

CSI 60: User Interface Design

Conceptual Models II

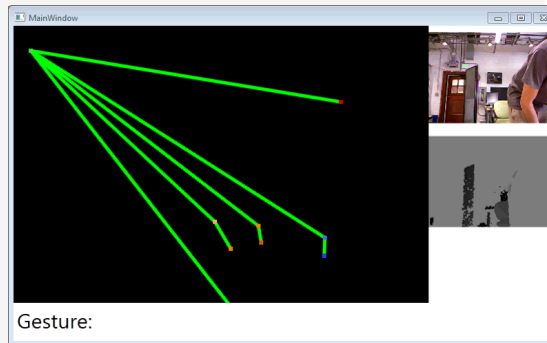
2/08/12

Berkeley
UNIVERSITY OF CALIFORNIA

Due Monday Feb 13

Individual Prog. Assignment 2

(Source code, executable
and video on wiki)



Contextual Inquiry and Task Analysis

Due Feb 22

Find and interview 3 target users (not from class)
Analyze their tasks
Explain how your application addresses their needs
Compare to five closest existing applications
See wiki for details

Start now!

Finding participants will take time
We will not accept late group project assignments

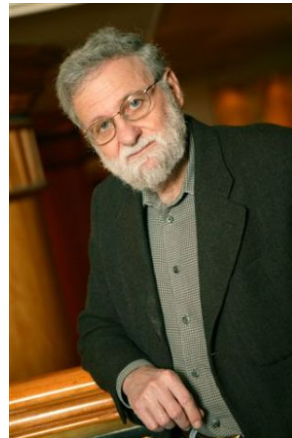
“... the term **affordance** refers to the *perceived* and *actual* properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.

Some affordances obvious

Knobs afford turning
Buttons afford pushing
Glass can be seen through

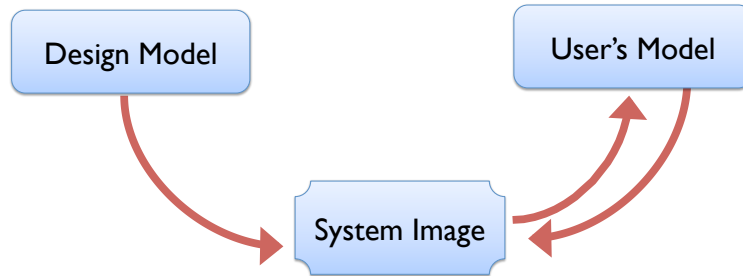
Some affordances learned

Glass breaks easily



The Design of Everyday Things.
Don Norman

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?

Design Principles

I. Make Controls Visible





Primary controls are 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



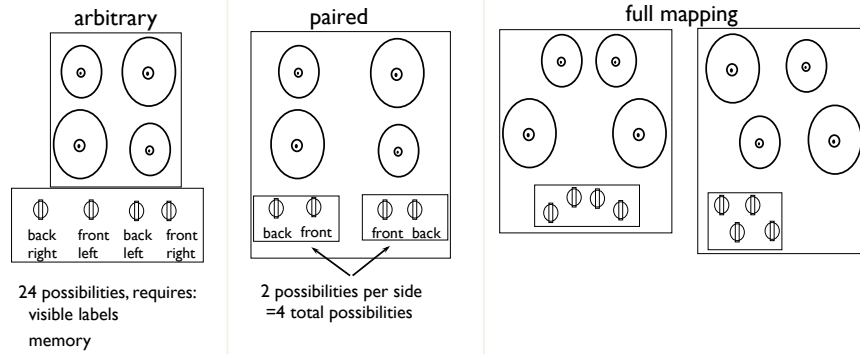
Mercedes S500 Car Seat Controller





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

Stovetop Controls



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



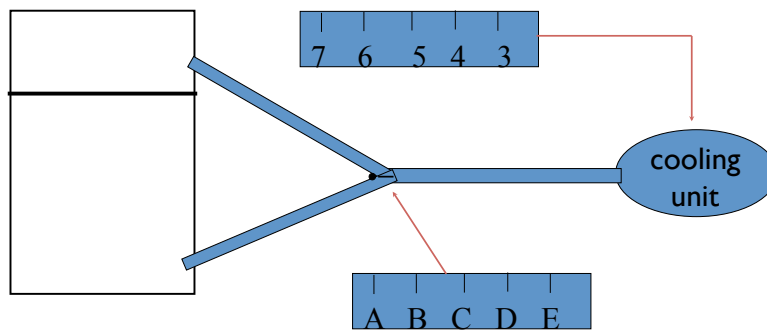
People press >> 1 time

Unclear if system has registered the button press



Elevator buttons light up → reducing multiple presses

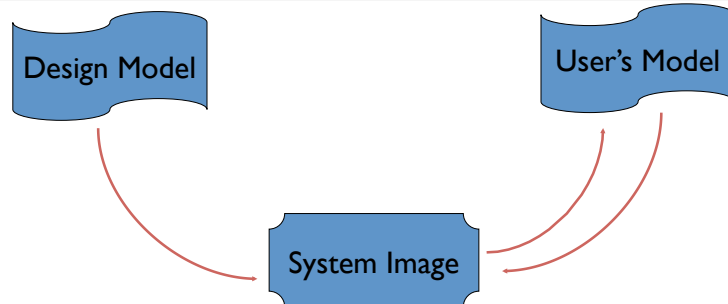
Poor Feedback



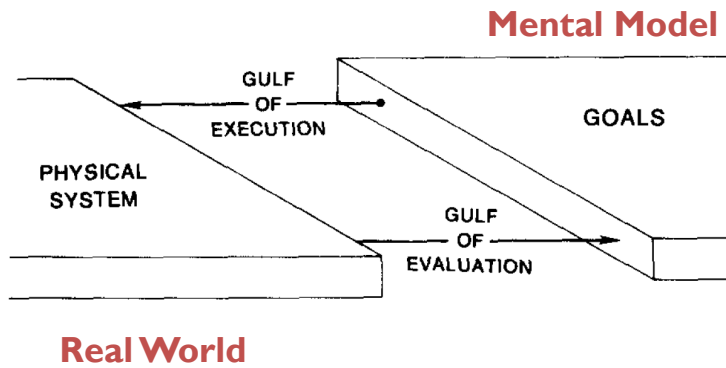
Took a day for refrigerator to adjust to new settings

The Action Cycle

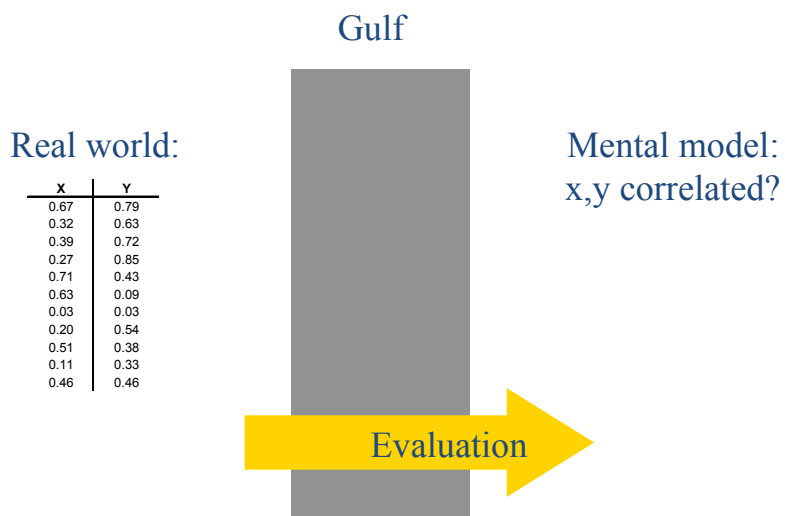
Conceptual Models



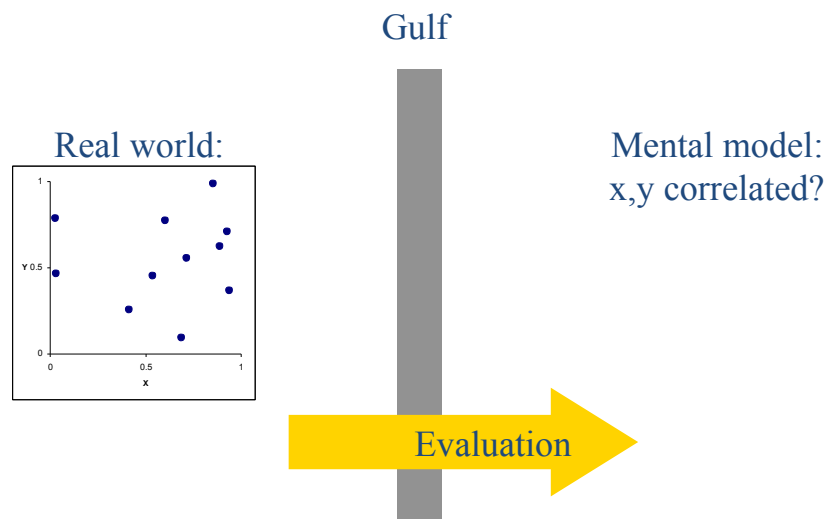
Gulfs of Execution & Evaluation



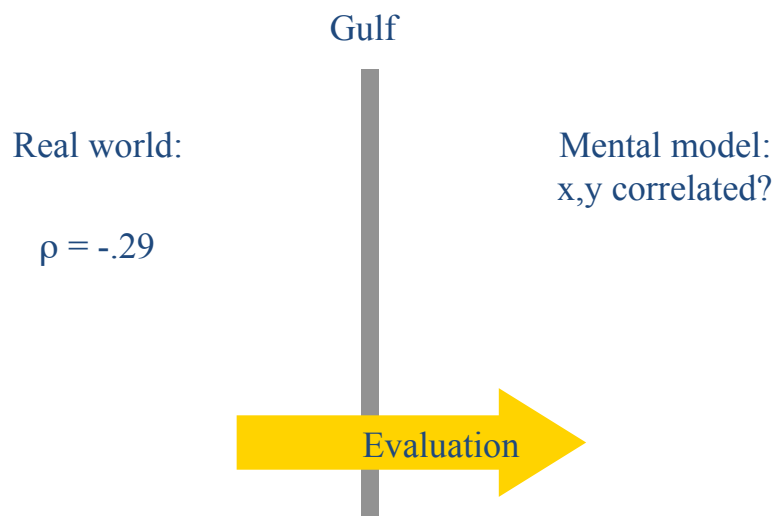
Gulf of Evaluation

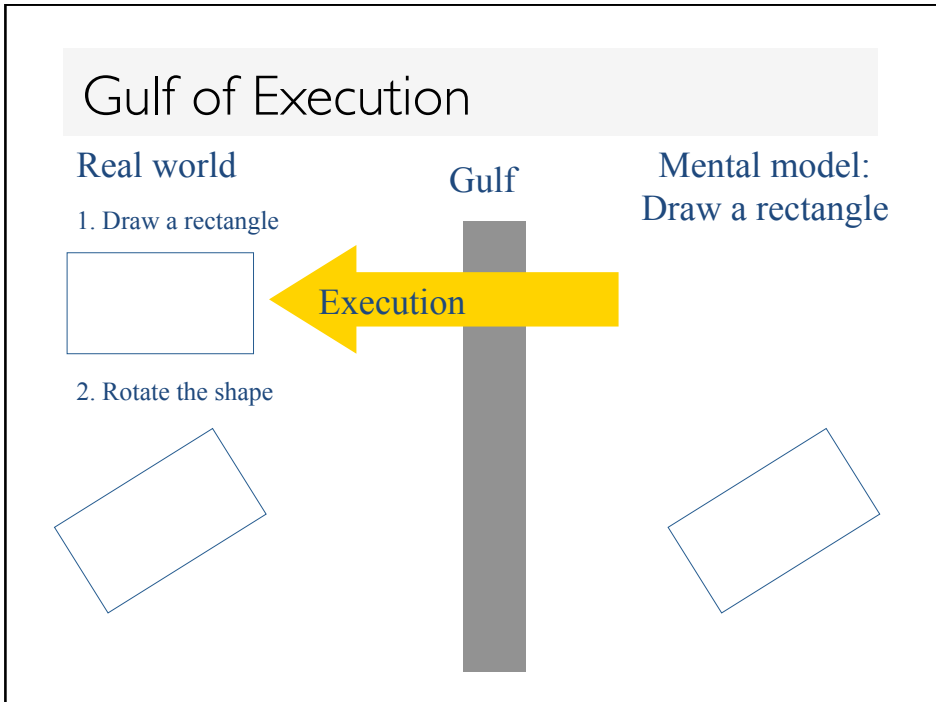
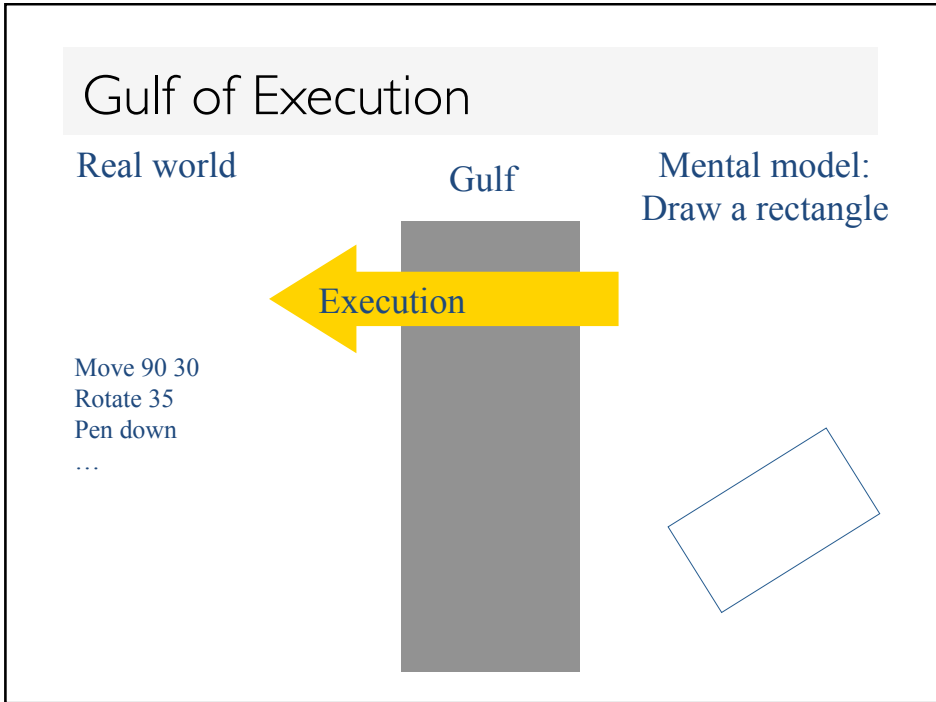


Gulf of Evaluation



Gulf of Evaluation



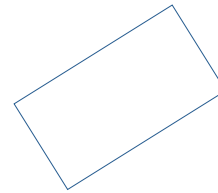
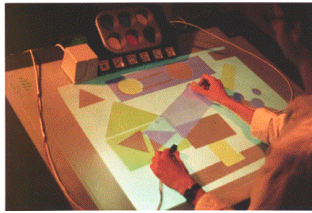


Gulf of Execution

Real world

Gulf

Mental model:
Draw a rectangle

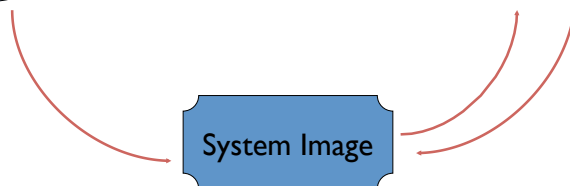


Conceptual Models

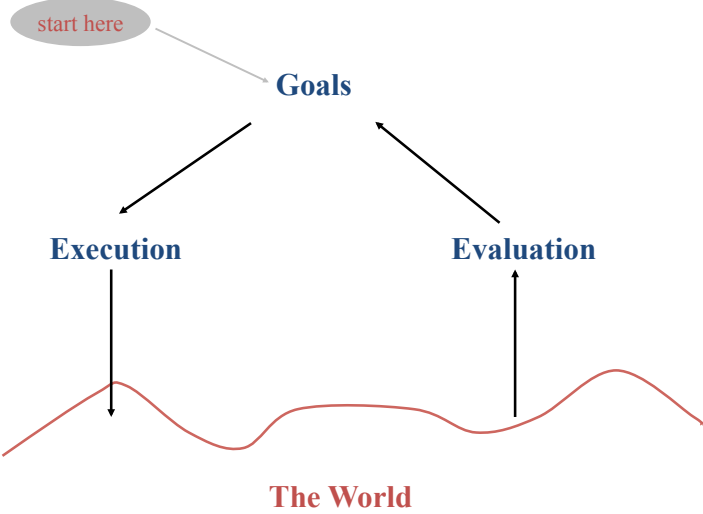
Design Model

User's Model

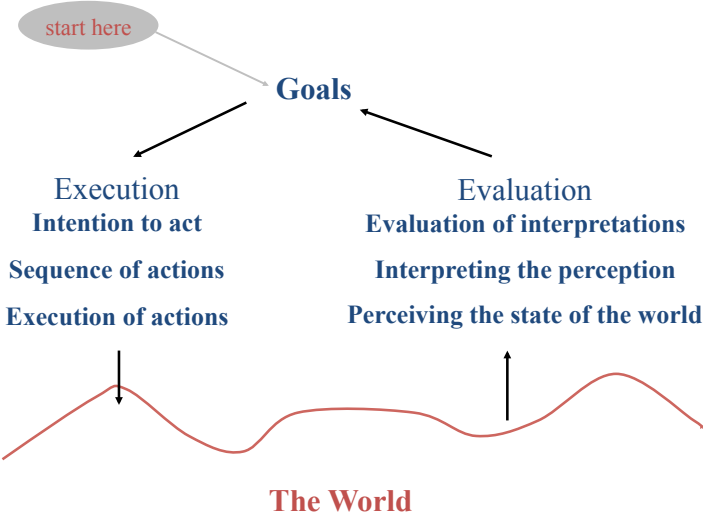
System Image



Action Cycle



Action Cycle



Direct Manipulation and Metaphors

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

Almost always based on a metaphor

Mapped onto some facet of the real world task semantics

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

Leverages knowledge of familiar, concrete objects/experiences

Transfer this knowledge to abstract tasks and concepts

Problem

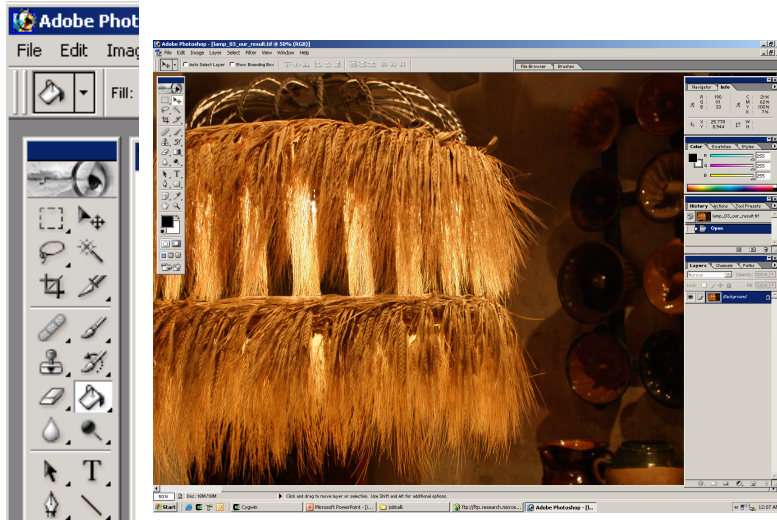
Inaccurate or naive conceptual model of the system



*A presentation tool
is like
an slide projector*



The Painting Metaphor



The Desktop Metaphor

Started at Xerox PARC

Xerox Star

Bitmapped screens made it possible



Not meant to be a real desktop

Organize information the way people use information on desktop
Allow windows to overlap – make screen act as if objects are on it

Microsoft Bob's Desktop Metaphor



Bob's "Living Room" Metaphor



3D Desktops



[Robertson 2000]



Sun's Looking Glass

Google Art Project



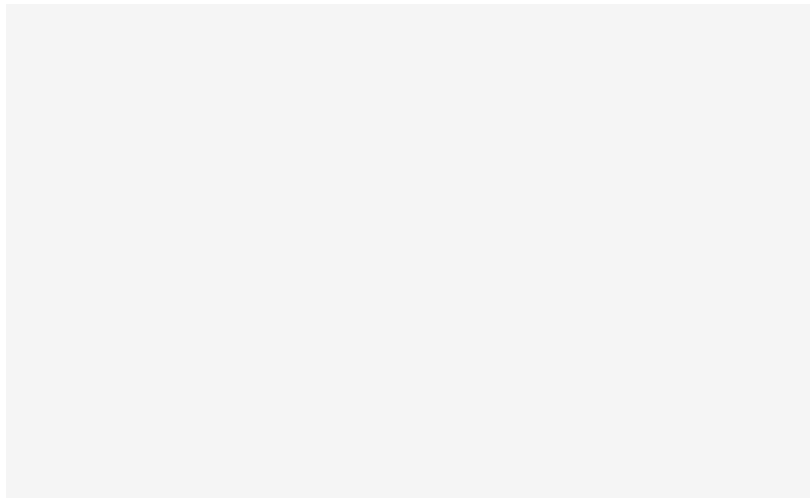
<http://www.googleartproject.com/museums/moma>

A Different Metaphor



[Hartmann 2009]

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?



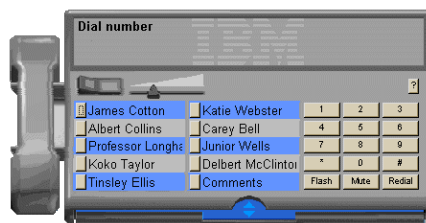
Misused Metaphors

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!



Guidelines for Design

Good Metaphors

Capture essential elements of the event / world

Deliberately leave out / mute the irrelevant

Appropriate for user, task, and interpretation

What about Abstract Operations?

Metaphors are ill-suited for abstract operations

Spell-checker?

Search database by scrolling or by query?

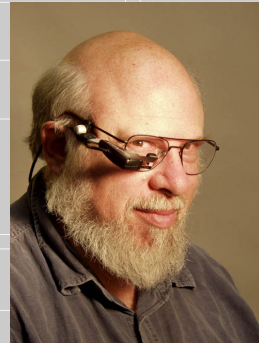
Solution: Combine direct manipulation & abstractions

Word processor:

WYSIWYG document (direct manipulation)

Buttons, menus, dialog boxes (abstractions, but direct manipulation "in the small")

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?

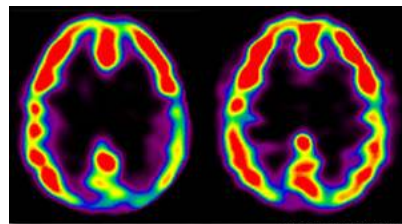
What is the last letter in your first name?

You know it but weren't consciously accessing this information a moment ago, but now you are.

How do your shoes feel right now?

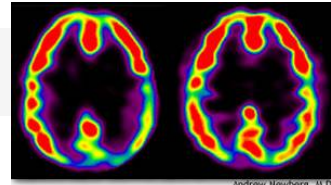
How did “The Shining” make you feel?

Having a name on the “tip of your tongue”



Andrew Newberg, M.D.

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

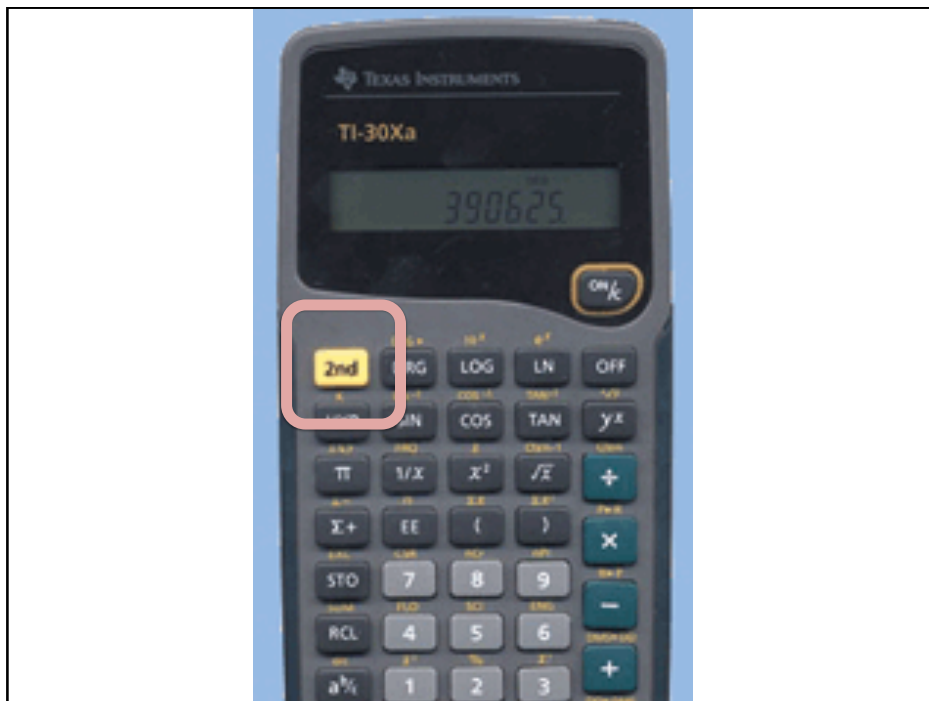
Modes

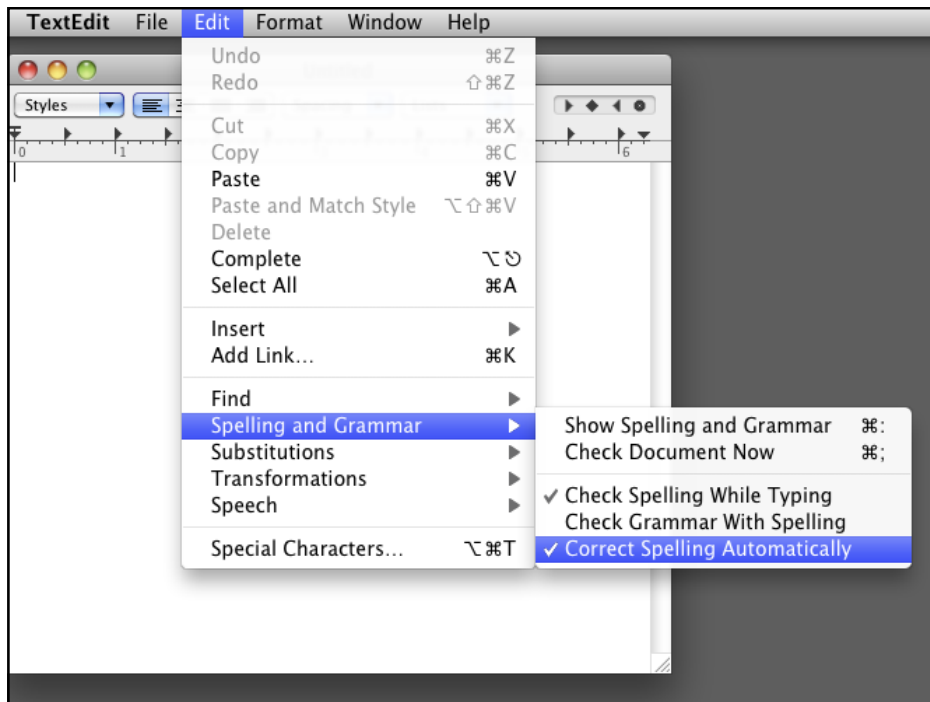
Modes: Definition

The same user actions have different effects in different situations.

Examples?

Modes: Examples





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

Why can they be problematic?

Big memory burden

Source of many serious errors

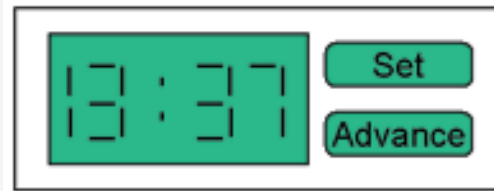
How can these problems be fixed?

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

Quasimodes

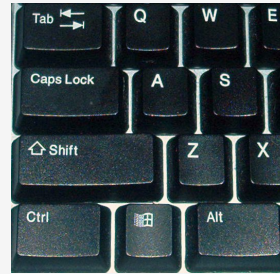
Set and hold a mode via conscious, continuous action

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

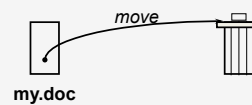
Actions always within context of object

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!