Questions?

• Project #1 presentation this Thursday!
• Homework #4 is out, due next Thursday
Human Information Processor
(Card, Moran, Newell)

<table>
<thead>
<tr>
<th>VISUAL IMAGE STORE</th>
<th>AUDITORY IMAGE STORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>( h_{\text{VIS}} = 200 )</td>
<td>( h_{\text{AIS}} = 1500 )</td>
</tr>
<tr>
<td>( n_{\text{VIS}} = 12 )</td>
<td>( n_{\text{AIS}} = 5 )</td>
</tr>
<tr>
<td>Physical</td>
<td>Physical</td>
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</tbody>
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WORKING MEMORY

- **Perceptual Processor**
  - \( t_p = 100 \) [50 – 200] msec
  - Eye movement = 230 [70 – 700] msec

- **Cognitive Processor**
  - \( t_C = 70 \) [25 – 170] msec

- **Motor Processor**
  - \( t_M = 70 \) [30 – 100] msec

LONG-TERM MEMORY

- \( n_{\text{LTM}} = \pi \)
- \( m_{\text{LTM}} = \pi \)
- \( h_{\text{LTM}} = \text{Semantic} \)
Put it together: Fitts’ law (tapping task)
Put it together: Are A and B letters?
Hick’s law

- Cost of taking a decision
Scope and Caveats

• Only a model

• Focus on low level phenomenon
  – Can be dwarfed by other considerations
    • Learning,
    • Compatibility

• Questions?
Learning
(“Learning and memory” Anderson)

• Power law of learning

Problem solving

Manual skill

Writing books
Stages of skill acquisition
(“Learning and memory” Anderson)

Example: Using a manual transmission

• Cognitive
  – Verbal representation of knowledge
Problem solving

• Hobbits and Orcs crossing a river
  – What is the difficult step?

• Problem solving Framework
  – States
  – Goals
  – Operators
    • Difference reduction
    • Sub-goaling
  – Search
Stages of skill acquisition
(“Learning and memory” Anderson)

Example: Using a manual transmission

- **Cognitive**
  - Verbal representation of knowledge

- **Associative**
  - Proceduralization
    - *From rehearsal to recognition*

- **Autonomous**
  - More and more automated
  - Faster and faster
  - No cognitive involvement
    - *Difficult to describe what to do*
  - The importance of motor program
Implications: confirmation steps

• Pros and Cons?

• See also “The humane interface” Raskin, p23