STRATEGIES for ENGAGED LEARNING

Presented by

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MOVEMENT and the BRAIN

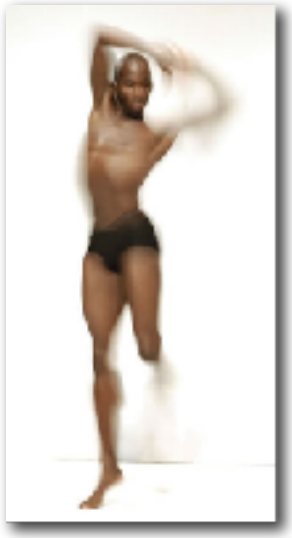
Movement:
Active and Stimulating

Exercise:
Movements you already know how to do

Benefits:

- Brings oxygen rich blood to the brain
- Elevates serotonin for balanced moods
- Improves mental clarity
- Reduces stress and depression
- Improves long-term memory
- Reduces Alzheimers' risk by 50%
- Stimulates neurogenesis

MOVEMENT and the BRAIN



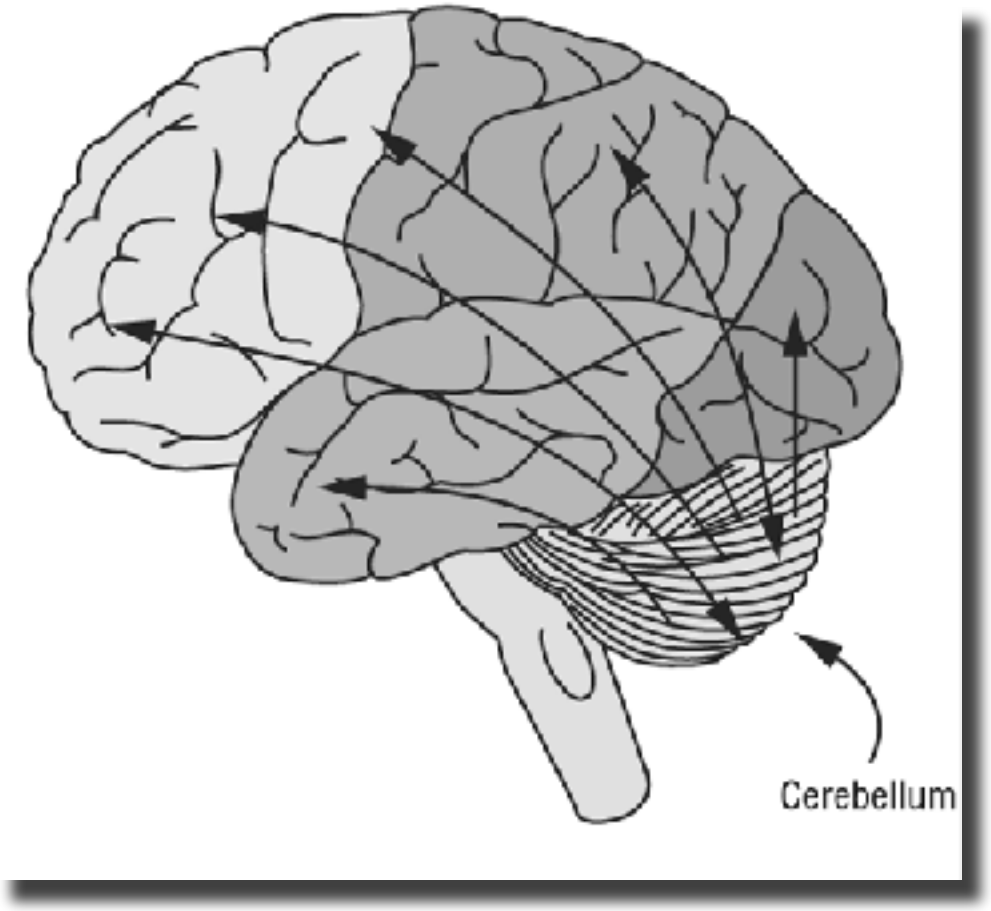
Movement:
Active and Stimulating

Stimulation:
Movements that are new to you

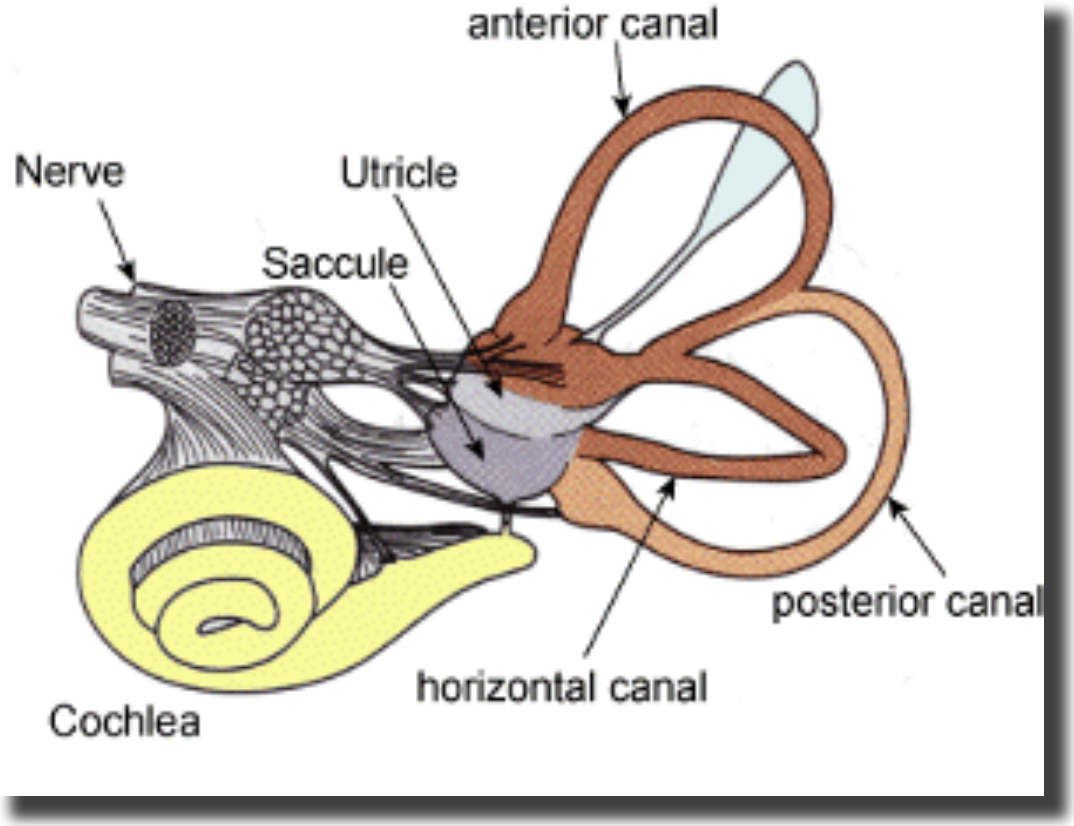
Benefits:

- Provides neural growth
- Builds neural capacity
- New movements are accompanied by novelty, challenge, and feedback
- Builds foundation for higher learning

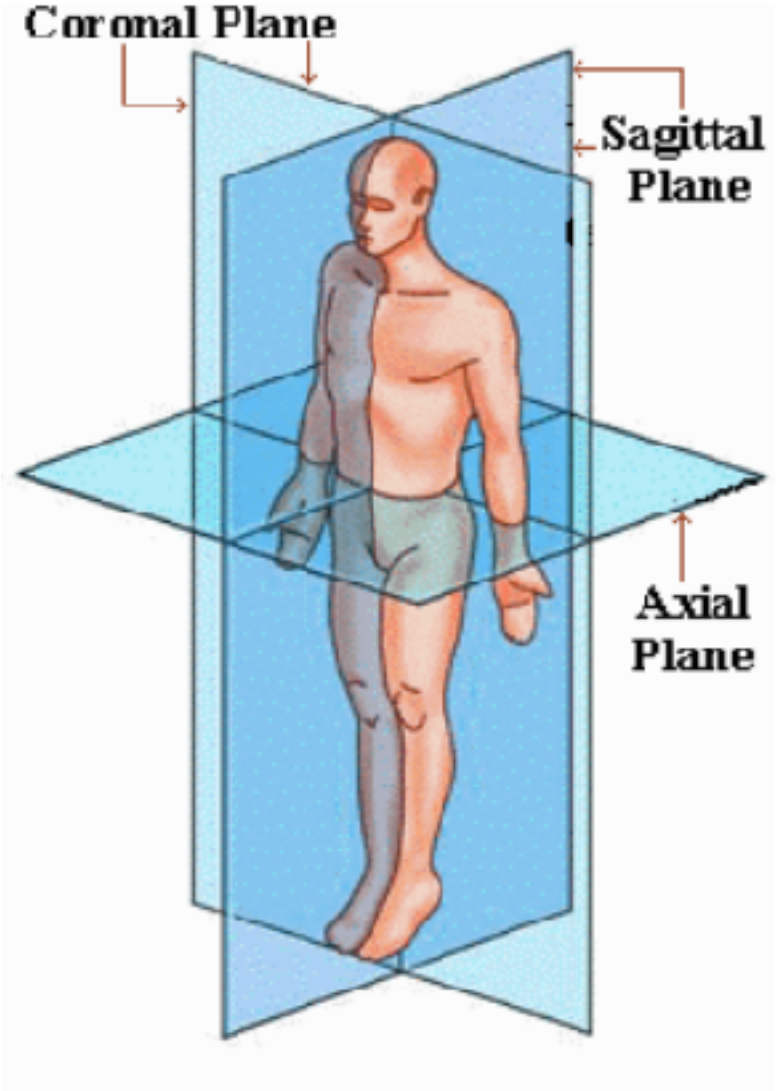
THE CEREBELLUM



THE VESTIBULAR SYSTEM

- 

THE MIDLINE PLANES



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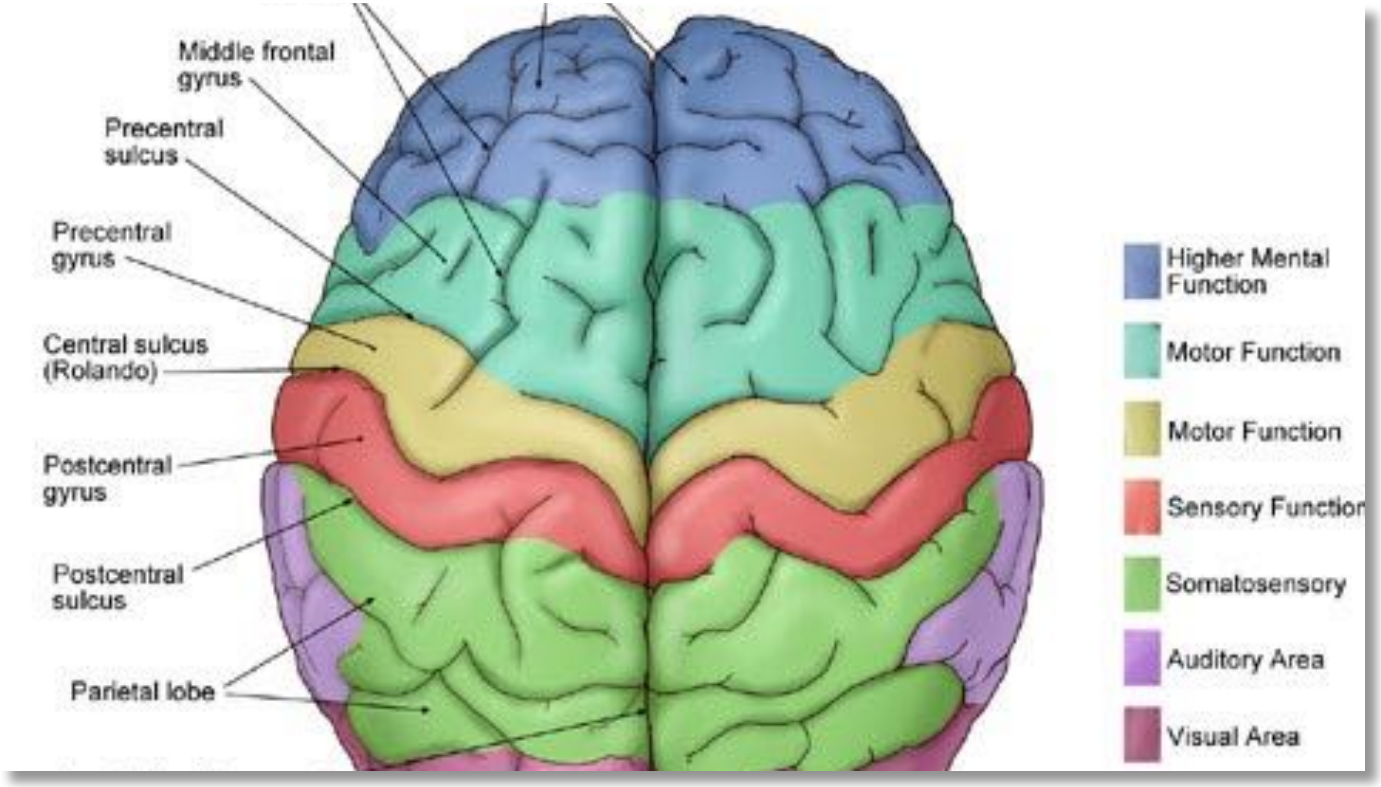
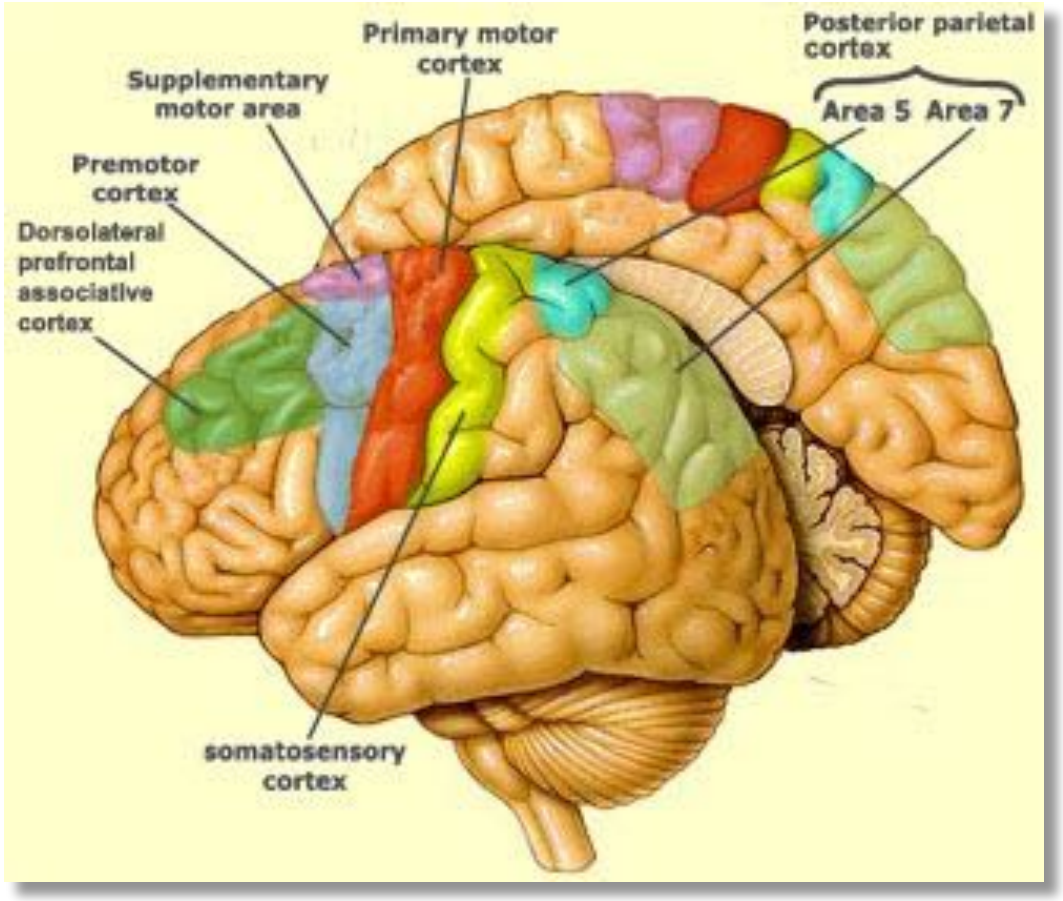


MOVEMENT and the BRAIN



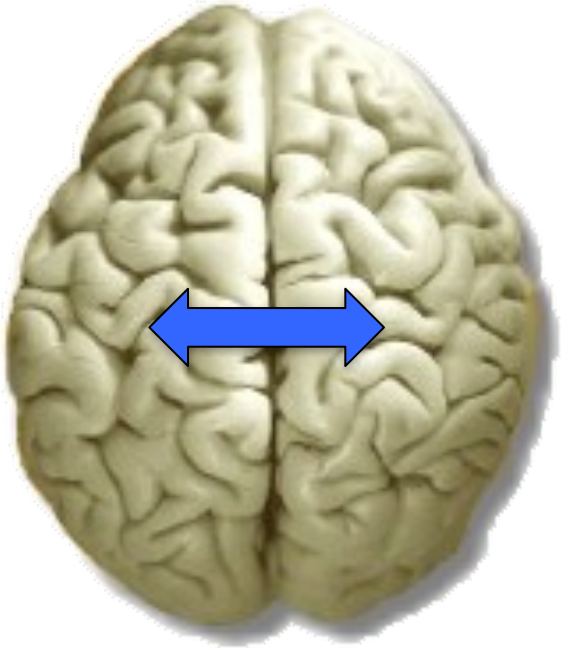
Areas of the Brain Involved in Movement

MOVEMENT and the BRAIN

Communication Dimension

Left Brain

Logic
Verbal
Detail
Science
Names
Math
Strategy
Order
Thinking
Write



Right Brain

Pictures
Stories
"Big Picture"
Observation
Shapes
Music
Patterns
Imagination
Beauty
Possibilities

MOVEMENT and LEARNING

"In the inferior olive and cerebellum, two brain regions that are involved in movement coordination, **the system oscillates at 10 Hz.** Those particular cells trigger timing throughout the nervous system."

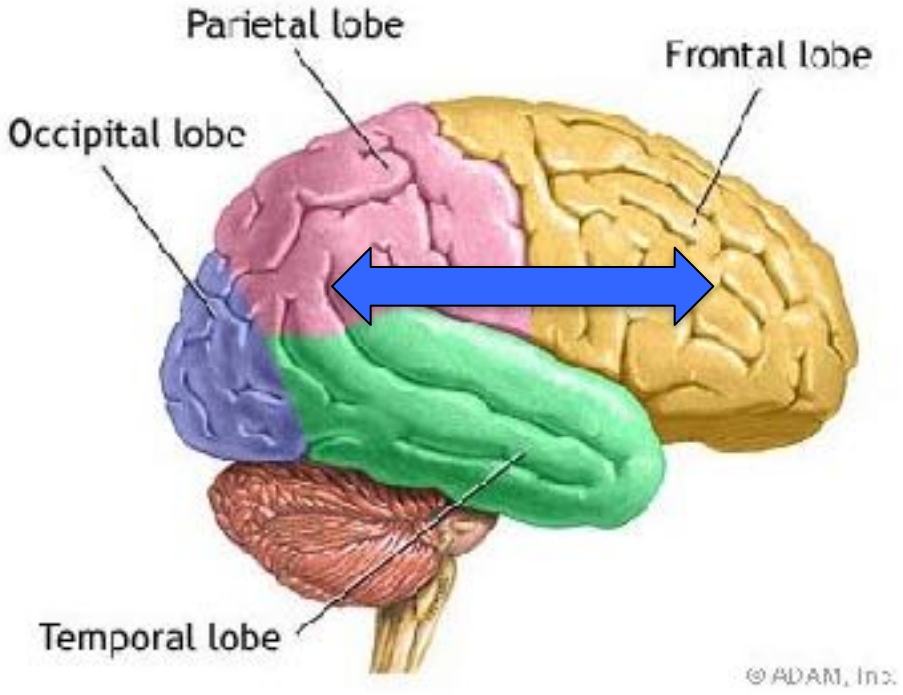
Rodolfo Llinas, M.D., neuroscientist,

New York University

Kat McGowan, "Brainsong," *The Brain*, *Discover Magazine Special,* p.19

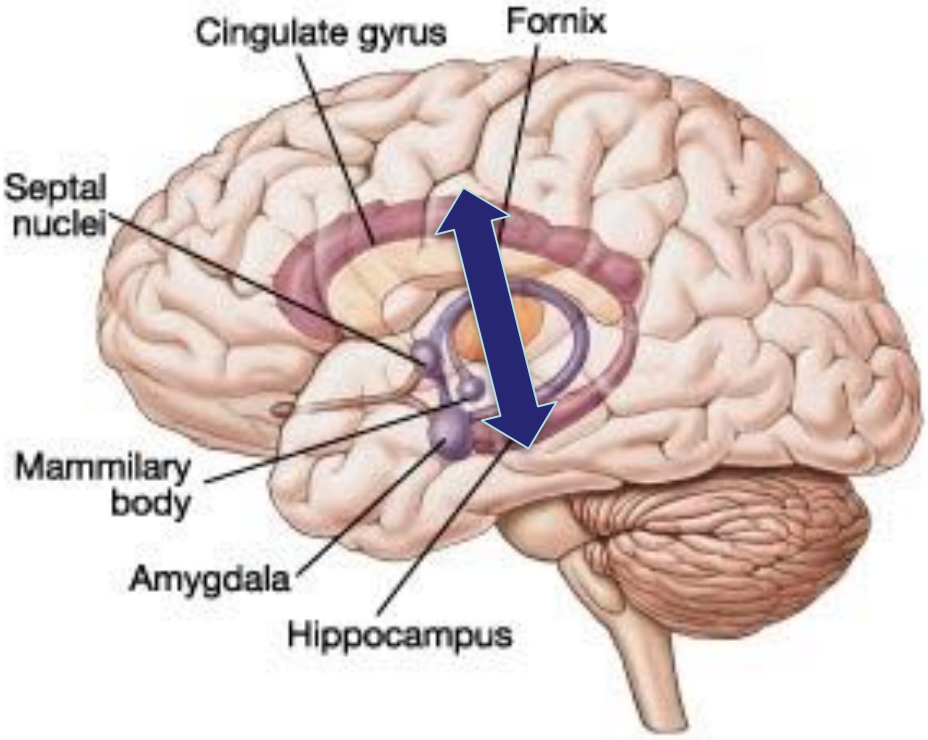
THE MIDLINE PLANES

Concentration Dimension



THE MIDLINE PLANES

Centering Dimension



ELEMENTS of PLAY

- **Pleasure and enjoyment**
- **Goals not imposed from the outside.**
- **Motivation is spontaneous, voluntary, and intrinsic.**
- **Active engagement on the part of the player.**
- **Attention to the means over the end product of the action or activity.**

"Children's Play," Paul McArdle
Child: Care, Health and Development, Vol 27, No 6, 2001

STAGES of PLAY

SOCIAL STAGES

I. Solitary

II. Parallel

III. Associative

IV. Cooperative
(also called peer play, socio-dramatic play)

COGNITIVE STAGES

I. Object play
(also called practice, exploratory, manipulative play)

II. Functional (use of an object for its intended use)

III. Pretend/symbolic

IV. Games with rules.

"Harnessing the Power of Play." Sonia Mastrangelo. *Teaching Exceptional Children*, Vol. 42, no 1, 2009

CHRONOBIOLOGY

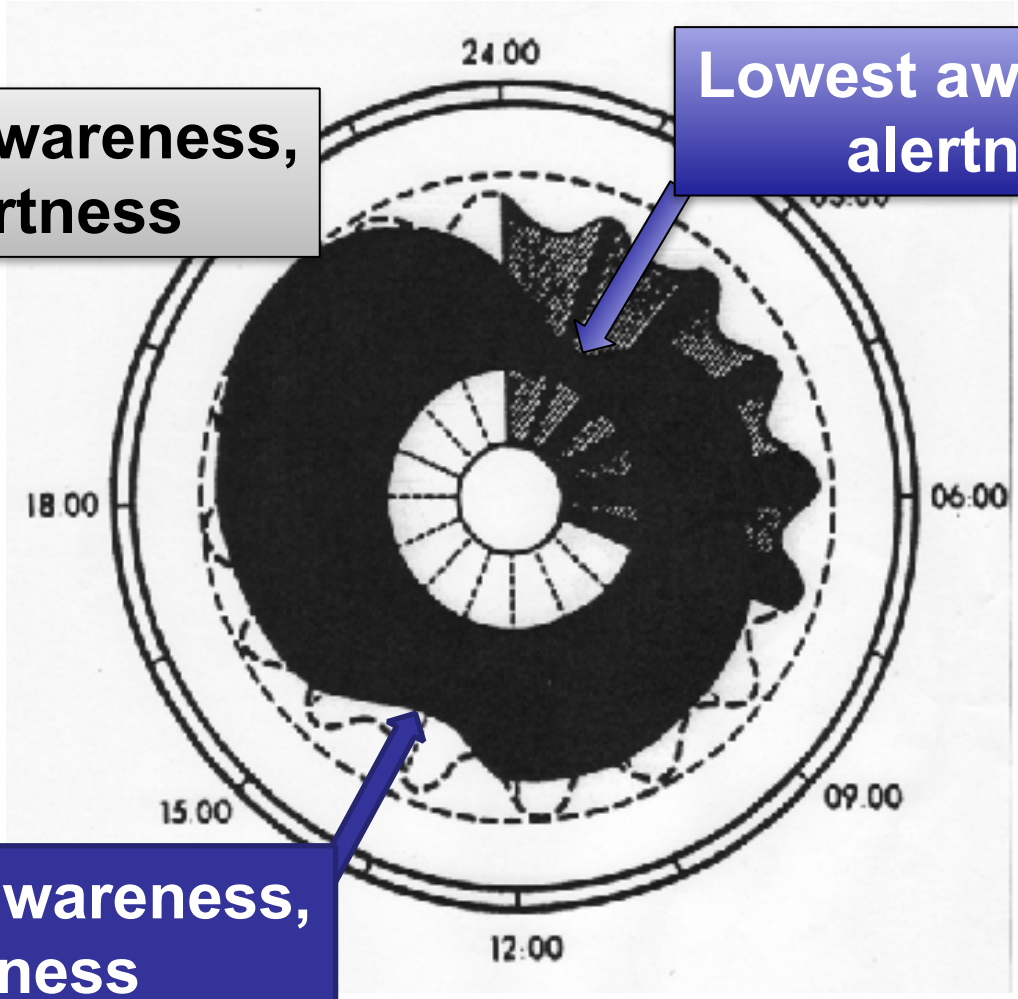
Infradian

Circadian

Ultradian

Hastings, Michael, ”The Brain, Circadian Rhythms, and Clock Genes.”
Clinical Review. BMJ 317:1704-1707, 19 Dec 1998.

BIORHYTHMIC VARIATIONS in the Circadian Cycle



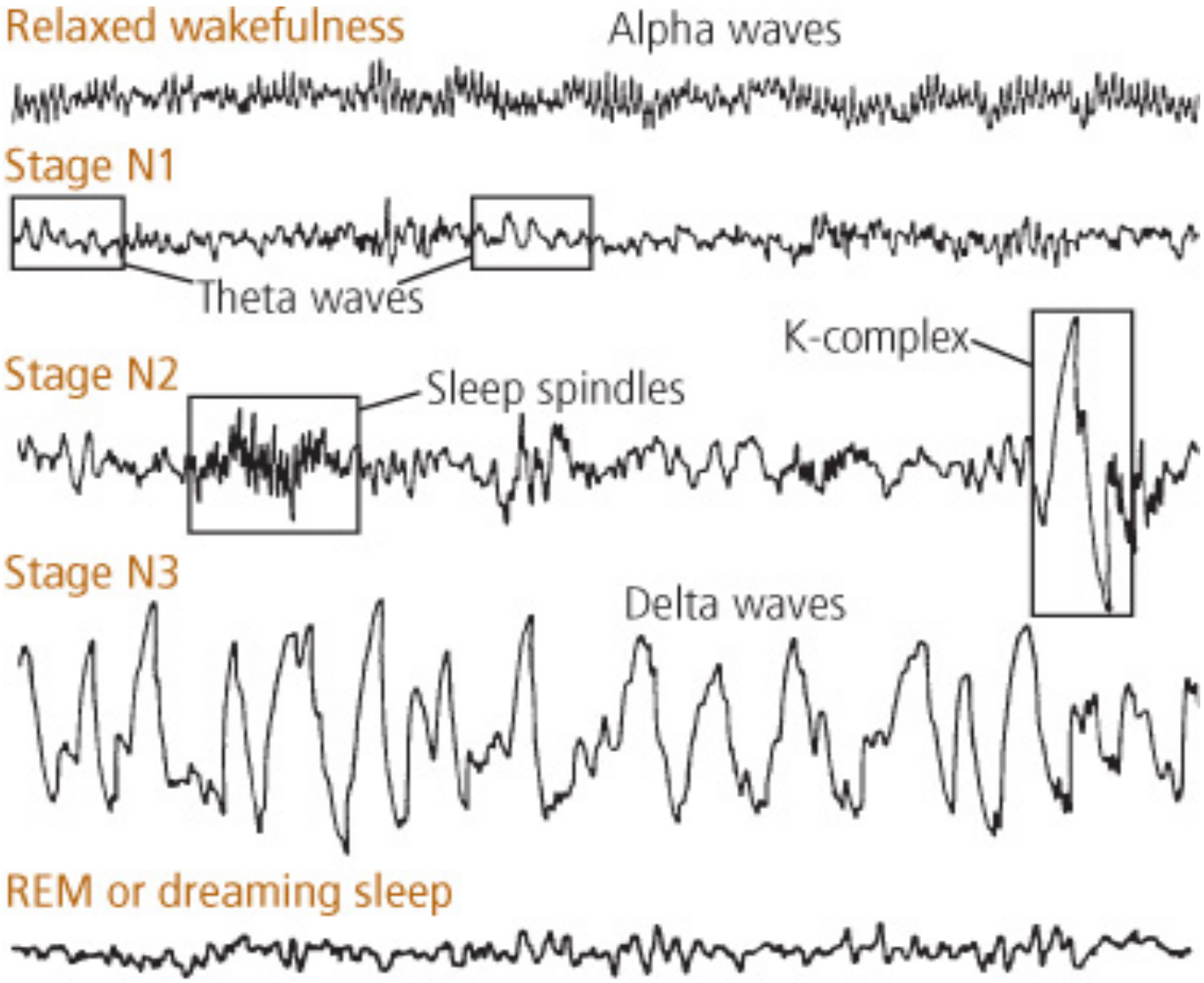
Peak awareness, alertness

Lowest awareness, alertness

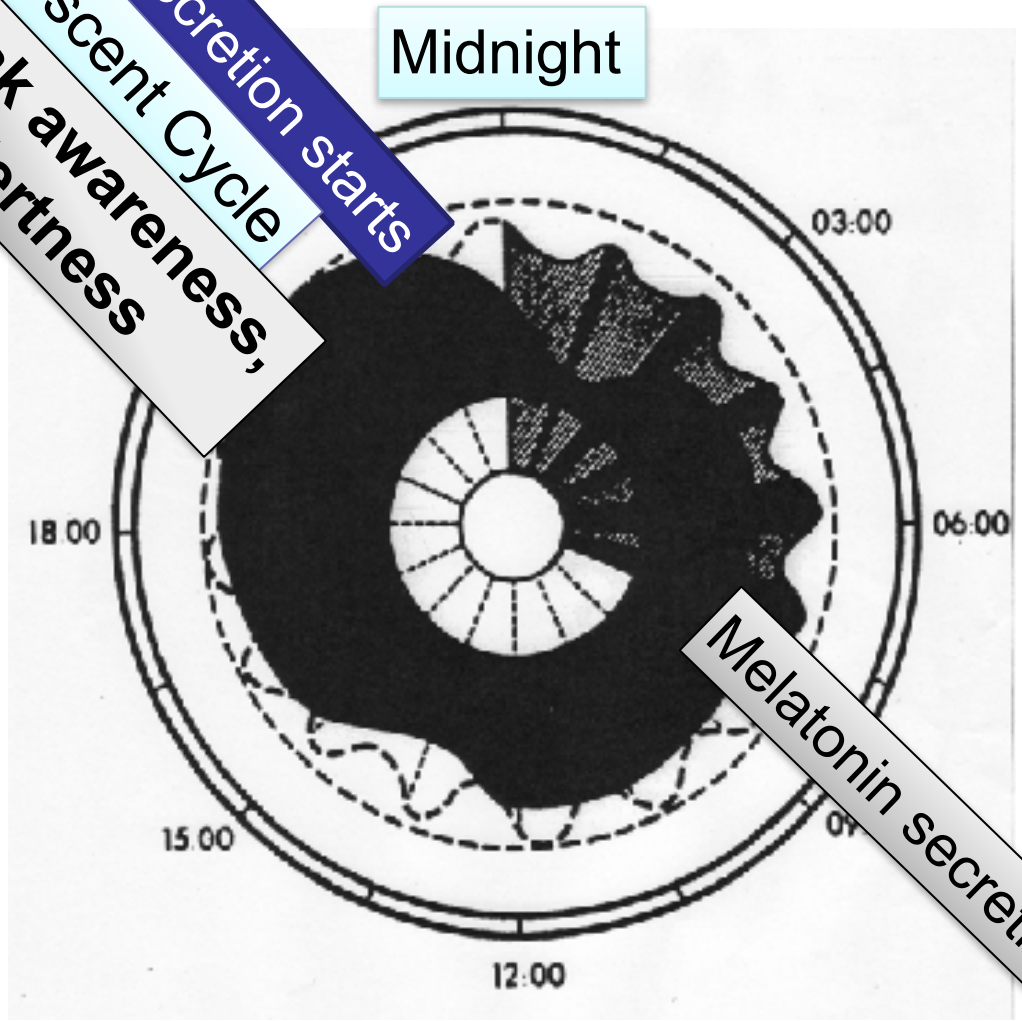
Lowered awareness, alertness

Source: R. Broughton. “Biorhythmic Variations in Consciousness and Psychological Functions.” *Canadian Psychological Review*, 1975; 16: 217-239.

STAGES of SLEEP and LEARNING



ORHYTHMIC VARIATIONS
the Circadian Cycle



Source: R. Broughton. "Biorhythmic Variations in Consciousness and P gical Functions." *Canadian Psychological Revie* 1975; 16: 217-239.

SLEEP and LEARNING

MEMORY ENCODING

‘A’ students

average 15 more minutes of sleep

than ‘B’ students,

average 15 more minutes of sleep

than ‘C’ students

Kyla Wahlstrom
Center for Applied Research and Educational Improvement (CAREI)

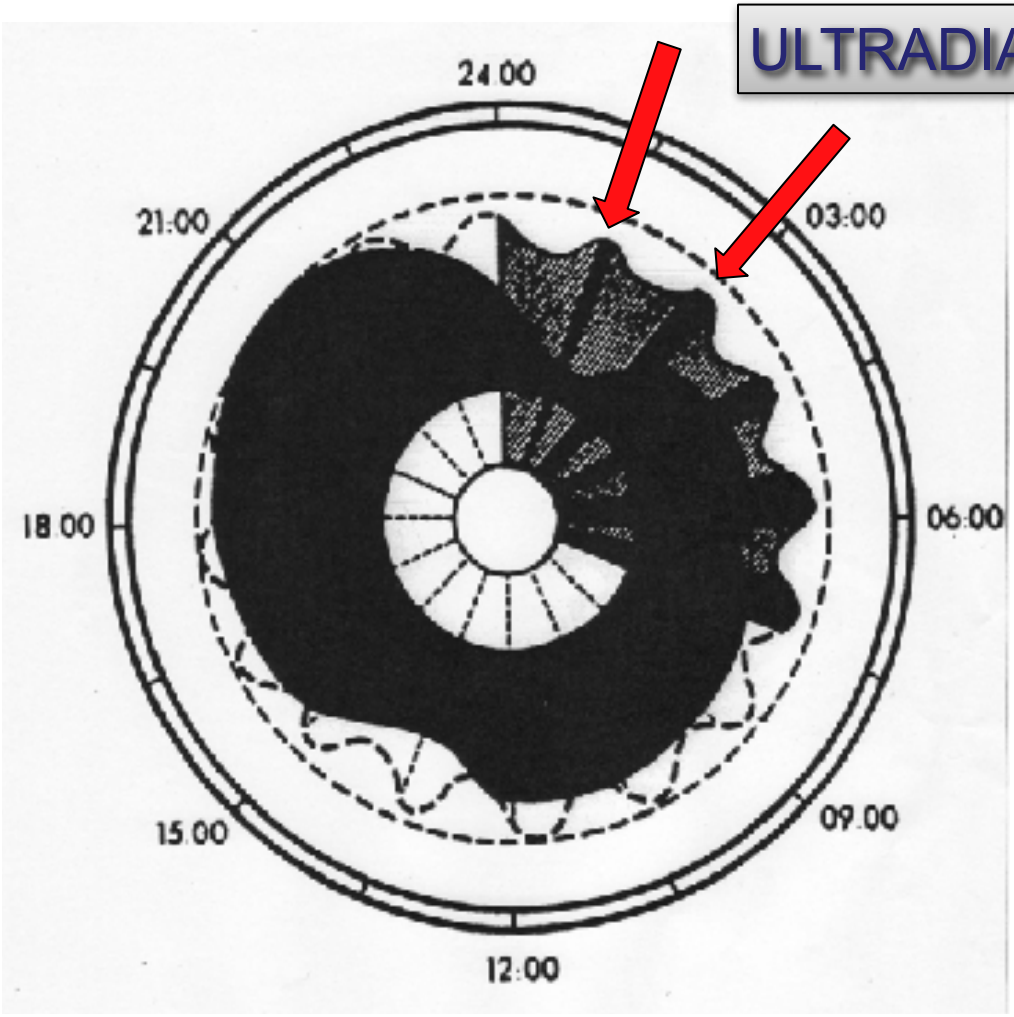
ULTRADIAN RHYTHMS

MODULATED MIND-BODY ACTIVITIES

MIND	BODY
Right-left brain dominance	Left-right nasal dominance
Attention	Autonomic nervous system
Concentration	Gene-cell metabolism
Learning	Endocrine system
Memory	Immune system
Sensations	Breast-feeding
Perceptions	Hunger and sex
Emotions	Digestion
Dreaming	Work and sports
Fantasy	Stress response
Imagination	Psychosomatic response
Creativity	Cellular metabolism
Trans-personal sense	Drug sensitivity

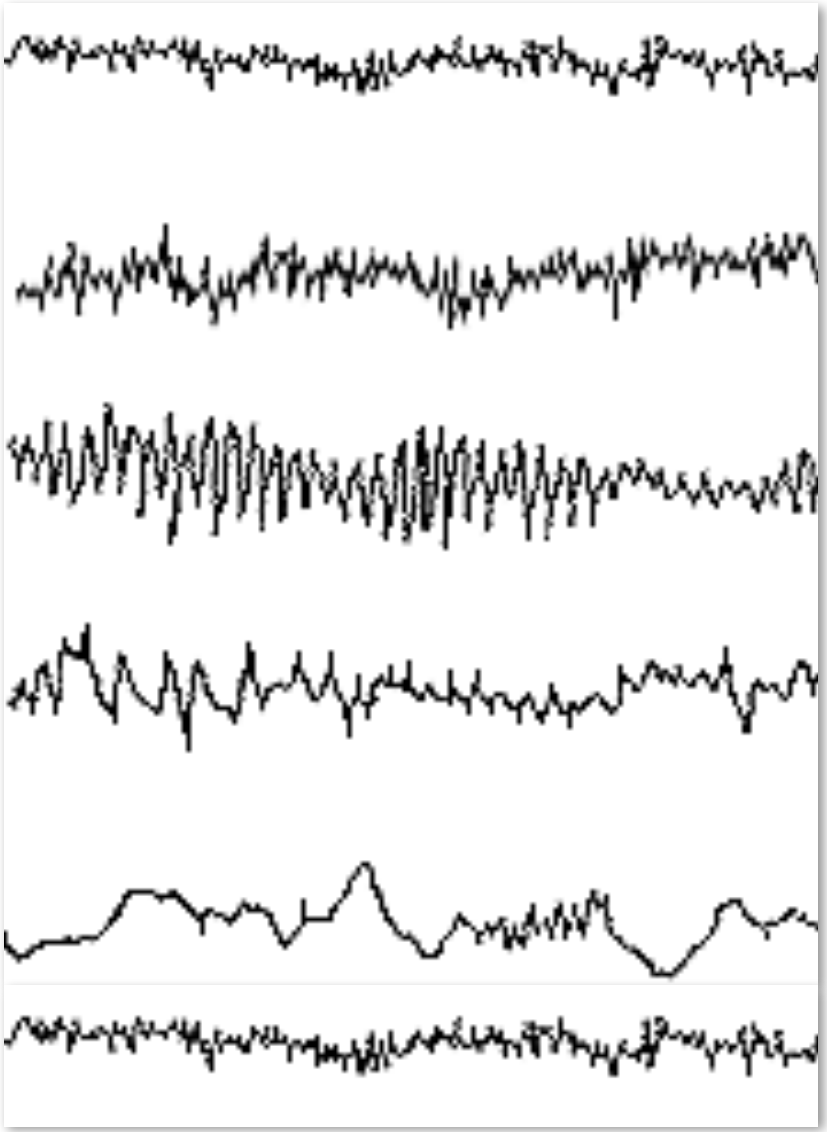
Source: E. Rossi, *The 20 Minute Break: Using the New Science of Ultradian Rhythms*

BIORHYTHMIC VARIATIONS in the Circadian Cycle



Source: R. Broughton. “Biorhythmic Variations in Consciousness and Psychological Functions.” *Canadian Psychological Review*, 1975; 16: 217-239.

BRAIN-MIND STATES
EEG Brainwave Activity



Gamma - 25-100 Hz (40hz typical).
Binds conscious perception

Beta – 13-30 Hz. Active, alert, concentration

Alpha – 9-13 Hz. Relaxed focus, light trance, enhanced serotonin production

Theta – 4-8 Hz. Trance-like state; enhanced catecholamine aids retention of learning

Delta – 1-3 Hz. Dreamless sleep; HGH produced

REM – Rapid Eye Movement; dreaming

Findings on Daydreaming

- About *one-third* of our time is spent daydreaming
- The brain activates several areas associated with *complex problem solving*
- Recent brain scans reveal that the brain may be most *actively engaged* when wandering
- **During daydreaming the brain makes new *associations and forges new neural connections***

Jonas Lehrer, *Imagine: How Creativity Works*
New York: Houghton, Mifflin, Harcourt, 2012, p. 48-49