Attention allocation (1)

- Attention process is active? or passive?

[ PASSIVE PROCESSING ]

- Auditory Cortex
  - Ear (sensor)
    - sound wave
  - Cochlear (decomposition)
  - decomposed signals
  - Auditory Cortex
    - cognition
  - Orbitofrontal Cortex (conscious perception)
    - understanding
    - decision

[ ACTIVE PROCESSING ]

- Auditory Cortex
  - Ear (sensor)
    - sound wave
  - Cochlear (decomposition)
  - concentration
  - Auditory Cortex
    - ?
    - Attention allocation?
Attention allocation (2)

- Attention allocation over perceptual domain at a time

- Problems
  - How to quantify the amount of “attention”? (amount of attention ≡ attention)
  - Is it reasonable to assume that human have “limited or constant” attention at a time?
  - What criterion allocates attentions over the frequency bands or any other perceptually decomposed domain?
  - Is it reasonable to assume that the sudden change of attention would be saliency?
**Attention allocation (3)**

- **Apply the bit-allocation in MPEG1-layer3 to the attention allocation**
  - Required bits to encode audio signal with transparent quality
    
    \[ \text{required bits} = \log_2 \left( 1 + \frac{\text{signal power}}{\text{masking threshold}} \right) \]
  
  - Bit-allocation process in MPEG1-layer1 and layer2
    - Allocate # of available bits over frequency elements to maximize mask-to-noise ratio
    - Greedy algorithm

- **Experiment result**

![Experiment result](image1)

**Required bit information**

![Required bit information](image2)