

Outline:

- The “what” vs. “how” pathways in vision
- A patient with face-processing impairments
 - Explicit vs. implicit awareness
- An apperceptive agnostic
 - Vision for action preserved
- An associative agnostic
 - Implicit awareness of “how” representation

Dual Visual Pathways

- (light in the) *Eye* → *Thalamus* → *Visual cortex*
- once visual info gets into primary visual cortex, visual processing splits into two ways:
 - temporal cortex, the “what” pathway (아래쪽)
 - prefrontal cortex, the “how” pathway
 - people with “what” pathway destroyed have no troubles with the “how pathway
- *In cortex, visual processing splits into two distinct pathways, each dealing with a distinct kind of representation*

Pareidolia

- *Seeing things (e.g., faces) in otherwise “random” objects/stimuli*
- See faces when they don’t even exist;
- From a scientific perspective, this reflects that faces are so salient & socializing is so important to us

The Visual Agnosias

- *Area of damage in “what” pathway leading to the different agnosias*
 - *Apperceptive agnosia*: impairment organizing parts of objects together; no object perception per se (not blind, but the world is just a jumble/chaos; visual input is there, but no idea what it is)
 - *Associative agnosia*: Can perceive objects, but impaired in ability to visually recognize them (can see basic shapes, but hard time understanding what they’re looking at)
 - *Prosopagnosia*: Impaired ability to perceive or recognize faces; can visually recognize all other kinds of objects (official medical terminology for the face blindness (NYT))

Q. What do we learn from the NYT “face blindness” article?

A.

Heutink (2012)

- *After stroke, the patient impaired in ability to recognize family members because their faces are distorted*
- *Damage in right middle temporal gyrus; raises two questions:*
 - Right hemisphere specializes with processing faces (consistency from lecture #2)
 - Expansion on NYT article about the face processing that it's not just the fusiform gyrus; emotionality impacting visual processing
- Table 1: Proportion of correct responses, mean reaction times (in ms), and standard deviations for correct responses in the face recognition task
- *However, patient displays normal galvanic skin conductance response (or SCR) to family faces (figure 3). Why?*
 - Normal emotional response
- *Two Hypotheses:*
 - *Overt or explicit awareness of family facial representation is impaired, but covert or implicit awareness remains intact*
 - *The SCR to family members is not driven by “normal” positive emotional response, but by an “abnormal” **negative emotional** response to the distorted/grotesque faces*

-> Q. Are these mutually exclusive? They can be happening at the same time

Definitions

- *Explicit or overt awareness* concerns representations in mind/brain that you are consciously aware of
- *Implicit or covert awareness* concerns representations in mind/brain that you are *not* consciously aware of

(Explicit awareness for what pathway, implicit awareness for how pathway representation)

An Aperceptive Agnosic

- Goodale et al. (1991)
 - Task 1: Use card to show orientation of the bar/slot

- Result: two control participants good at matching the slot vs. DF – only when it's vertical; hard time seeing the orientation of the slot and reporting
- Task 2: Show width of tile
- Result: measured how far apart she put her fingers – x-width of tiles, y-width of the fingers; controls have downward sloping curve (smaller tile, smaller finger width) vs. DF – deficient and basic; cannot assume
- How about using the “how” path representation:
- Task 3: Put card in slot
- Result: DF now perfectly accurate (using visual info to guide her hand to do the job)
- Task 4: Pick up tile
- Result: can't tell you how big the tile is, but can use the hand to the object. (intact how representation, which is implicit awareness)

An Associative Agnosic

- What he's looking at and trying to identify: **clarinet**
 - Can see basic shapes, but his size is wrong (“pen”)
 - Gets category right eventually (“flute”)
 - Slowly work through and his hands know exactly how to grab it (hands know how to interact with the object vs. he can't say what it is)
- What he's looking at and trying to identify: **lock**
 - Dialing number
- A test: How does he recognize actual objects, and what does this tell us about object recognition?
 - Refer back to lecture #3, NYT article (sense of touch)
 - Recognizing objects by how they feel
 - Doesn't have to rely on the what pathway representation, but how they feel
 - Can name objects, just can't take visual input

Readings

- Just Another Face in the Crowd, Indistinguishable even if it's your own
 - prosopagnosia (face blindness)
 - can typically understand facially expressed emotions
 - they see the face clearly, they just do not know whose face they are looking at, and cannot remember it once they stop looking
 - fusiform gyrus responds much more strongly to faces than to other objects

- When family looks strange and strangers look normal: A case of impaired face perception and recognition after stroke
 - 3 aspects of impaired face perception
 - impaired recognition of basic emotional expressions
 - recognition of close family members is disproportionately impaired compared to faces of celebrities
 - perceives faces of family members as distorted
 - prosopagnosia – inability to recognize previously familiar faces
 - capgras delusions – belief that close acquaintances have been replaced by imposter, robots, aliens
 - > admit that these imposters truly look like their acquaintances but in fact are not identical to this person
 - prosopometamorphopsia – result of perceptual distortions which are restricted to faces; may involve perceptual distortion of the whole face or only half or a part of the face; ‘torn’, ‘warped’, ‘distorted’, ‘contorted’