The Human

John C. Hart

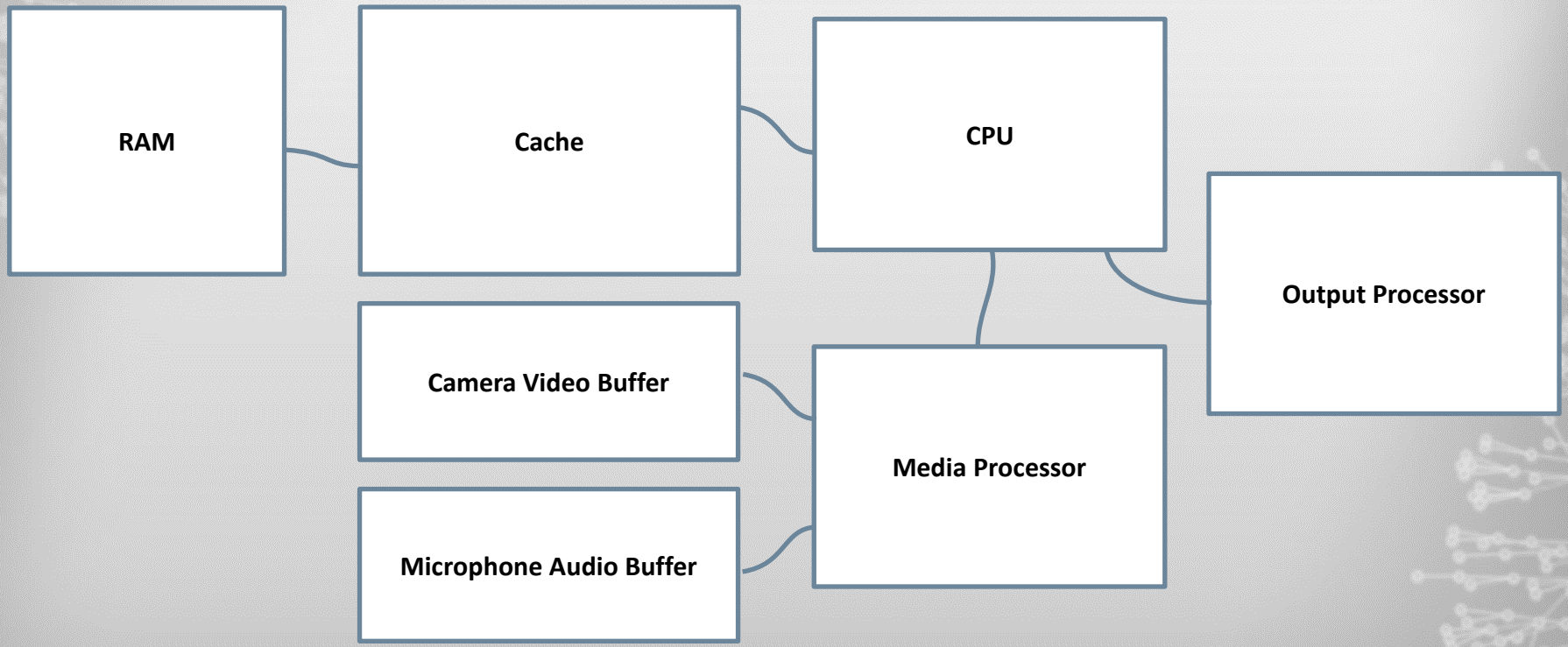
Department of Computer Science

University of Illinois at Urbana-Champaign

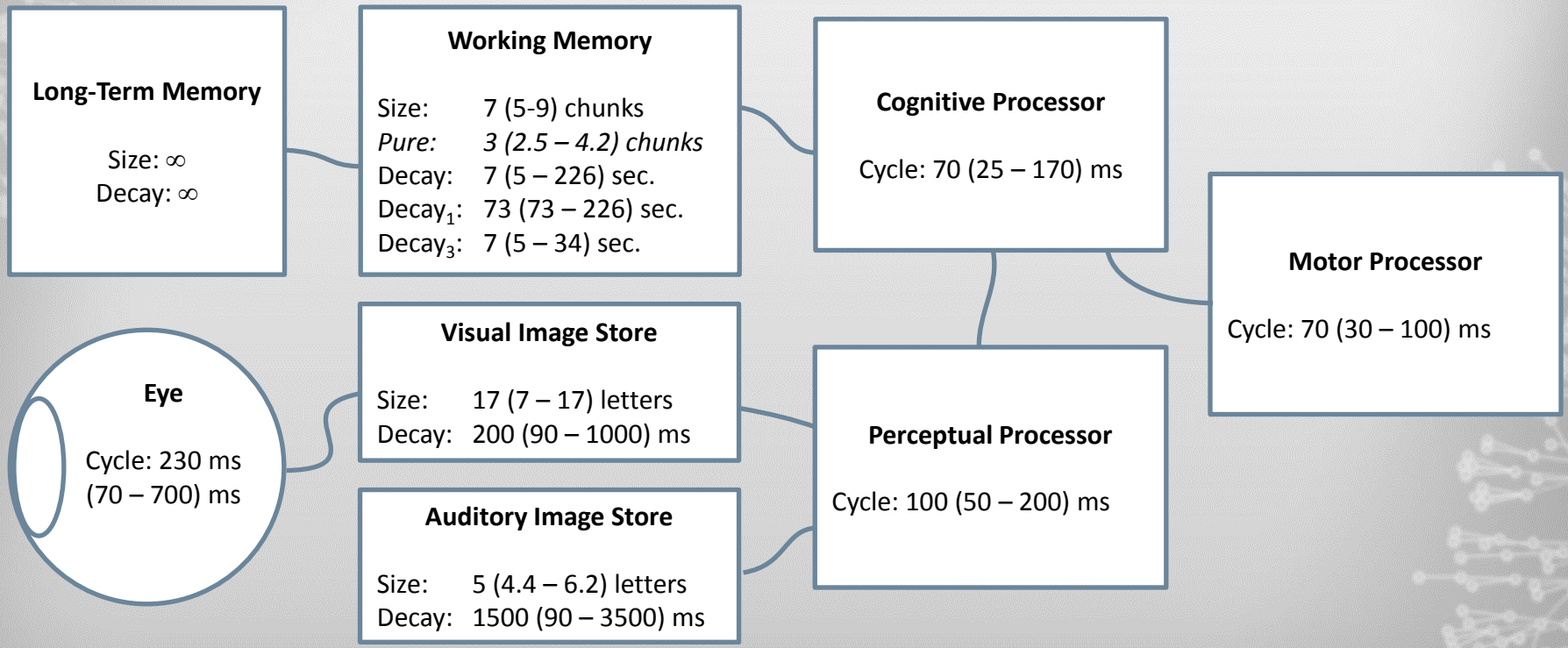
What Will We Learn?

- I understand computers, but how does a *human* work?
- How can I use this to create a more effective computer interface for the human?

Cellphone Processor

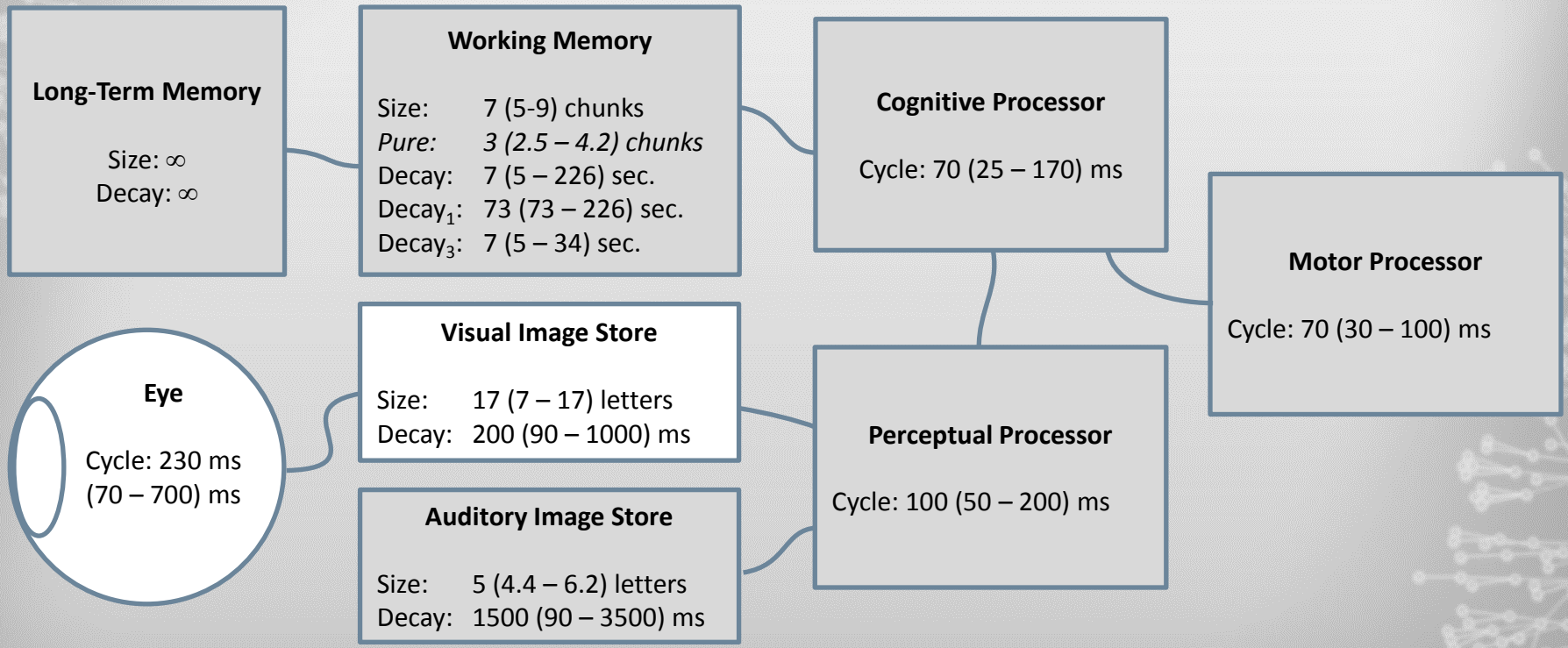


The Model Human Processor



Card, Stuart K. "The model human processor: A model for making engineering calculations of human performance." In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 25(1),1981. pp. 301-305

Visual Processing



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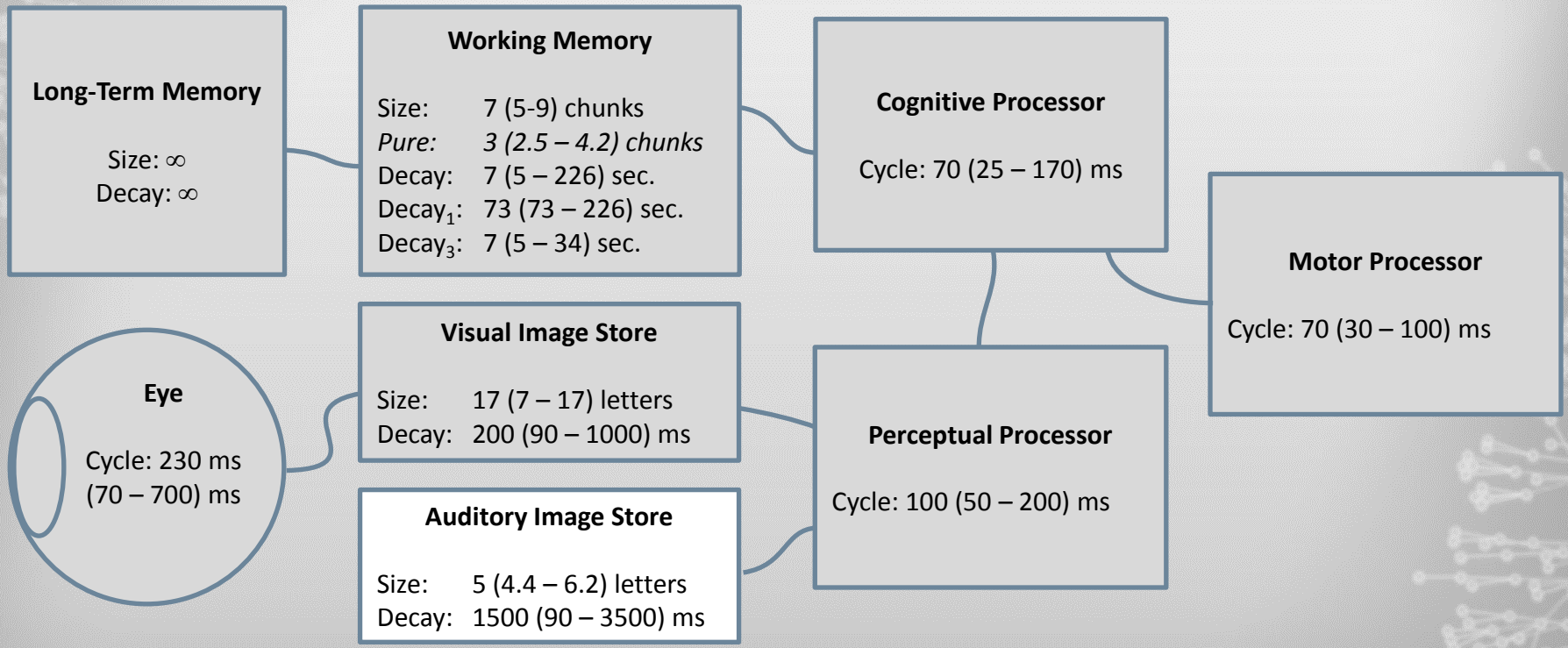
Reading

- *Saccades* - eye scans forward
- *Fixations* - eye is still
  - Perception happens
  - 94% of the time
- We do not perceive saccades
- 9pt,12pt equally legible
- We still read books faster than computers

Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

Audio Processing



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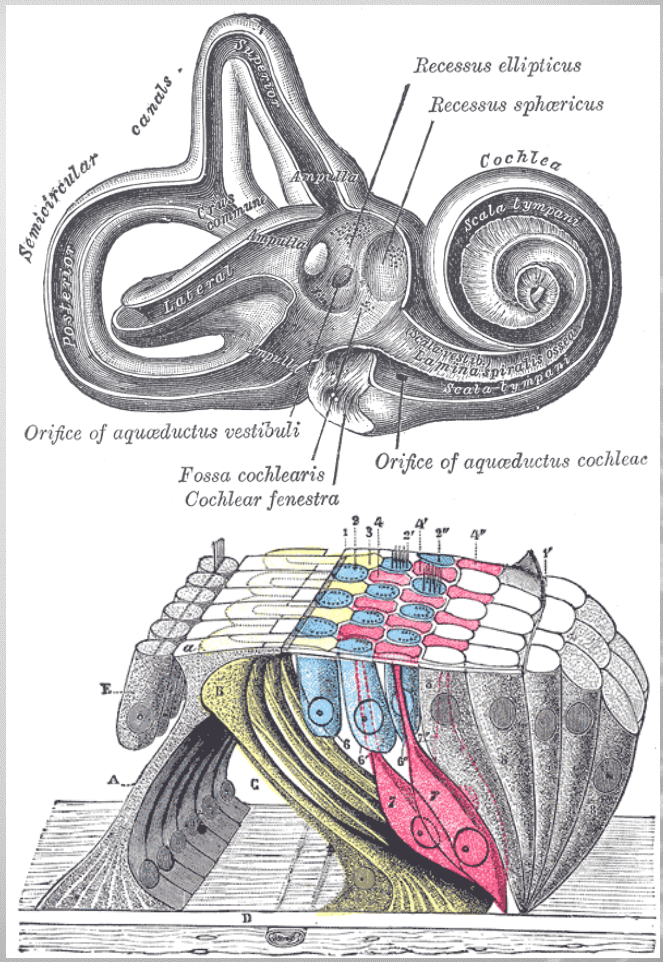
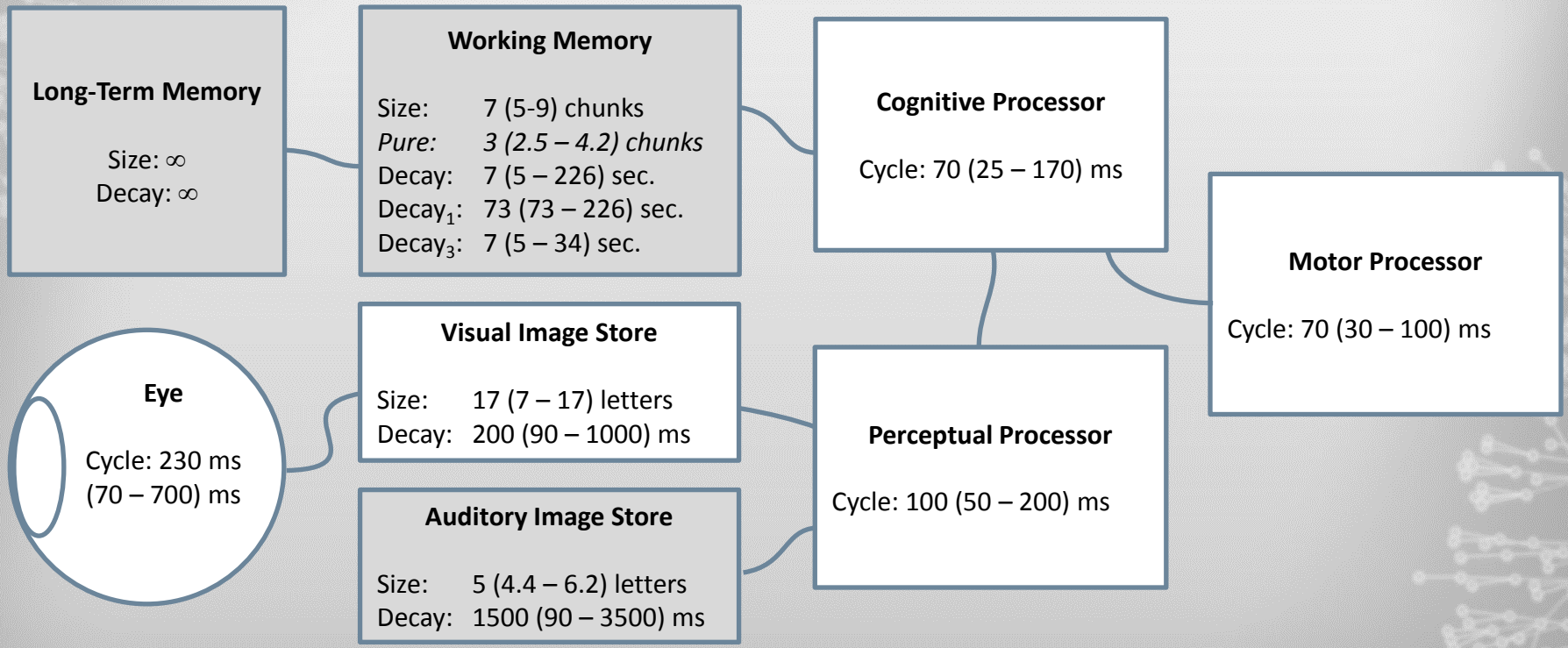
Hearing

- Auditory canal -> eardrum -> ossicles -> cochlea -> cilia
- Sound parameters
  - Pitch - frequency
  - Loudness - amplitude
  - Timbre - waveform of sound
- Stereo location of source
- Cocktail party effect (ability to focus on a particular conversation)



Hand-Eye Coordination



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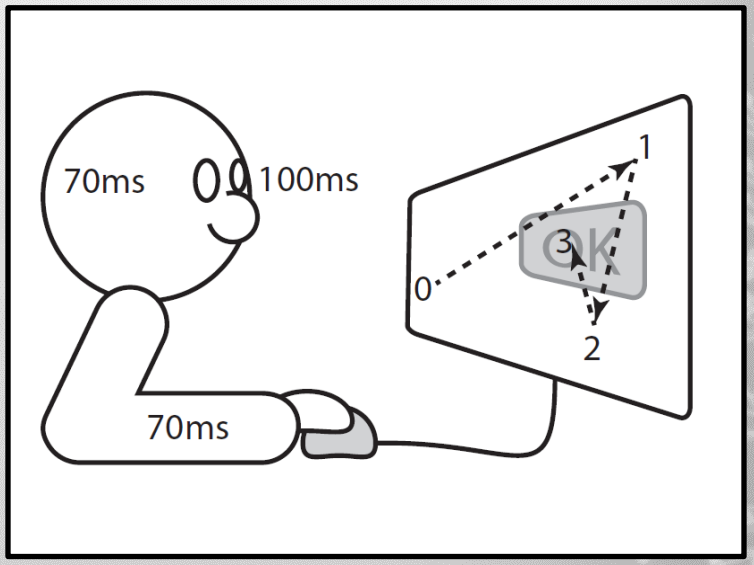
Fitt's Law

- Kinesthesis: We know where our limbs are
- Larger movements are faster but less accurate than smaller ones

$$T \approx 600 \text{ ms} + 240 \text{ ms} \lg(1+D/S)$$



- D = distance to target
- S = size of target
- 240 ms = 70 ms to move your hand +
  100 ms to see the result +
  70 ms to decide how to correct it

What Did We Learn?

- The Model Human Processor models the human in computational terms
- We read in chunks even though we don't perceive it that way
- We similarly process audio, but less effectively
- We can use these models to estimate how long a task takes, and improve performance