Note: no class on 09/04/2023 (Labor Day)
Class 1 [09/11/2023]. Introduction to Vision
Class 2 [09/18/2023]. The Phenomenology of Vision
Class 3 [09/25/2023]. Natural image statistics and the retina
Class 4 [10/02/2023]. Learning from Lesions
Note: no class on 10/09/2023 (Indigenous Day)
Class 5 [10/16/2023]. Primary Visual Cortex
Class 6 [10/23/2023]. Adventures into terra incognita

Class 7 [10/30/2023]. From the Highest Echelons of Visual Processing to Cognition
Class 8 [11/06/2023]. First Steps into in silico vision
Class 9 [11/13/2023]. Teaching Computers how to see
Class 10 [11/20/2023]. Computer Vision
Class 11 [11/27/2023]. Connecting Vision to the rest of Cognition [Dr. Will Xiao]
Class 12 [12/06/2023]. Visual Consciousness

Anatomical projections of inferior temporal cortex

Markov et al 2014
Prefrontal cortex: the central executive
ITC represents visual shapes, not semantics
Categorical responses in PFC but not IT

Freedman et al., 2001; Freedman et al., 2003.
Pattern completion of partially occluded objects
Evaluating pattern completion

20 bubbles

10 bubbles

6 bubbles

4 bubbles

Tang et al 2014, 2018
Strong robustness to limited visibility
Interrupting processing by backward masking

20 bubbles

10 bubbles

6 bubbles

4 bubbles
Backward masking disrupts pattern completion
Delayed neural responses to occluded objects

Inferior Temporal Gyrus
Perception is not a constant function of input
Perception is not a constant function of input
Neural responses are not a constant function of input.

"Repetition suppression"

Neuronal tuning in ITC arises as a consequence of learning.

Logothetis et al. 1995
Learning alters neuronal responses in ITC

Sakai and Miyashita 1991
Seeing faces is necessary to have neural signals that respond to faces.

Arcaro et al, Nature Neuroscience 2017
ITC can represent information even in the absence of a visual stimulus!

Chelazzi et al 1998
Working memory representations are absent in early visual cortex and emerge in visual association cortex.
Selective responses during visual imagery in the human brain
Task demands modulate activity in ventral visual cortex

Bansal et al 2014
Attention is essential for vision
Pay attention!
Feature-based attention

Bichot et al. Science 2005
Summary

- ITC neurons represent shape, not semantic information.

- ITC neurons can complete patterns from partially visible stimuli.

- Neural responses continue representing selective visual information even in the absence of a visual stimulus.

- Neuronal responses in ITC are modulated by task demands, including attention.

- Neuronal tuning properties are the result of experience with visual world statistics.
Further reading


Original articles cited in class (see lecture notes for complete list)