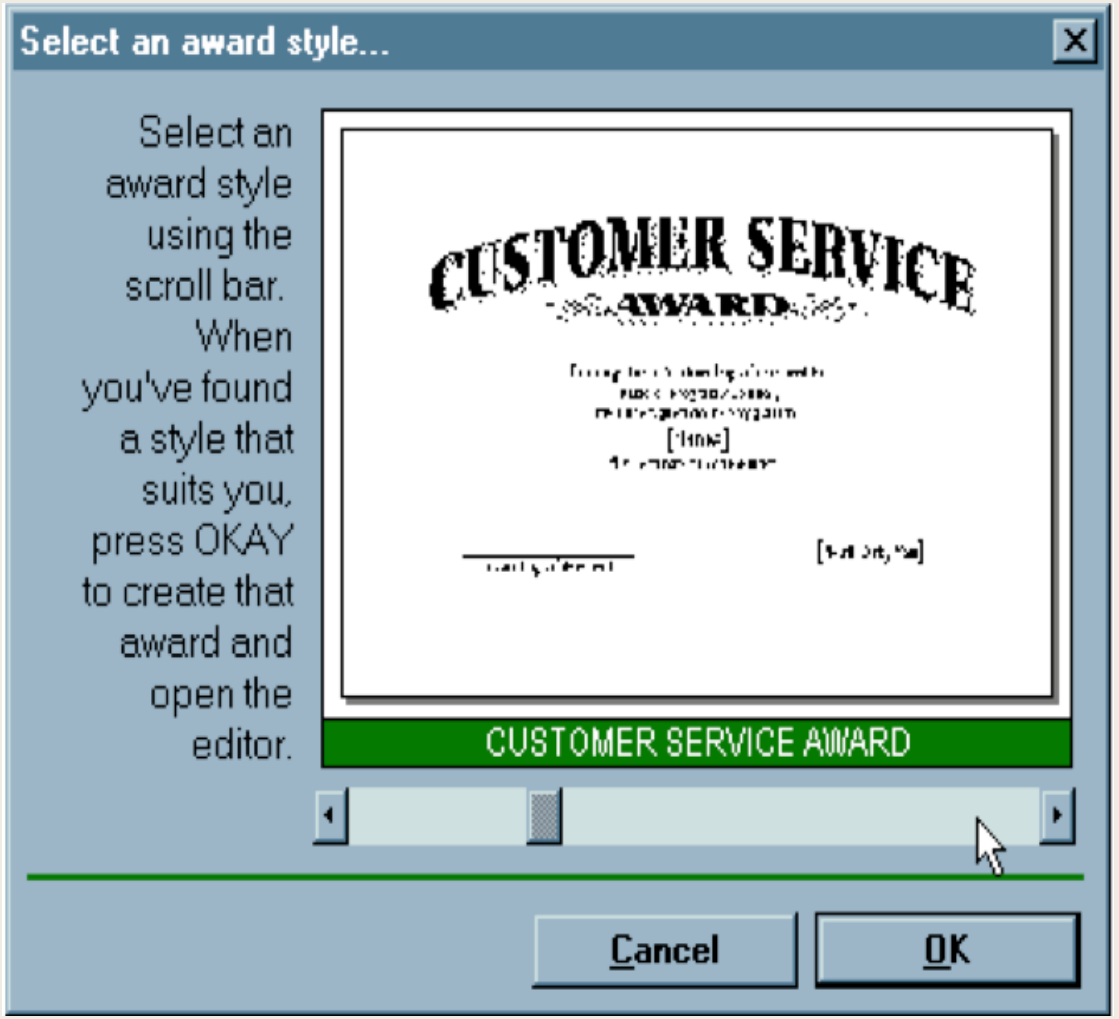
HUMAN COMPUTER INTERACTION

Lecture 2: Usability

User Interface-1: Hall of Shame

- Usability is about creating effective user interfaces (UIs).
- This interface is clearly graphical. It's mouse-driven – no memorizing or typing complicated commands.
- It's even what-you-see-is-what-you-get (WYSIWYG) – the user gets a preview of the award that will be created.
- So why isn't it usable?

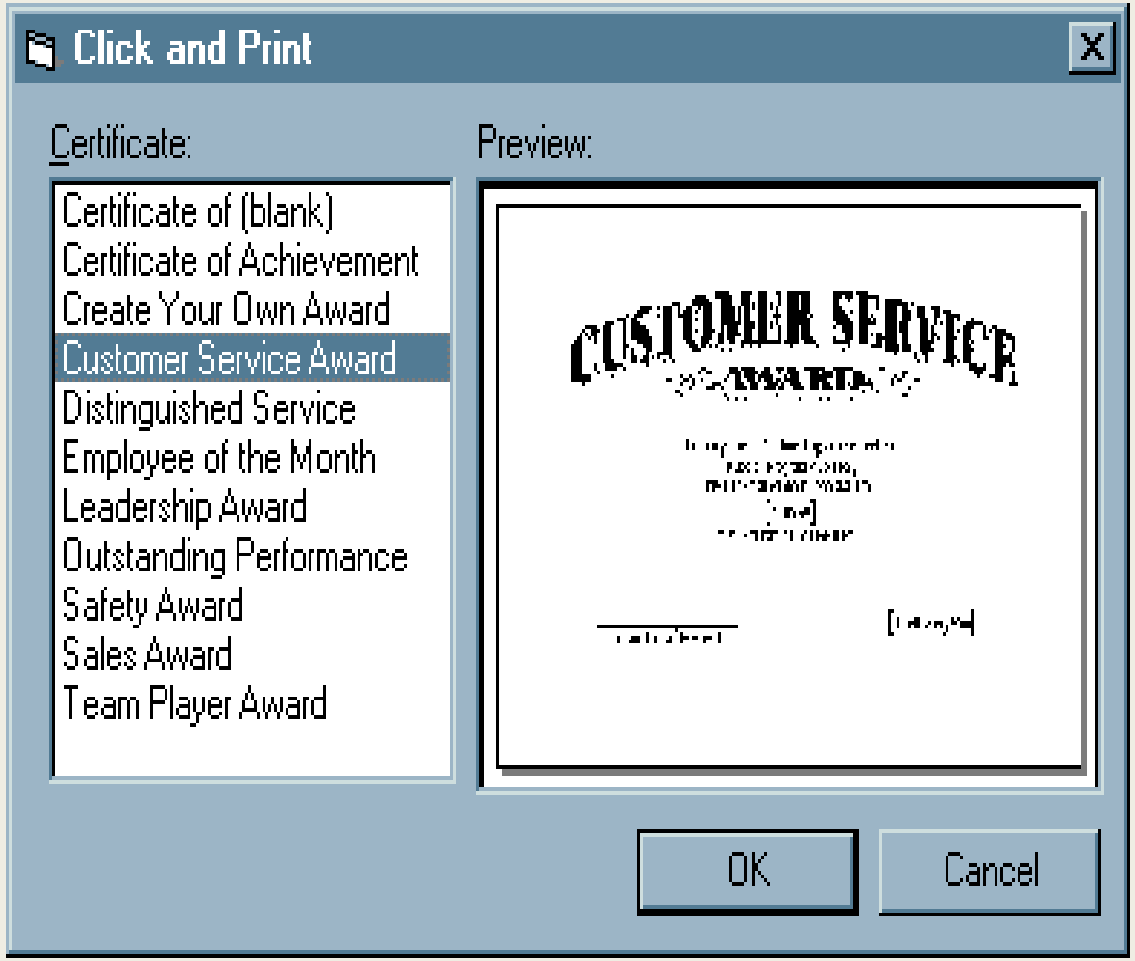


User Interface-1: Hall of Shame

- Long help message on the left side.
  - *Why so much help for a simple selection task? Because the interface is bizarre!*
- The scrollbar is used to select an award template.
  - *Moving the scrollbar back and forth changes the template shown.*
  - *Cute but bad*
  - *Inconsistent*
- No Shortcut.
- How to redesign?

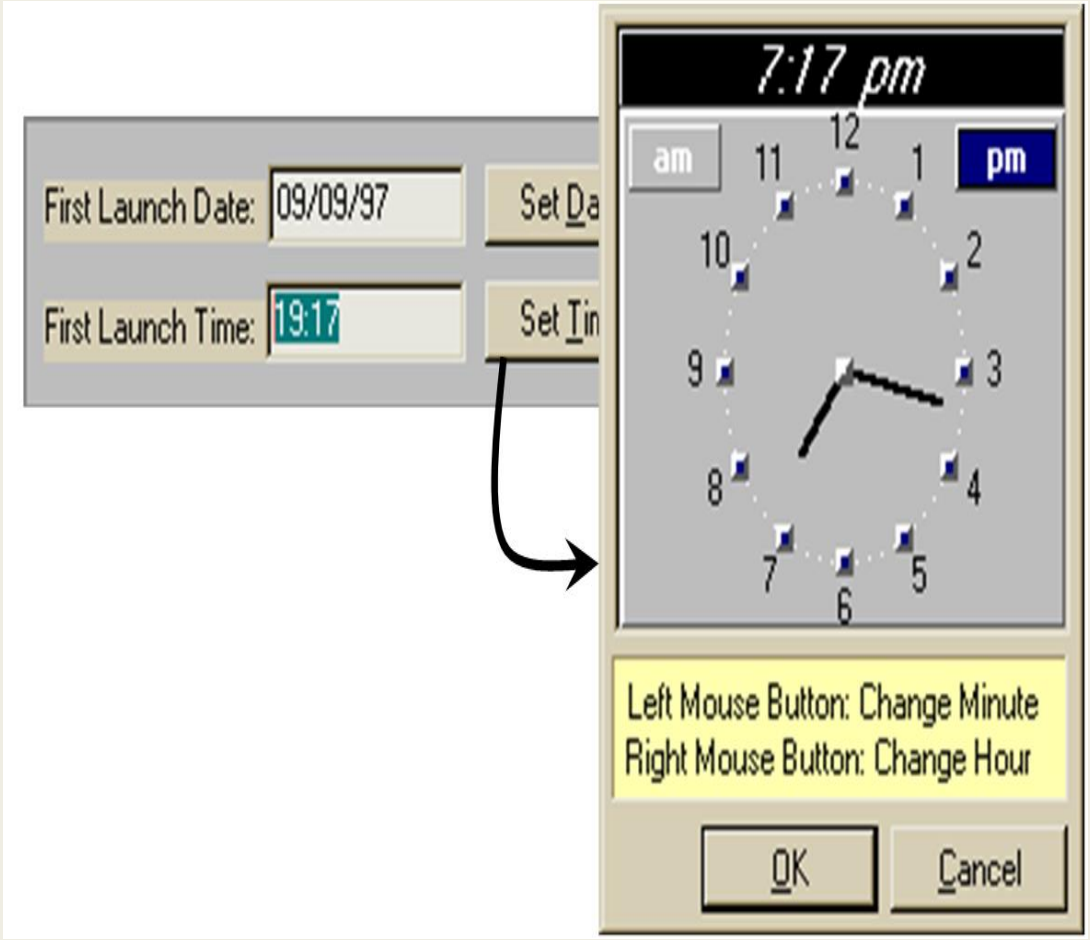
A Possible Redesign

- The templates filled in a list box on the left.
- Its preview on the right.
- Random access is trivial for frequent users.
- No help message is needed.



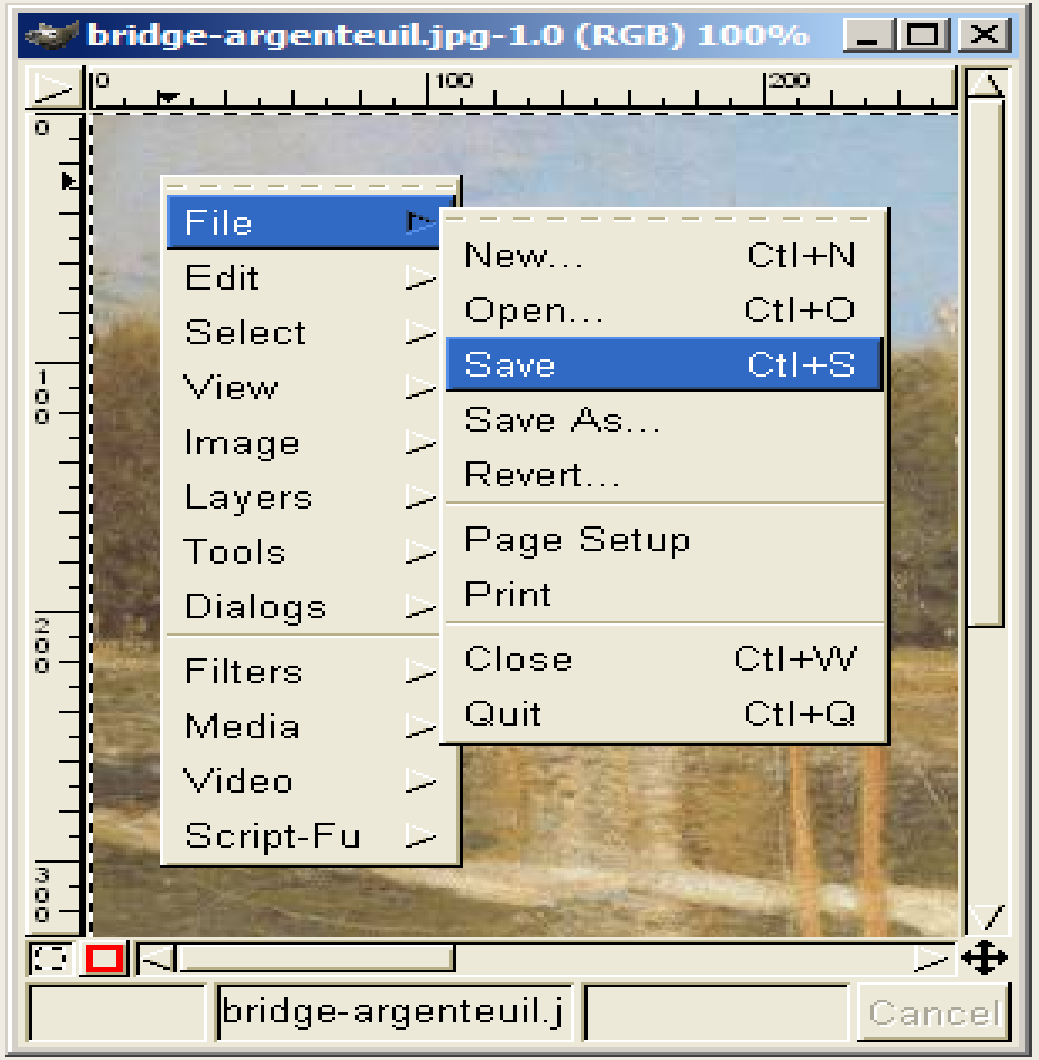
User Interface-2: Hall of Shame

- Program that launches housekeeping tasks at scheduled intervals.
- The date and time look like editable fields (affordance!).
- To change the time, you have to click on the Set Time button to bring up a dialog box.

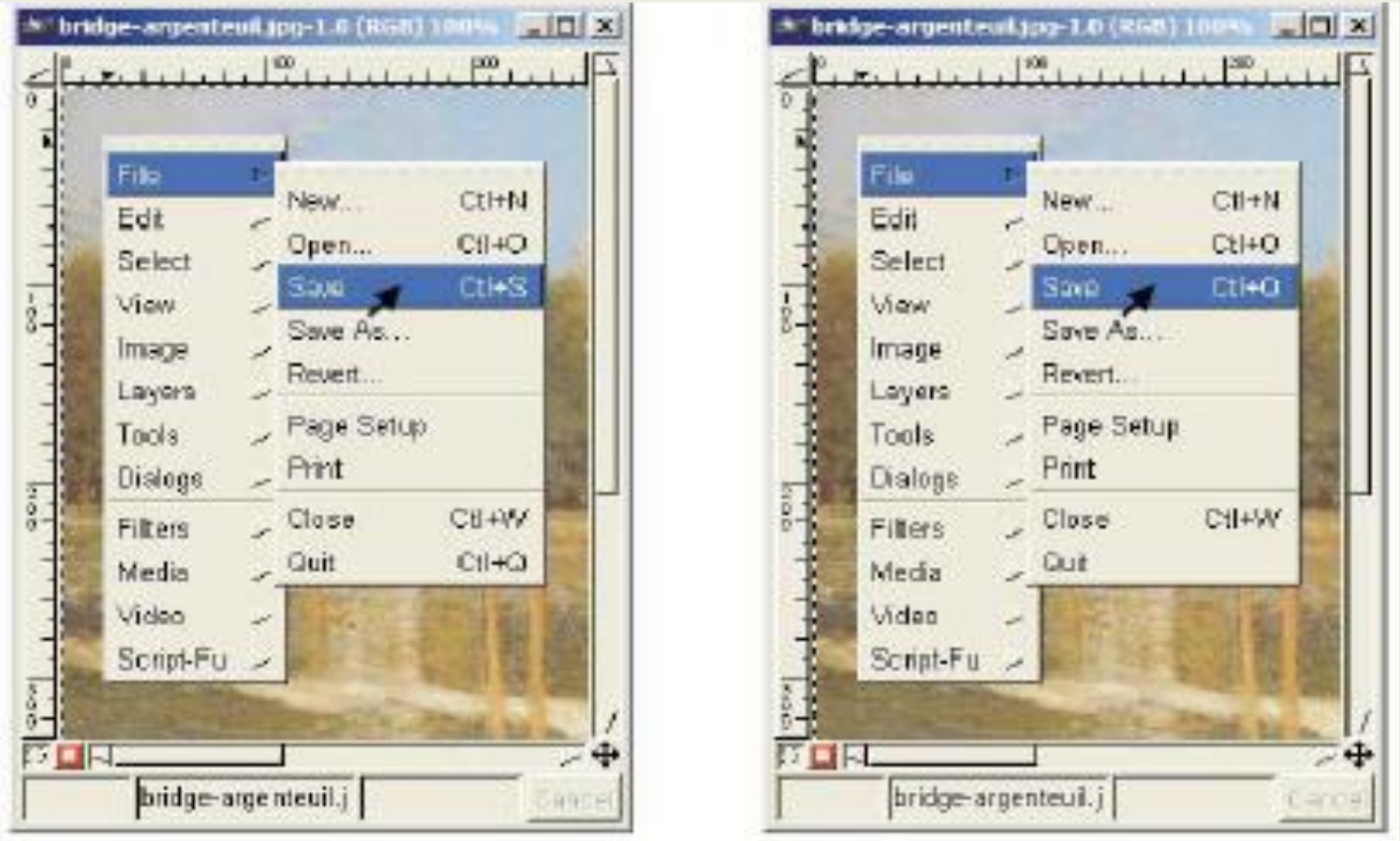


User Interface-3: Hall of Fame or Shame

- Gimp is an open-source image editing program.
- No menu bar.
  - *Menus are accessed from a context menu.*
- *Faster for the Experienced Users. Is it?*

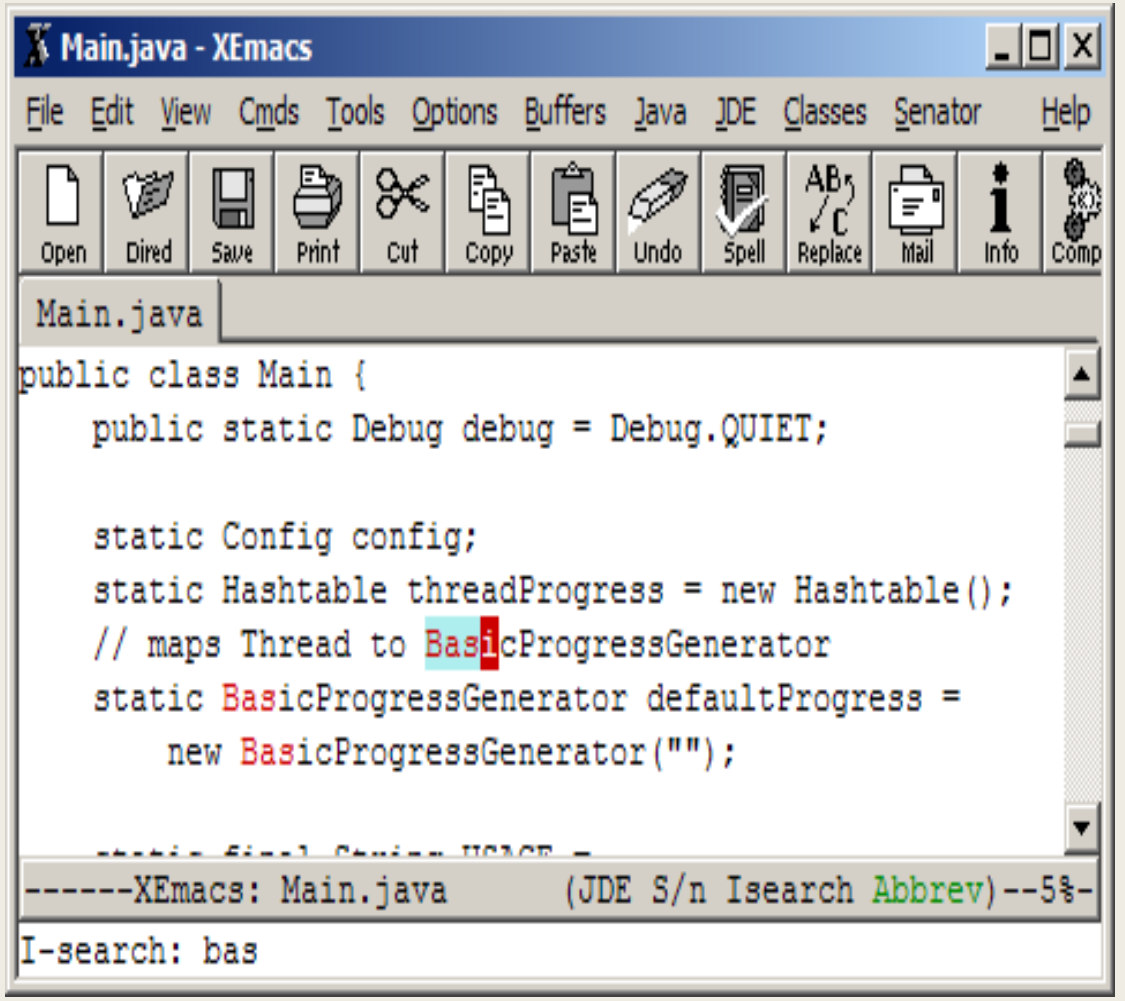


User Interface-3: Another Problem



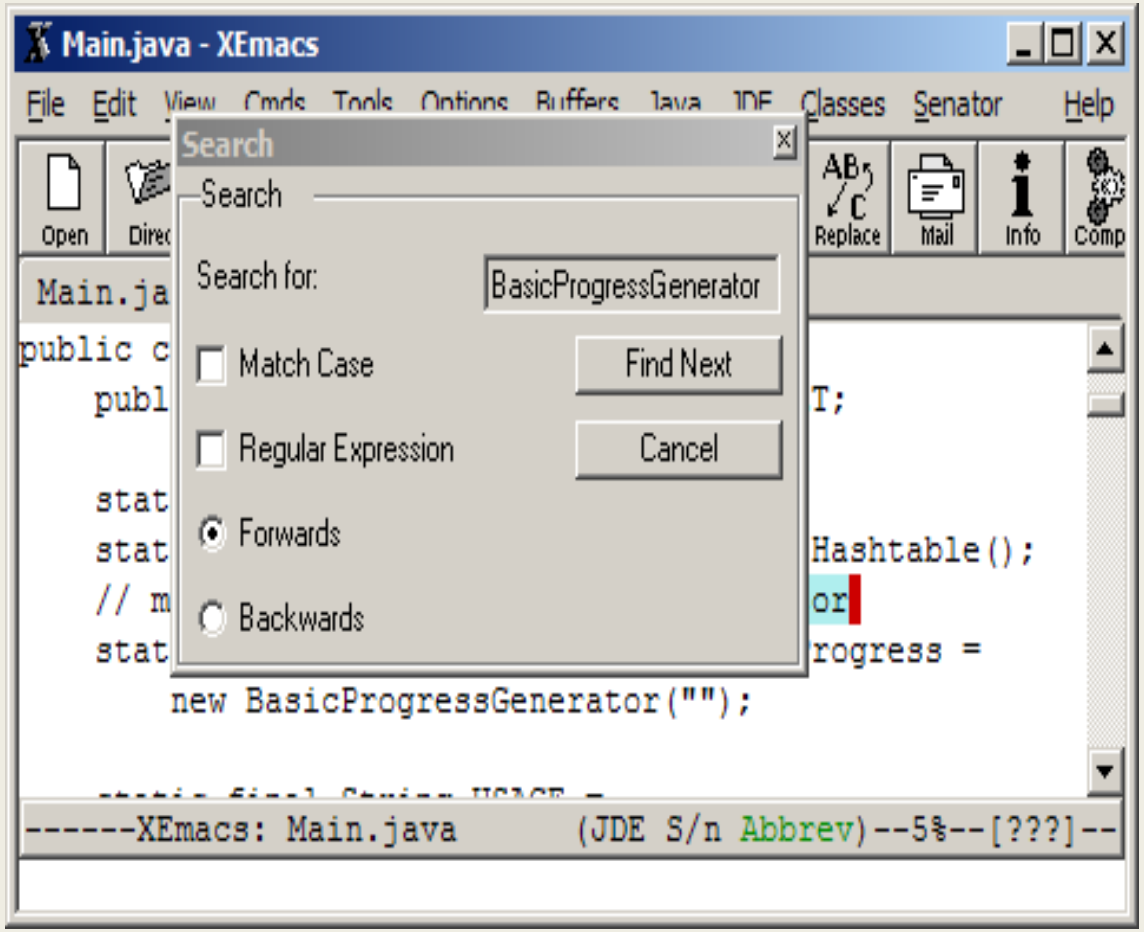
User Interface-4: Hall of Fame or Shame

- In Emacs, Ctrl-S starts an incremental search.
  - *it's highly responsive:*
  - *it's easily and obviously reversible*
  - *successful searches may even achieve early success: only 3 letters*
  - *user gets early feedback about typos and failed searches.*
  - *No problem?*



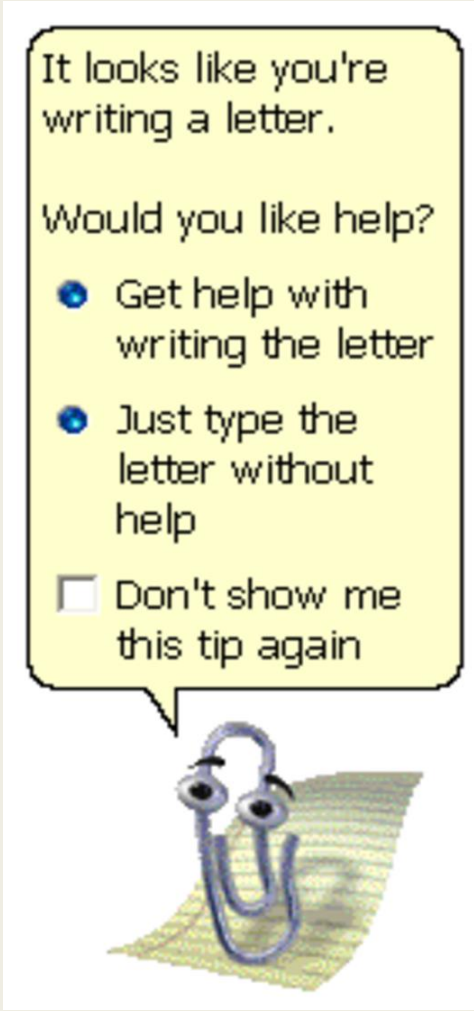
User Interface-4: Hall of Fame or Shame

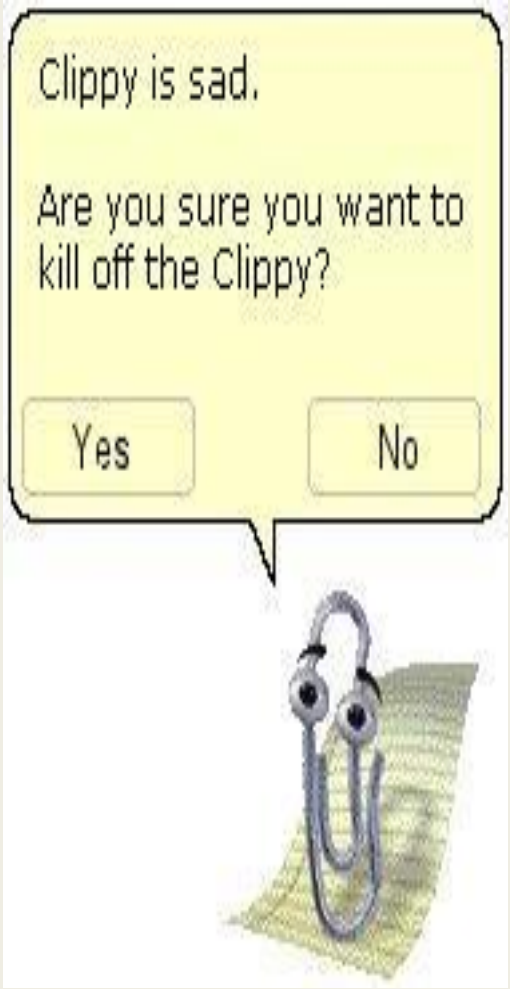
- XEmacs has menus (the original Emacs didn't).
- It has conventional Find dialog,
  - *great on visibility,*
  - *Lacks the responsiveness, easy reversibility, and fast performance of incremental search.*
- *Even worse,*
  - *It covers up the matches.*
  - *You have to manhandle.*



User Interface-5: Hall of Fame or Shame

- Clippy was a well-intentioned effort to solve a real usability problem.
  - *Users don't read the manual,*
  - *don't use the online help*
  - *don't know how to find the answers to their problems.*
- Clippy tries to suggest answers to the problem it thinks you're having.





User interface is important

- User interface strongly affects perception of software.
  - *Usable software sells better.*
  - *Unusable web sites are abandoned.*
- Perception is something Superficial.
  - *Users blame themselves for UI failings.*
  - *People who make buying decisions are not always end-users.*

The cost of getting it wrong

- Users' time isn't getting cheaper.
- Design it correctly now, or pay for it later.
- Disasters happen
  - *Thrac-25 radiation therapy machine*
  - *Aegis radar system in USS Vincennes*
  - *Supertanker accident off England*
  - *Predator UAV accident in Arizona*

User Interfaces are Hard to Design

- You are not the user
  - *Most software engineering is about communicating with other programmers*
  - *UI is about communicating with users*
- The user is always right.
  - *Consistent problems are the system's fault*
- But the user is not always right.
  - *Users aren't designers*

Usability Defined

- Usability: how well users can use the system.
- Dimensions of Usability.
  - *Learnability: is it easy to learn?*
  - *Efficiency: once learned, is it fast to use?*
  - *Visibility: is the state of the system visible?*
  - *Errors: are the errors few and recoverable?*
  - *Satisfaction: is it enjoyable to use?*

Usability Dimensions vary in Importance

- Depend on the User
  - *Novice users need learnability*
  - *Infrequent users need memorability*
  - *Experts need efficiency*
- But no user is uniformly novice or expert.
  - *Domain experience*
  - *Application experience*
  - *Feature experience*

Usability is Only One Attribute of a System

- Software designers have a lot to worry about
  - *Functionality, Usability*
  - *Performance, Size, Cost*
  - *Reliability, Security, Standards*
- Many design decisions involve tradeoffs among different attributes
- Well take an extreme position in this class

Words, Words, Words

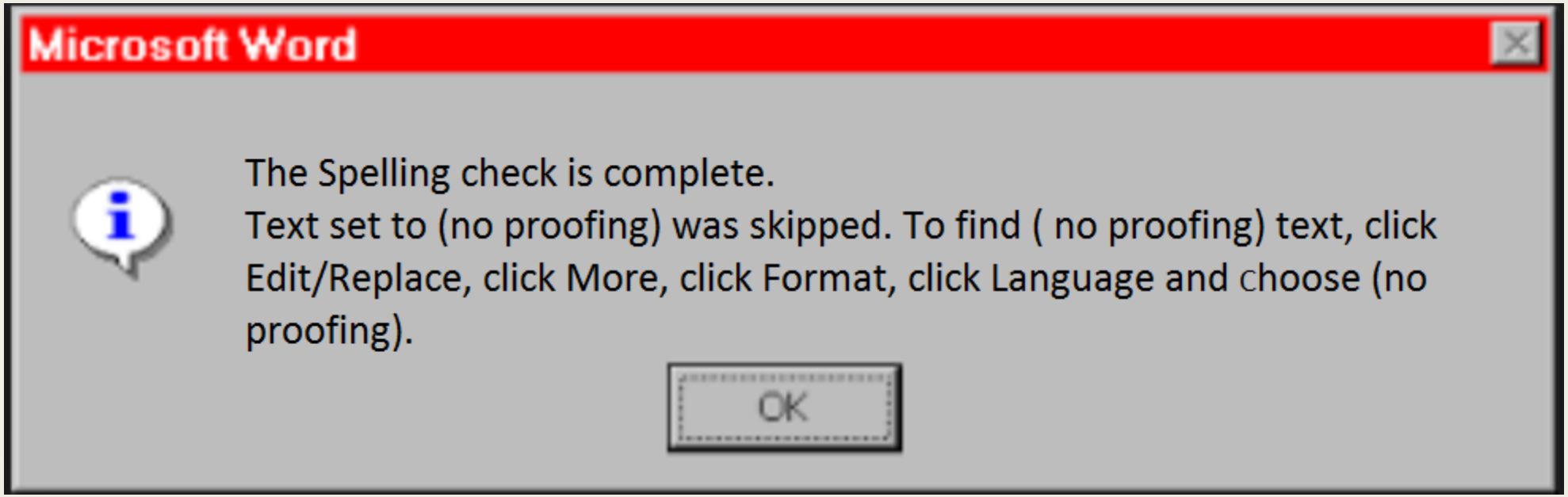
- User Interface (UI)
  - *Usability*
- Human-Computer Interaction (HCI)
  - *Ergonomics*
- User Experience (UX)
  - *Design*

Learnability

Further Discussion

- Human Memory
- Interaction Styles
- User model vs. system model
- Learnability Principles and design patterns

People Don’t Learn instantly



Memory

- Working memory
  - *Small: 7 ± 2 “chunks”*
  - *Short-lived: ~10 sec*
  - *Maintenance rehearsal fends off decay(but costs attention)*
- Long-term memory
  - *Practically infinite in size and duration*
  - *Elaborative rehearsal transfers chunks to long-term memory*

Chunking

- "Chunk" is a unit of memory of perception
  - *Depends both on presentation and on what you already know*

  Hard: M W B C R A L O A B I M B F I

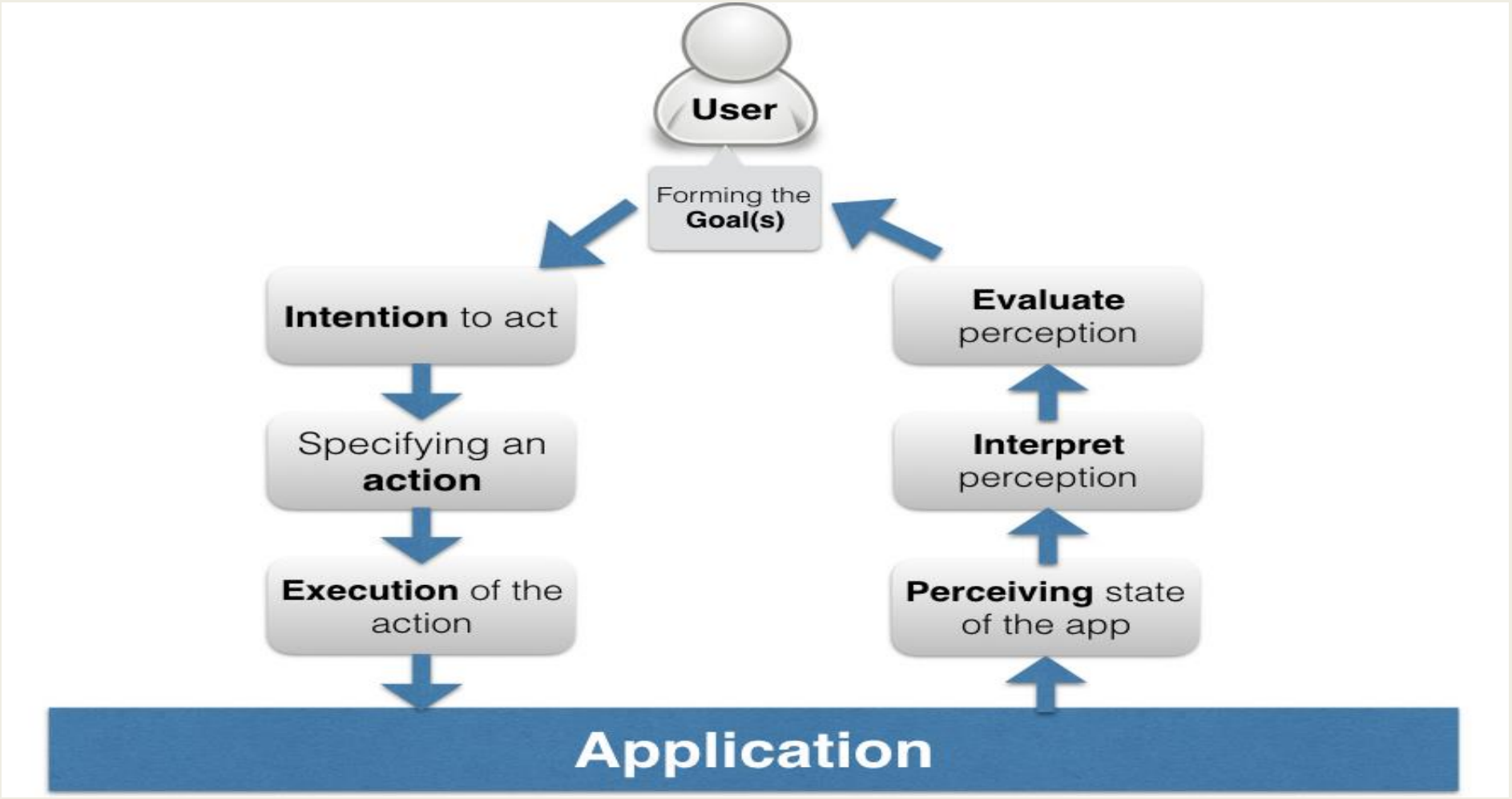
  Easier: MWB CRA LOA BIM BFI

  Easiest: BMW RCA AOL IBM FBI

Recognition vs. Recall

- Recognition: remembering with the help of a visible cue
  - *Aka “Knowledge in the world”*
- Recall: Remembering with no help
  - *Aka “Knowledge in the head”*
- Recognition is much easier
  - *So menus are more learnable than command languages*

Gulf of Execution and Evaluation



Interaction Styles

- Command Language
- Menus and Forms
- Direct manipulation

Command language

- User types in command in an artificial language

ls -1 *.java (*Unix shell)*

Menus and forms

- User is prompted to choose from menus and fill in forms.
  - *Menu bars*
  - *Context menus*
  - *Drop down menus*

Direct Manipulation

- User interacts with visual representation of data objects
  - *Continuous visual representation*
  - *Physical actions or labeled button presses*
  - *Rapid, incremental reversible, immediately visible effects*
  - *E.g. File and Folders on desktop, Scrollbars, drag and drop etc.*