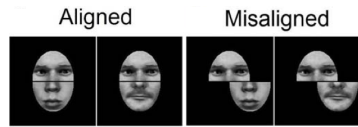


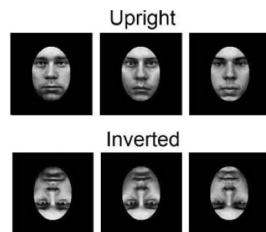
## Feature based vs. holistic processing

### composite face effect



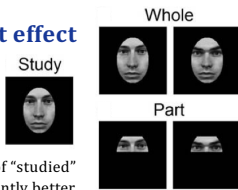
- identical top halves seen as different when aligned with different bottom halves
- when misaligned, top halves perceived as identical

### face inversion effect



inversion disrupts recognition of faces more than other objects

### whole-part effect



identification of "studied" face is significantly better in whole vs. part condition



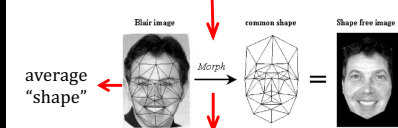
1

## The power of averages, Burton et al. (2005)

### "average faces"



(samples from the internet)



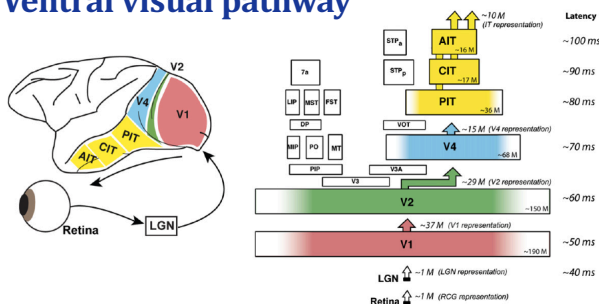
### recognition of average faces (vs. instances)

- greater accuracy
- faster reaction times



2

## Ventral visual pathway

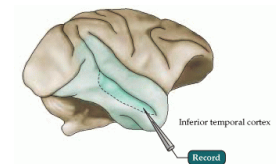
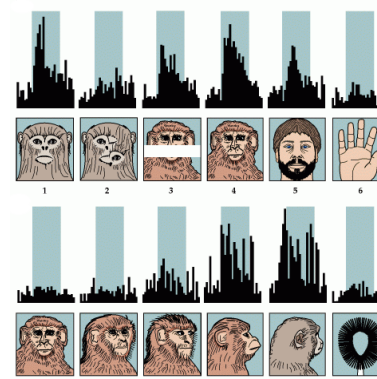


Progressing to higher areas along the ventral pathway:

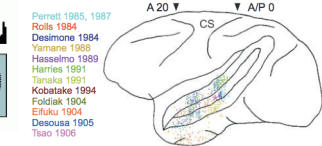
- response latency increases
- receptive field size increases
- neurons become selective to more complex spatial patterns
- neural responses become more invariant to changes in position, scale, pose, etc.

3

## Face selective cells in IT cortex



Locations of face selective cells in IT, from single cell recordings



Desimone et al., 1984


4

## Fusiform Face Area (FFA) in the human brain

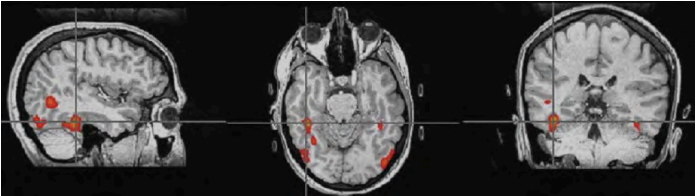
The Journal of Neuroscience, June 1, 1997, 17(11):4302-4311

### The Fusiform Face Area: A Module in Human Extrastriate Cortex Specialized for Face Perception

Nancy Kanwisher,<sup>1,2</sup> Josh McDermott,<sup>1,2</sup> and Marvin M. Chun<sup>2,3</sup>  
<sup>1</sup>Department of Psychology, Harvard University, Cambridge, Massachusetts 02138, <sup>2</sup>Massachusetts General Hospital NMR Center, Charlestown, Massachusetts 02129, and <sup>3</sup>Department of Psychology, Yale University, New Haven, Connecticut 06520-8205

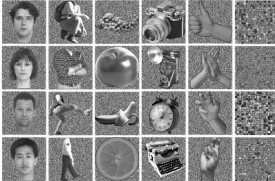


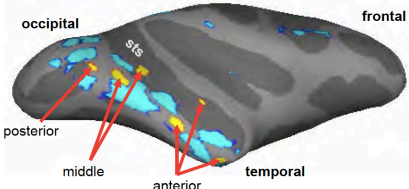
Nancy  
Kanwisher




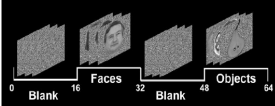
5

## Face patches in macaque IT cortex







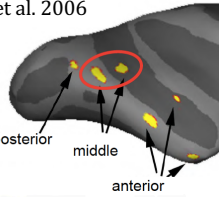


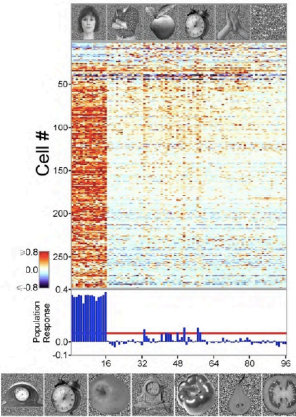
Tsao, Freiwald, Tootell, Livingstone, 2006

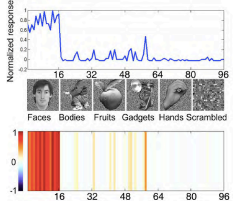
6

## Targeting neurons in middle face patches using single cell recording

Tsao et al. 2006

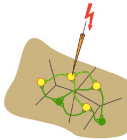




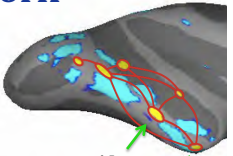


7

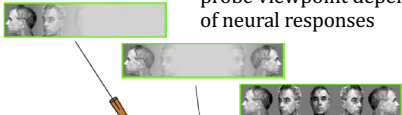
## The face patch network

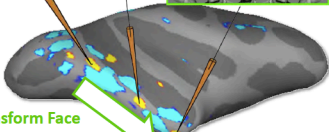


Combined micro-stimulation & fMRI to determine the connectivity of face patches

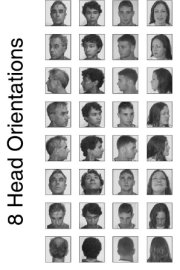


Used single cell recording to probe viewpoint dependence of neural responses





Transform Face Representation from Picture to Identity



8 Head Orientations

8