Metaphysics and consciousness

Mary ET Boyle, Ph. D.
Department of Cognitive Science
UCSD

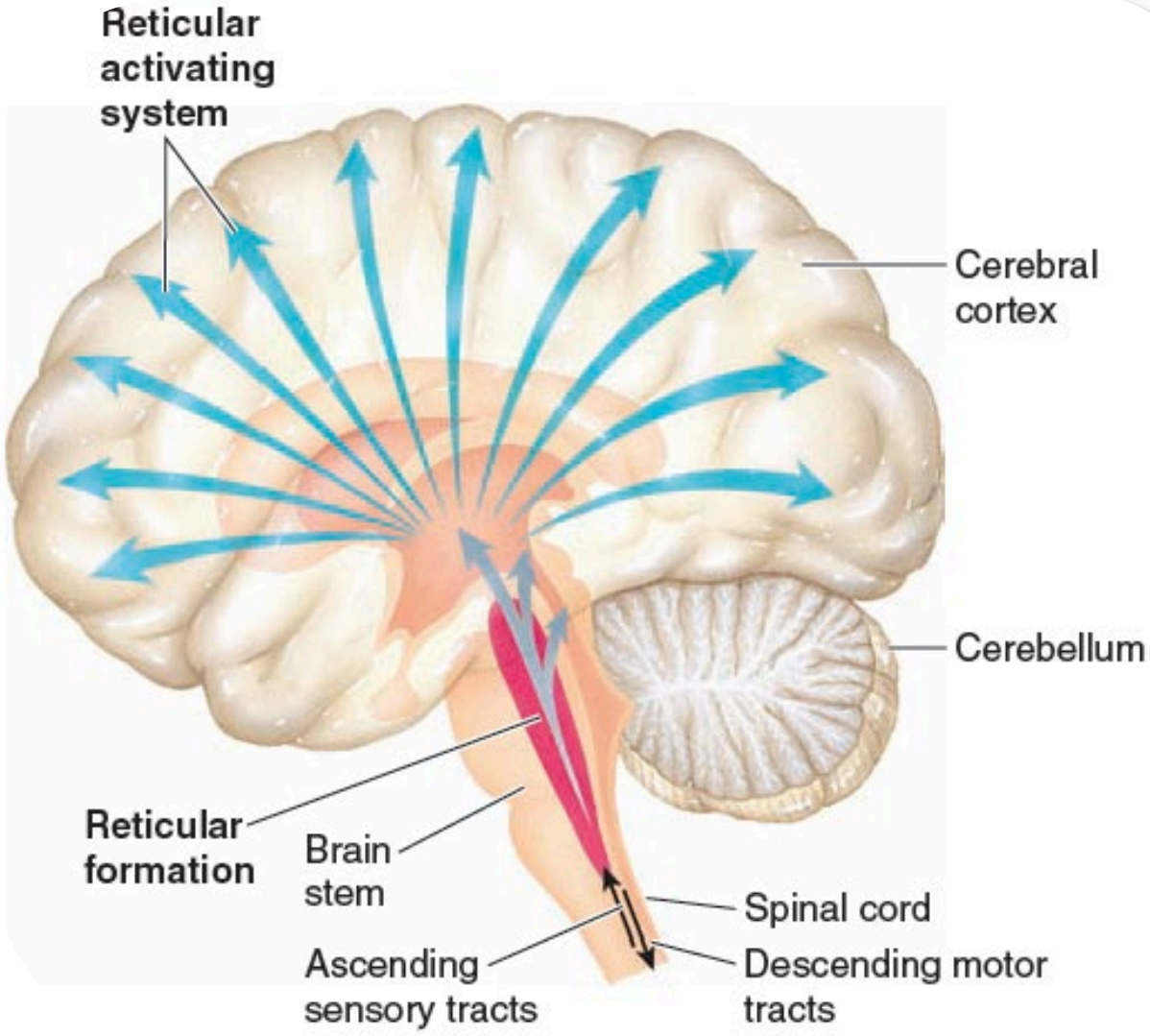
Part 2

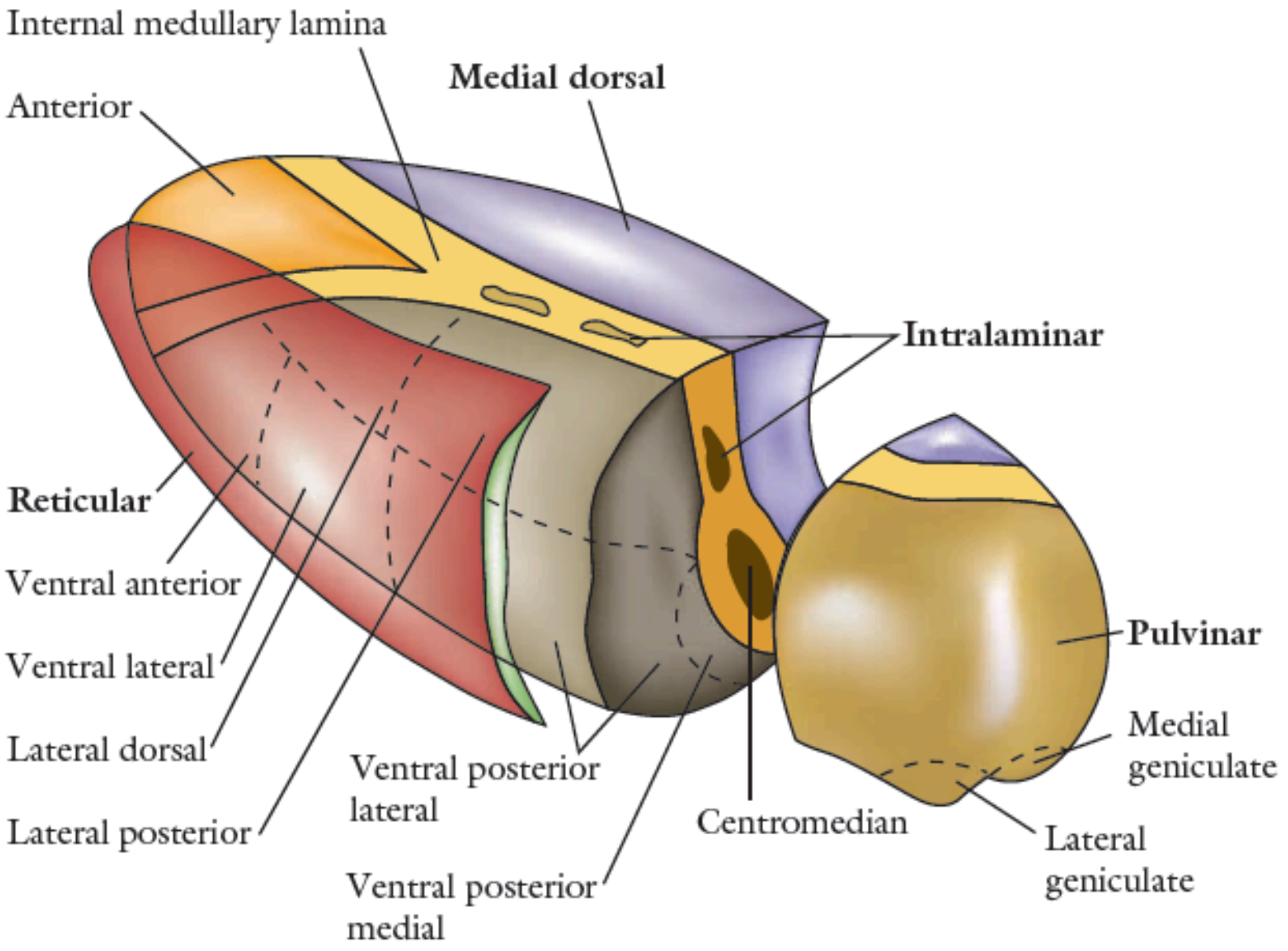
Enabling factors:

(what must be in place for consciousness to occur)

Proper blood supply	Functional brainstem MRF (mesencephalic reticular formation)	Acetylcholine	Non-specific thalamic activity

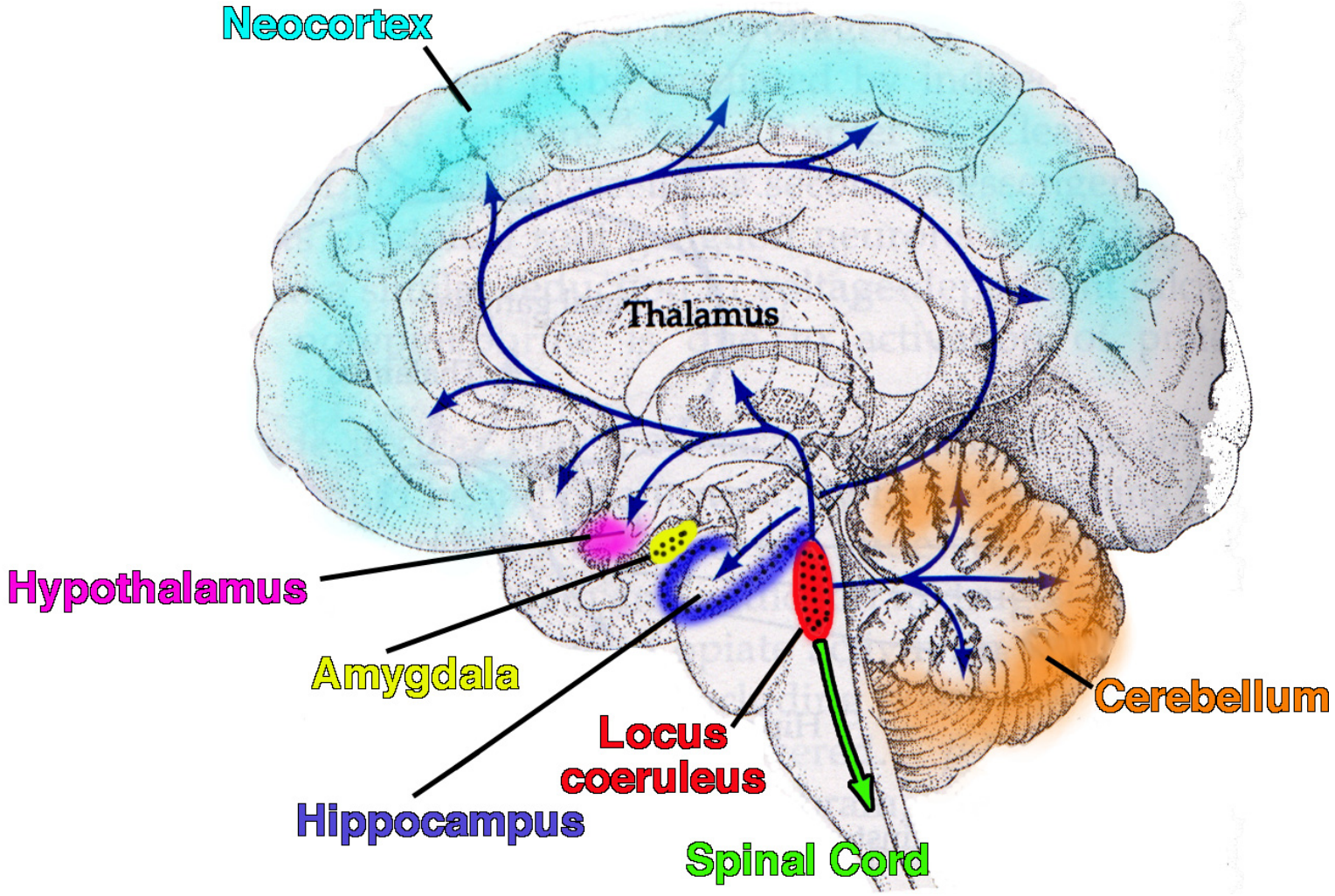
The reticular activating system is involved in overall arousal.



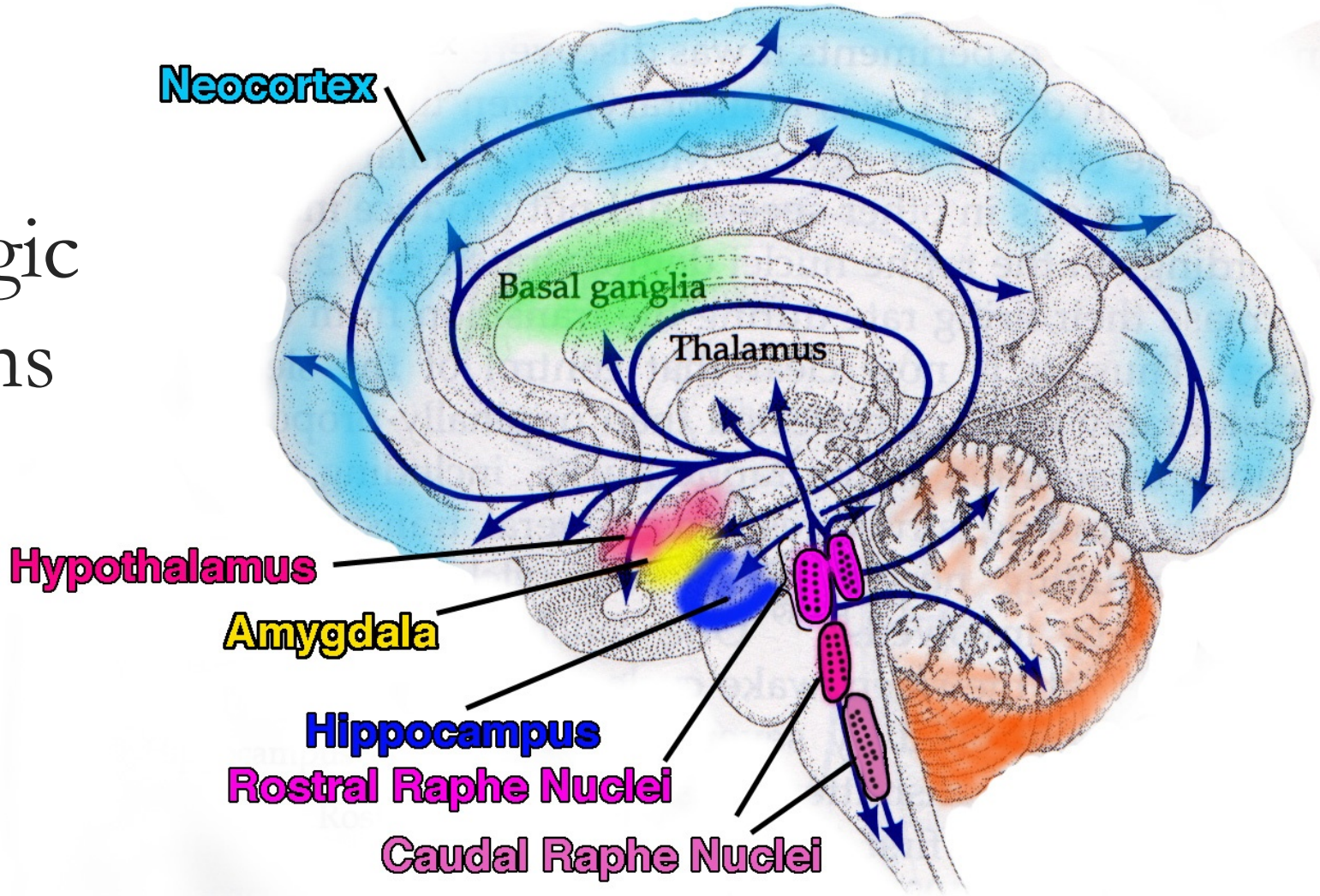

Internal medullary lamina
Anterior
Medial dorsal
Intralaminar
Reticular
Ventral anterior
Ventral lateral
Lateral dorsal
Lateral posterior
Ventral posterior lateral
Ventral posterior medial
Centromedian
Pulvinar
Medial geniculate
Lateral geniculate

Projections of Norepinephrine-containing neurons

It is the conscious experience of dreams that rules out NE as a viable factor for consciousness.



Serotonergic Projections



Thalamus

- Brainstem to thalamus
- Influence sensory information from the thalamus.
- Propitious location

Cortex

- All cortical regions
- Limbic system

Sleep-Wake

- Increased cholinergic activity is associated with wakefulness.

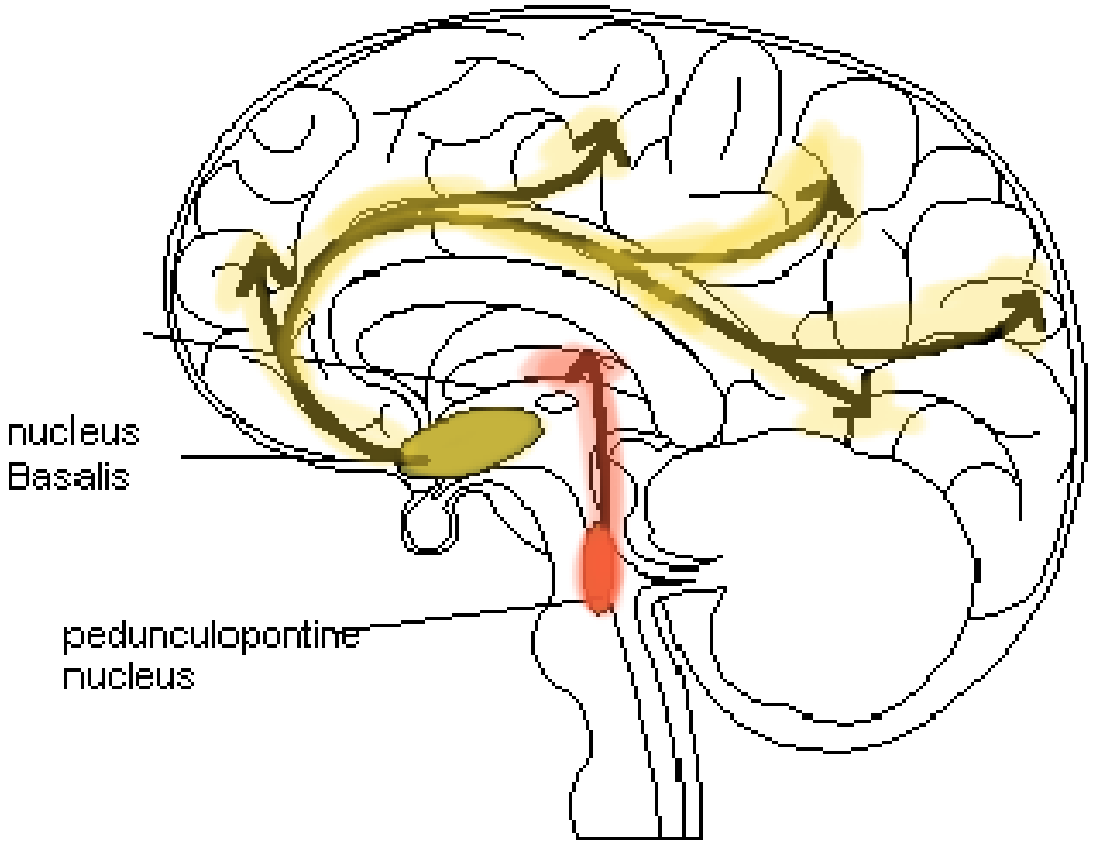
Dementias

- Alzheimer's, Parkinson's disease
- Loss of cholinergic pathway

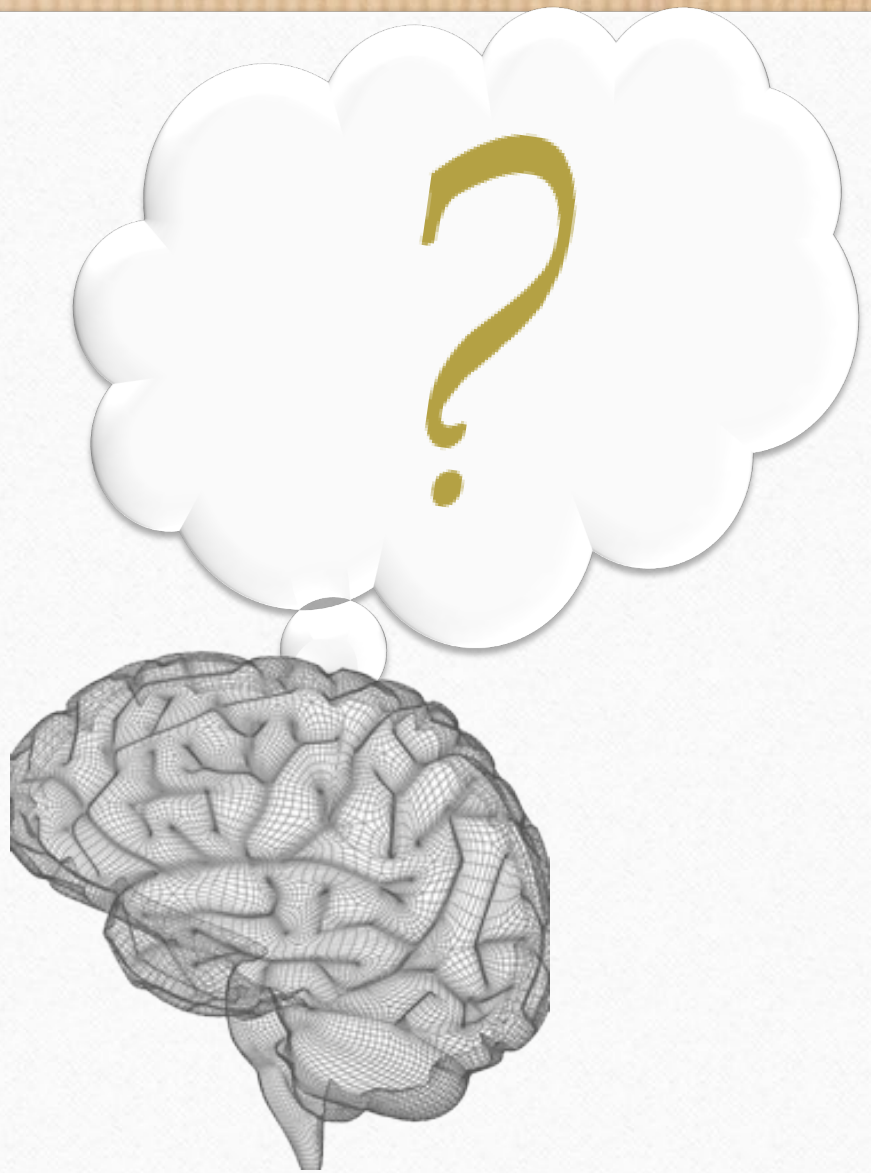
Why might the cholinergic neurons be part of the NCC?

Major cholinergic projections

- Nucleus basalis projects to neocortex.
- Pedunculopontine nucleus (PPN) projects to the thalamus



What is the neuronal counterpart of each subjective experience?



There is a unique neuronal correlate of consciousness for:

seeing a red patch

seeing one's grandmother

feeling angry

Perturbing or halting any neuronal correlate of consciousness will alter its associated percept or cause that percept to disappear.

Koch's – Basic assumption

Coalition of activity

- Thalamus & cortex

Duration

- How long do the neurons need to fire to produce a percept?

Effects

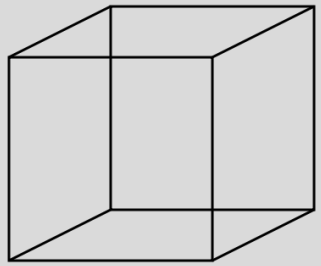
- Conscious perception
- If activity is blocked, is the percept disabled?
- Potential for anesthetic?

sufficient activity for conscious percepts

- information is broadcast to many areas in the cortical system

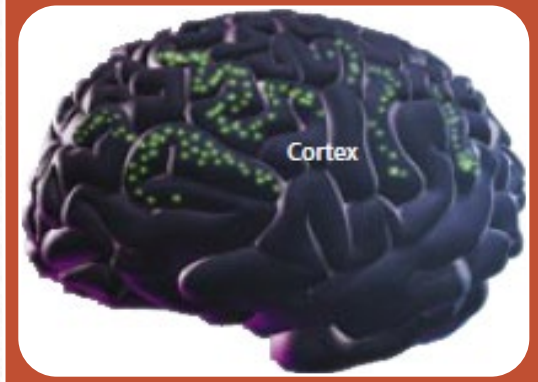
competition

- One coalition of neuronal activity survives while the other coalitions are inhibited or suppressed



Direct cause and effect mechanisms

- According to Christof Koch:
  - Every conscious percept is associated with a specific coalition of neurons acting in a specific way.



Perturbing or halting any NCC will alter its associated percept or cause that percept to disappear.

How does one figure out which set of neurons, and what activity among them constitutes a conscious percept??

Describe visual consciousness

- Main function of the visual system is to perceive objects and events
- Information available to our eyes is not enough to provide a unique interpretation coming into our eyes
- Top down processing is needed

What we are aware of at any moment, in one sense or another, is not a simple matter.

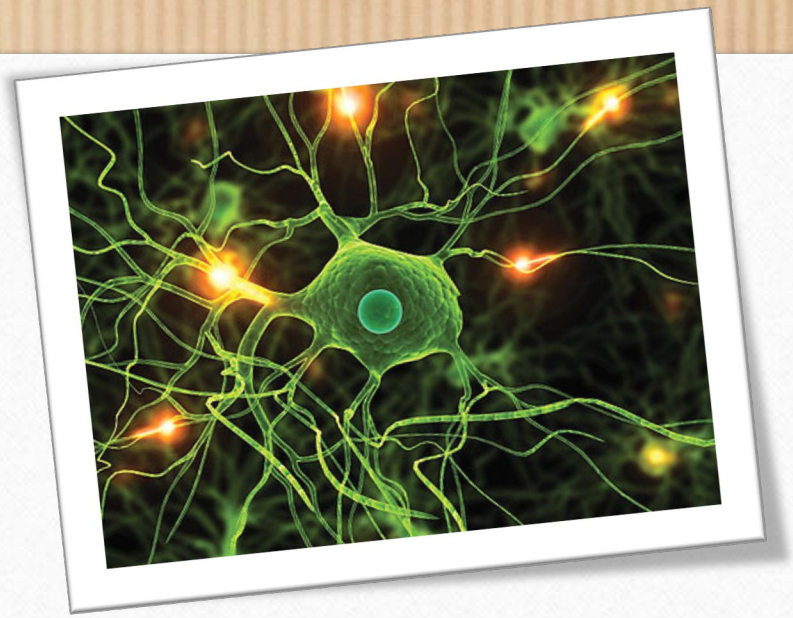
Explicit representation

- Something that is symbolized without further processing

Implicit representation

- More processing is required

Active representation



Latent representation

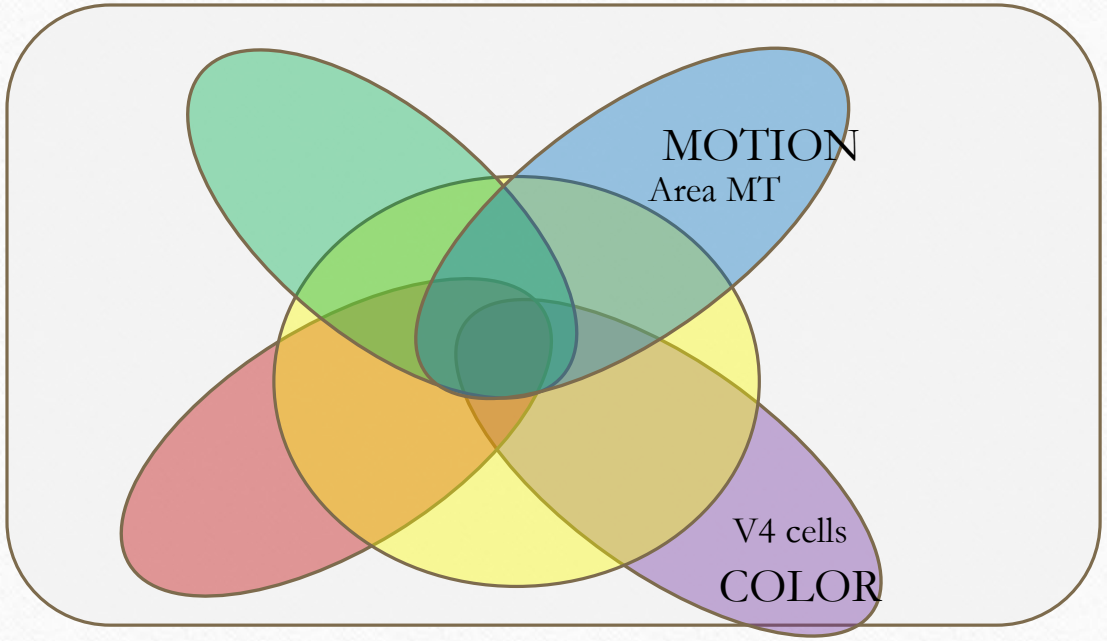
“statue of liberty”

Neural Activity	Example	Mental State
Entirely nonconscious activity	Deep stages of slow-wave sleep	Not conscious
Feed-forward activity that subserves stereotyped sensory-motor behaviors	Activity that underlies eye movements, posture adjustments	Not conscious
Activities that precede and follow the NCC	Retinal and spinal cord activity	Not conscious
Transient coalition	Cortical activity associated with Non-attended events	Fleeting consciousness
Maintained coalition of cells in high-level sensory areas and frontal regions (NCC proper)	Synchronized activity between inferior temporal and prefrontal cortex	Focused, perceptual consciousness

Koch (2004) The Quest for Consciousness

Global workspace or blackboard

Microconsciousness - Zeki



Define the term *Microconsciousness* – "to emphasize that the NCC at an essential node for one particular attribute, say color, can be independent of the NCC at another essential node for a different attribute, say motion." Koch, 2004