HCI: GOMES

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Goals, Operations, Methods, and Selection rules – GOMS

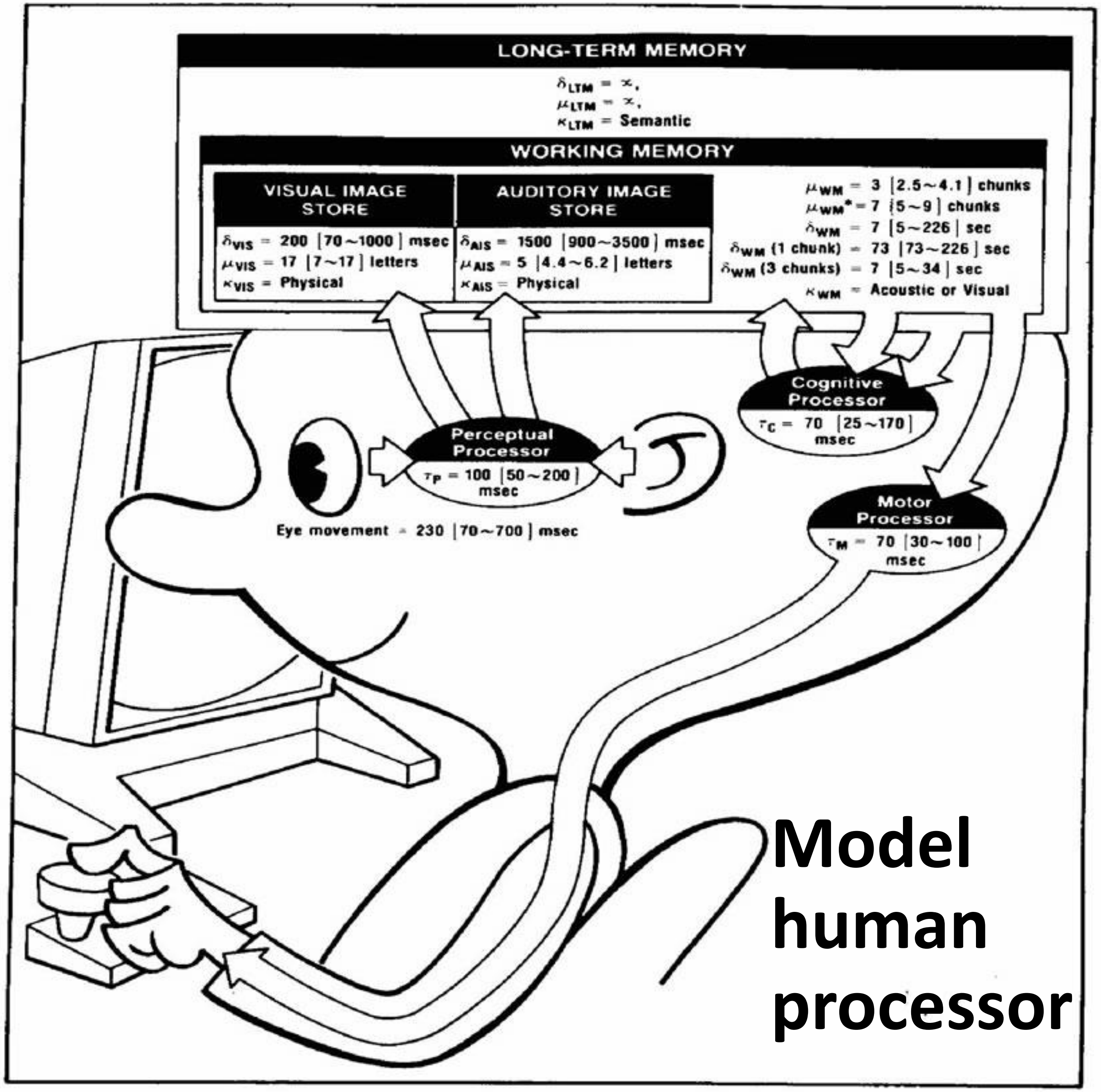
Time-on-task

- How long does it take a user to complete a task or subtask?
- One of the most common measurements of usability
- Basic setup:
  - Give the user a task
  - Start timing them
  - If you have screen capture software you can time their subtasks too
  - When they say “done” stop timing them
- Measure how long the task takes on your software compared to other similar software

Time-on-task

- Pros
  - Easy to understand and easy to measure
  - No fancy HCI stuff needed, web logs will sometimes work if they have the right data
  - Basic statistics like t-tests are well suited for this type of data, so easy to do data analysis
- Cons
  - You must measure a large number of people
  - How many people depends on their variance and how precise of data you need
  - This is NOT a discount usability method
  - Very hard to measure how fast a person will be once they get used to using the system

Idea: Physically, humans are similar to each other. Could we use that?


LONG-TERM MEMORY
$\delta_{LTM} = \infty$,
$\mu_{LTM} = \infty$,
κ_{LTM} = Semantic
WORKING MEMORY
VISUAL IMAGE STORE
$\delta_{VIS} = 200\ [70 \sim 1000]$ msec
$\mu_{VIS} = 17\ [7 \sim 17]$ letters
κ_{VIS} = Physical
AUDITORY IMAGE STORE
$\delta_{AIS} = 1500\ [900 \sim 3500]$ msec
$\mu_{AIS} = 5\ [4.4 \sim 6.2]$ letters
κ_{AIS} = Physical
$\mu_{WM} = 3\ [2.5 \sim 4.1]$ chunks
$\mu_{WM}* = 7\ [5 \sim 9]$ chunks
$\delta_{WM} = 7\ [5 \sim 226]$ sec
δ_{WM} (1 chunk) $= 73\ [73 \sim 226]$ sec
δ_{WM} (3 chunks) $= 7\ [5 \sim 34]$ sec
κ_{WM} = Acoustic or Visual
Cognitive Processor
$\tau_C = 70\ [25 \sim 170]$ msec
Perceptual Processor
$\tau_P = 100\ [50 \sim 200]$ msec
Eye movement = $230\ [70 \sim 700]$ msec
Motor Processor
$\tau_M = 70\ [30 \sim 100]$ msec

Model human processor

GOMS is a method of predicting the time-on-task for an expert user without needing to measure any people

Goals, Operations, Methods, and Selection rules (GOMS)

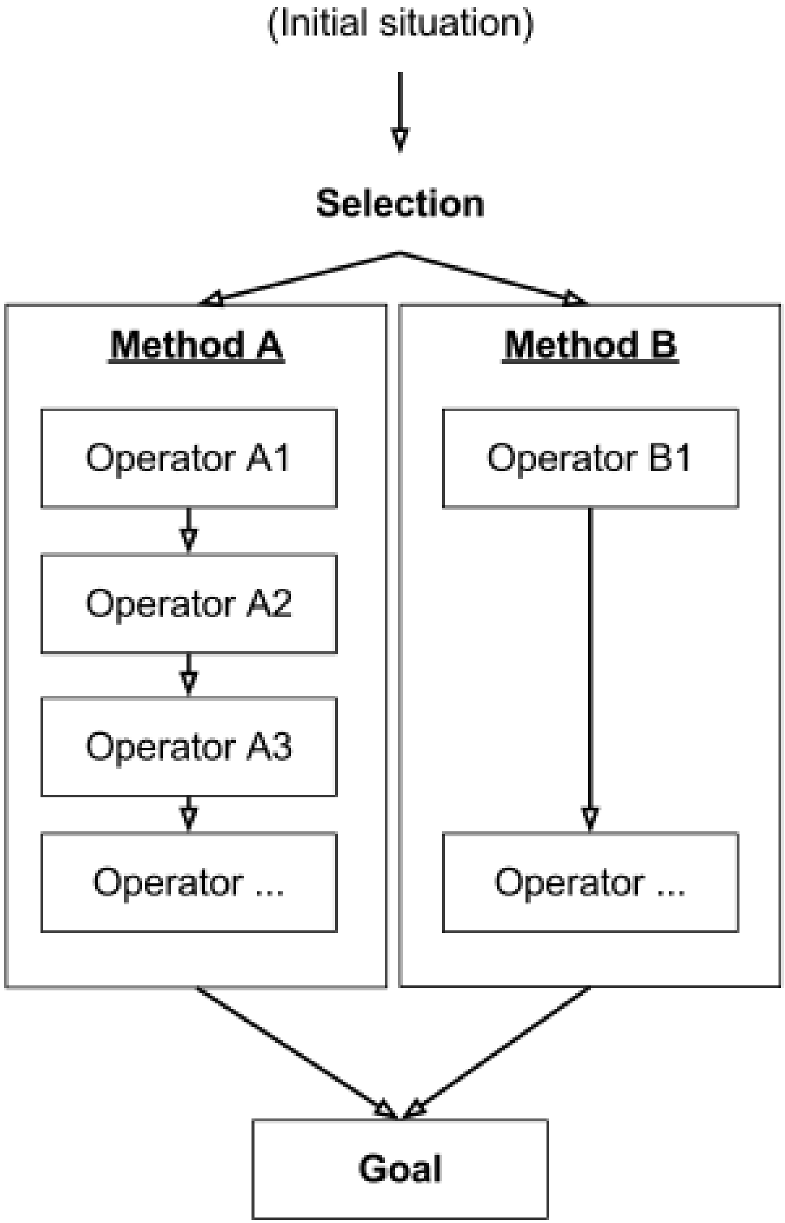
- Model the physical reaction times of a human to predict how an expert would use the system
- Pros
  - No need for any experiments
  - Shockingly accurate
  - Can avoid costly mistakes for UIs that will be used regularly (think telephone operators)
- Cons
  - Only predicts how fast expert users will be, not novices
  - Can't identify any standard usability problems
  - Assumes that users are complete experts, always knowing where to go and what to click on or type

Selection

Method

Operator

Goal



(Initial situation)

Selection

Method A

Operator A1

Operator A2

Operator A3

Operator ...

Method B

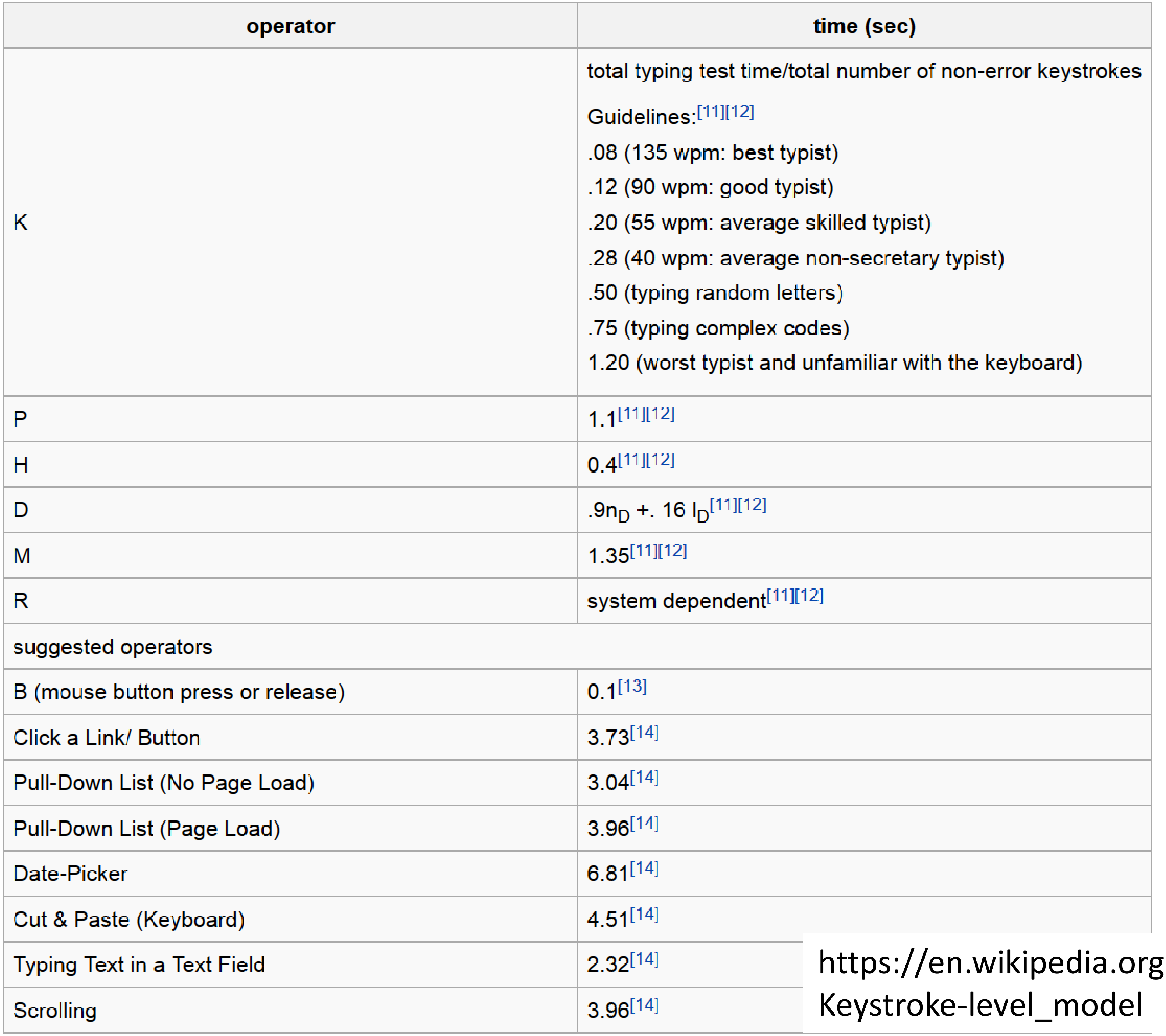
Operator B1

Operator ...

Goal

Keystroke-Level Model

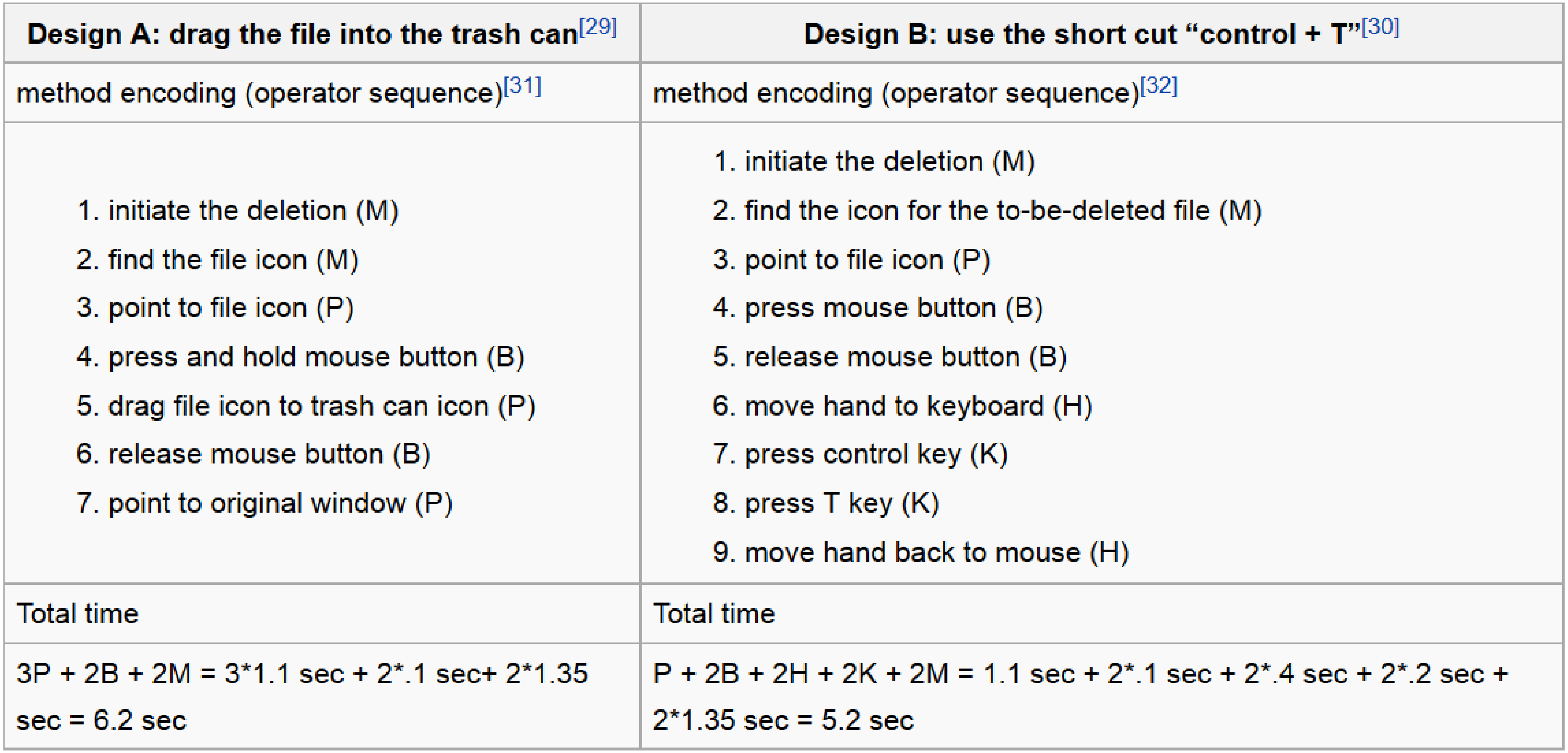
- **K** keystroking/ keypressing
- **P** pointing with a mouse to a target
- **H** homing the hand on the keyboard or mouse
- **D** drawing a line segment on a grid
- **M** mentally preparing for executing physical actions
- **R** response time of the system



operator	time (sec)
K	total typing test time/total number of non-error keystrokes Guidelines:[11][12] .08 (135 wpm: best typist) .12 (90 wpm: good typist) .20 (55 wpm: average skilled typist) .28 (40 wpm: average non-secretary typist) .50 (typing random letters) .75 (typing complex codes) 1.20 (worst typist and unfamiliar with the keyboard)
P	1.1[11][12]
H	0.4[11][12]
D	.9n_D +. 16 l_D[11][12]
M	1.35[11][12]
R	system dependent[11][12]
suggested operators	
B (mouse button press or release)	0.1[13]
Click a Link/ Button	3.73[14]
Pull-Down List (No Page Load)	3.04[14]
Pull-Down List (Page Load)	3.96[14]
Date-Picker	6.81[14]
Cut & Paste (Keyboard)	4.51[14]
Typing Text in a Text Field	2.32[14]
Scrolling	3.96[14]

https://en.wikipedia.org/wiki/Keystroke-level_model

Compare two designs



Design A: drag the file into the trash can[29]	Design B: use the short cut "control + T"[30]
method encoding (operator sequence)[31]	method encoding (operator sequence)[32]
1. initiate the deletion (M) 2. find the file icon (M) 3. point to file icon (P) 4. press and hold mouse button (B) 5. drag file icon to trash can icon (P) 6. release mouse button (B) 7. point to original window (P)	1. initiate the deletion (M) 2. find the icon for the to-be-deleted file (M) 3. point to file icon (P) 4. press mouse button (B) 5. release mouse button (B) 6. move hand to keyboard (H) 7. press control key (K) 8. press T key (K) 9. move hand back to mouse (H)
Total time	Total time
3P + 2B + 2M = 3*1.1 sec + 2*.1 sec+ 2*1.35 sec = 6.2 sec	P + 2B + 2H + 2K + 2M = 1.1 sec + 2*.1 sec + 2*.4 sec + 2*.2 sec + 2*1.35 sec = 5.2 sec

https://en.wikipedia.org/wiki/Keystroke-level_model

Questions?

Write something here