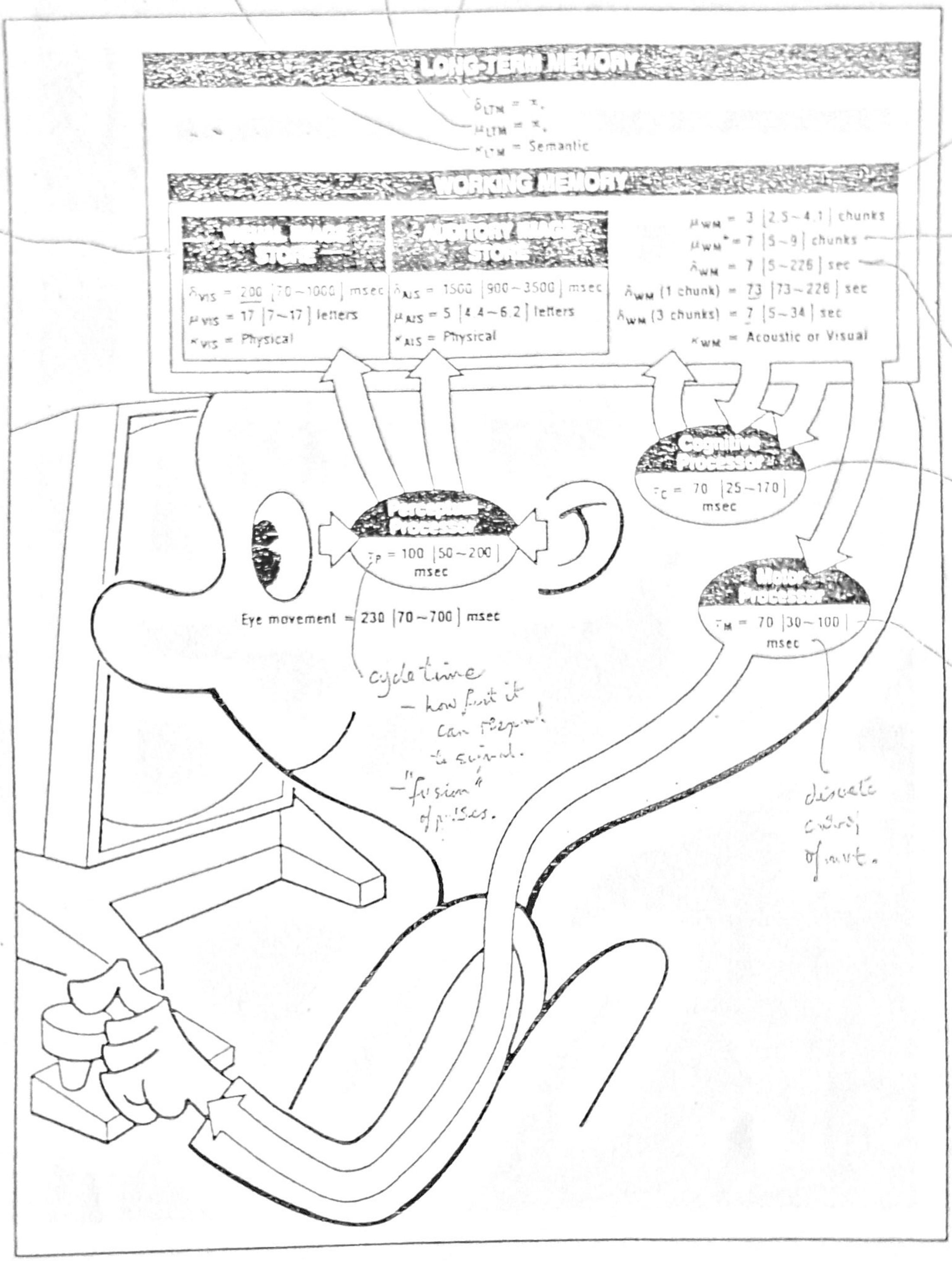


Figure 2.1. The Model Human Processor—memories and processors.

Sensory information flows into Working Memory through the Perceptual Processor. Working Memory consists of activated chunks in Long-Term Memory. The basic principle of operation of the Model Human Processor is the *Recognize-Act Cycle of the Cognitive Processor* (P0 in Figure 2.2). The Motor Processor is set in motion through activation of chunks in Working Memory.

δ = delta
κ = kappa
μ = mu

P0. *Recognize-Act Cycle of the Cognitive Processor.* On each cycle of the Cognitive Processor, the contents of Working Memory initiate actions associatively linked to them in Long-Term Memory; these actions in turn modify the contents of Working Memory.

P1. *Variable Perceptual Processor Rate Principle.* The Perceptual Processor cycle time τ_P varies inversely with stimulus intensity. i.e. shorter for more intense stimulation.

produce

P2. *Encoding Specificity Principle.* Specific encoding operations performed on what is perceived determine what is stored, and what is stored determines what retrieval cues are effective in providing access to what is stored.

P3. *Discrimination Principle.* The difficulty of memory retrieval is determined by the candidates that exist in the memory, relative to the retrieval clues. confusion

P4. *Variable Cognitive Processor Rate Principle.* The Cognitive Processor cycle time τ_C is shorter when greater effort is induced by increased task demands or information loads; it also diminishes with practice.

P5. *Fitts's Law.* The time T_{pos} to move the hand to a target of size S which lies a distance D away is given by:

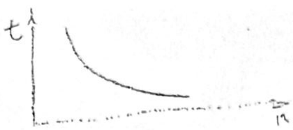
$$T_{pos} = I_M \log_2 (D/S + .5)\,, \qquad (2.3)$$

impact of size of $\frac{D}{S}$?

where I_M = 100 [70~120] msec/bit. : ~ amount of info — reduction of uncertainty.

P6. *Power Law of Practice.* The time T_n to perform a task on the nth trial follows a power law:

$$T_n = T_1 n^{-\alpha}\,, \qquad \frac{T_1}{n^{\alpha}} \qquad (2.4)$$



where α = .4 [.2~.6] .

P7. *Uncertainty Principle.* Decision time T increases with uncertainty about the judgement or decision to be made: (Choice Reaction)

$$T = I_C H\,,$$

where H is the information-theoretic entropy of the decision and I_C = 150 [0~157] msec/bit. For n equally probable alternatives (called Hick's Law),

$$H = \log_2 (n + 1)\,. \qquad (2.8)$$

For n alternatives with different probabilities, p_i, of occurence,

$$H = \Sigma_i p_i \log_2 (1/p_i + 1)\,. \qquad (2.9)$$

P8. *Rationality Principle.* A person acts so as to attain his goals through rational action, given the structure of the task and his inputs of information and bounded by limitations on his knowledge and processing ability: ~ best action given knowledge.

Goals + Task + Operators + Inputs
+ Knowledge + Process-limits → Behavior — can influence

P9. *Problem Space Principle.* The rational activity in which people engage to solve a problem can be described in terms of (1) a set of states of knowledge, (2) operators for changing one state into another, (3) constraints on applying operators, and (4) control knowledge for deciding which operator to apply next.

Figure 2.2. The Model Human Processor—principles of operation.