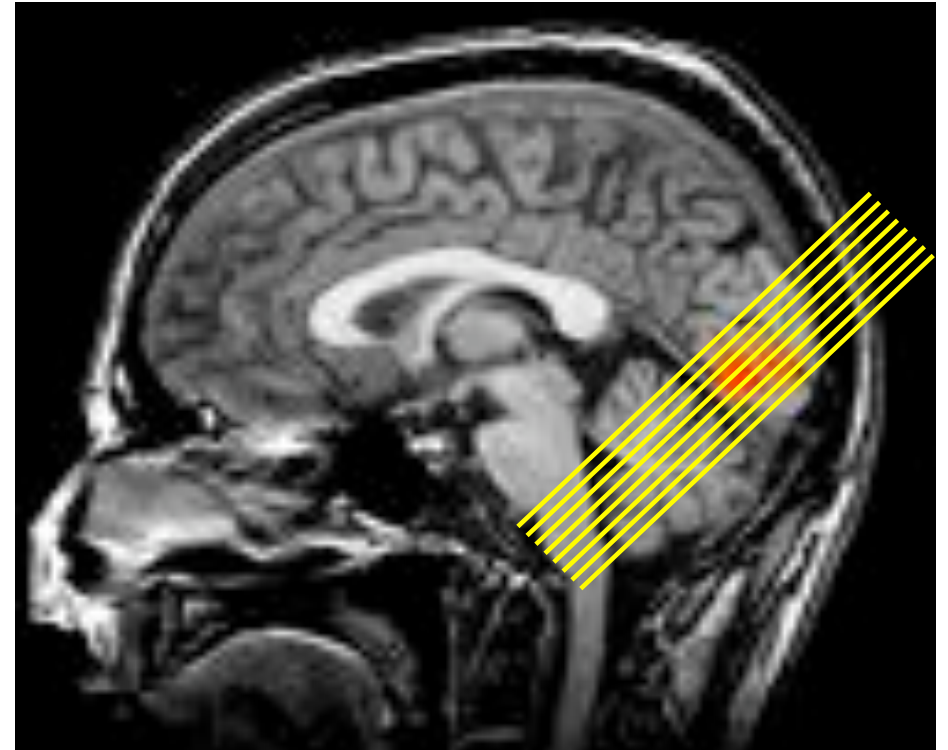
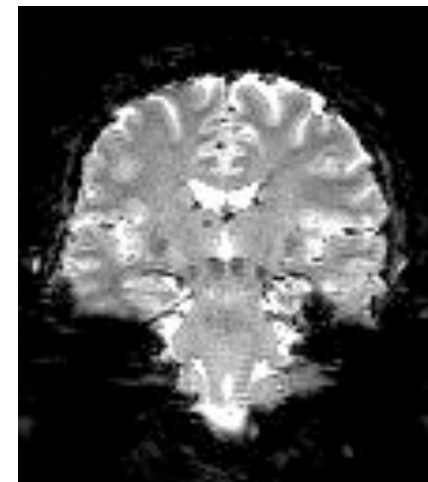
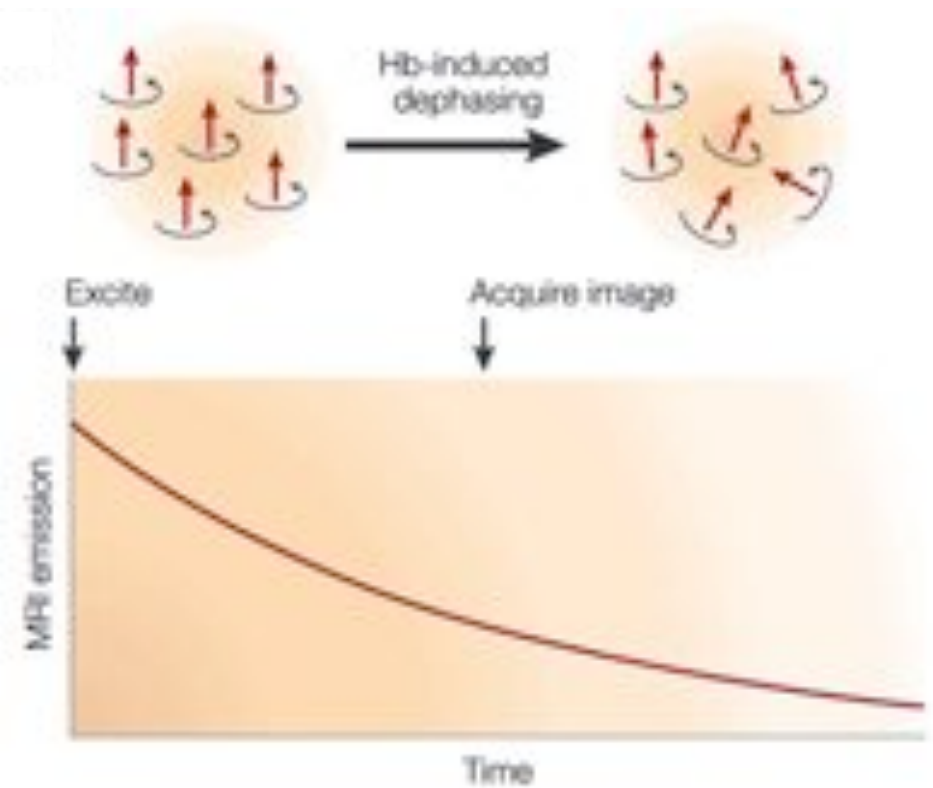
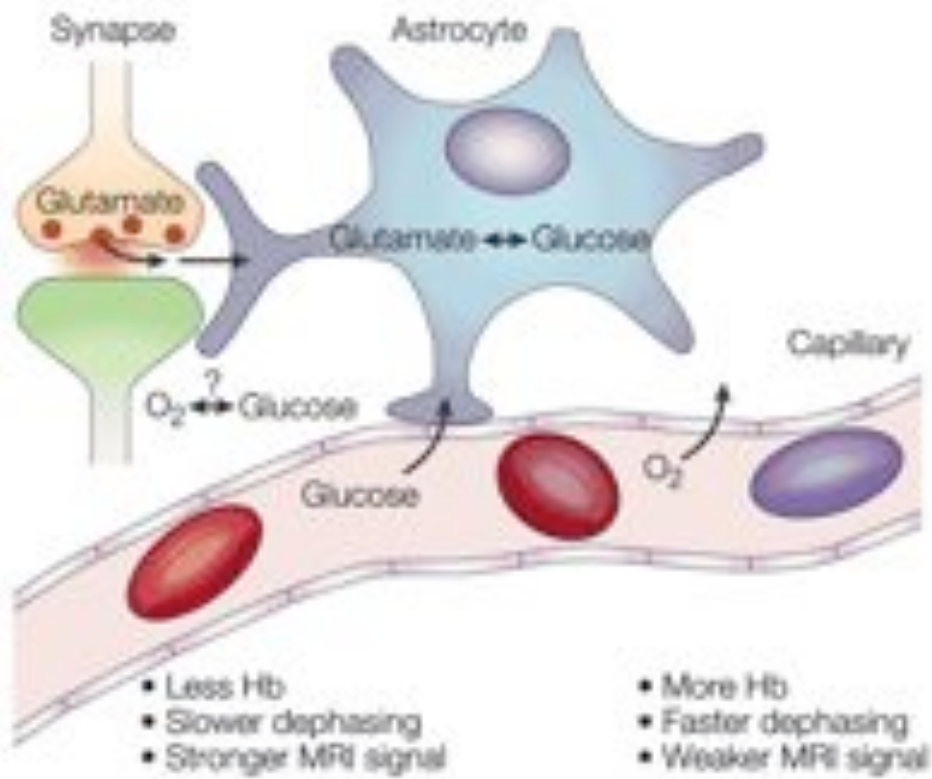


Functional magnetic resonance imaging



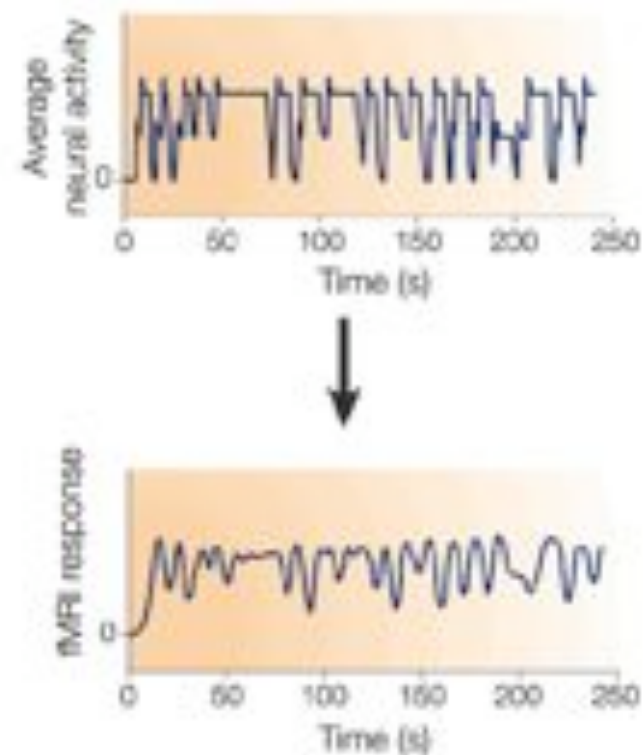
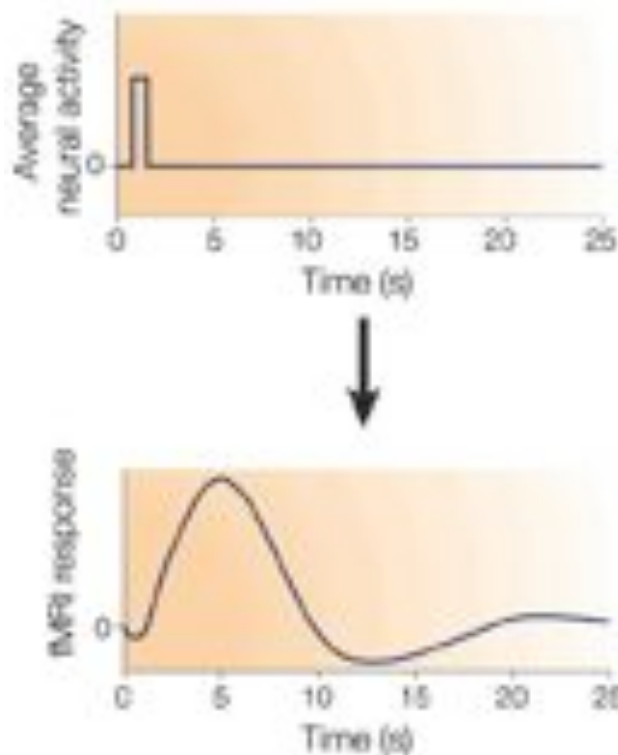
Revolution in psychology and neuroscience: ~1000 papers published per month over the past 5 years!

Indirect measure of neural activity

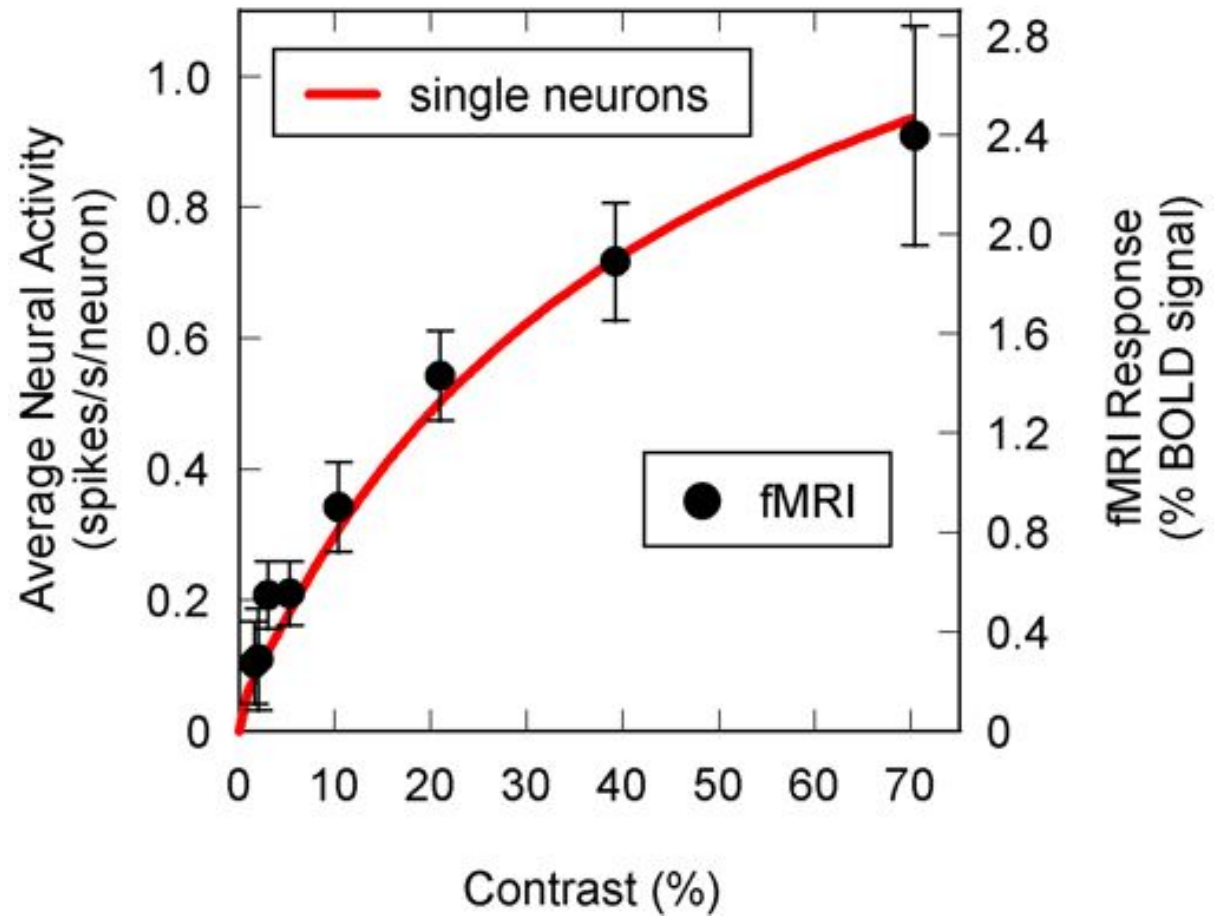
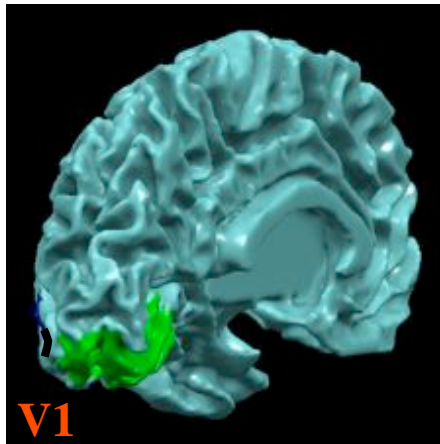
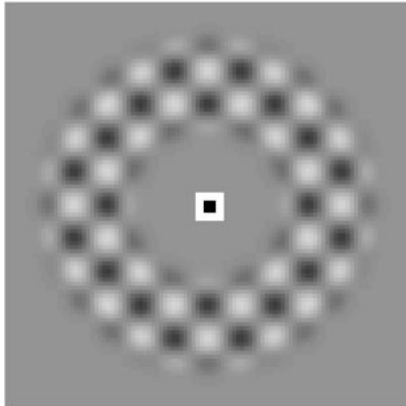


The linearity hypothesis

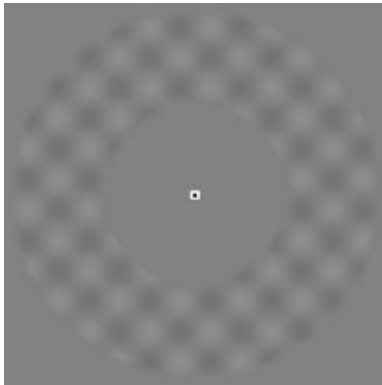
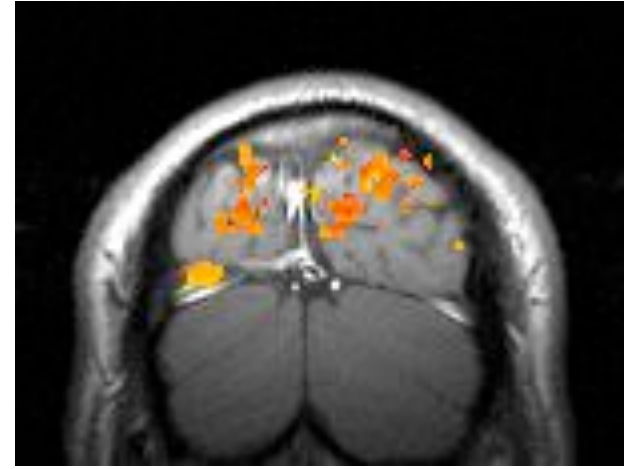
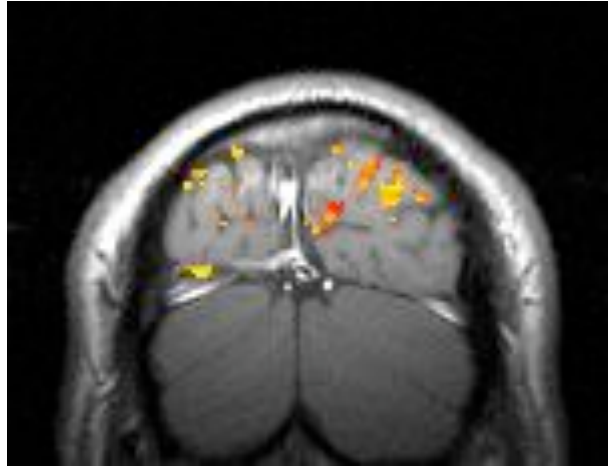
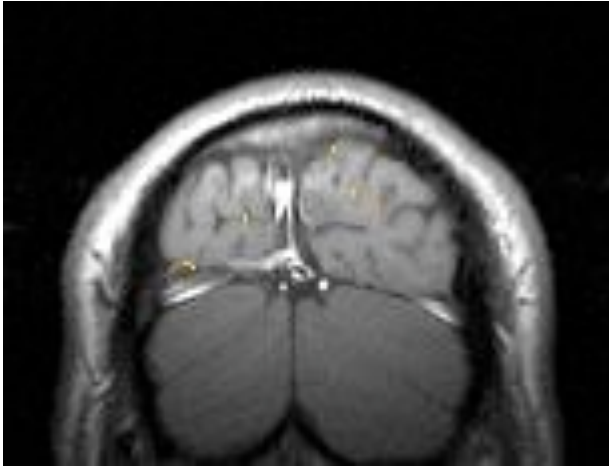
fMRI signal is approximately proportional to a measure of local neural activity, averaged over a spatial extent of several millimeters and over a time period of several seconds.



V1 contrast-response

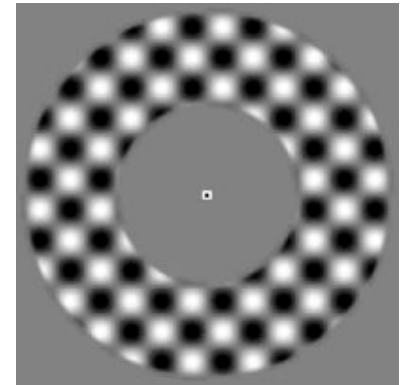


Beware of statistical thresholds



low

stimulus contrast



high

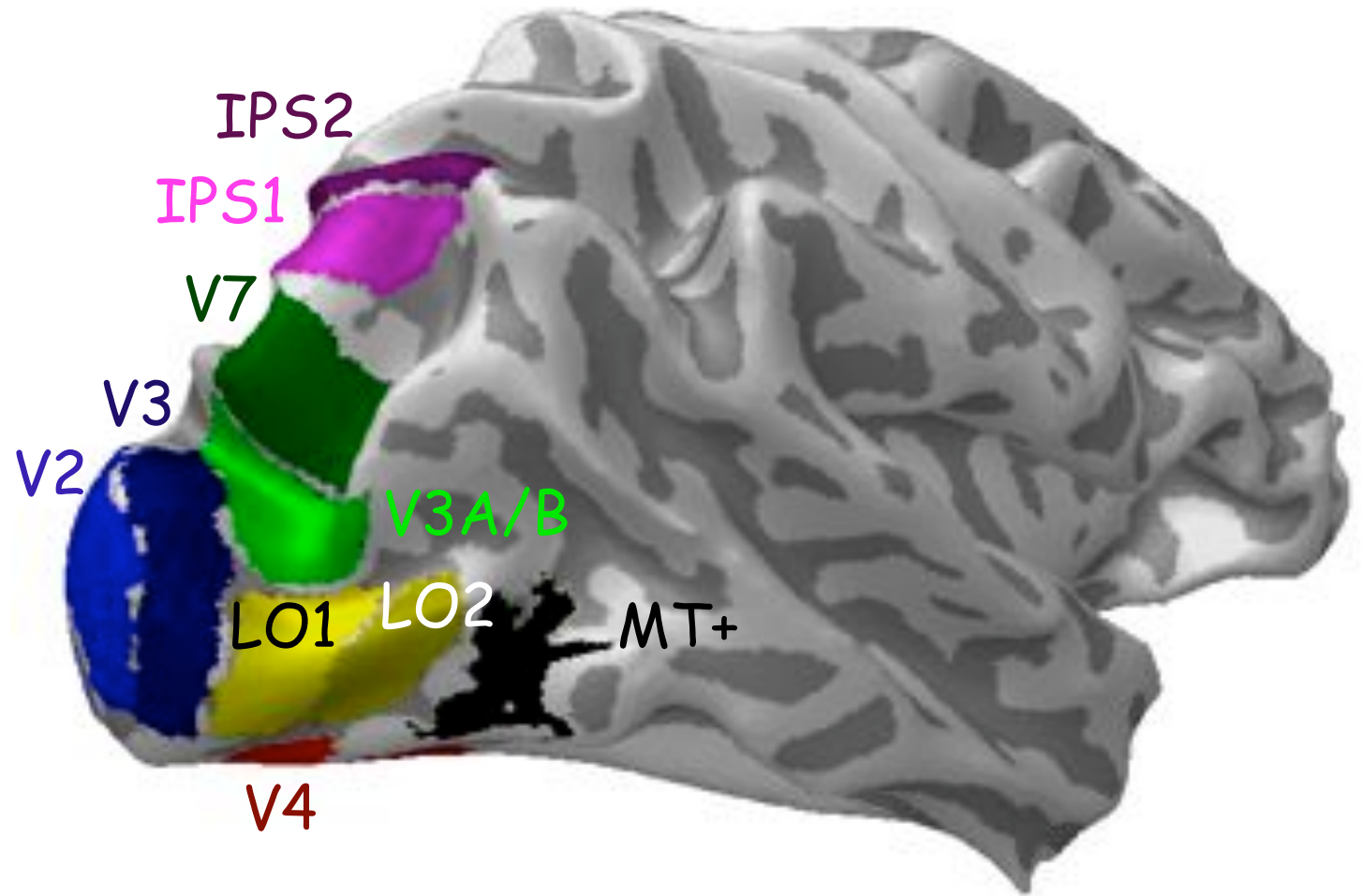
Topography and Visual Cortical Areas

What is a visual cortical area?

PhACT:

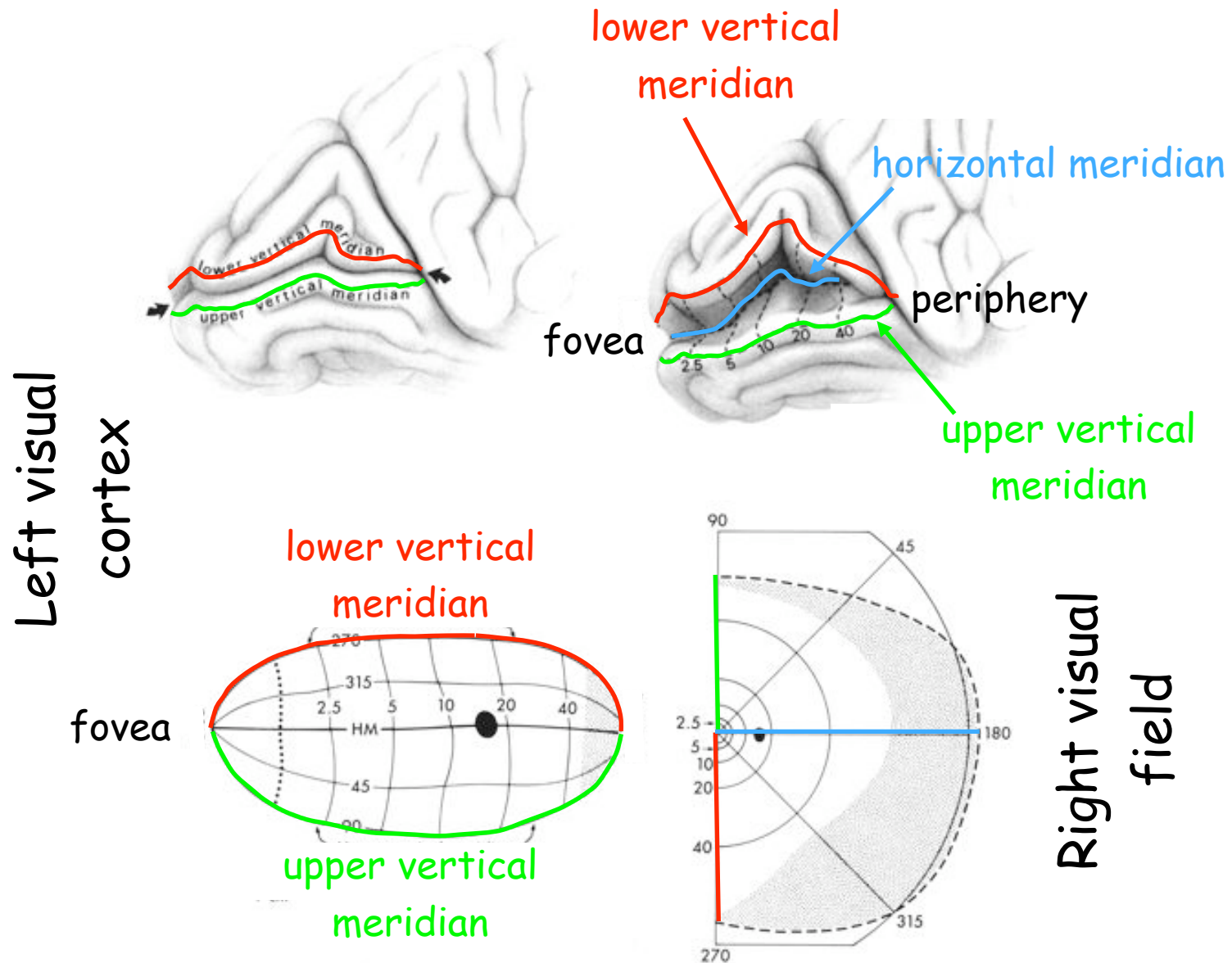
- Physiology
- Architecture
- Connections
- Topography

Visual maps in the brain

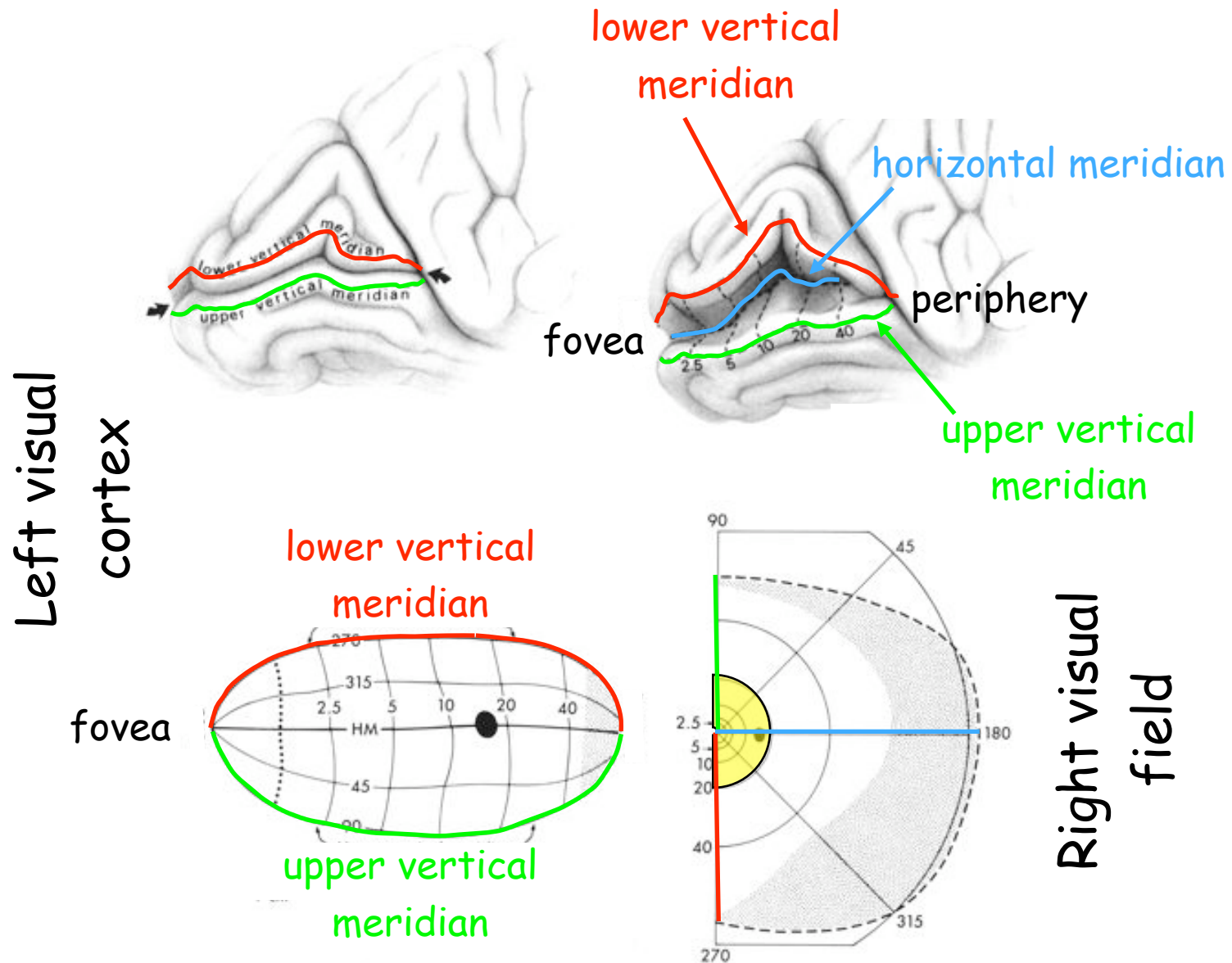


Each visual brain area contains a map of the visual world and performs a different function.

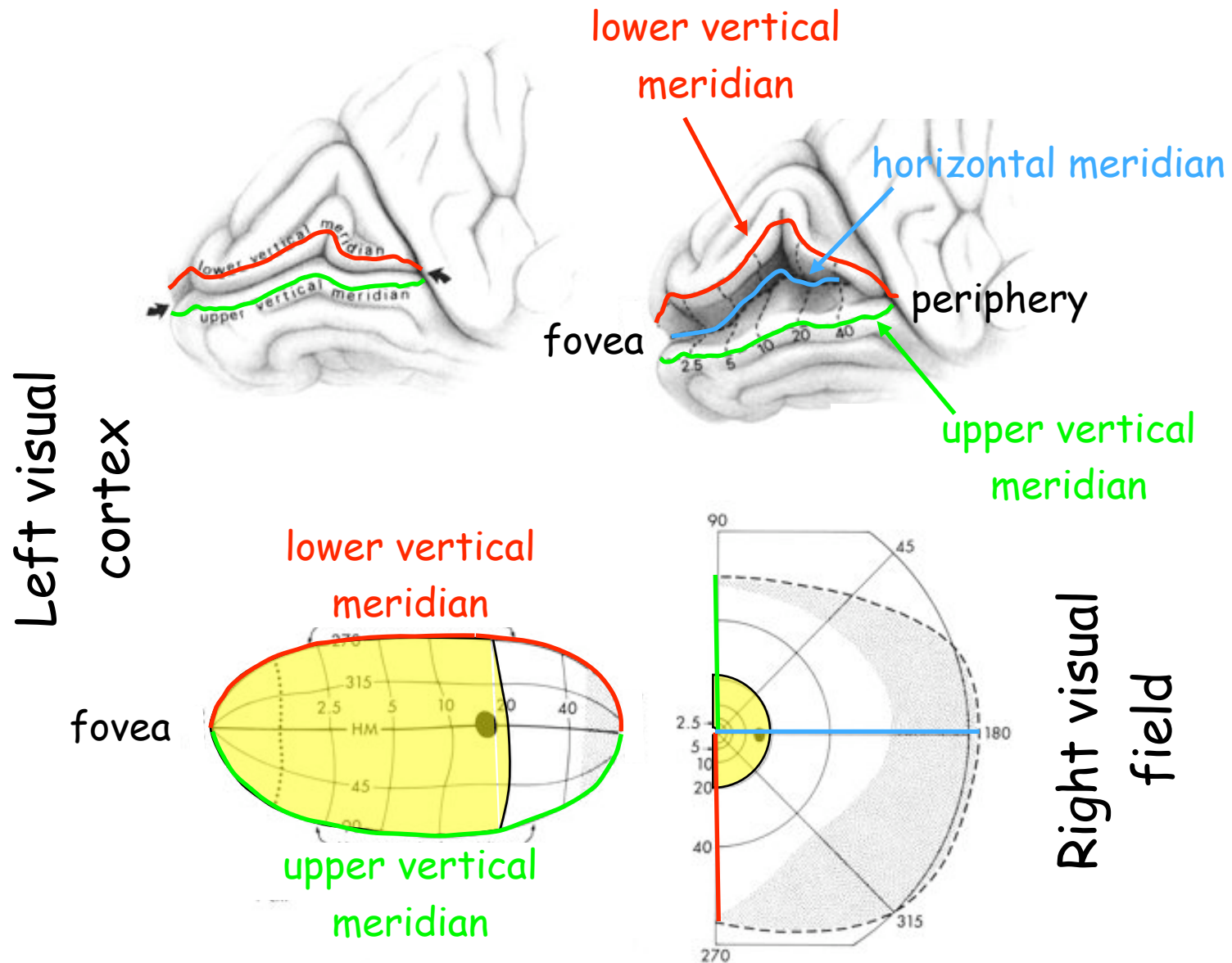
Topography (human V1)



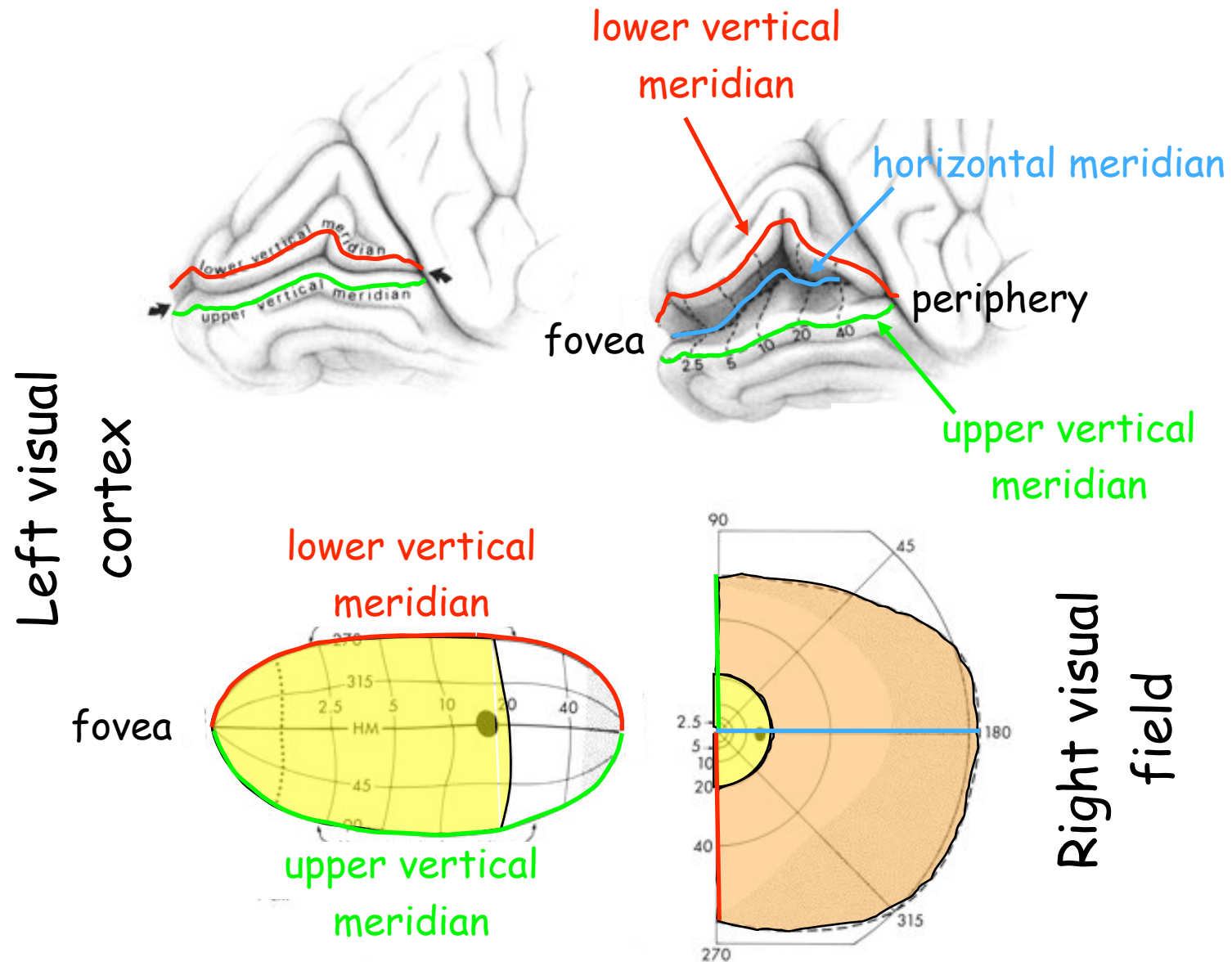
Topography (human V1)



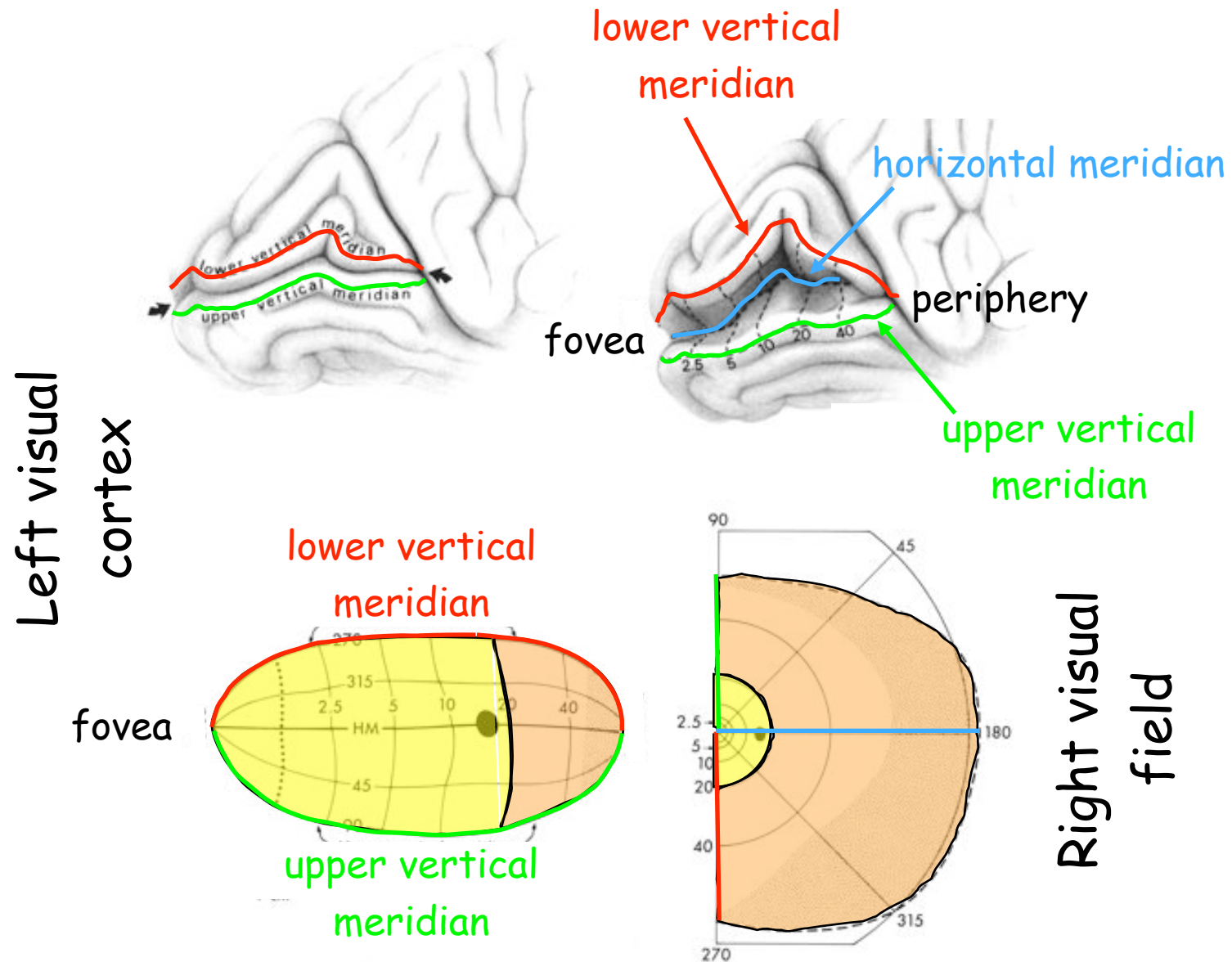
Topography (human V1)



Topography (human V1)



Topography (human V1)



Retinotopy

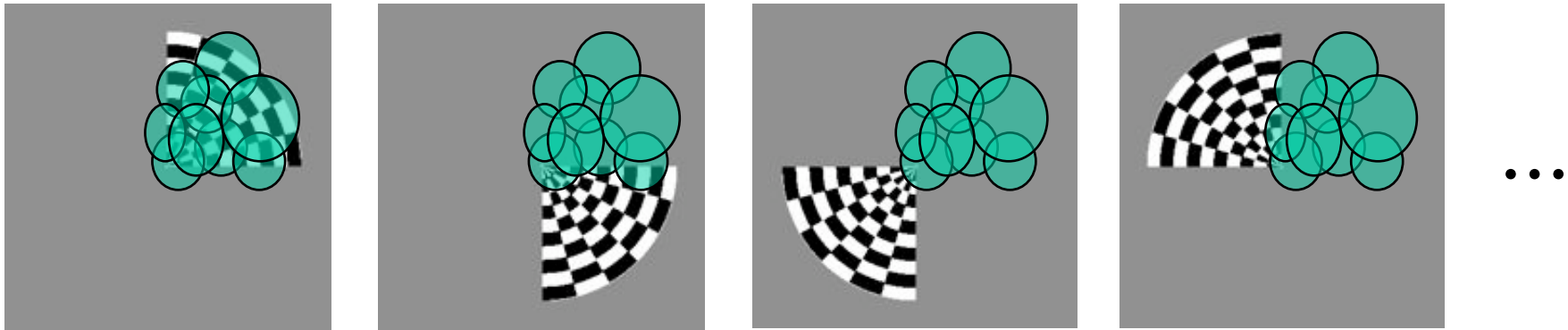
Radial component



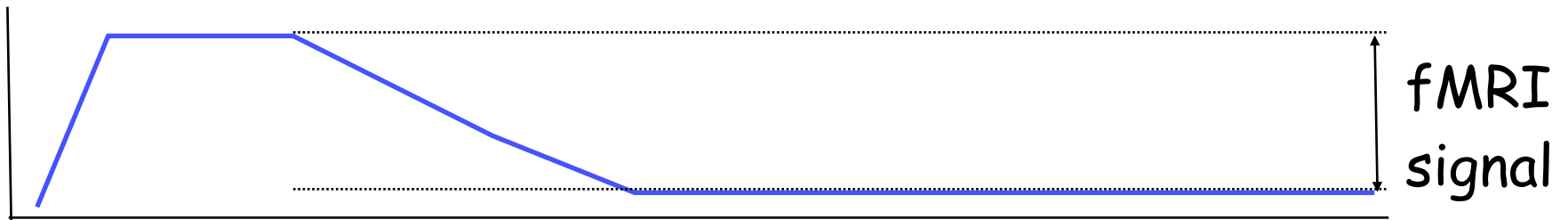
Angular component



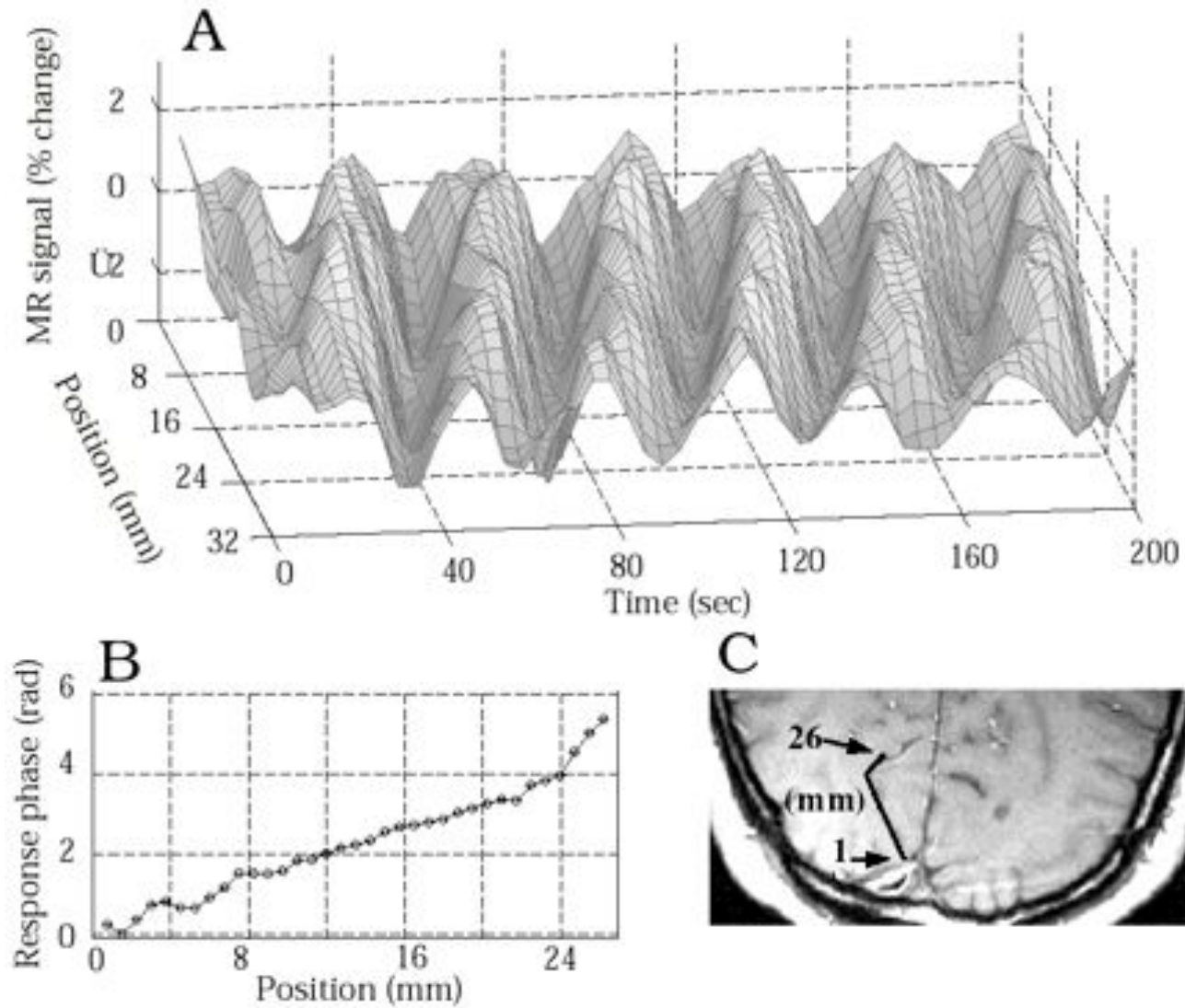
Timing of activity, response phase



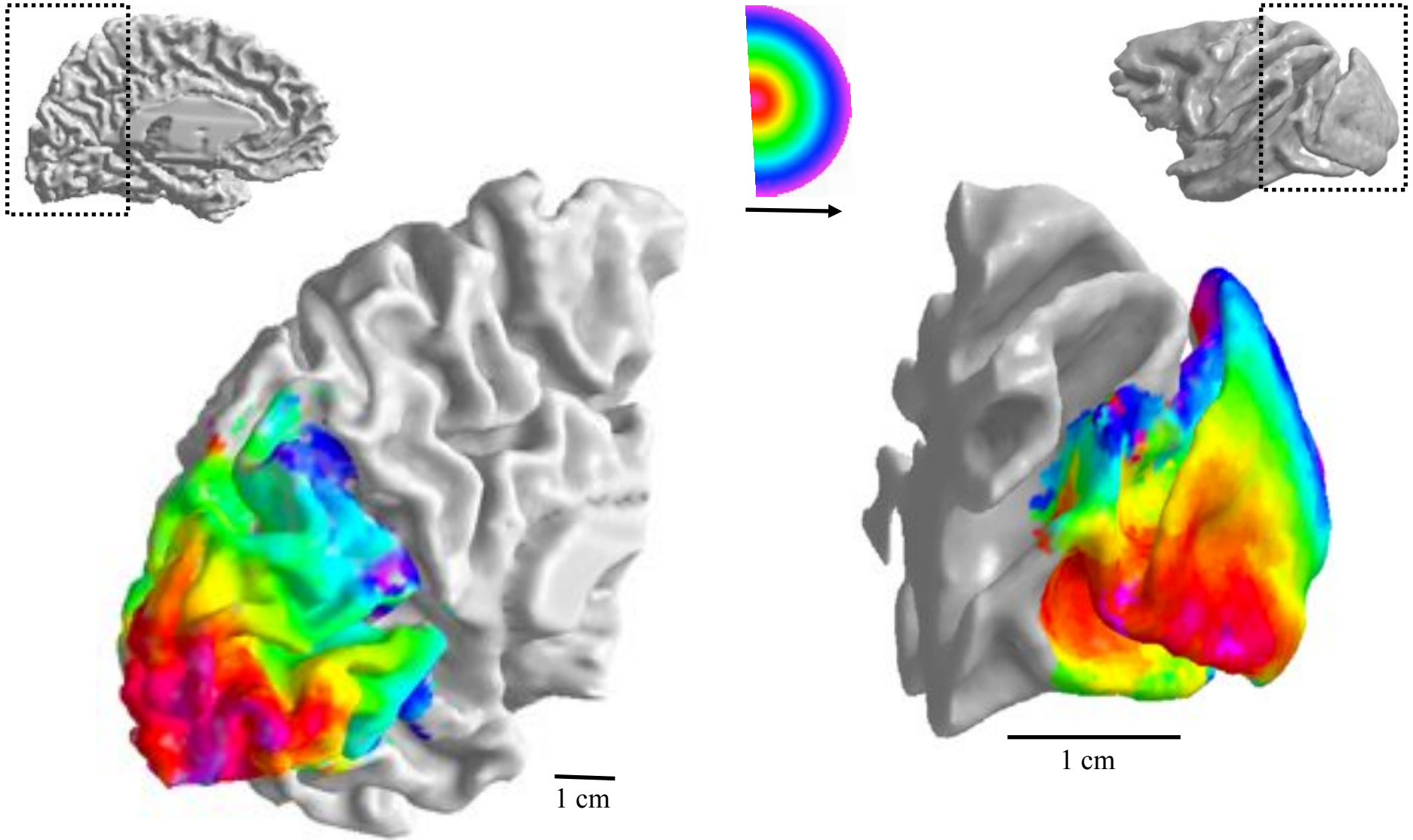
Time →



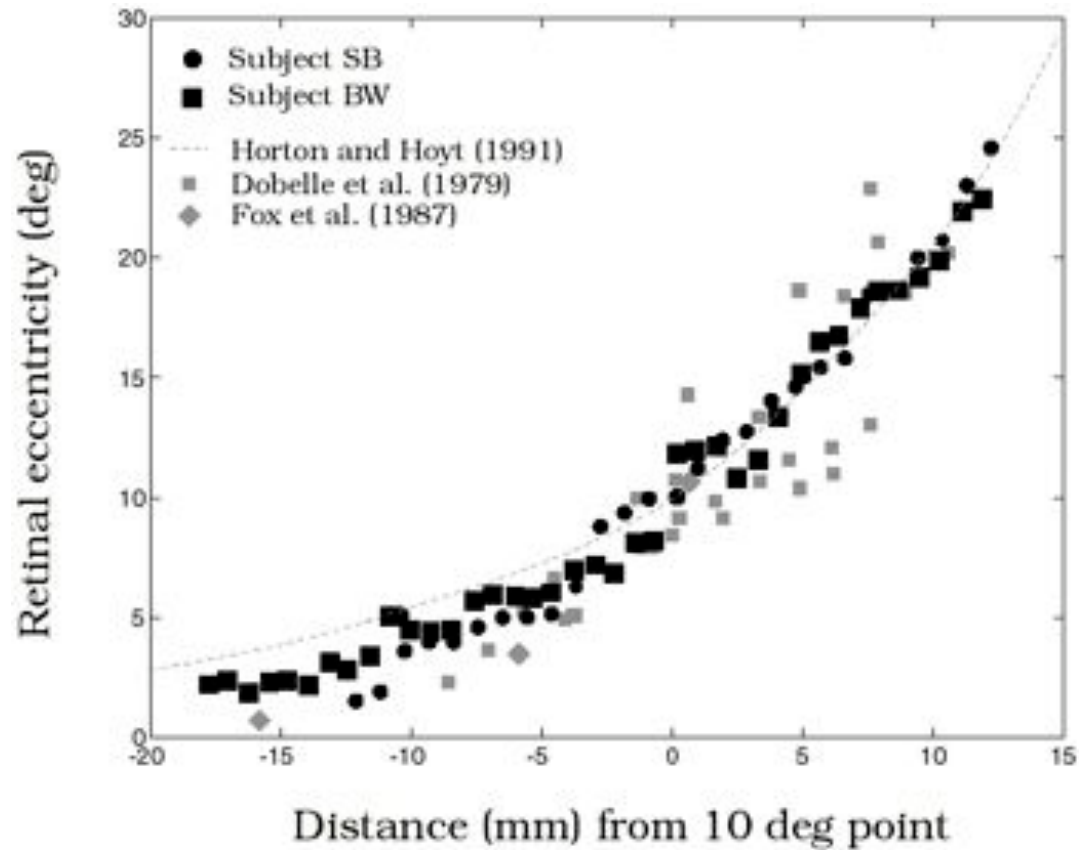
Traveling wave



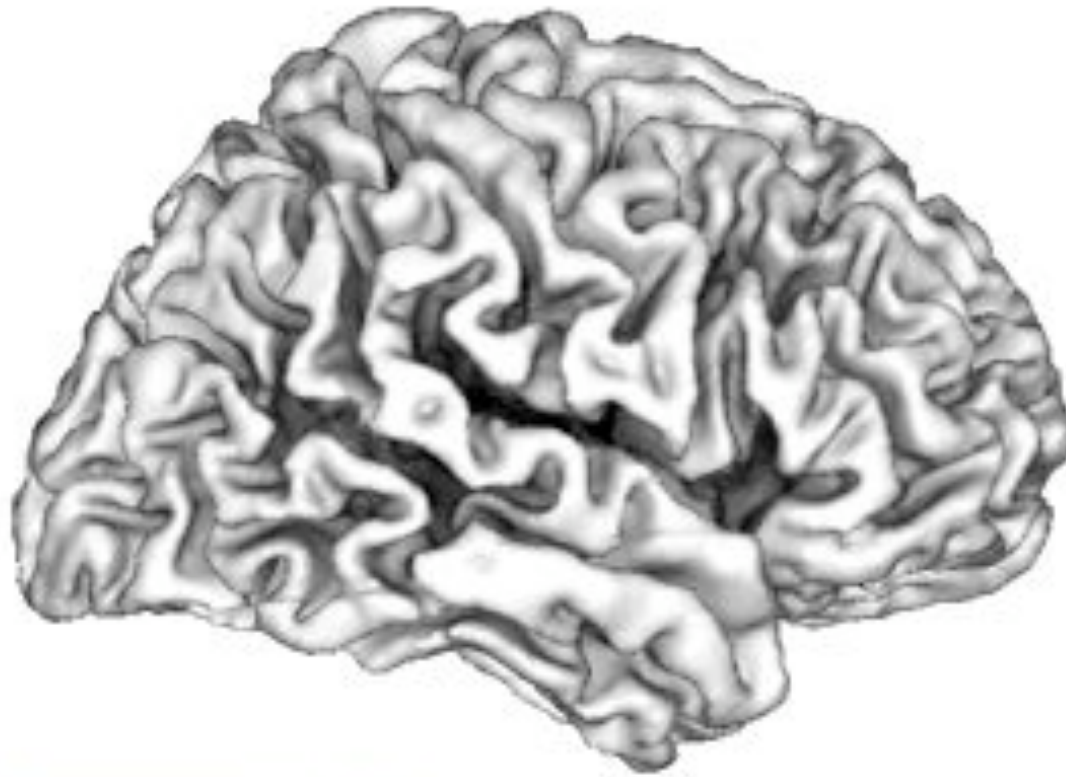
Retinotopy: radial component



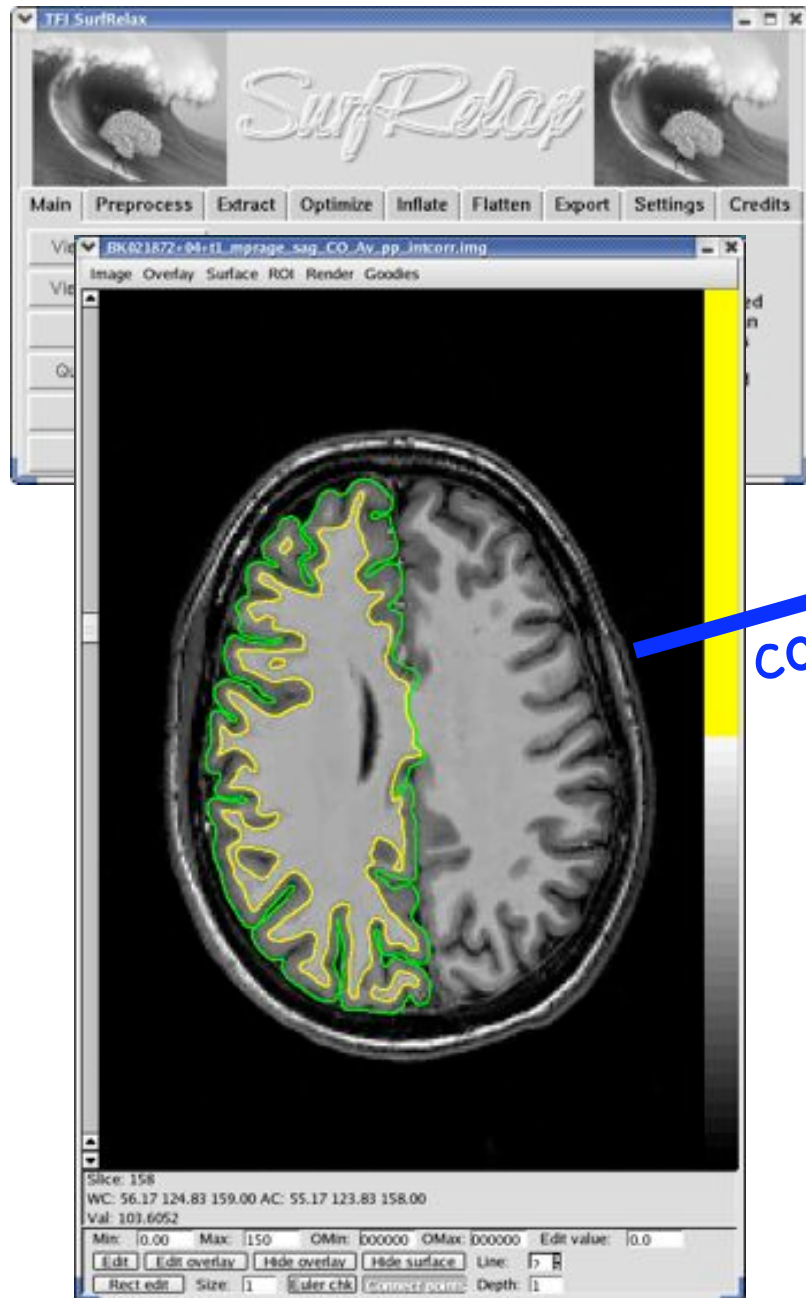
Cortical magnification



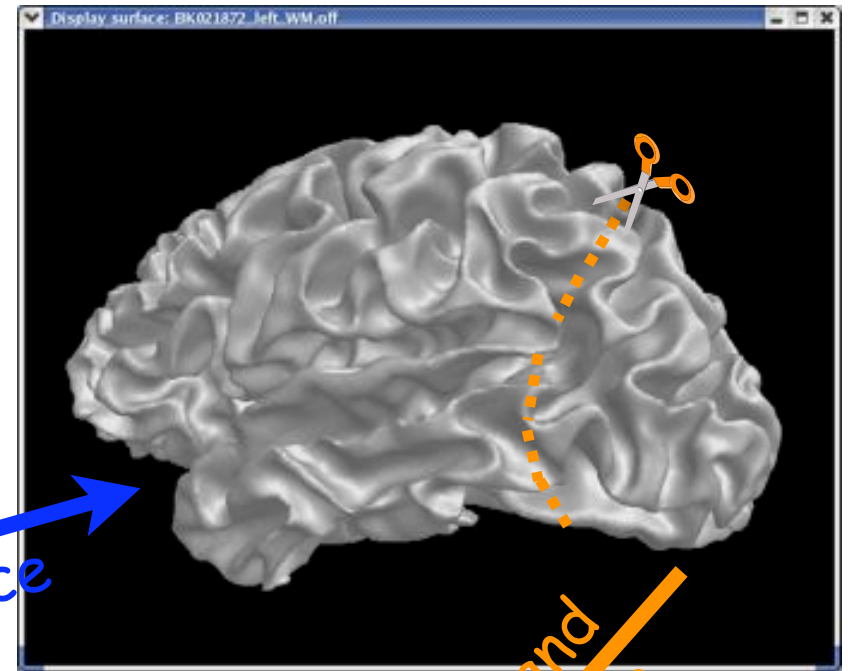
Flat maps of the cortical surface



Cortical segmentation & flattening

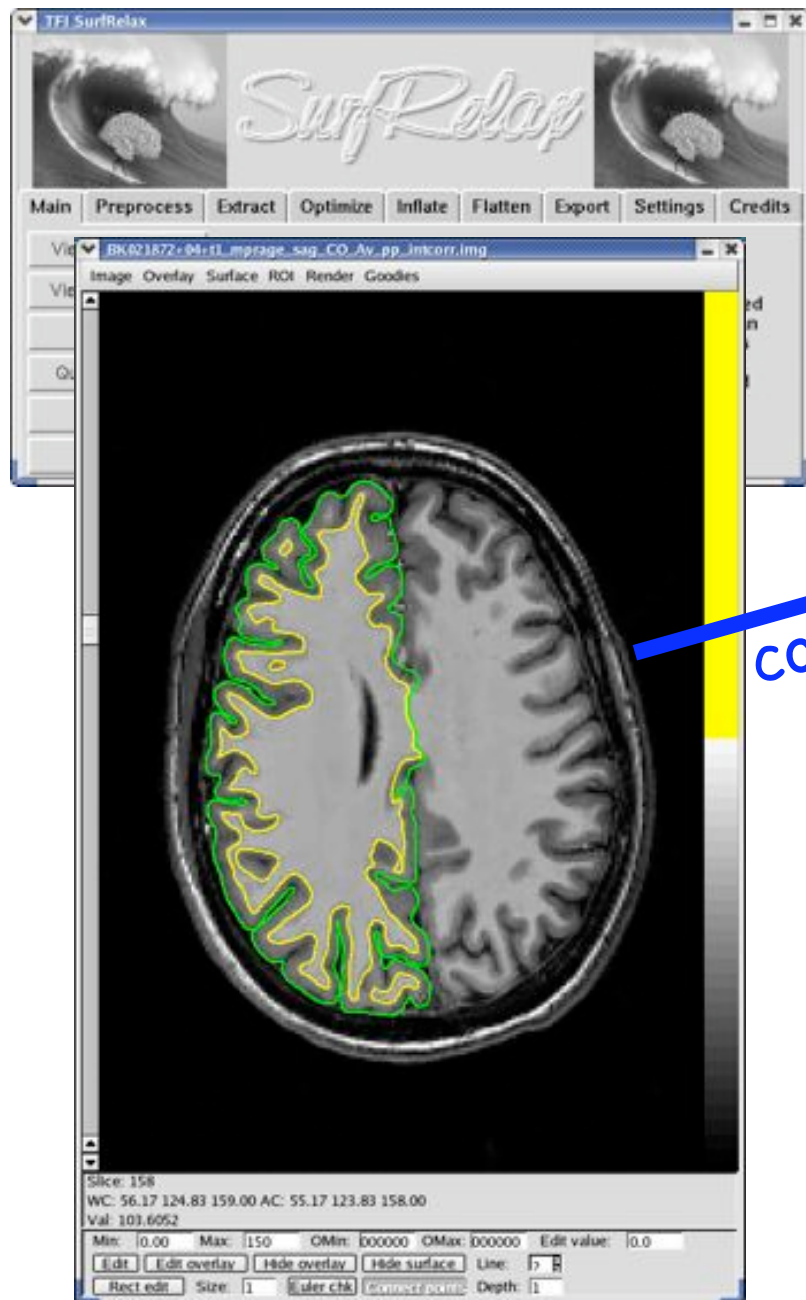


extract
cortical surface

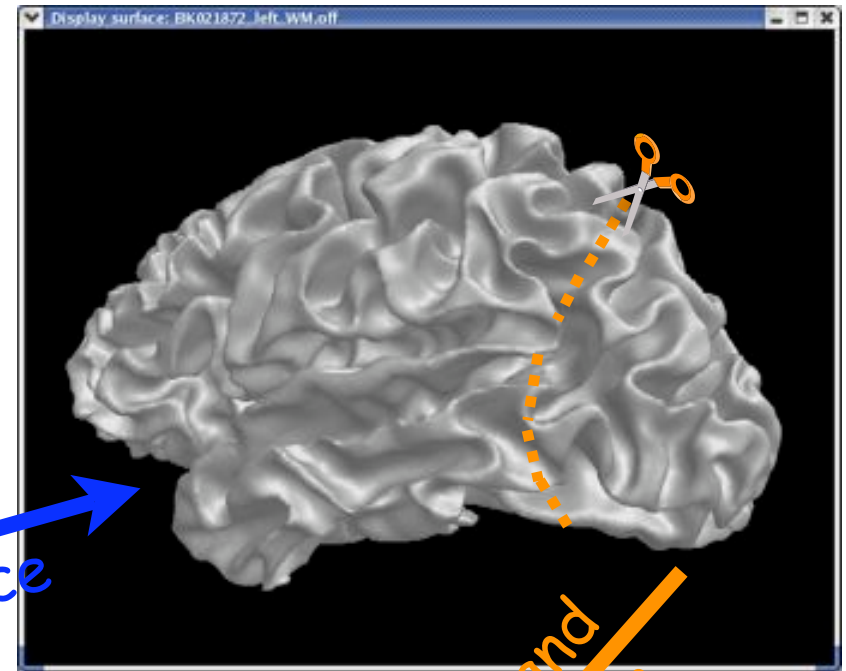


cut and
flatten

Cortical segmentation & flattening



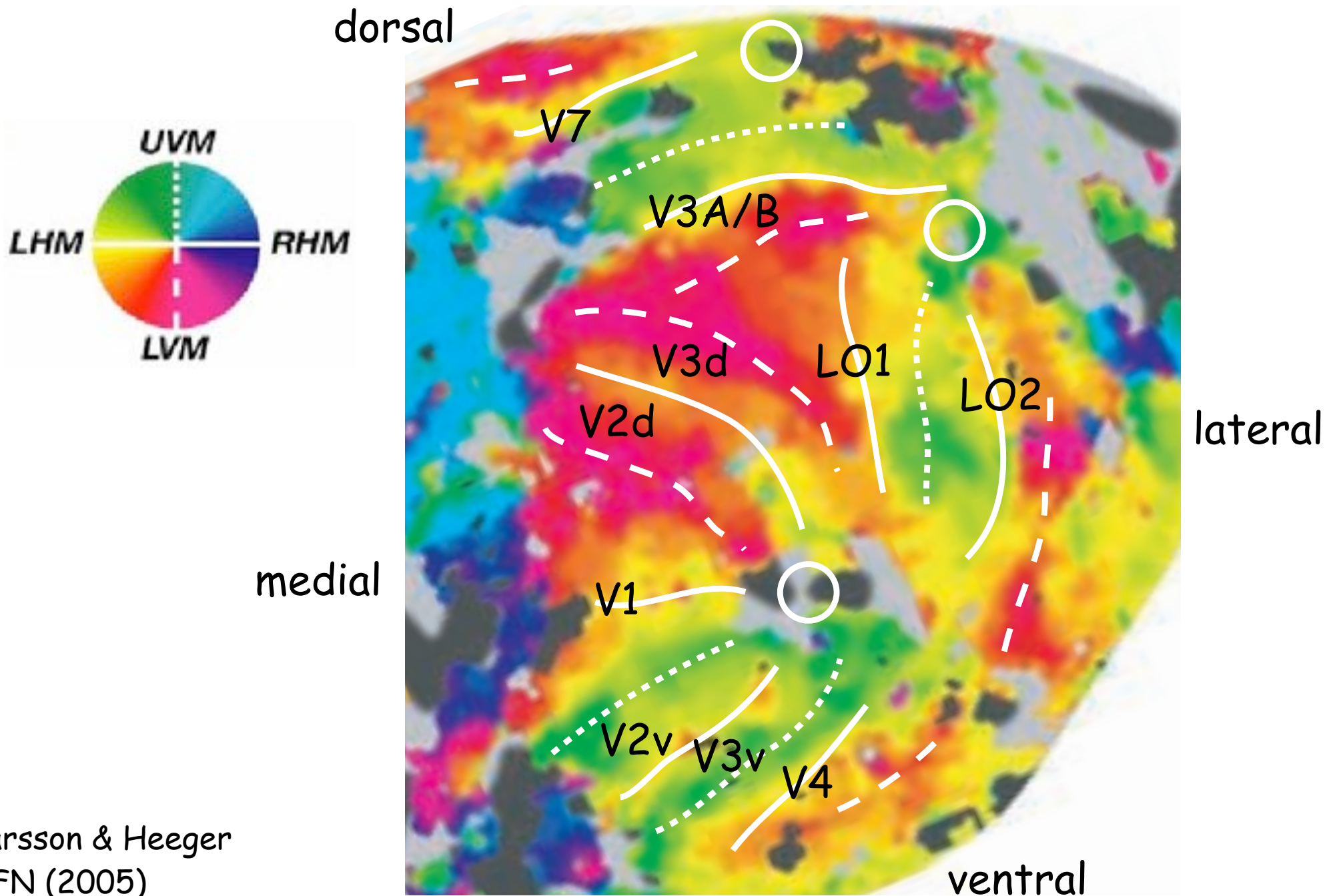
extract
cortical surface



cut and
flatten

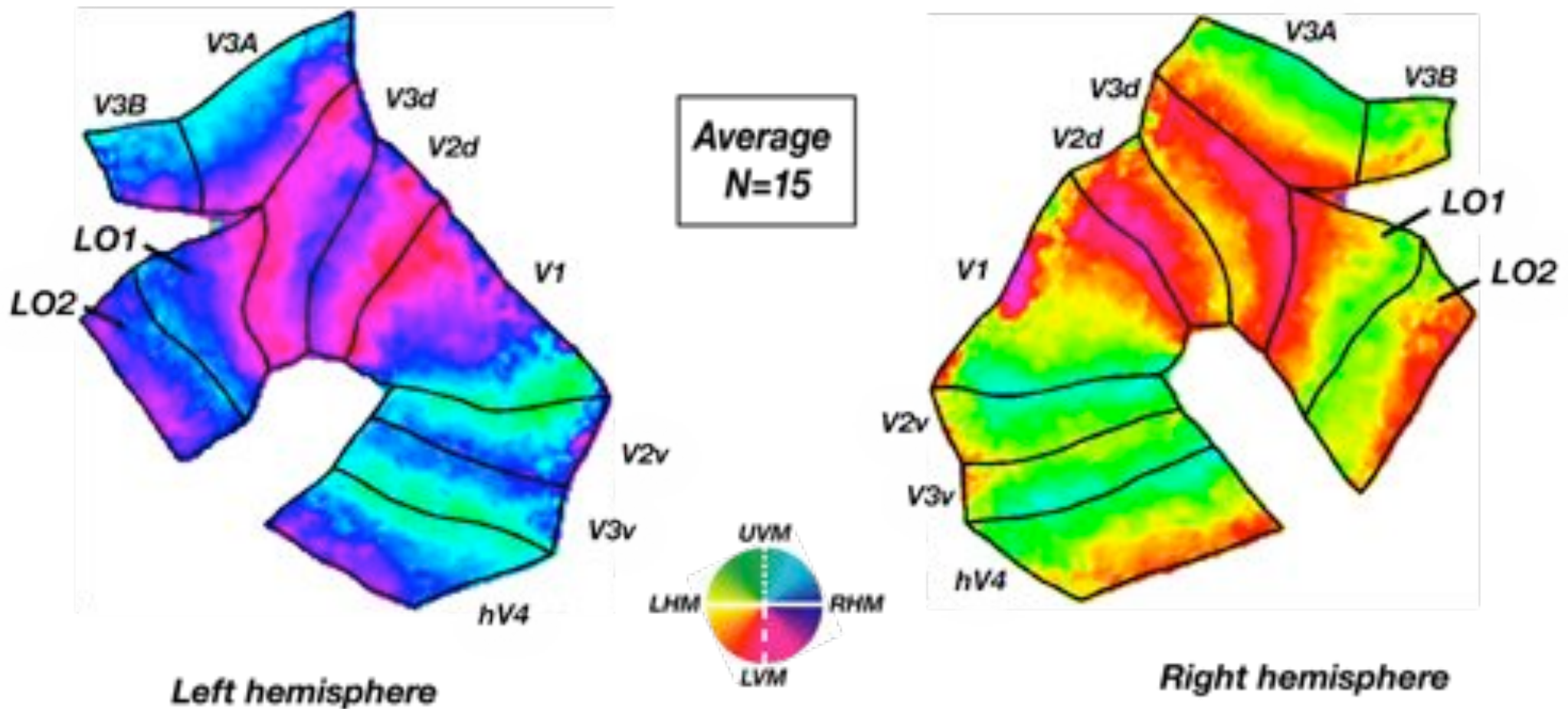


Retinotopy: angular component

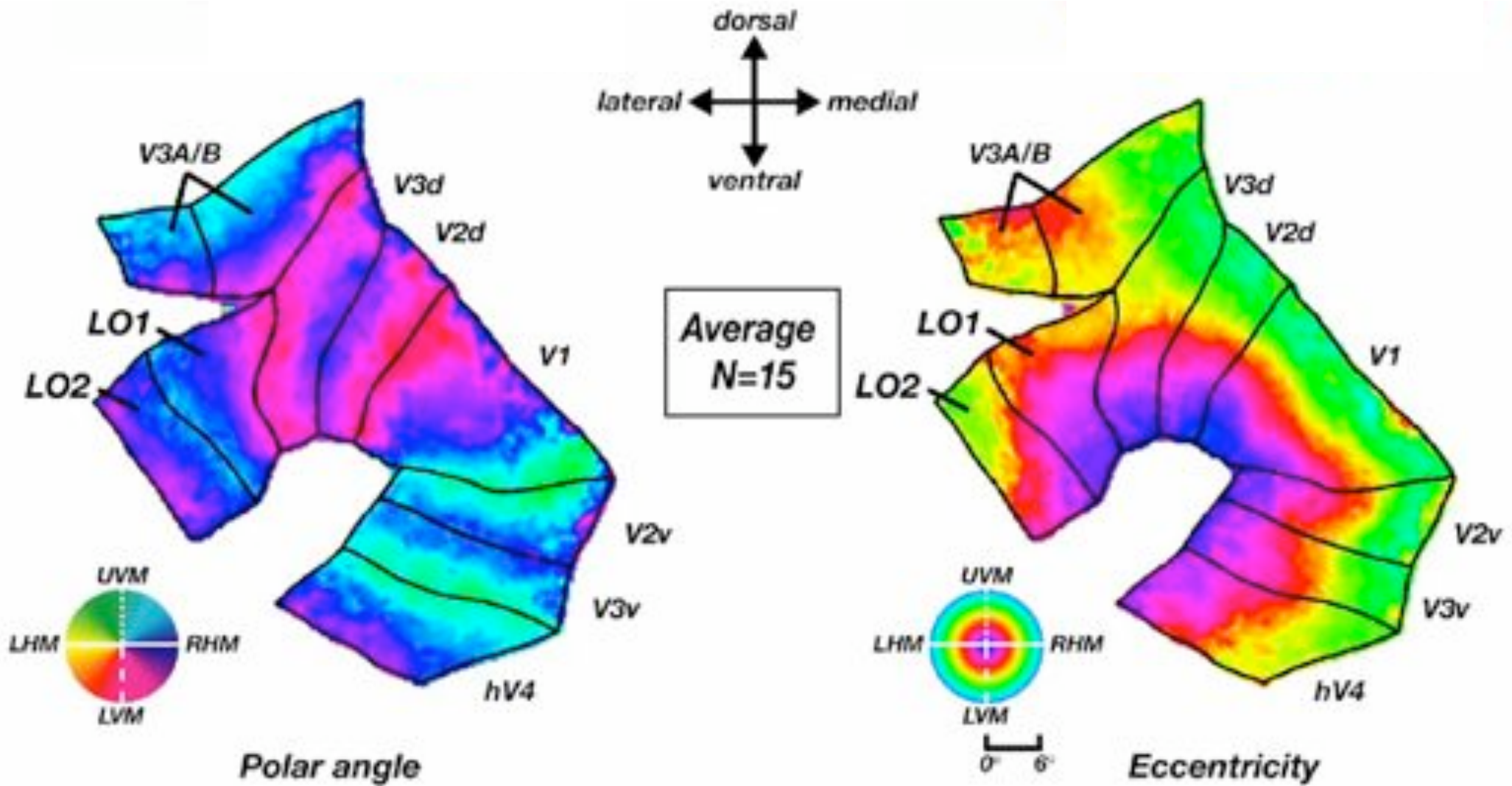


Larsson & Heeger
SFN (2005)

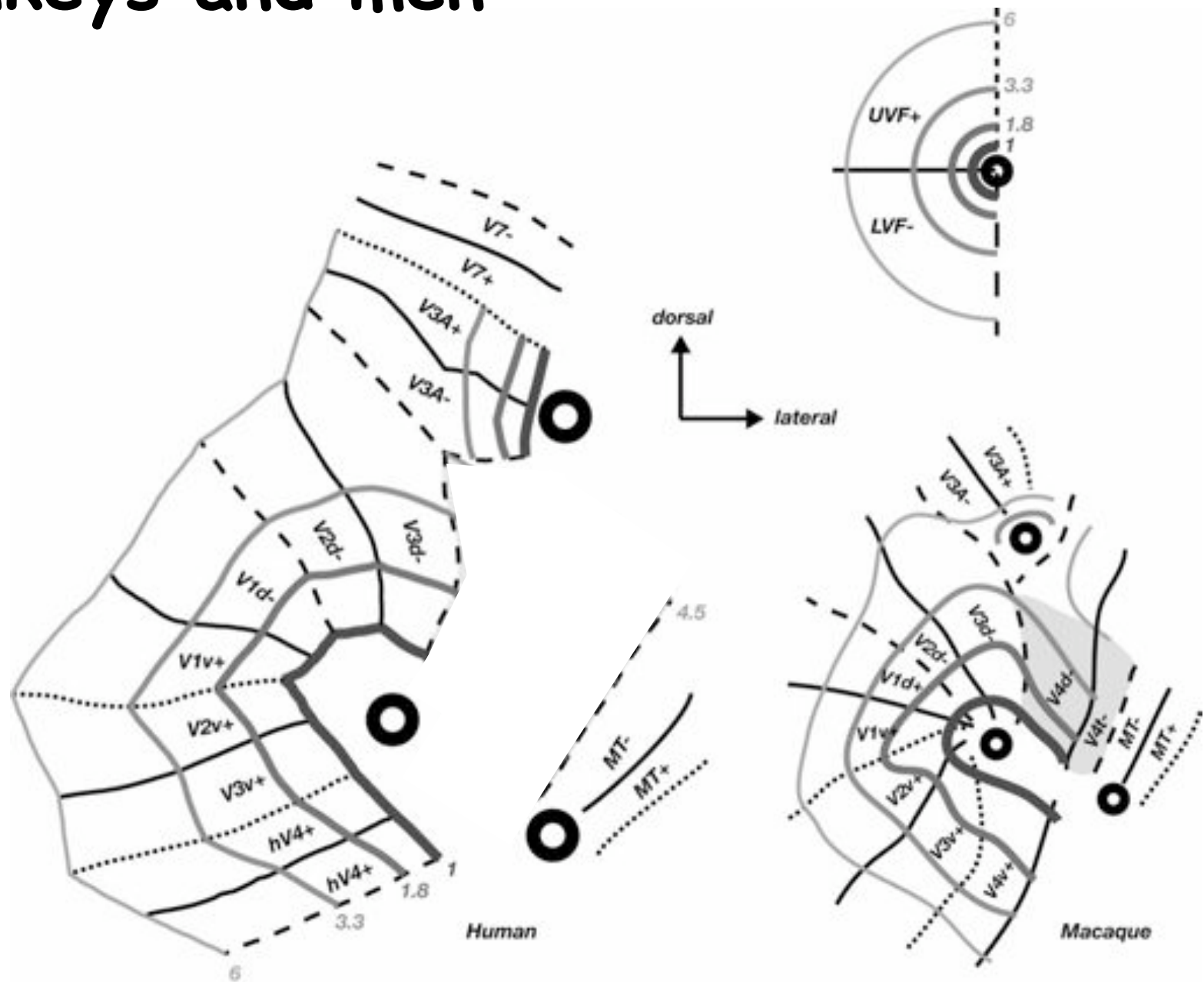
Visual area boundaries



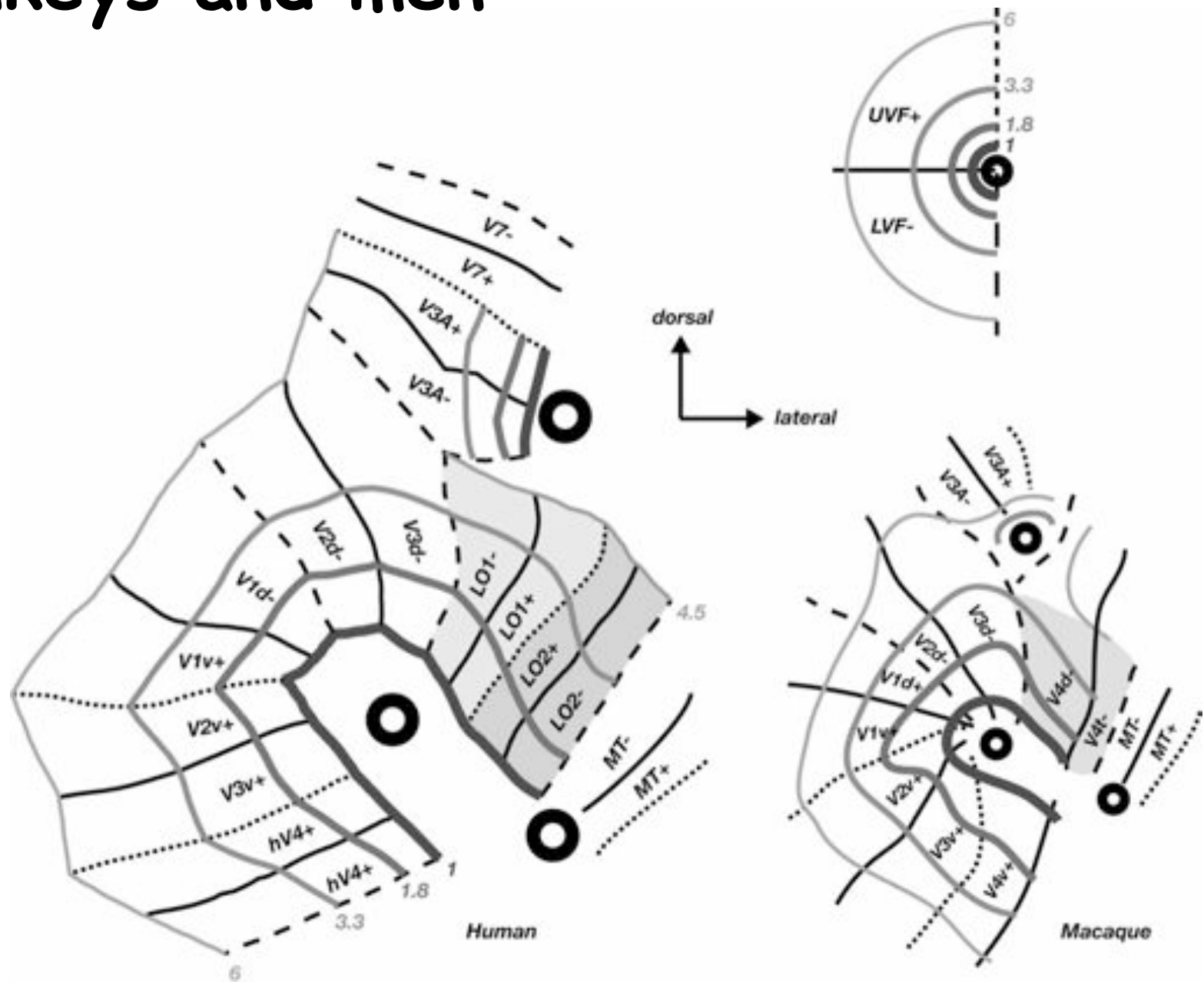
Retinotopic maps



Of monkeys and men



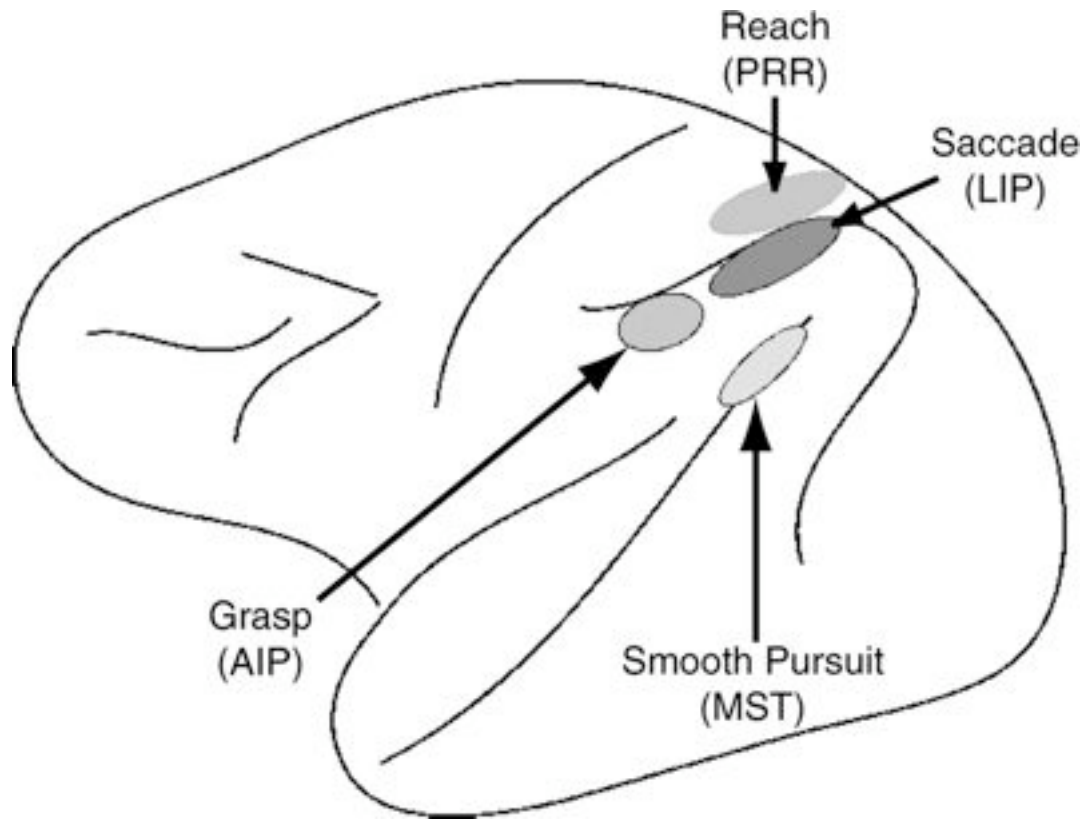
Of monkeys and men



Larsson & Heeger, SFN (2005)

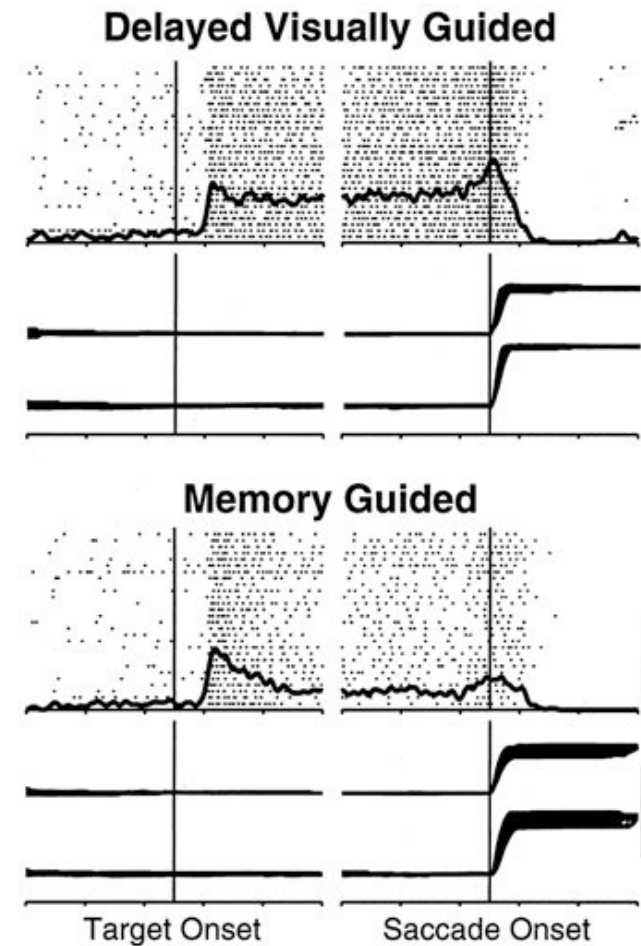
Posterior parietal cortex

Functional subdivision



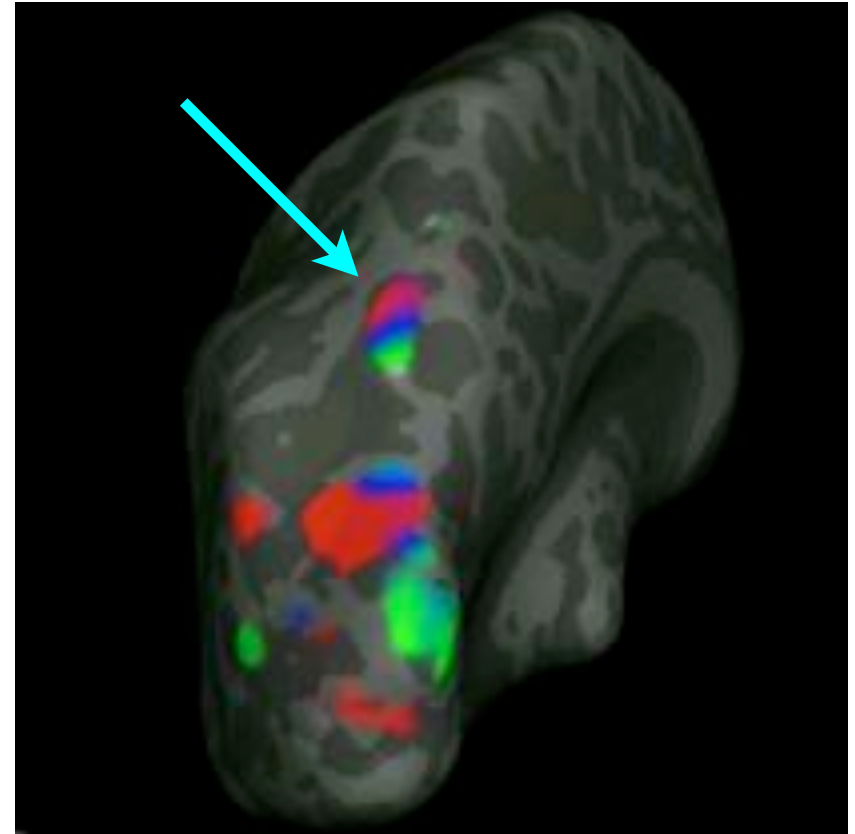
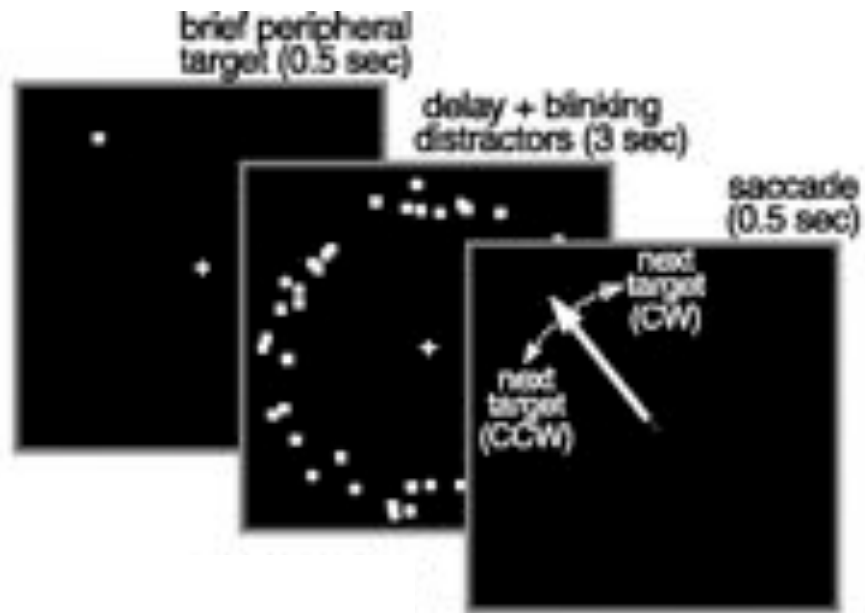
Andersen & Buneo, Ann Rev Neurosci, 2002

Sustained delay-period activity



Pare & Wurtz, J Neurophysiol, 1997

Human LIP?



Visual cortical areas

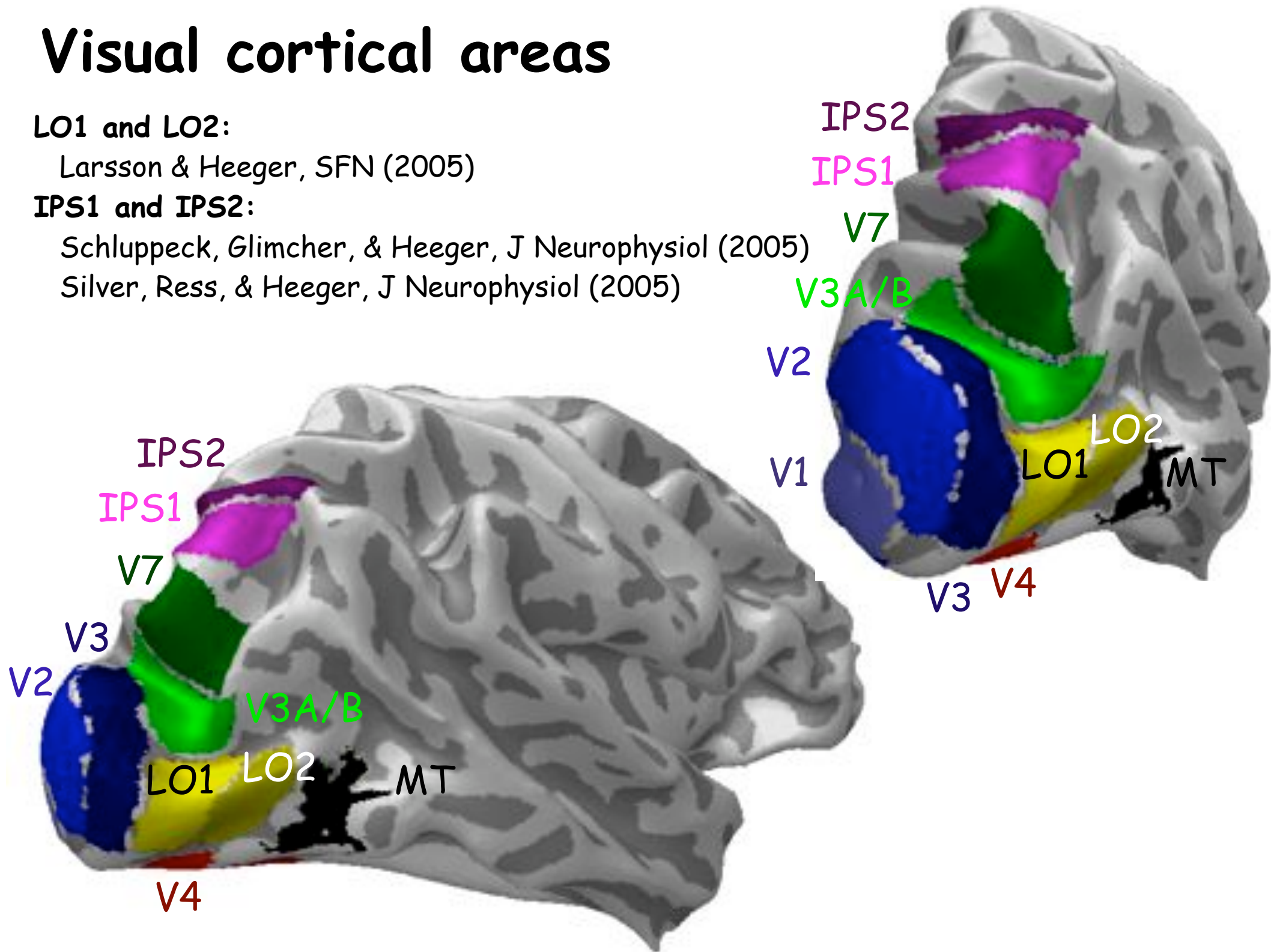
LO1 and LO2:

Larsson & Heeger, SFN (2005)

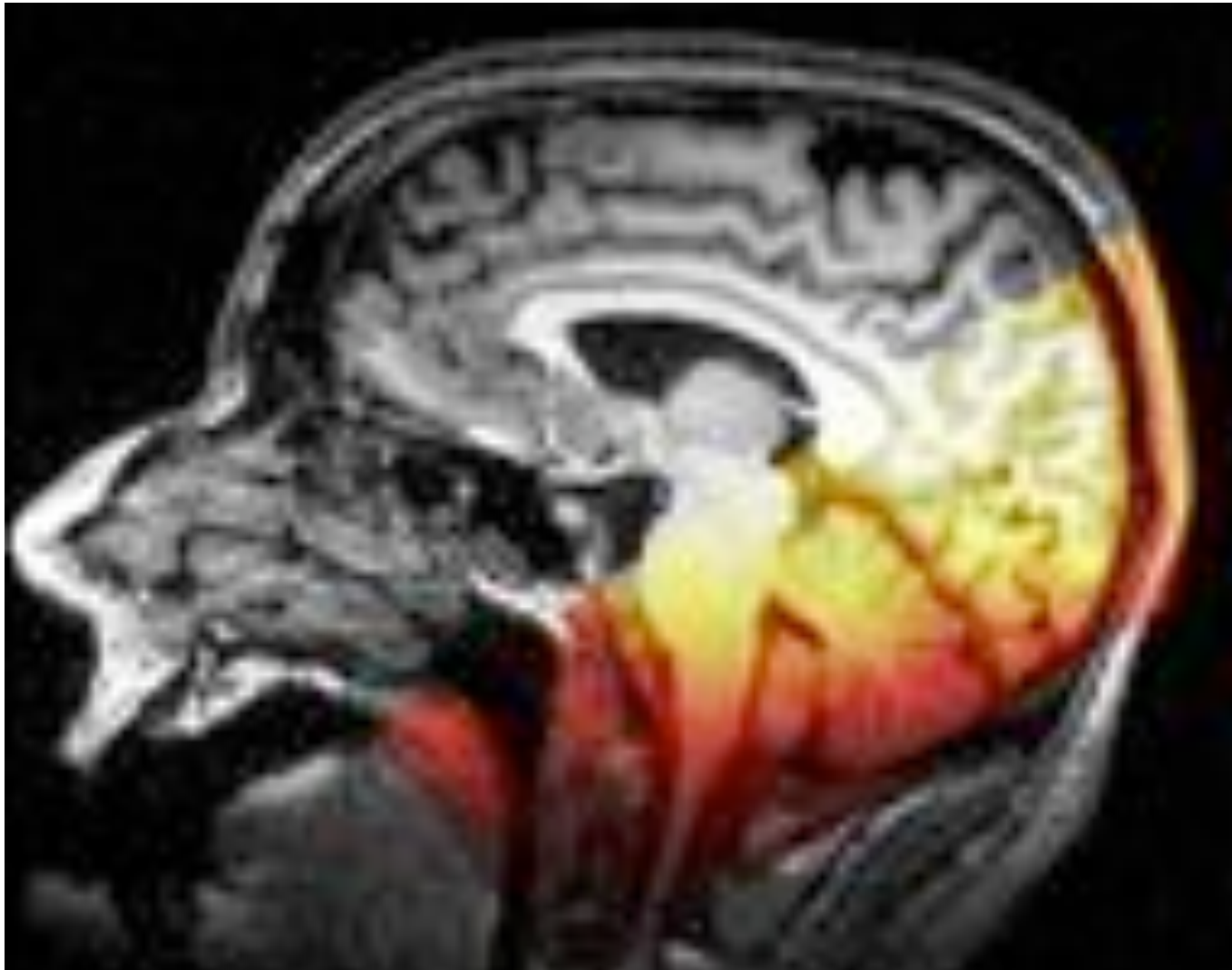
IPS1 and IPS2:

Schluppeck, Glimcher, & Heeger, J Neurophysiol (2005)

Silver, Ress, & Heeger, J Neurophysiol (2005)



Alignment across scanning sessions



Nestares & Heeger, Magn Reson Med (2000)

Monkey visual areas

