



# ATTN:MIND

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# Metaphors for Attention

- Spotlight (Posner, 1980)
- Quantum spotlight (Sperling, 1995)
- Zoom lens (Eriksen, 1986)
- Gradient (LaBerge, 1989)

# Function

- Orienting
- Detecting
- Alerting
- Disengage, shift, engage
  - Posterior parietal lobe
  - Superior colliculus
  - Thalamus



# What is it, really?

- Interconnected systems of the brain have co-evolved into one massive network with such complicated internal relationships that it is often hard to tell where one mechanism stops and another starts
- Top-down and bottom-up control mechanisms

# Anatomy

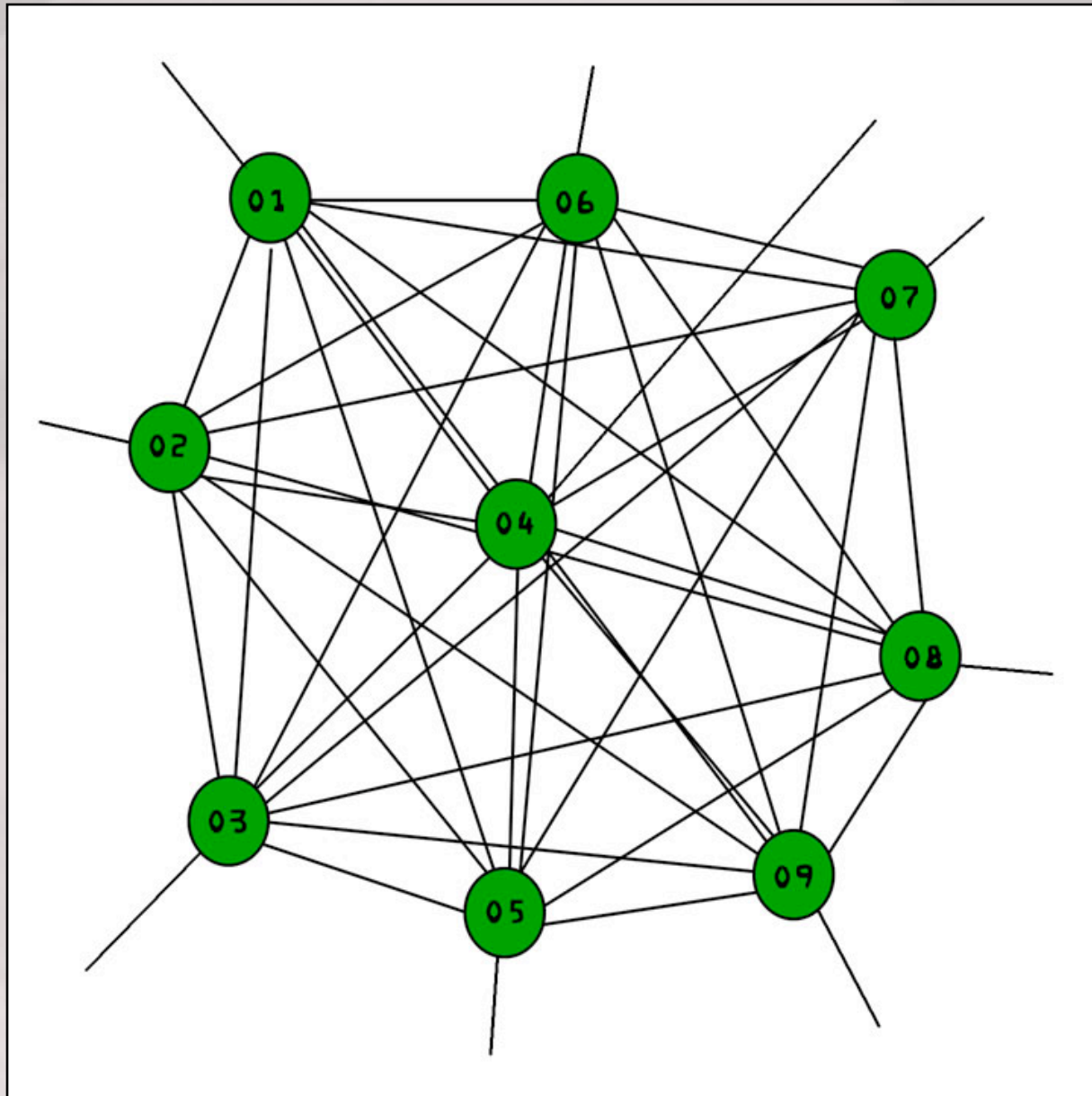
- **Prefrontal cortex** controls task specific memory and top down reset
- **Posterior parietal cortex** guides spatial memory.
- **Anterior cingulated cortex** is the connection between the PFC, the PPC, and the amygdale.
- **Frontal eye fields** are involved in motor planning for saccades in visual attention.
- **Basal ganglia** function is in biasing the attentional system towards stimuli with high appetitive value.
- **Superior colliculus** is responsible for saccade targeting in the visual processing stream
- **Pulvinar nuclei** provide attention indexing support.
- **Locus coeruleus** is responsible for norepinephrine (NE) release and alerting.

# Reflexive vs. Voluntary Attention

- Reflexive attention occurs when attention to a stimulus is automatic.
- Voluntary attention involves the top-down direction of sensory receptors towards important stimuli.
- Reflexive attention is engaged more rapidly and is more resistant to interference than voluntary attention.
- Reflexive attention involves a quick raising of awareness to a specific location followed by an inhibition of return.
- More cortical structures are involved in voluntary attention and subcortical structures are devoted to reflexive attention

# Objects of attention

- Objects of attention are enhanced through biased competition.
- Attention serves to enhance neurons representing stimuli at a single relevant location in the visual field and suppress irrelevant ones by allowing objects to compete for the response of cells in the cortex.
- An organism's behavior is influenced by top-down mechanisms sensitive to behavioral relevance and bottom-up mechanisms sensitive to novelty and contrast



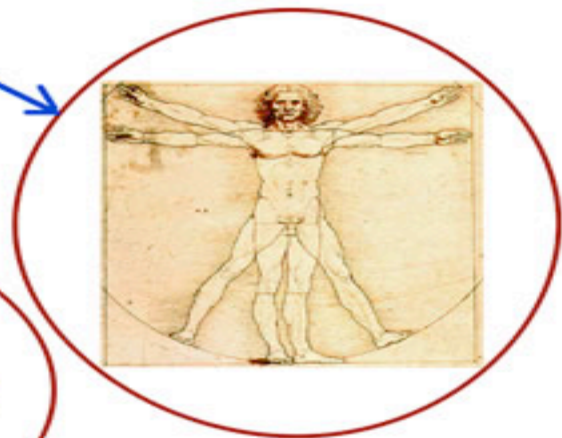
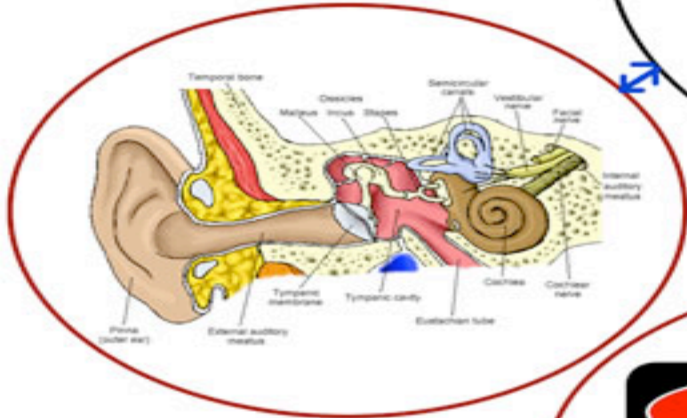
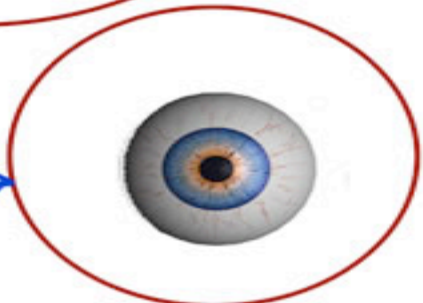
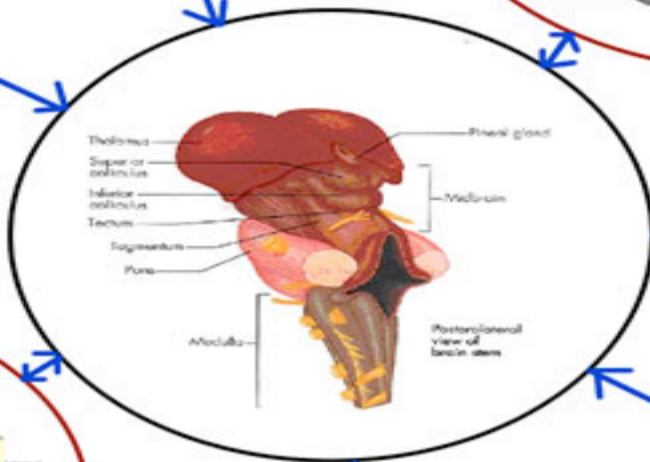
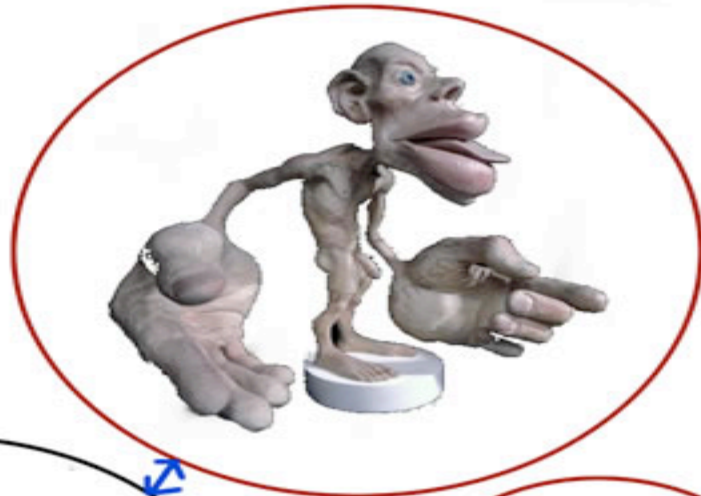
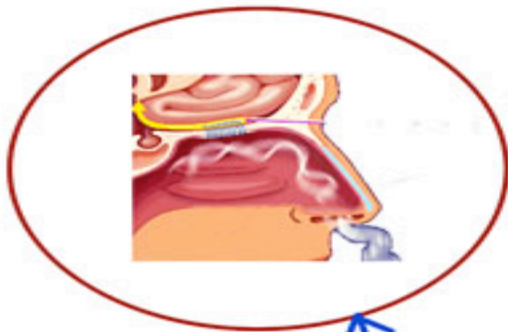


# Central Nexus of Attention (Lucas)

- Competitive appetitive activation networks
- Comparison of inputs
- Look-ahead and imagination
- Reentrant connections

# The Thalamus

- The thalamus is the routing hub of the brain with direct sensory signals coming in and out.
- Motor functions, drive information, and orientation information also travels through this area in the center of the brain.



# References

- Post, Justin. “Attention and Mind.” Never ever published. 2004.