

Notes: Attention

PDF

attention - selecting specific information for further processing
implies that some information is neglected/lost

psychological categories/models of attention (LaBerge, 1990 for review)

_____ - overall activation of the brain

_____ - sustained activity over time

_____ - prioritizing some stimuli over others

_____ - directing processes or brain areas to certain tasks

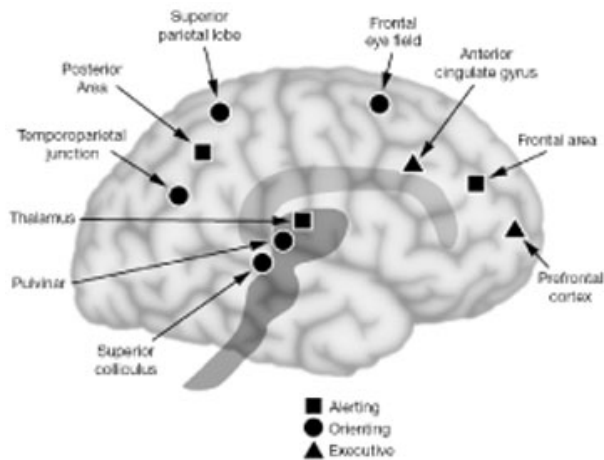


Image credit: Michael Posner, PhD

Reticular activating system (RAS)

involved in _____

sleep-wake cycles

cell bodies in brain stem and diffuse connections

bilateral lesions to RAS results in coma or chronic _____ state
intact: some semblance of sleep wake cycle, autonomic function, reflexes
with external support, can be maintained for years (Gunderson, 1990)

Superior colliculus

directs _____ eye movements (saccades) to areas of interest
voluntary saccades are not affected by damage to superior colliculus (Guitton et al, 1985)

Thalamus

receives connections from RAS and makes connections with cortex
damage impairs ability to direct attention to certain locations and filter out other locations (Rafal & Posner, 1987)
when trying to detect a target item, greater activation when the target is intermixed with other items
than when the target appears alone (LaBerge & Buchsbaum, 1990)

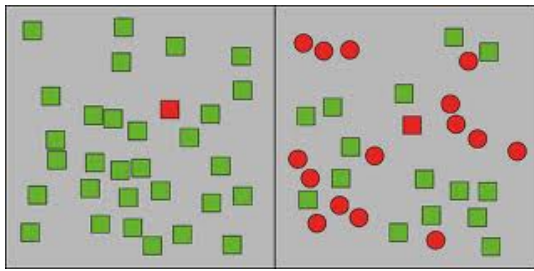
sensory _____ (an example of habituation)
when a click/tone is played, it produces an ERP called the P50
when the click is played twice, 50 ms apart, the P50 for the 2nd click is smaller (Smither et al, 1994)
healthy individuals may have a 2nd P50 that is 80-90% smaller,
schizophrenics only decrease 10-20% (Wan et al, 2008)

Parietal lobe

Lateral intraparietal region

single cell recordings in monkeys show responses to activity in a particular spatial location
that activity can be from a visual or auditory source, or related to motor movement
neuron activity can be enhanced even if the monkey must attend to the space
without saccading to it ([Colby et al, 1996](#))

not activated by a difficult semantic categorization task,
so not generic attentional demand ([Wojciulik & Kanwisher, 1999](#))



the time to detect a target depending on a single feature (red square in left half) is not affected by the number of objects

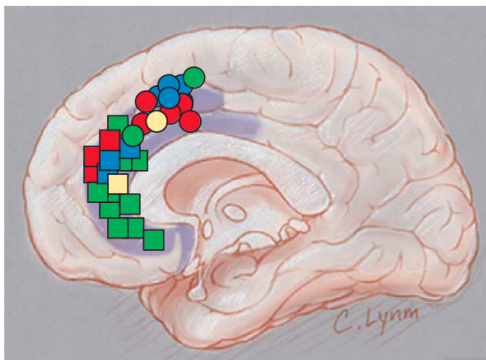
the time to detect a feature conjunction (red square in right half) does depend on the number of lures

bilateral damage to parietal regions impairs detection of feature conjunction, but not simple features (Friedman-Hill et al, 1995)

TMS to parietal lobe of health individuals can slow search for feature conjunction, but not simple features (Ashbridge et al, 1997)

Anterior Cingulate Cortex (ACC)

- Conflict monitoring
- Unexpected/experienced pain
- Induced anxiety
- Ambiguous emotion pictures
- Error detection
- Expected/anticipated pain
- Induced emotion (happy, sad, anger, disgust)
- Expected negative emotional pictures



TRENDS in Cognitive Sciences

for incongruent trials of Stroop task, responses took longer & activation in ACC was greater (Miller et al, 2001)

subjects practiced: when they hear "A" respond with "B", when they hear "L" respond with "M"

in the novel condition, A->M and L->B

greater activation in ACC for novel condition

varied the response modality to use speech, manual & saccades

different task modalities activated different areas of ACC

ACC activation is seen in many tasks (see image to right)

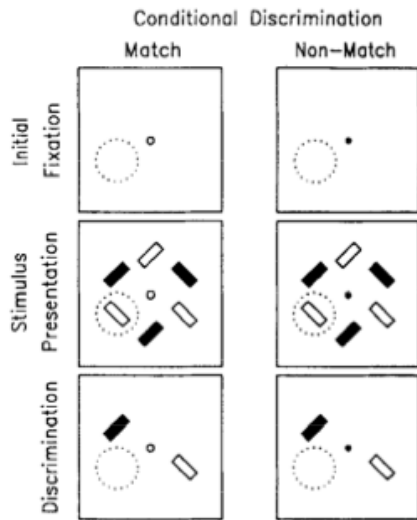
Source: Eisenberger & Lieberman, 2004

Frontal Lobe

unilateral damage is associated with hypokinesia for the contralateral side of the body (Watson et al, 1978)

or for motor movements towards that side of space (Damasio et al, 1980)

this is distinct from the sensory neglect associated with parietal damage (Bisiach et al, 1990)



visual cortex is more active when the stimulus matches a "goal" (Motter, 1994)

monkeys are trained to judge the orientation of various lines
 before each trail, they are given a cue that tells them to
 pay attention to color or luminance
 they are shown multiply lines at once and judge the line that
 matches the color or luminance cue

neurons in V4 are recorded and are activated when a line is in their receptive
 field (dashed circle in figure)

74% of these neurons were more active for a line that matched the cue than
 for a line that did not match

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