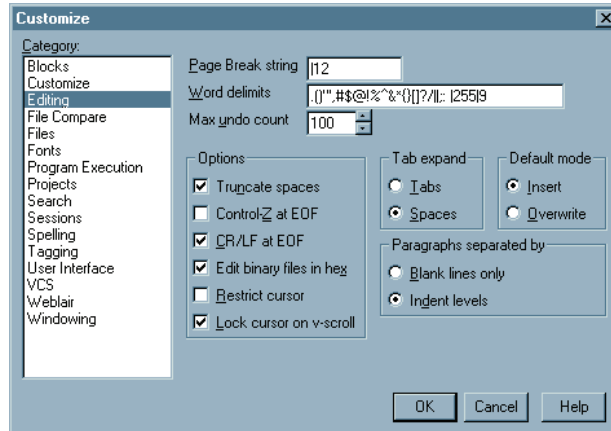
- Too many tabs – take up lots of screen space
- Tab layout reorganized every time user clicks on one
- Unclear if OK corresponds to single tab or to whole dialog





- Many tabs are hidden
- Have to scroll through to see all tabs





- Can fit in many more options vertically
- Layout never changes (selecting one does not affect others)

Review

Challenges of working with Mobile Devices

- Limited Physical Resources
 - CPU, Memory, Screen Size, Input Devices, Battery Life etc
- Diversified Context of Use
- Different Activities
- Limited Attention



Review: Input



12-button Keypad



15-button Keyboard



Half Keyboard

Review: Output

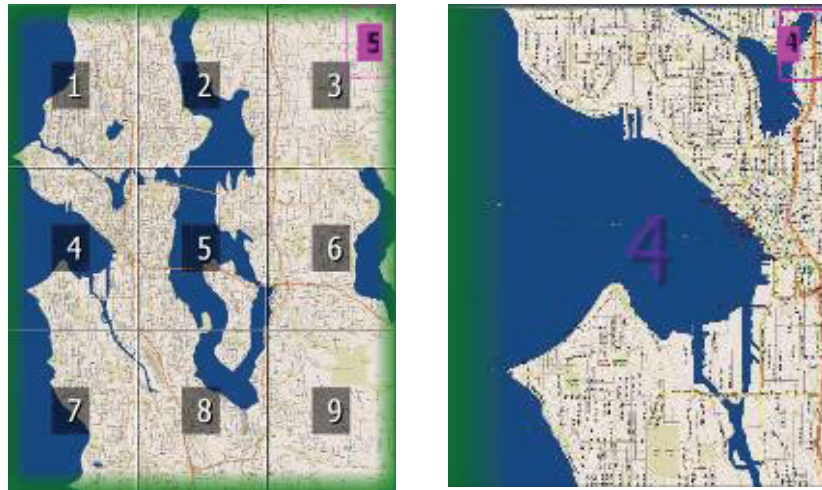


<http://patrickbaudisch.com/projects/summarythumbnail/index.html>

[Lam 05]

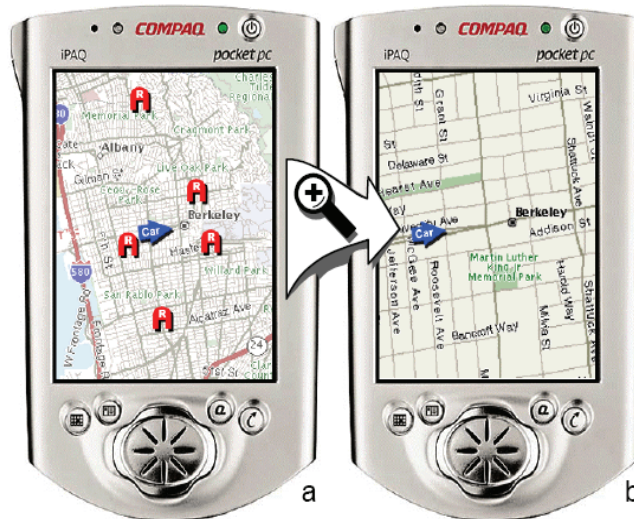
ZoneZoom [Robbins 04]

- Take advantage of spatial memory



Halo - A Virtual Periphery for Mobile Devices

<http://patrickbaudisch.com/projects/halo/index.html>



[Baudisch 03]

Halo - A Virtual Periphery for Mobile Devices

<http://patrickbaudisch.com/projects/halo/index.html>



[Baudisch 03]

Can Halo Be Improved?

Wedge



<http://research.microsoft.com/users/baudisch/projects/wedge/index.html>

[Gustafson 08]

Due Today (before class)

Individual Project Proposal

Assignment (due Feb 7)

Group Brainstorm

- Goal: Brainstorm and refine project ideas with small group
- Will have time in class (next time), but may need to meet outside of class as well

Next class

- Bring printouts of your Individual Project Proposal
- Brainstorm together

You should tell us who you would like to work with for the project by end of day – Saturday.

Brainstorm may not be with your project group.

Topics

- Affordances
- Conceptual Models
- Design Principles

Affordances

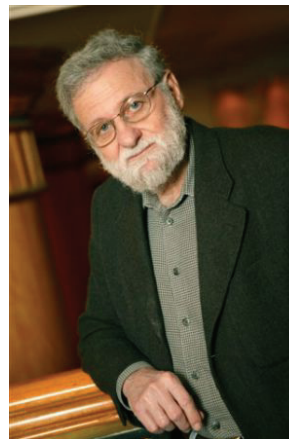
“... the term **affordance** refers to the *perceived* and *actual* properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.

Some affordances obvious

- Knobs afford turning
- Buttons afford pushing
- Glass can be seen through

Some affordances learned

- Glass breaks easily
- Floppy disk
 - Rectangular – can't insert sideways
 - Tabs prevent backwards insertion



The Design of Everyday Things. 1988. Don Norman

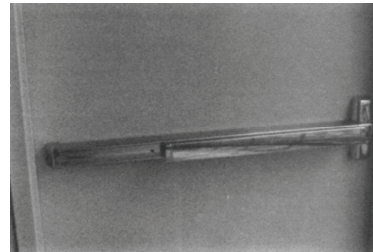
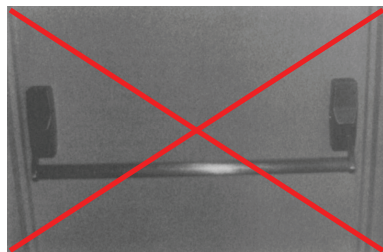
Door Handles

Affordances suggest how to use the object



Door Handles

Affordances suggest how to use the object



Dependencies

Affordances suggest how to use the object

Can be dependent on the

- Experience
- Knowledge
- Culture



Cultural Dependencies

Affordances suggest how to use the object

Can be dependent on the

- Experience
- Knowledge
- Culture
 - Switches (US down=off, UK down=on)
 - red = danger, green = go

Can make an action easy/difficult



Perceived Affordances

Affordances suggest how to use the object

Can be dependent on the

- Experience
- Knowledge
- Culture of the actor

Can make an action easy/difficult

Affordances may be *perceived* without actually existing



Screen-Based Interfaces

Physical affordances

- Screen, pointing device, physical buttons, keyboard
- These afford touching, pointing, looking, clicking on every pixel



Screen-Based Interfaces

Physical affordances

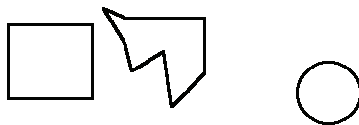
- Screen, pointing device, selection buttons, keyboard
- These afford touching, pointing, looking, clicking on every pixel

Physical affordances of screens often unused

- Screen affords touching, but most screens are *not* touch sensitive

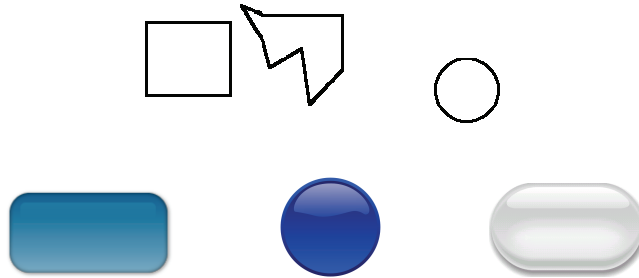


Designer Controls Perceived Affordances

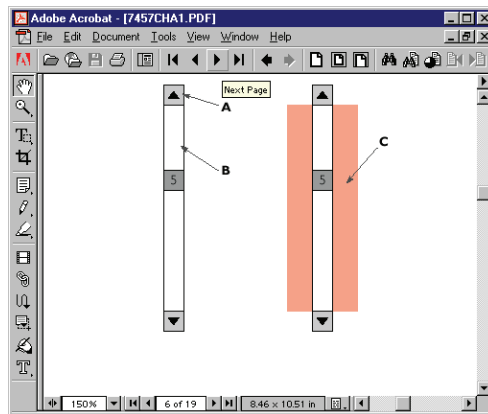


What are the affordances of these graphical objects?

Do Graphical Objects Afford Clicking?



- Graphical design emphasizes affordances
- Does user recognize object as a button to be clicked?



Conceptual Models

Mental Representations

Users' understanding of how interface works

People have preconceived models

- Infix vs. postfix calculators
- Delete file by dragging into trash can

Changing mental models can be difficult



Interfaces Must Communicate Model

Online help / documentation useful (but shouldn't be necessary)



Affordances

Clues about how object/interface works



Affordances

Clues about how object/interface works



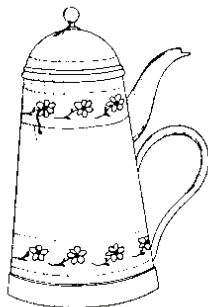
Affordances

- holes for insertion of fingers
- blades for cutting

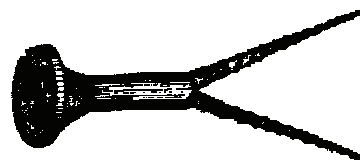
Implications clear for how operating parts work

Affordances

Clues about how object/interface works or doesn't

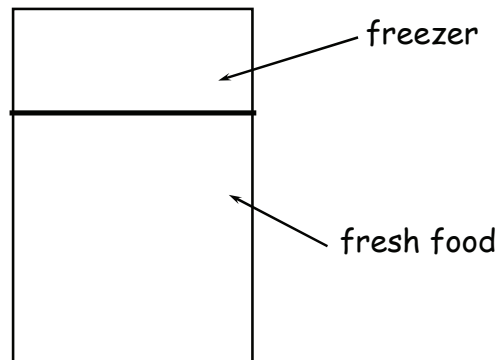


Teapot



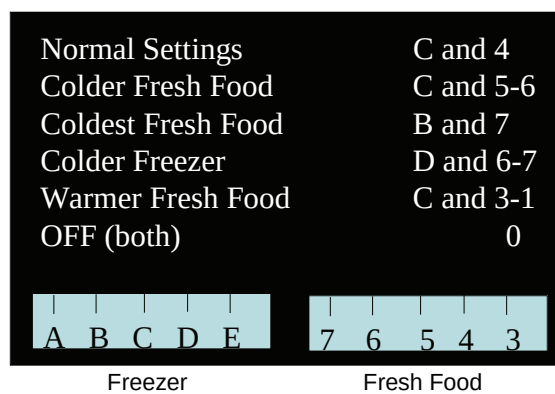
Screw

Refrigerator



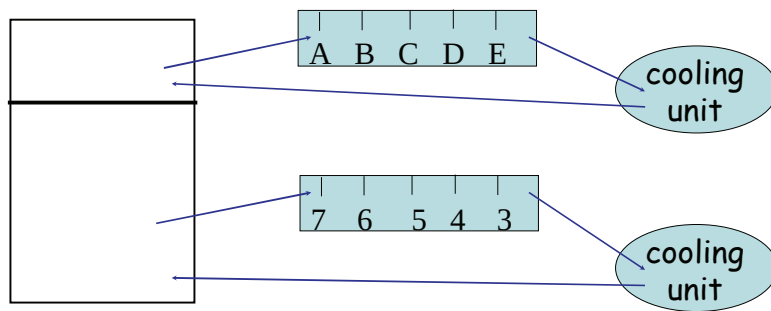
Problem: freezer too cold, but fresh food just right

Refrigerator Controls



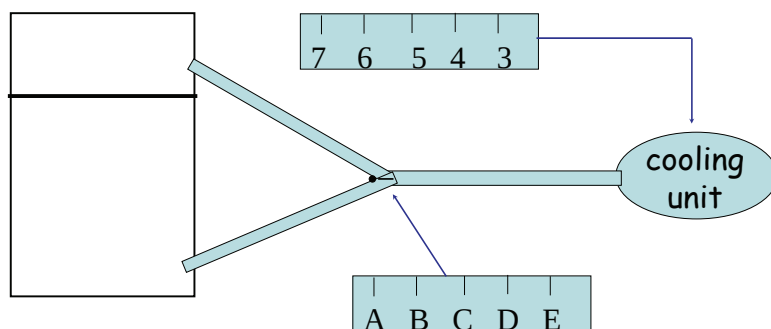
What is your conceptual model?

Most Likely Conceptual Model



Independent Controls

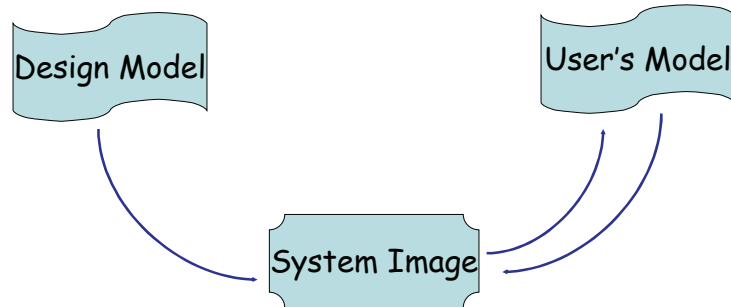
Correct Conceptual Model



Possible solutions:

- Make controls map to user's model
- Make controls map to actual system

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?

Mismatches between models

- Errors
- Slow
- Frustration
- ...



Preconceived Models

People have preconceived models of how things work:

- how does your car start?
- how does an ATM machine work?
- how does your computer boot?

Allows us to predict how things will work or not work

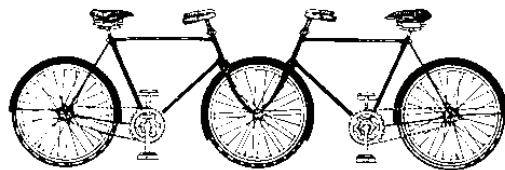
Based on slide by Saul Greenberg

Preconceived Models

People have preconceived models of how things work:

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- how does your computer boot?

Allows us to predict how things will work



Based on slide by Saul Greenberg

Preconceived Models Often Wrong!

Extracted from fragmentary evidence

People find ways to explain things

- Computer terminal breaks when accessing the library catalog
- Certain you're driving on the correct road

Design Principles

I. Make Controls Visible



Poor Visibility (BMW's iDrive)





How do you put someone on hold?



How do you set the alarm?



- Primary controls visible
- But how to set a radio station preset?

Too Much Visibility?



6 remote controls for “modest” home theater

2. Make Sure Mapping is Clear

Mapping: Relationship between controls and their result



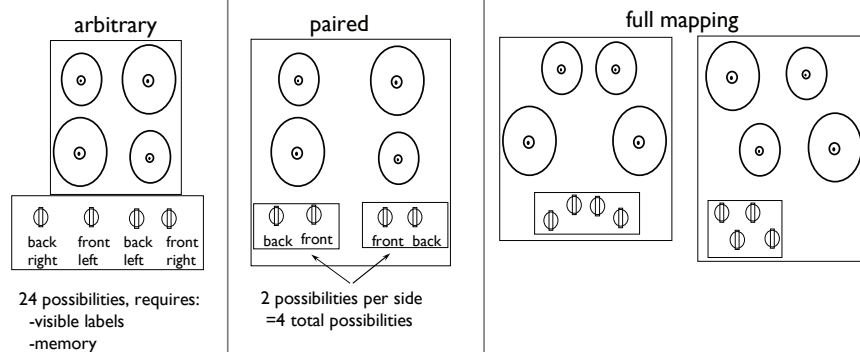
Mercedes Seat Adjustment





Does it control moving sound left/right or front/back?

Stovetop Controls

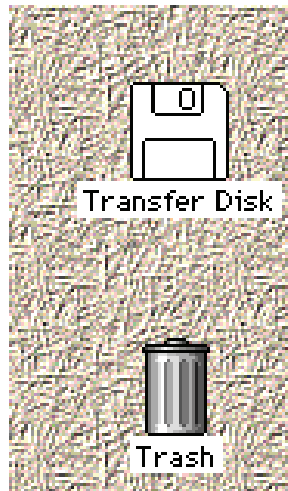


Slide adapted from Saul Greenberg

Transfer Effects

People transfer expectations from known objects to similar new ones

- Positive: previous experience applies to new situation
- Negative: previous experience conflicts with new situation



What happens when disk is dragged onto trash can?

3. Provide Feedback

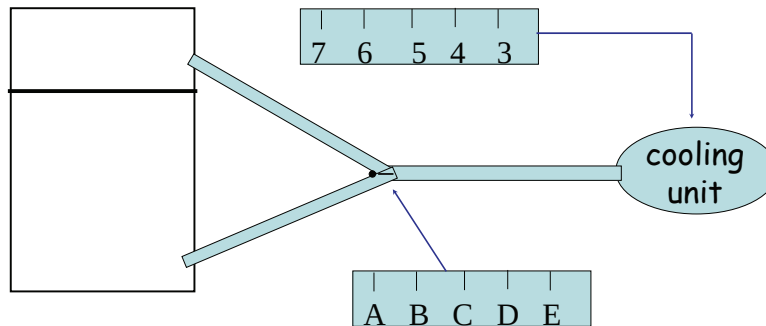


People press >> 1 time
– Unclear if system has registered the button press



Elevator buttons light up → reducing multiple presses

Poor Feedback



Took a day for refrigerator to adjust to new settings

Summary

Conceptual model is the user's mental model of how the interface works

Perceived affordances help users form this model

Designers must provide clues in system to make conceptual model clear

- Make controls visible
- Make sure mapping is clear
- Provide feedback

Next Time

No reading

In Class Group Brainstorm

- Brainstorm together
- Bring printouts of your Individual Project Proposal
- Send us who you wish to work with by email by end of day - Saturday