

2018-02-12 Object, Scenes, & Faces

PSY 525.001 · Vision Science · 2018 Spring

Rick Gilmore

2018-02-16 14:04:10

Today's topics

Today's topics

Objects

Today's topics

Objects

Scenes

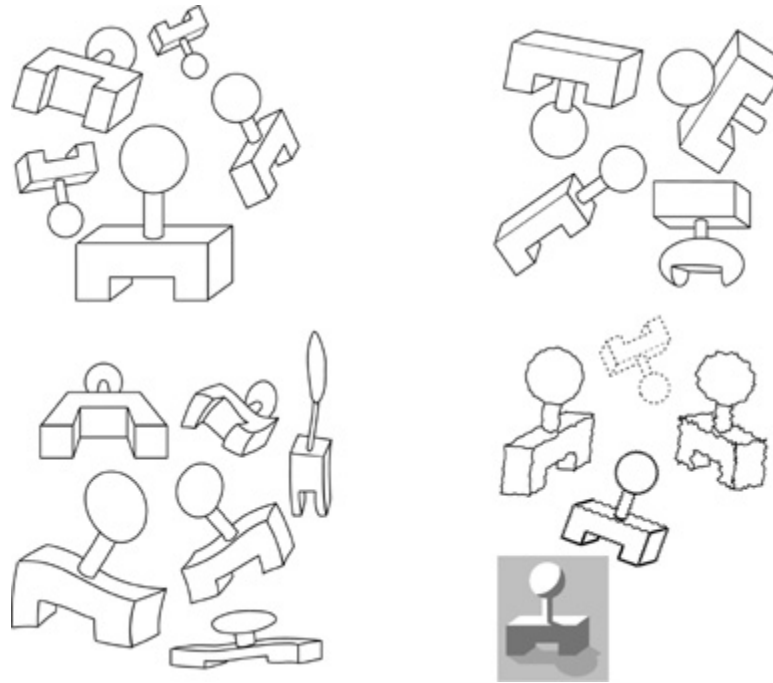
Today's topics

Objects

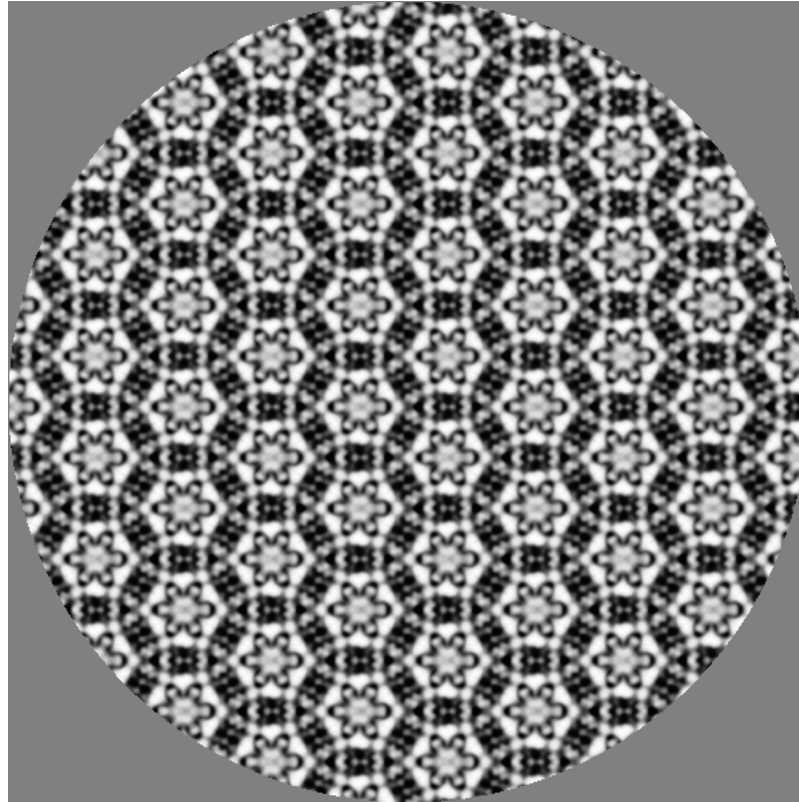
Scenes

Faces

Shape & structure



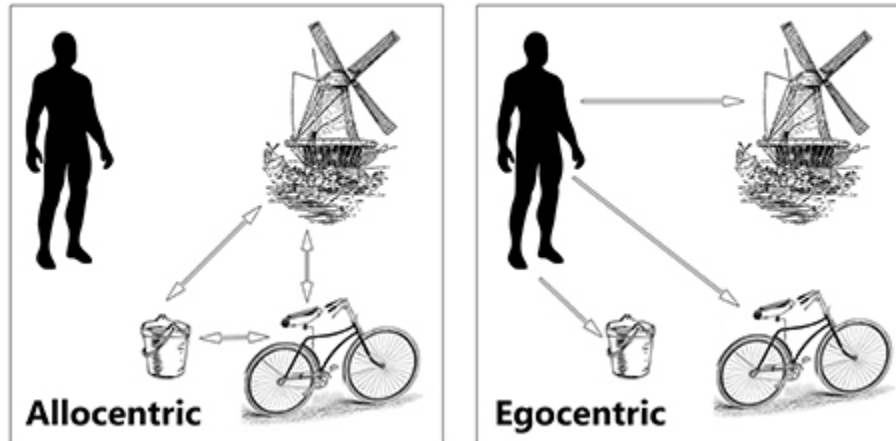
Shape invariance (over transformations)



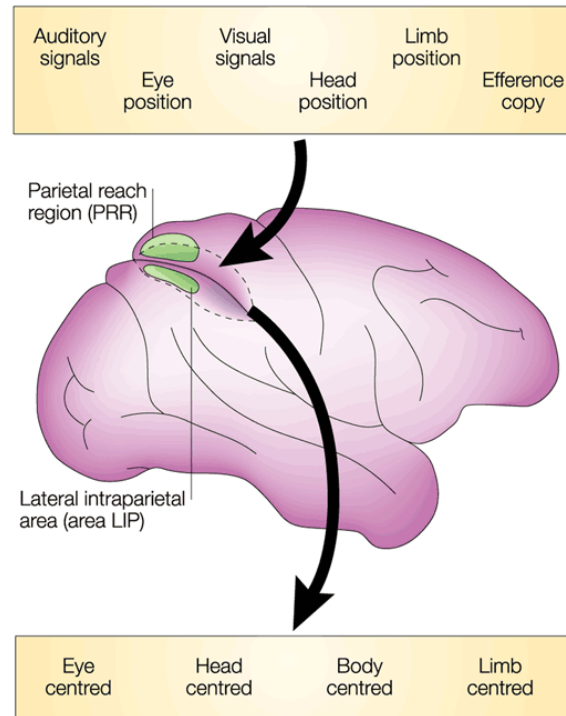
Self-similarity under transformations

Gilmore, R.O. & Norcia, A.M. (2014). The Salience of Lower-Order, Localized Features in Highly Self-Similar Wallpaper Groups. Databrary. Retrieved February 16, 2018 from <http://doi.org/10.17910/B7KS3M>

Spatial Reference Frames



Frames of reference

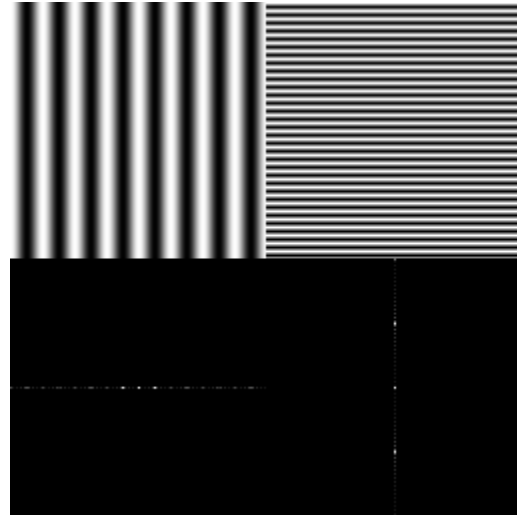


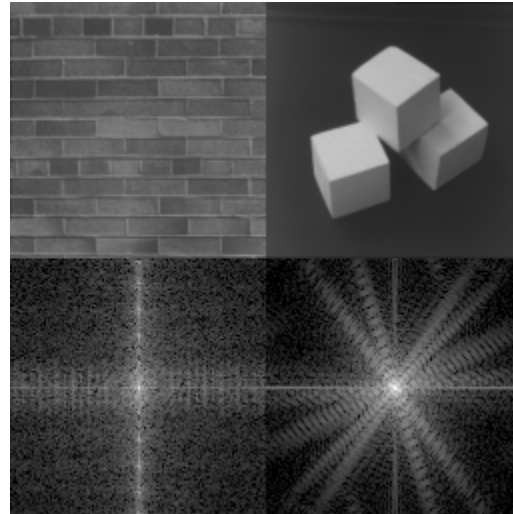
Nature Reviews | Neuroscience

Cohen, Y. E., & Andersen, R. A. (2002). A common reference frame for movement plans in the posterior parietal cortex. *Nature Reviews Neuroscience*, 3(7), 553–562. Retrieved from <http://dx.doi.org/10.1038/nrn873>

How do we recognize shape?

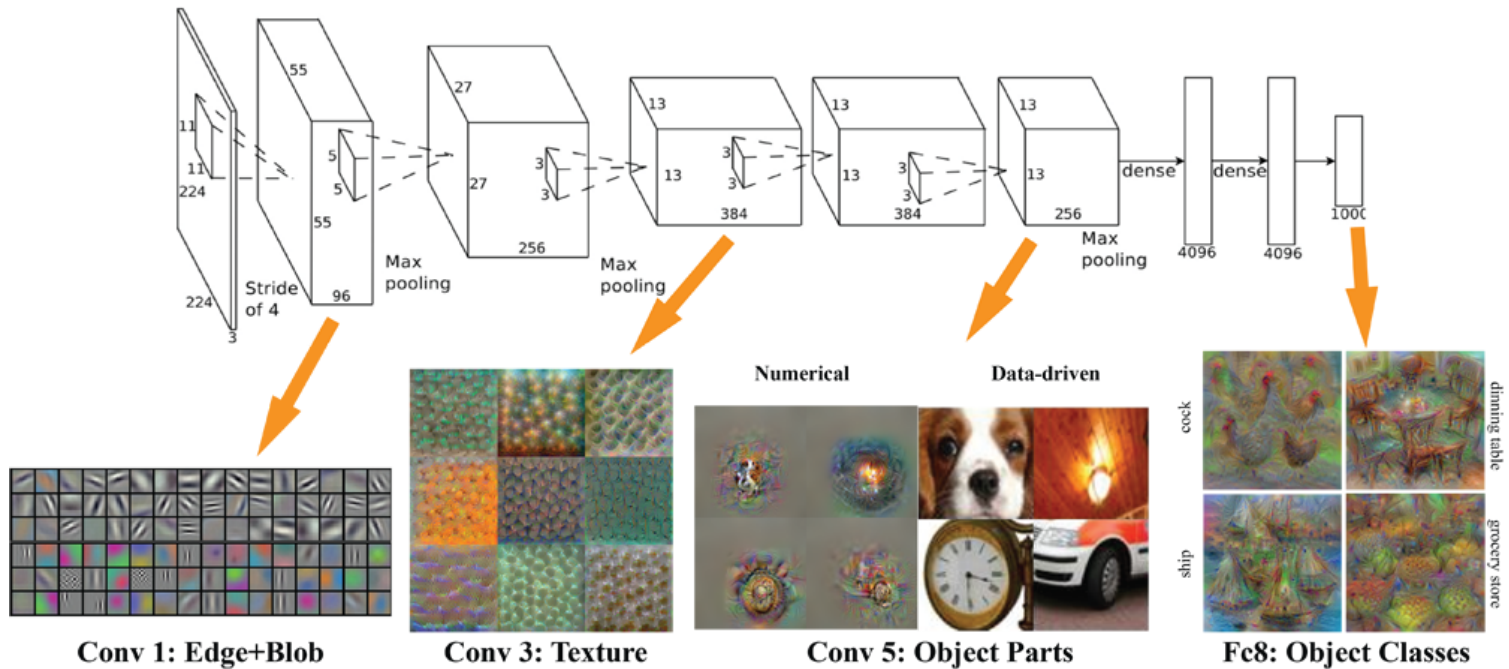
- Templates
- Fourier spectra





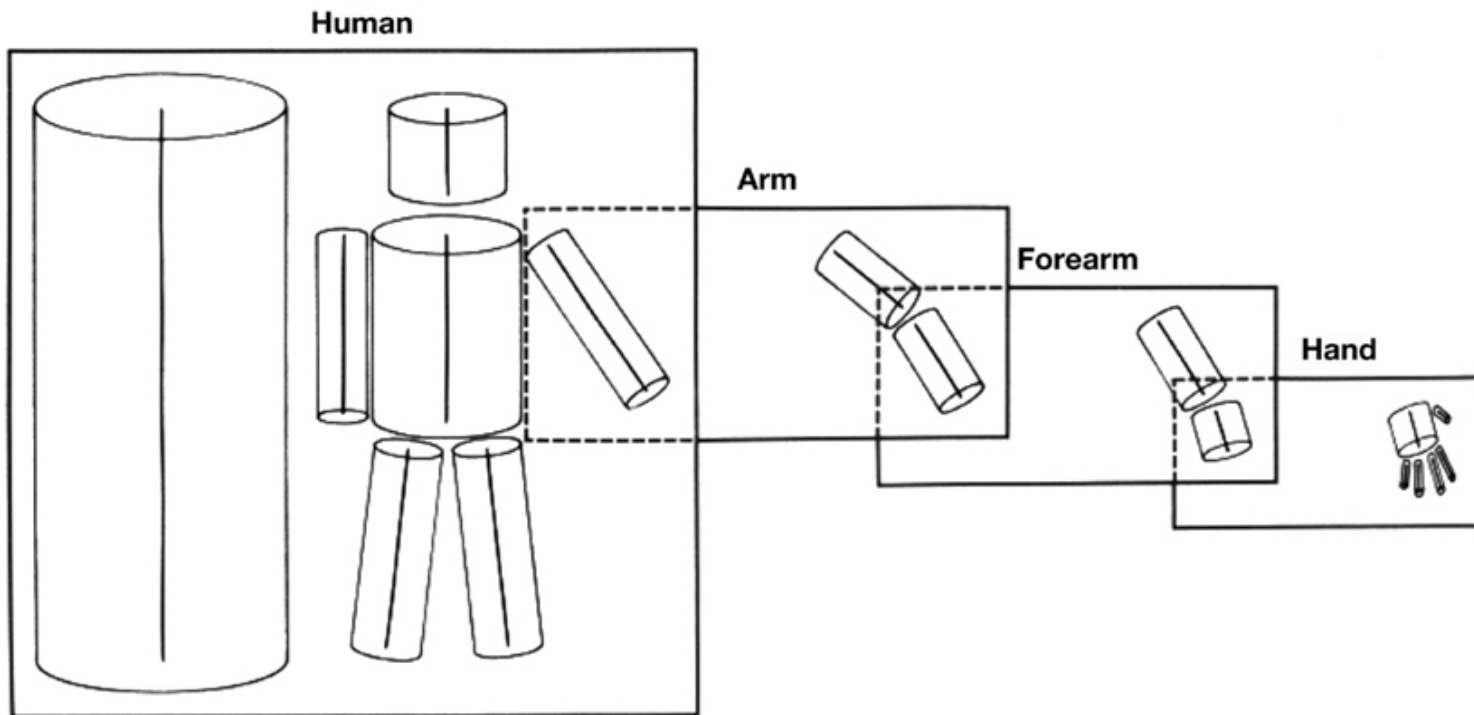
How do we recognize shape?

- Features and dimensions



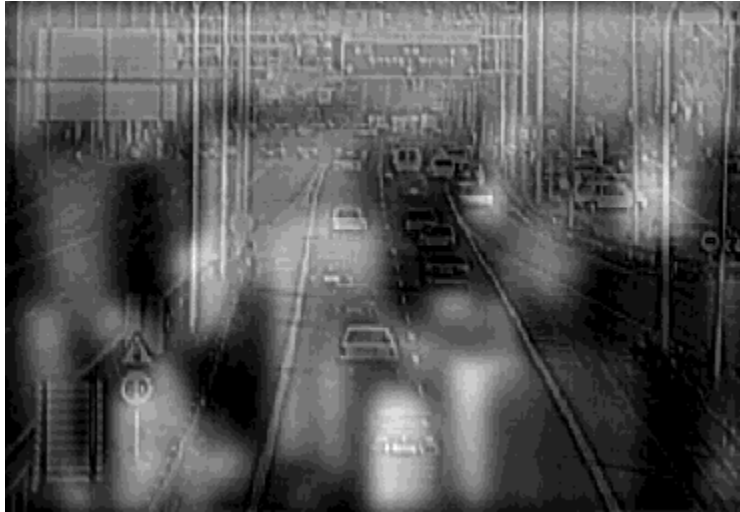
How do we recognize shape?

- Structural descriptions



Rolls, E. T. (2012). Invariant Visual Object and Face Recognition: Neural and Computational Bases, and a Model, VisNet. *Frontiers in computational neuroscience*, 6, 35. Retrieved from <http://dx.doi.org/10.3389/fncom.2012.00035>

Schyns, P. G., & Oliva, A. (1994). From Blobs to Boundary Edges: Evidence for Time- and Spatial-Scale-Dependent Scene Recognition. *Psychological Science*, 5(4), 195–200. SAGE Publications Inc. Retrieved from <https://doi.org/10.1111/j.1467-9280.1994.tb00500.x>



Face illusion Mr. Angry - Mr. Smile

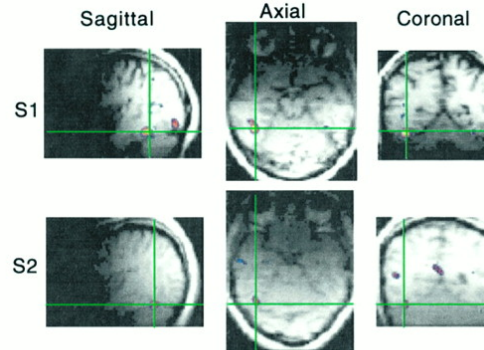
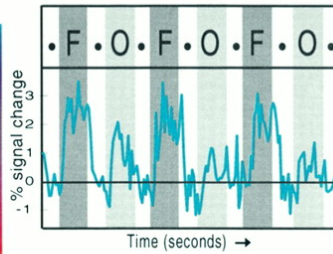
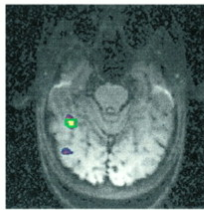


Kanwisher, N., McDermott, J., & Chun, M. M. (1997). The fusiform face area: a module in human extrastriate cortex specialized for face perception. *The Journal of Neuroscience*, 17(11), 4302–4311. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/9151747>

Questions to ponder

- What do Kanwisher et al. mean when they say that fusiform cortex is i) a module that is ii) specialized for face perception?
- What is an alternative view?

1a. Faces > Objects



1b. Objects > Faces

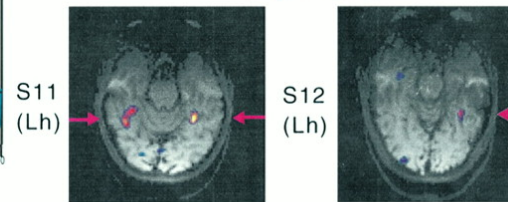
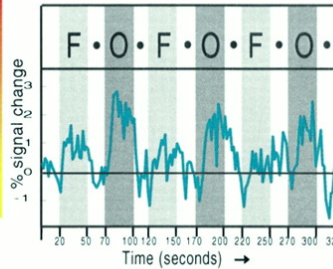
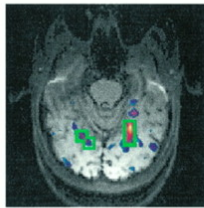
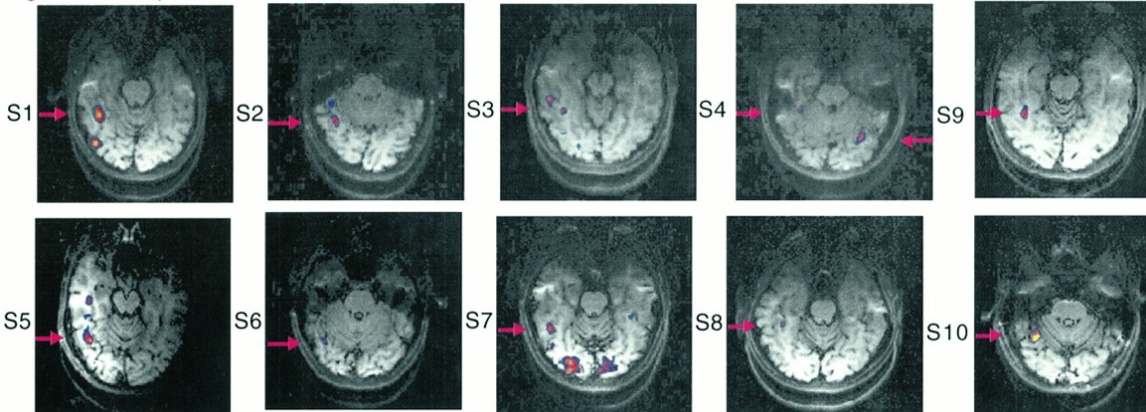
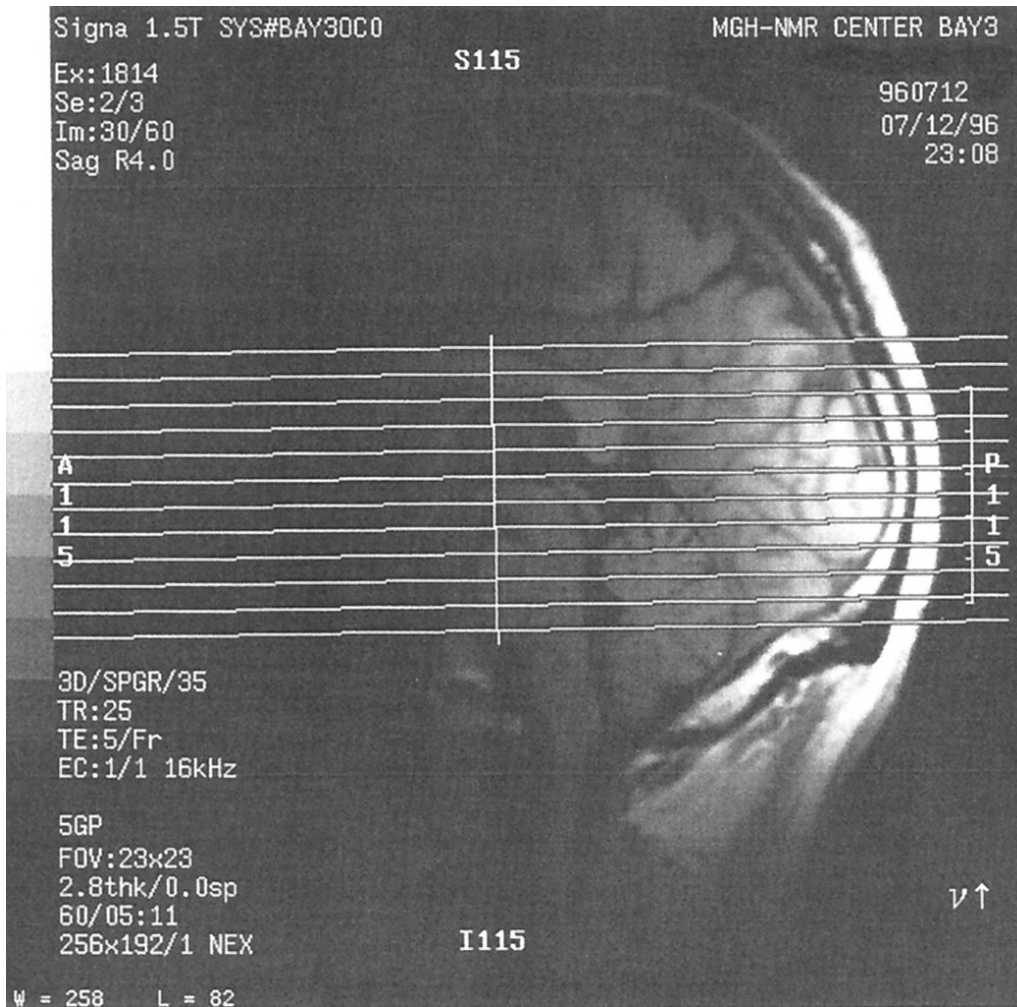


Fig 2. 12 Subjects

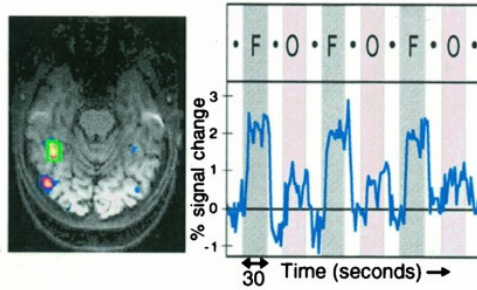
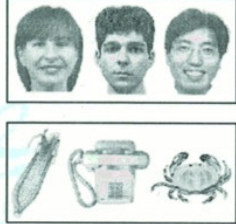


Kanwisher et al., 1997

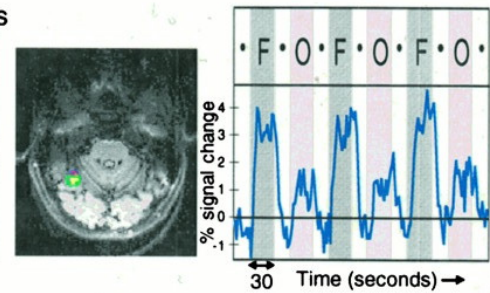
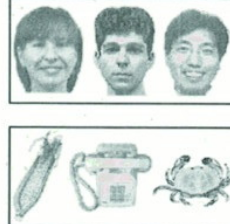


Kanwisher et al., 1997

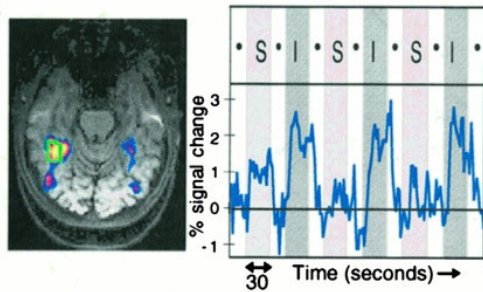
3a. Faces > Objects



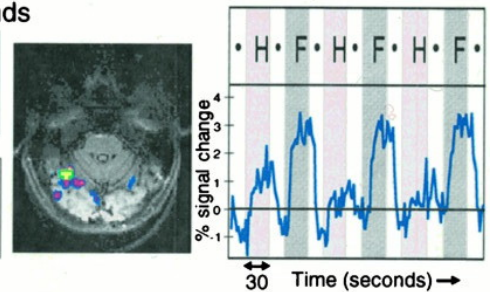
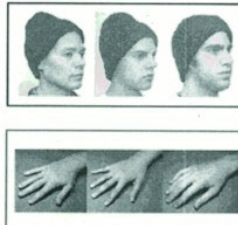
4a. Faces > Objects



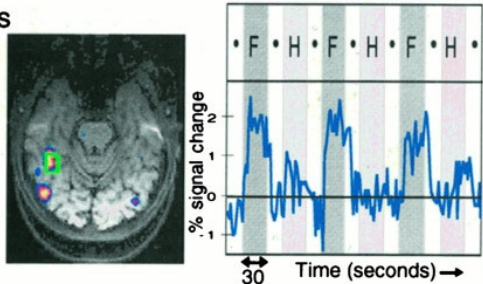
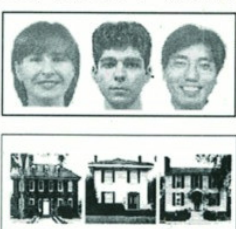
3b. Intact Faces > Scrambled Faces



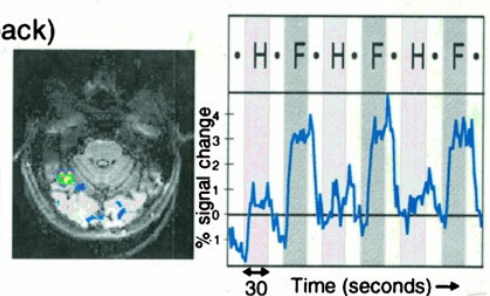
4b. 3/4 Faces > Hands



3c. Faces > Houses

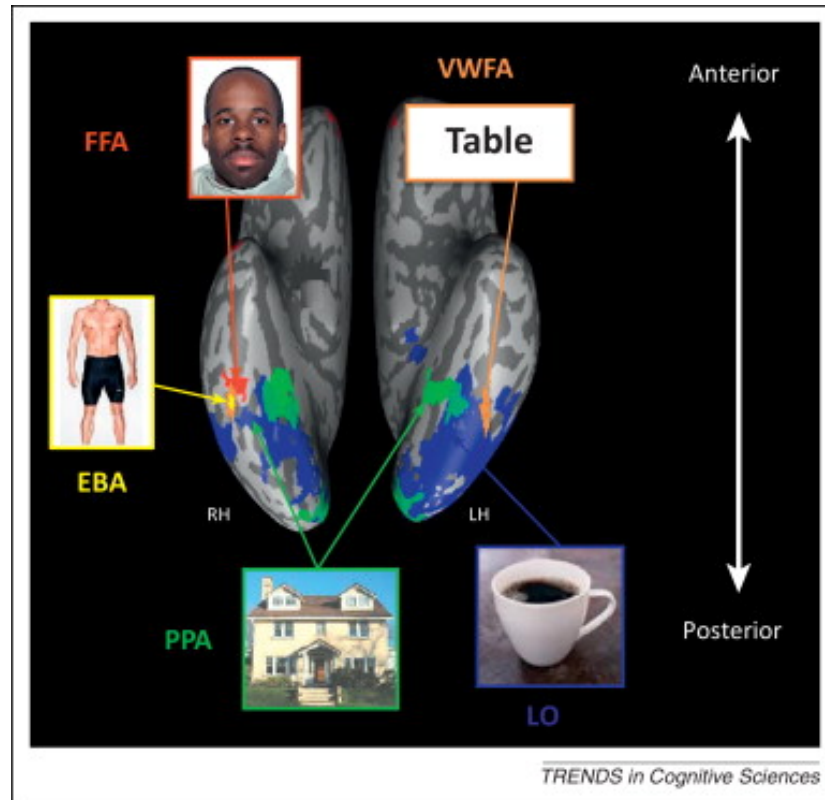


4c. 3/4 F > H (1-back)



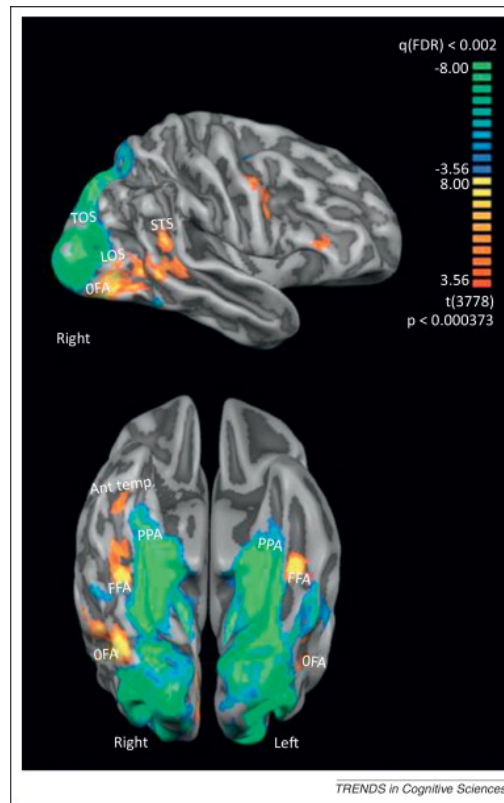
Kanwisher et al., 1997

Alternative views



Behrmann & Plaut, 2013

Faces vs. buildings



Behrmann & Plaut, 2013

Next time...

Color

Lee, T.-W., Wachtler, T., & Sejnowski, T. J. (2002). Color opponency is an efficient representation of spectral properties in natural scenes. *Vision Research*, 42(17), 2095–2103. Elsevier. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/12169429>

Nikolić, D., Lichti, P., & Singer, W. (2007). Color opponency in synaesthetic experiences. *Psychological Science*, 18(6), 481–486. journals.sagepub.com. Retrieved from <http://dx.doi.org/10.1111/j.1467-9280.2007.01925.x>

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