



California Training Institute

NPS Operational Leadership Facilitator Updates

Enhancing Your Knowledge

Science based solutions to human factor issues

Sensory Gating: How we filter stimuli to meet demand

NPS Operational Leadership Reference: Attention & Stress & Performance

Sensory gating describes the neurological processes of filtering out redundant or unnecessary stimuli in the brain from all possible environmental stimuli.^[1]

Also referred to as gating or filtering, sensory gating prevents an overload of irrelevant information in the higher cortical centers of the brain. Gating applies to all incoming stimuli but is most often encountered in vision and hearing. The thalamus play a major role in attention, and filter out unnecessary information.^[2] Although sensory gating is largely automatic, it also occurs within the context of attentional processes.

The cocktail party effect, tuning out other conversations, illustrates how the brain inhibits input from environmental stimuli, while still processing sensory input from the attended stimulus. The cocktail party effect demonstrates sensory gating in hearing, but the other senses also go through the same process protecting primary cortical areas from being overwhelmed.



What is the Process? Information from sensory receptors make their way to the brain through neurons and synapse at the thalamus. The thalamus function as the gatekeeper, deciding which information should be inhibited, and which should be sent to further cortical areas. Sensory gating is mediated by a network in the brain which involves the auditory cortex (AC), prefrontal cortex and hippocampus.

Is It Affected by Stress? Under extreme stress our brain concentrates its mental energy on the most threatening stimulus and shuts out or blunts other stimuli. This is an evolutionary mechanism that we have under stress that helps prevent the brain from getting overstimulated. Under low stress it occurs when we consciously focus our attention on a particular stimulus. One key study demonstrated that our visual field collapsed from 50 degrees to 7 degrees when we focused on a important neutral (no stress) stimuli.^[3]

¹ Cromwell, H.C. (2008). Sensory gating: A translational effort from basic to clinical science. Clinical EEG and Neuroscience.

² Banich, M.T. (2004). Cognitive neuroscience and neuropsychology (2nd Edition). Houghton Mifflin Company: pp. 49-50, 258-259.

³ Harada, Y., Hakoda, Y., Kuroki, D., Mitsudo, H. (2015). The Presence of a Weapon Shrinks the Functional Field of View. Applied Cognitive Psychology. DOI: 10.1002/acp.3143