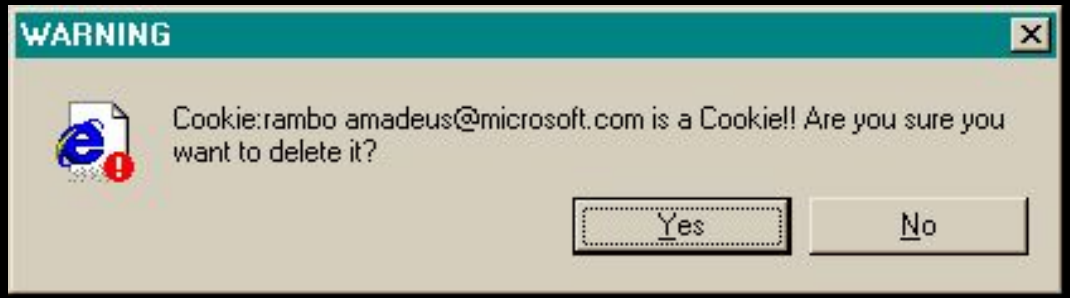
Efficiency

Internet Explorer - Deleting a Cookie File



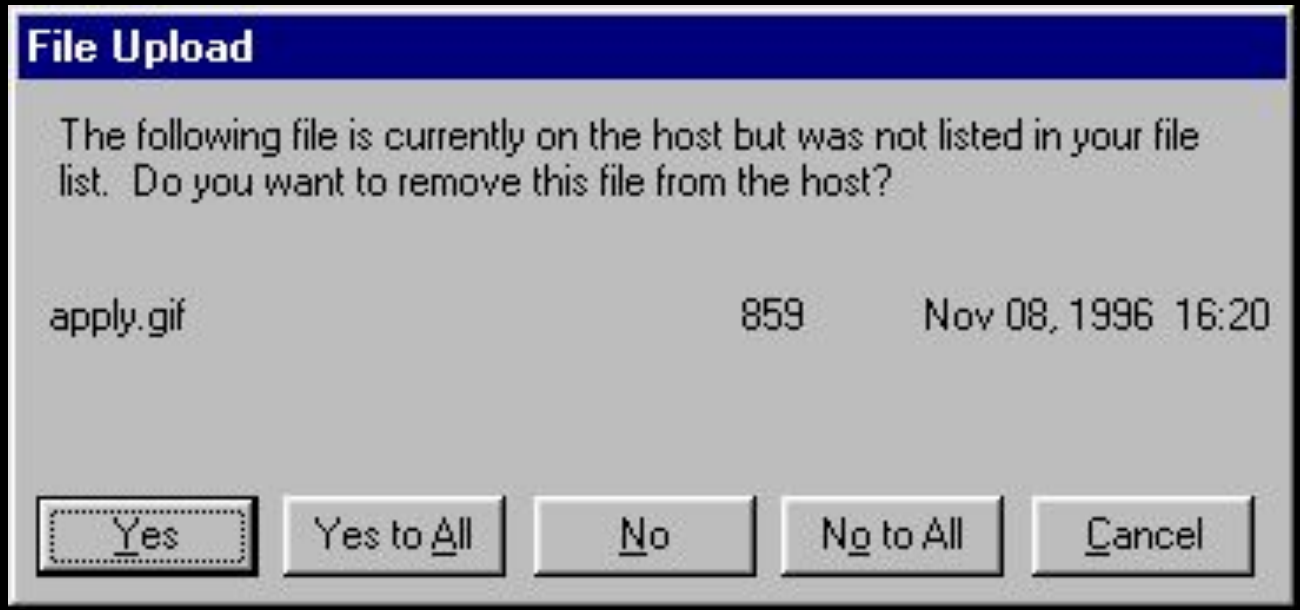
Put aside the fact that the message is almost tautological (“Cookie… is a Cookie”) and overexcited (“!!”).

Does it give the user enough information to make a decision?

Deleting Multiple Cookies

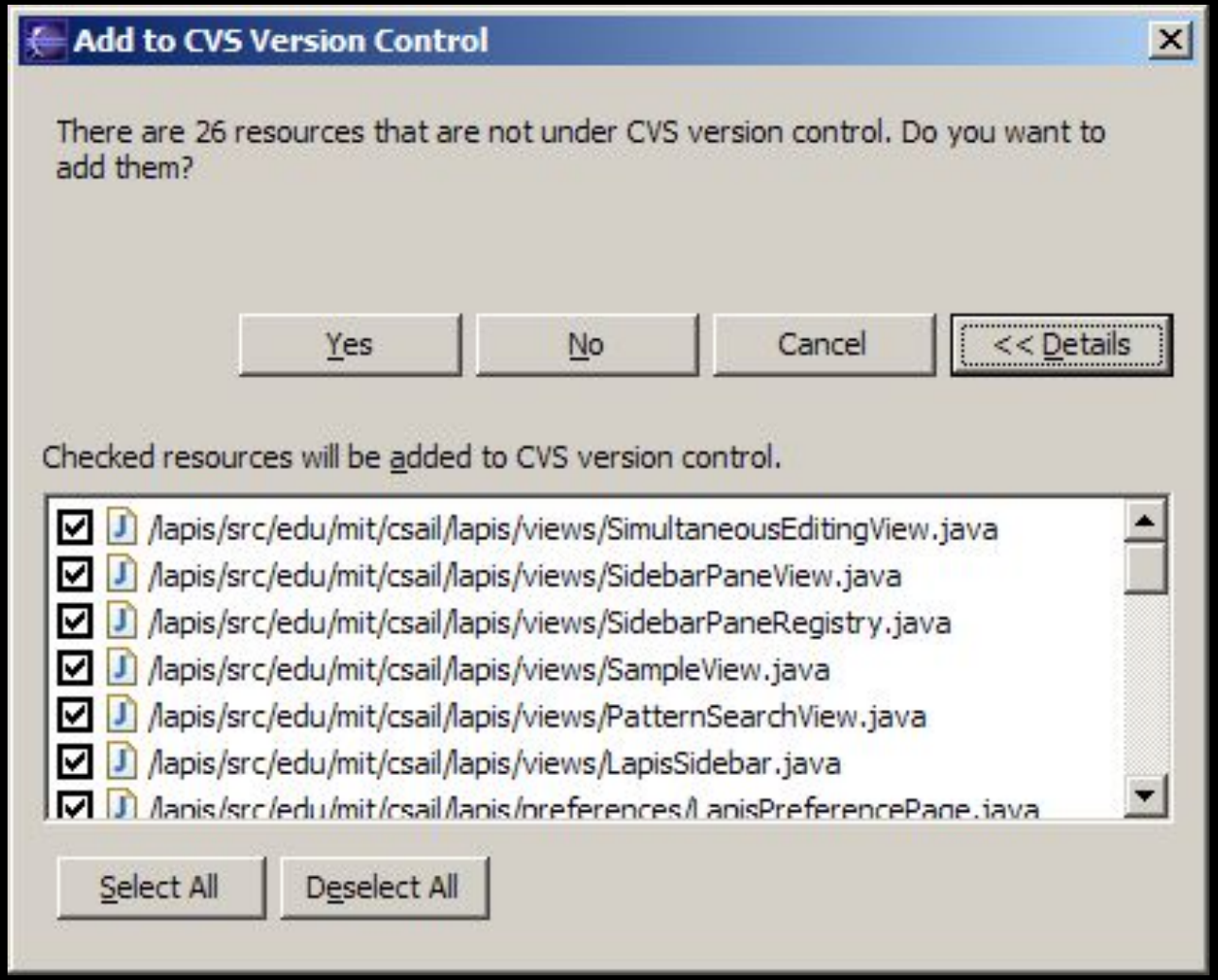
What button is missing from this dialog?

Microsoft Publishing Wizard



But what if you know there’s a file on the host that you don’t want to delete? What would you have to do?

Eclipse

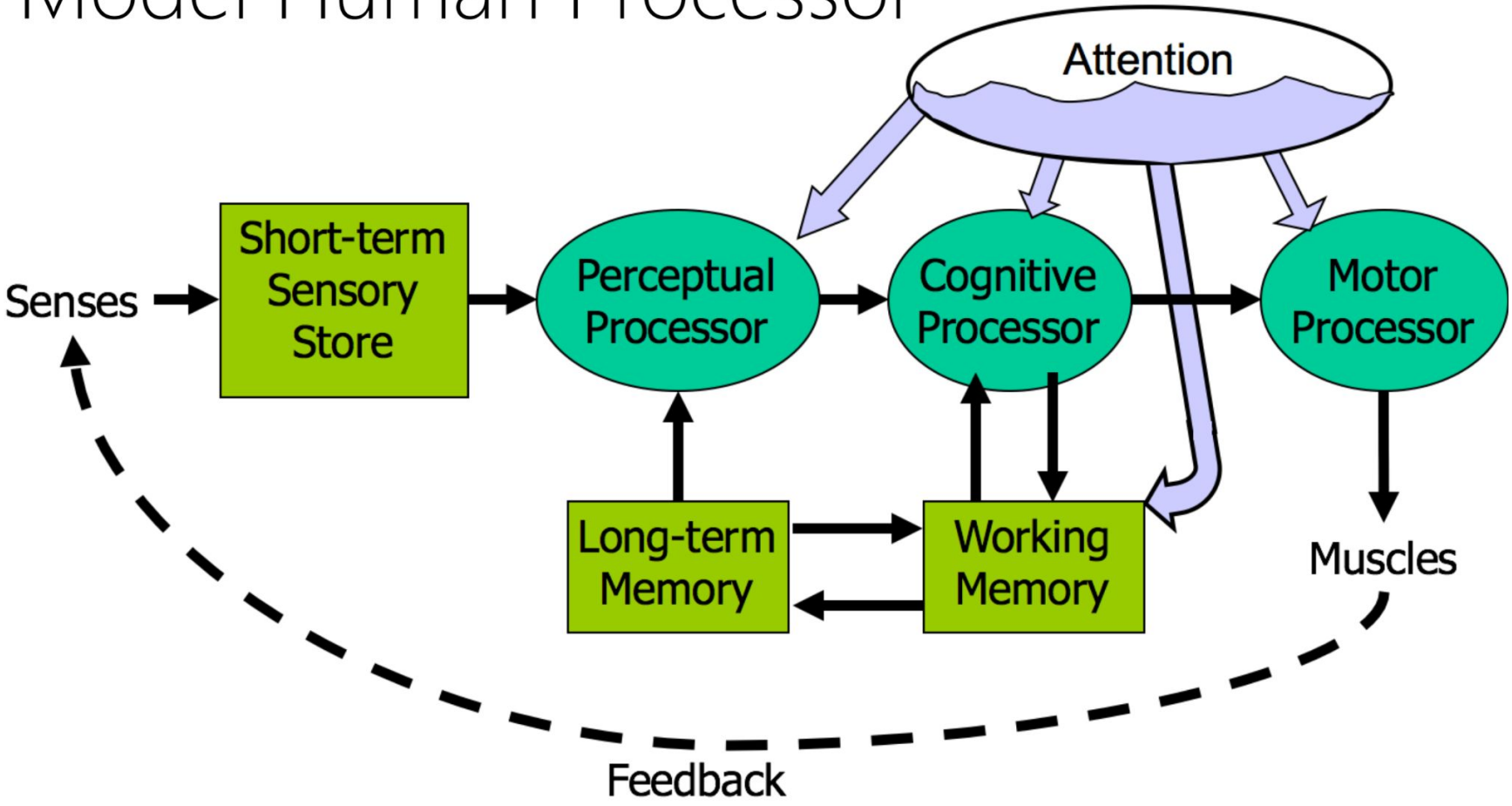

Add to CVS Version Control
There are 26 resources that are not under CVS version control. Do you want to add them?
Yes
No
Cancel
<< Details
Checked resources will be added to CVS version control.
/lapis/src/edu/mit/csail/lapis/views/SimultaneousEditingView.java
/lapis/src/edu/mit/csail/lapis/views/SidebarPaneView.java
/lapis/src/edu/mit/csail/lapis/views/SidebarPaneRegistry.java
/lapis/src/edu/mit/csail/lapis/views/SampleView.java
/lapis/src/edu/mit/csail/lapis/views/PatternSearchView.java
/lapis/src/edu/mit/csail/lapis/views/LapisSidebar.java
Select All
Deselect All

Efficiency

- of task
  - limit high level steps needed to accomplish goal
- of thought
  - don't make me think
  - don't make me remember
- of movement
  - fine motor control is hard
  - limit mechanical steps needed

Human Information Processing

Model Human Processor



Here's a high-level look at the cognitive abilities of a human being – really high level, like 30,000 feet.

This is a version of the Model Human Processor (MHP), developed by Card, Moran, and Newell as a way to summarize decades of psychology research in an engineering model (Card, Moran, Newell, The Psychology of Human-Computer Interaction, Lawrence Erlbaum Associates, 1983).

This model is different from the original MHP; modified to include a component representing the human's attention resources (Wickens, Engineering Psychology and Human Performance, Charles E. Merrill Publishing Company, 1984).

Input from the eyes and ears is first stored in the short-term sensory store. As a computer hardware analogy, this memory is like a frame buffer, storing a single frame of perception.

The perceptual processor takes the stored sensory input and attempts to recognize symbols in it: letters, words, phonemes, icons. It is aided in this recognition by the long-term memory, which stores the symbols you know how to recognize.

The cognitive processor takes the symbols recognized by the perceptual processor and makes comparisons and decisions. It might also store and fetch symbols in working memory (which you might think of as RAM, although it's pretty small). The cognitive processor does most of the work that we think of as "thinking".

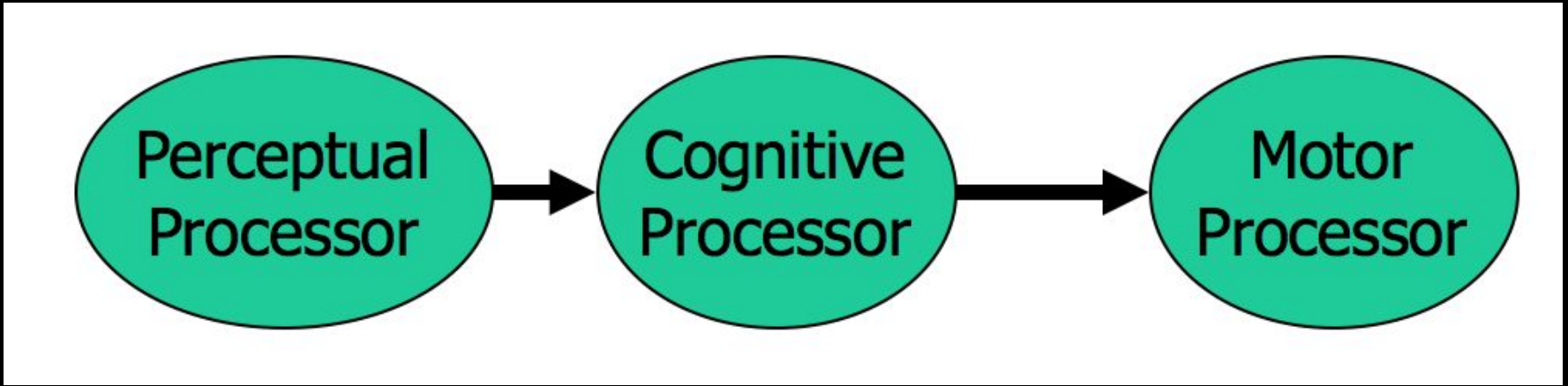
The motor processor receives an action from the cognitive processor and instructs the muscles to execute it. There's an implicit feedback loop here: the effect of the action (either on the position of your body or on the state of the world) can be observed by your senses, and used to correct the motion in a continuous process.

Finally, there is a component corresponding to your attention, which might be thought of like a thread of control in a computer system.

Note that this model isn't meant to reflect the anatomy of your nervous system. There probably isn't a single area in your brain corresponding to the perceptual processor, for example. But it's a useful abstraction nevertheless.

Human Processor Cycle Time

- Processors have a cycle time
  - Tp ~ 100ms [50-200 ms]
  - Tc ~ 70ms [30-100 ms]
  - Tm ~ 70ms [25-170 ms]



Perceptual Fusion

- Two stimuli within the same PP cycle (Tp ~ 100ms) appear fused
  - Causality is strongly influenced by fusion
  - Relevant to effective feedback

Perceptual fusion: Here's an intuition for how fusion works.

Every cycle, the perceptual processor grabs a frame (snaps a picture).

Two events occurring less than the cycle time apart are likely to appear in the same frame. If the events are similar – e.g., Mickey Mouse appearing in one position, and then a short time later in another position – then the events tend to fuse into a single perceived event – a single Mickey Mouse, in motion.

Cognitive Processing

- Cognitive processor
  - compares stimuli
  - selects a response
- Types of decision making
  - skill-based: learned procedures
    - automatic; minimal attention
    - walking, talking, driving, reading
  - rule-based: apply learned if-then rules
    - tipping, tic tac toe, cooking---is it done yet?
  - knowledge-based: problem solving, experimentation

Motor Processing

- Open-loop control
  - Motor processor runs a program by itself
  - cycle time is Tm ~ 70 ms
- Closed-loop control
  - Muscle movements (or their effect on the world) are perceived and compared with desired result
  - cycle time is Tp + Tc + Tm ~ 240 ms

Making Choices


menùpizze
500 modi per... farti innamorare della pizza!
menùpizze

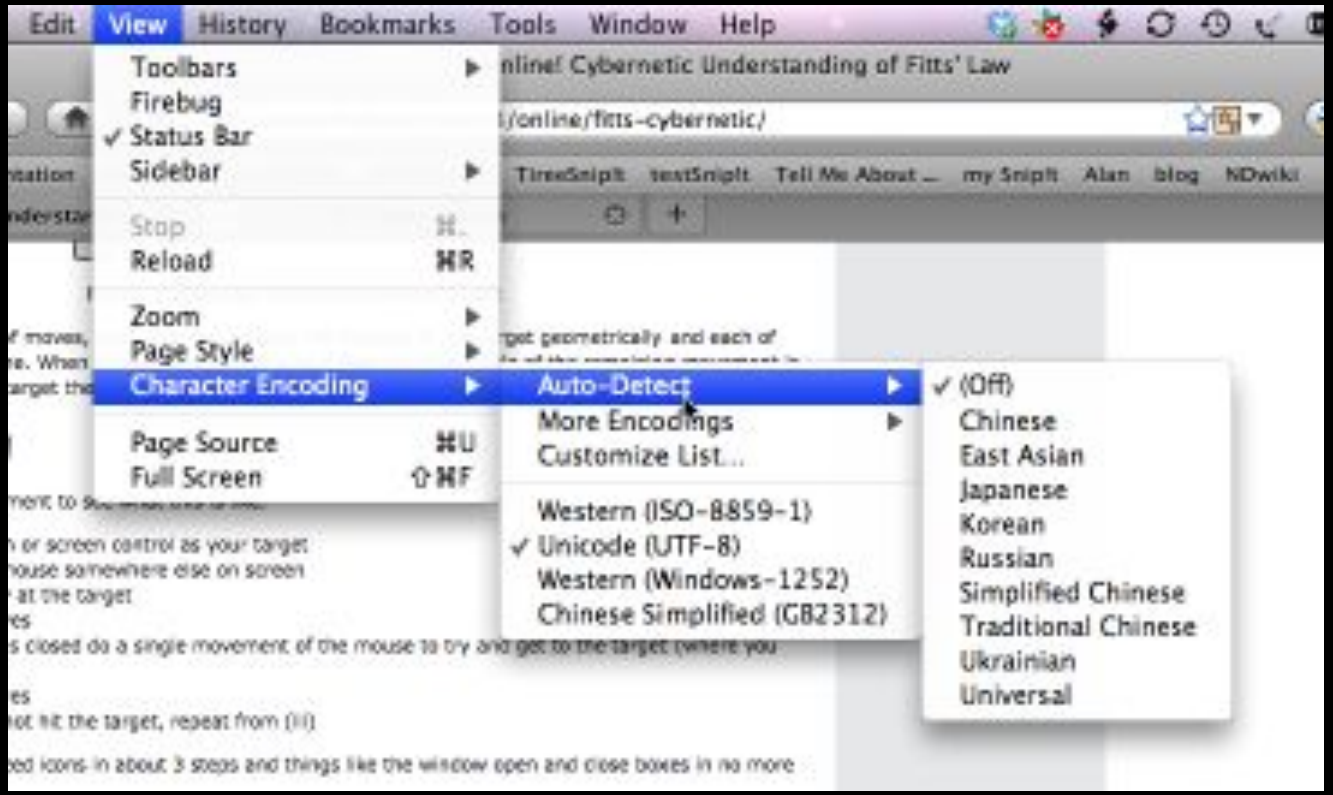

SOUTH
BY-PASS
EAST
TRUCK
SOUTH
BY-PASS
SOUTH
TRUCK
WEST
TRUCK
WEST
73
29
601
73
73
29
601
601
73
73


AT&T
replaytv
SONIC blue
DVD
Pioneer
SONY
TV
Pioneer
Panasonic
LIGHT TOWER

Scan versus Search

- If choices unfamiliar, must scan all
  - linear work
  - learnability/discoverability issue
- A known ordering enables (e.g. binary) search
  - logarithmic
  - but may require cognition (thinking about alphabetical order) so worse constant
- Hierarchy can help too
  - Break one large choice into a few small ones
  - also logarithmic

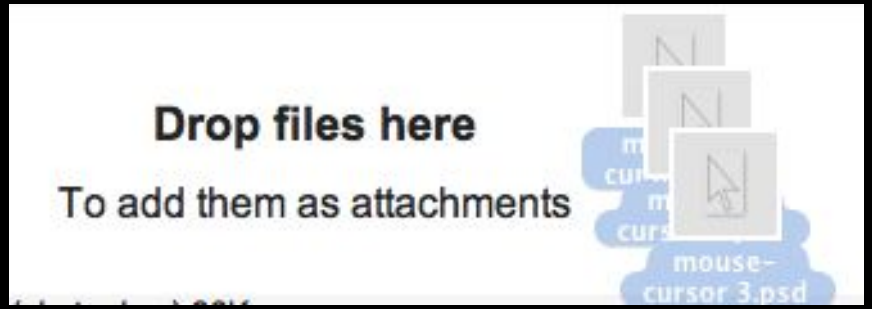
Pull-out Hierarchical Menus



Fewer Choices is Better

Ideas for Efficiency

Aggregation

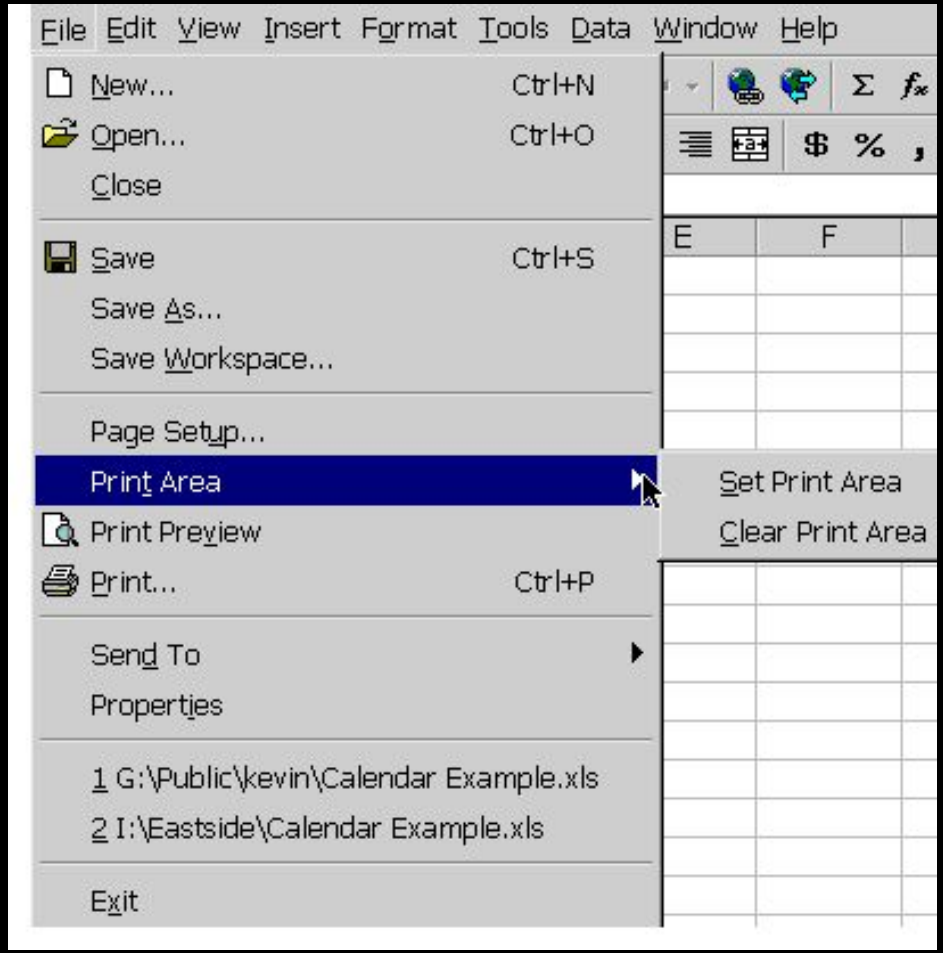


multiple selection for action

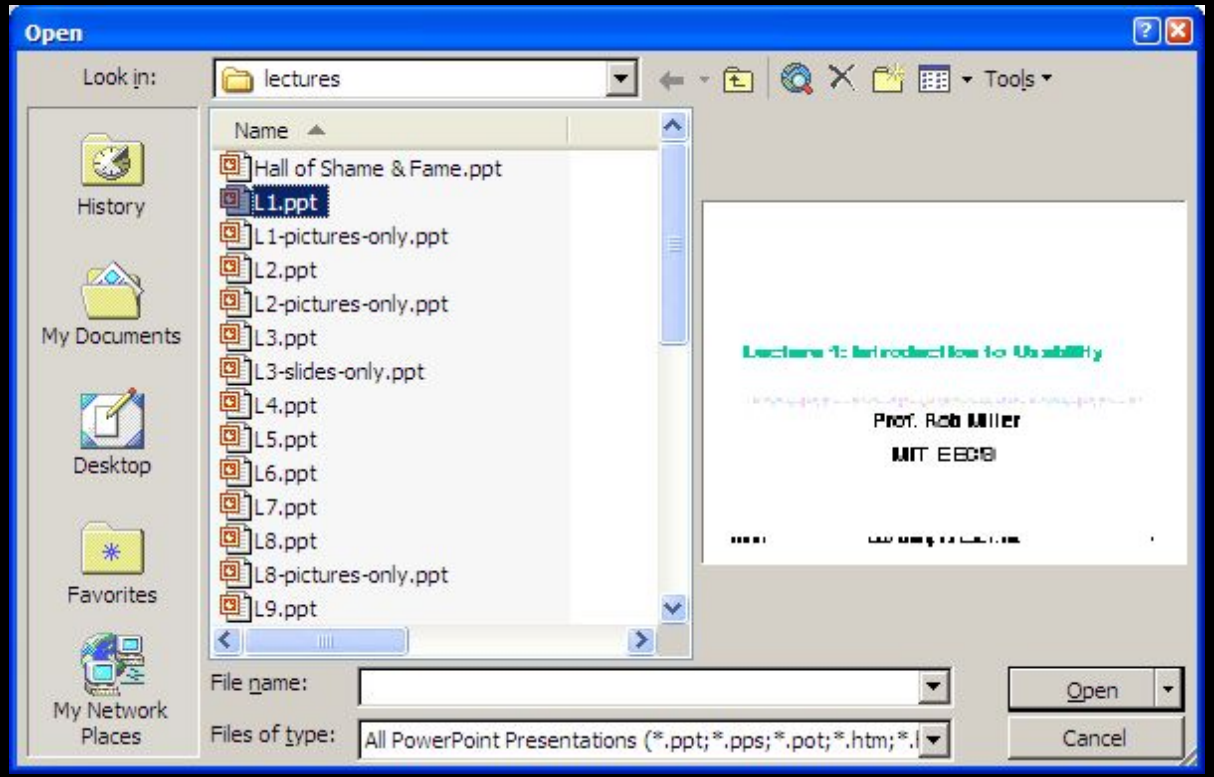
multiple drag & drop

Accelerators

- Secondary method for doing something faster in a less obvious way
- e.g. keyboard commands
- in particular, menu accelerators

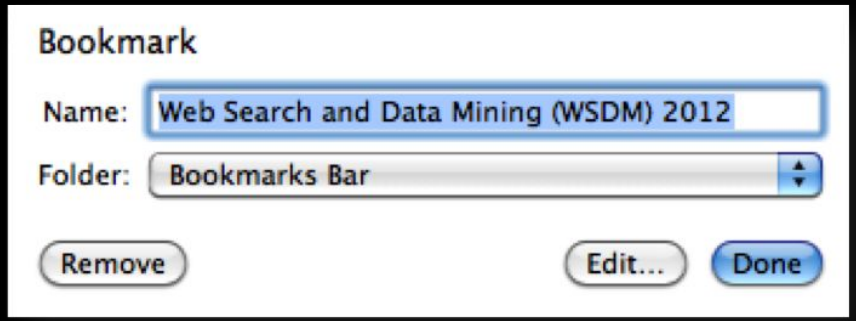


Anticipation

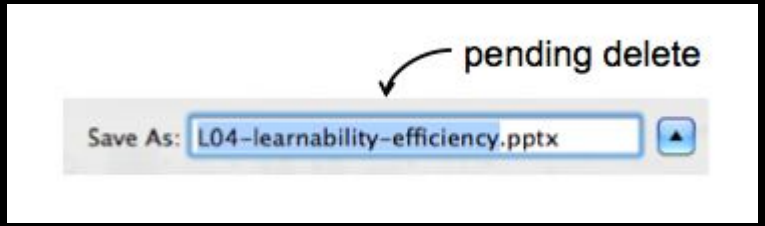


Info or functionality the user needs should be at hand without their needing to go find it

Defaults & Pending Delete

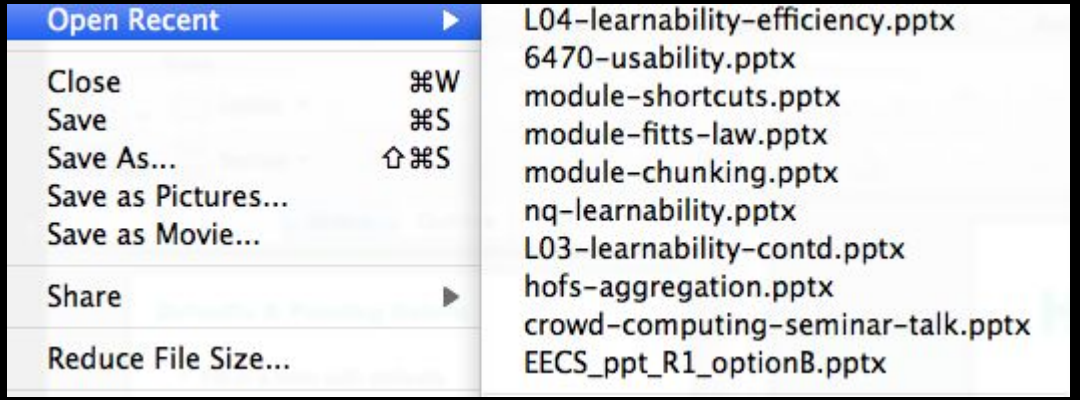


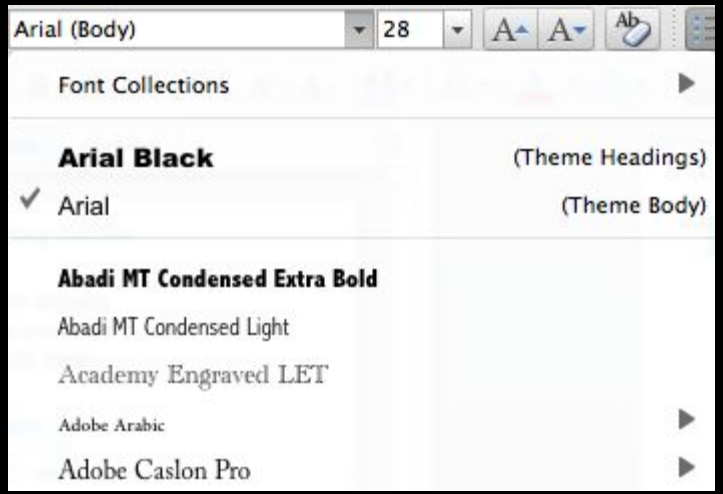
- Fill in a form with defaults
  - from history, by prediction
- Make the defaults fragile



History

- Offer recently-used or frequently-used choices





Dynamic menu

- Idea: dynamic menu changes based on frequent usage patterns.
  - Office 97: frequent items move higher (order by frequency)
  - Gone from office 2001. Why?
    - Consistency
  - Instead, split menu has a group of common items copied to top.
  - Static vs. (auto) Adaptive vs. (manually) Adaptable

Autocomplete

- Minimize typing with autocomplete
- another kind of anticipation of what will be typed
- Autocomplete doesn't just help with efficiency. What other usability dimensions does it help?
- Dynamic, just like dynamic menus. Same problem?
- No, because not used for small fixed set of choices