Psych3BN3 Topic 5
Attention and Consciousness

Readings:
Gazzaniga Chapter 12
Disordered attention / consciousness in a patient with hemispatial neglect
Outline

• Attention: overt vs covert, exogenous vs endogenous, early vs late
• Disorders of consciousness in hemispatial neglect and split-brain patients
• Attentional blink
• Tripartite model of attention and awareness
Helmholtz’s studies of covert attention
The cocktail party effect (Cherry, 1953)

Then I said "Golly, that's really great!"

The new sculpture is impressive. It will certainly add to the collection.
Cherry’s dichotic listening paradigm: is it early or late selection/filtering?

Attended inputs:
*President Lincoln often read by the light of the fire...*

Ignored inputs:
*The horses galloped across the field...*

Speech output: “President Lincoln often read by the light of the fire...”
Broadbent’s model of early selection
Early vs late selection

Sensory inputs

Early Selection
- Registration
- Perceptual analysis
- Semantic encoding/analysis

Late Selection
- Executive functions
- Decisions, memory, etc.

Response
Endogenous vs exogenous attention

- In Posner’s endogenous cueing studies, valid cueing speeds time to detect target
Visual search for single vs conjunctive features: testing the visual spotlight hypothesis
Attended input enhances the N1, an early sensory-evoked ERP component: evidence for early selection
Early sensory attention localizes to Heschl’s gyrus (primary auditory cortex)
Deficits of attention and consciousness in hemispatial neglect
Self-portraits by the late German artist Anton Raederscheidt, following a severe Rt hem stroke, causing left-sided neglect
Hemispatial neglect


Evidence of neglect in line bisection task

Test paper (with horizontal lines on it)

Patient bisections (vertical lines)
Evidence of neglect in eye movements during visual search for the letter ‘T’

Unconscious processing of neglected visual information

• Intact semantic priming by left-sided neglected item e.g. tree -- scarf primes ‘apple’ (McGlinchey-Berroth et al., 1993)

• Intact object recognition on “burning house” test (Marshall & Halligan, 1988)

• Conclusion: Neglect ≠ Blindness
Representational neglect (neglect in mental imagery)
Representational neglect in memory of Milan square (Bisiach and Luzatti, 1978)

- Summing across the two viewpoints, long-term memory is intact

- Left side of mental image, or attention to this side, is faulty
Neural basis of attention (fig 12.36)

a) Cortical regions involved in attentional control (blue), novelty and attentional reorienting (yellow)  

b) regions damaged in neglect

(a) IPs/SPL  
 b) Cortical areas damaged in spatial neglect

TPJ (IPL/STG)  
VFC (IFg/MFg)
Model of hemispheric biases in spatial attention (fig 12.50)
Split-brain, split-consciousness?

Split-brain patient W.T.:

- Prior to surgery, normal verbal and motoric object recognition from both hemispheres.
- After surgery, only left hemisphere could name objects, but Rt hem could still grasp objects appropriately.
- The two hemispheres seemed to have two separate conscious states, e.g. game of horseshoes w rt hand.
What does it mean to be conscious?

- Awake, responsive (as opposed to unconscious, anaesthetized, comatose …)
- Awareness
- Able to report verbally
Inputs → Sensory analysis → Conscious → Attended, Unattended → Conscious report
Attentional blink paradigm used by Marois et al
PPA very active for hits, misses
LFC differentiates consciously perceived stim from misses
Tripartite model of attention and awareness: subliminal to preconscious to conscious processing