Questions?

- Project #2
- HW#4 due 10/15/07
- Midterm in a week!
GOMS (Card et al.)

- Family of methods
  - KLM, CMN-GOMS, NGOMSL, CPM-GOMS

- Describe the user behavior in term of
  - Goals
    - *Edit manuscript, locate line*
  - Operators
    - *Elementary perceptual, motor or cognitive acts*
  - Methods
    - *Procedure for accomplishing goals*
  - Selection rules
    - *Used if several methods are available for a given goal*
GOMS example I

• Setting

• Analysis

GOAL: EDIT-MANUSCRIPT
  • GOAL: EDIT-UNIT-TASK repeat until no more unit tasks
  • GOAL: ACQUIRE-UNIT-TASK
  • GET-NEXT-PAGE if at end of manuscript page
  • GET-NEXT-TASK
  • GOAL: EXECUTE-UNIT-TASK
  • GOAL: LOCATE-LINE
  • [select: USE-QS-METHOD
  USE-LF-METHOD]
  • GOAL: MODIFY-TEXT
  • [select: USE-S-COMMAND
  USE-M-COMMAND]
  • VERIFY-EDIT.
GOMS example II
(From HCI Models, Theories and Frameworks, J. Carroll)

• Using a text editor edit the following text as shown

The fox jumps over the lazy quick brown dog.

• Goals and sub-goals?
• Operators?
• Methods?
• Selection rules?
* Expansion of MOVE-TEXT goal

GOAL: MOVE-TEXT
  • GOAL: CUT-TEXT
    • GOAL: HIGHLIGHT-TEXT
      • [select**: GOAL: HIGHLIGHT-PHRASE-COMPSED-OF-WORDS
          • MOVE-CURSOR-TO-FIRST-WORD 1.10
          • DOUBLE-CLICK-MOUSE-BUTTON 0.40
          • MOVE-CURSOR-TO-LAST-WORD 1.10
          • SHIFT-CLICK-MOUSE-BUTTON 0.40
          • VERIFY-HIGHLIGHT 1.35
  • GOAL: HIGHLIGHT-ARBITRARY-TEXT
    • MOVE-CURSOR-TO-BEGINNING-OF-TEXT
    • PRESS-MOUSE-BUTTON
    • MOVE-CURSOR-TO-END-OF-TEXT
    • RELEASE-CLICK-MOUSE-BUTTON
    • VERIFY-HIGHLIGHT]

GOAL: ISSUE-CUT-COMMAND
  • MOVE-CURSOR-TO-EDIT-MENU
  • CLICK-MOUSE-BUTTON
  • MOVE-CURSOR-TO-CUT-ITEM
  • VERIFY-HIGHLIGHT
  • CLICK-MOUSE-BUTTON

GOAL: PASTE-TEXT
  • GOAL: POSITION-CURSOR-AT-INSERTION-POINT
    • MOVE-CURSOR-TO-INSERTION-POINT 1.10
    • CLICK-MOUSE-BUTTON 0.20
    • VERIFY-POSITION 1.35

GOAL: ISSUE-PASTE-COMMAND
  • MOVE-CURSOR-TO-EDIT-MENU
  • CLICK-MOUSE-BUTTON
  • MOVE-CURSOR-TO-PASTE-ITEM
  • VERIFY-HIGHLIGHT
  • CLICK-MOUSE-BUTTON

TOTAL TIME PREDICTED (SEC) 16.25
Keystroke Level Model (KLM)

- Describe the task using the following operators:
  - K: pressing a key or a pressing (or releasing) a button
    \[ t_K = 0.08 - 1.2s \]
  - P: pointing
    \[ t_P = 1.1s \text{ (without button press)} \]
  - H: Homing (switching device)
    \[ t_H = 0.4s \]
  - D(n,l): Drawing segmented lines
    \[ t_D = 0.9*n + .16*l \text{ s} \]
  - M: Mentally prepare
    \[ t_M = 1.35s \]
  - R(t): system response time
    \[ t_R = t \]
How to use KML

• Encode using all physical operator (K, P, H, D(n,l), R(t))
• Apply KML rules [0-4]
• Transform R followed by an M
  – If $t \leq t_M$: $R(t) \rightarrow R(\emptyset)$
  – If $t_M < t$: $R(t) \rightarrow R(t - t_M)$
• Compute the total time by simply adding all times
  – Will describe expert user behavior
KLM heuristic rules (Raskin’s)

0: Insert M
  • In front of all K
  • In front of all P’s selecting a command
1: Remove M between fully anticipated operators
  • PMK → PK
2: if a string of MKs belong to cognitive unit delete all M but first
  • 4564.23: MKMKMKMKMKMKMK → MKKKKKKK
3: if K is a redundant terminator then delete M in front of it
  • ↓↑: MKMK → MKK
4a: if K terminate a constant string (command name) delete the M in front of it
  • cd↓↓: MKKMK → MKKK
4b: if K terminate a variable string (parameter) keep the M in front of it
  • cd class↓↓: MKKKMKKKKKKKMK → MKKKMKKKKKKKMK
Converting temperature: design 1
(“Humane Interface”, Raskin)

• Convert 92.5F to Celsius

Assume the focus is on the dialog box, so typing on the keyboard will enter
text in the text field directly

MKKKKMK (3.7s)

Average: 5.4s

HMPKHMKKKKMK (7.15s)
Converting temperature: design 3
(“Humane Interface”, Raskin)

• Simple text interface with the following prompt:

“To convert temperatures, type the numeric temperature, followed by C if it is in degrees Celsius or F if it is in degrees Fahrenheit. The converted temperature will be displayed”

MKKKKMK (3.7s)

Average: 3.7s
Converting temperature: design 4

("Humane Interface", Raskin)

Temperature Converter

Type in the temperature to be converted. The converted temperature will appear on the right as you type.

MKKKK (2.15s)

Average: 2.15s
Pros and Cons

“To convert temperatures, type the numeric temperature, followed by C if it is in degrees Celsius or F it is in degrees Fahrenheit. The converted temperature will be displayed”
Converting temperature: design 2
(“Humane Interface”, Raskin)

HMPKPK (4.35s)

HMPKSKMPKSKMPKSKMPKPK (21.9s)

Average: 13.1s
GOMS: Application and limitations

• Applications
  – Telephone operator (CPM-GOMS)
  – CAD system (NGOMSL)
  – Text editing with the mouse (KLM)

• Limitations
  – Skilled users
  – Do not deal with error
  – Do not deal with skill acquisition
  – Do not deal with high level issues
  • Functionality
  • Workload
  • Fatigue