

1. What is the relationship between perceptions and actions; how do sensory and motor systems interact to enhance our perceptions and optimally regulate our actions? How might cerebral corticocortical circuits and corticothalamocortical (matrix) circuits contribute to this relationship of sensory perceptions and intentional actions?

2. How might a bottom-up (feedforward peripheral drive) or top-down (feedforward, feedback or recurrent central drive) influence/alter sensory system function? How might feedforward and re-entrant (recurrent) connections among different brain areas together influence our sensations/perceptions? What specific cellular processes are proposed to account for convergence of bottom-up and top-down influences in the cerebral cortex?

3. Does the state of the brain (e.g., selective attention, perceptual awareness and the context of behavior [including internal and external reward, emotional & 'value' factors]) have any relationship to what we see, feel, hear and do at the "preconscious/subconscious" & "conscious" levels? What specific area(s) in the Human Brain are thought to provide a special capacity for a.) self-awareness/agency, b.) self-control and c.) "mindfulness"/"intrinsic insight" due to network loop connections?

References: GMOMMBook, Lecture Materials, Previous Readings and-

1. V.A.F. Lamme and P.R. Roelfsema, The Distinct Modes of Vision Offered by Feedforward and Recurrent Processing. Trends Neurosci 23: 571-579, 2000.

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2.-A.D. (Bud) Craig, How Do You Feel-Now? The Anterior Insula and Human Awareness. Nature Rev Neurosci 10: 59-70, 2009.

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3. S. Kastner, I.C. Fiebelkorn and M.K. Eradath, Dynamic Pulvino-Cortical Interactions in the Primate Attention Network. Current Opin Neurobiol 65: 10-19, 2020.

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