Advanced Machine Learning

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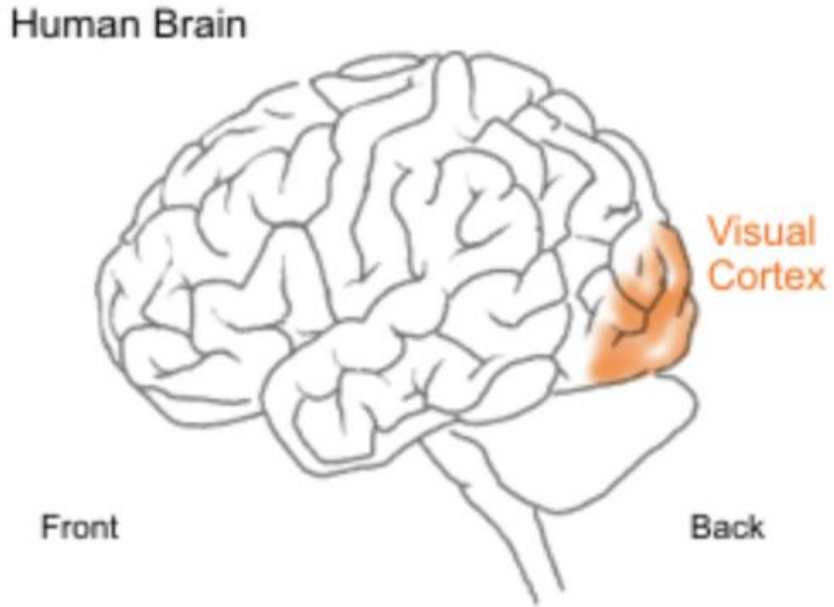
Primary Visual Cortex (V1)

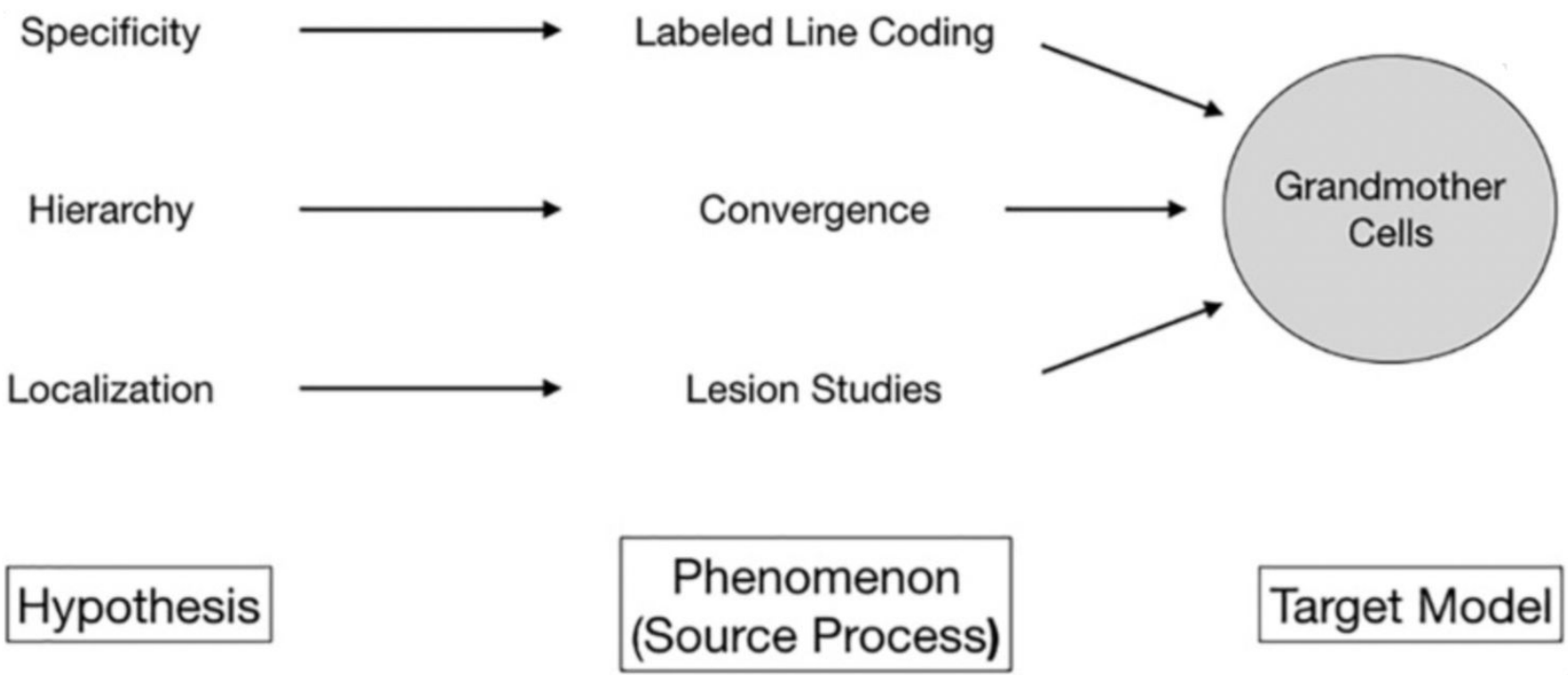


Primary Visual Cortex (V1)

CNN’s capture 3 main properties of V1:

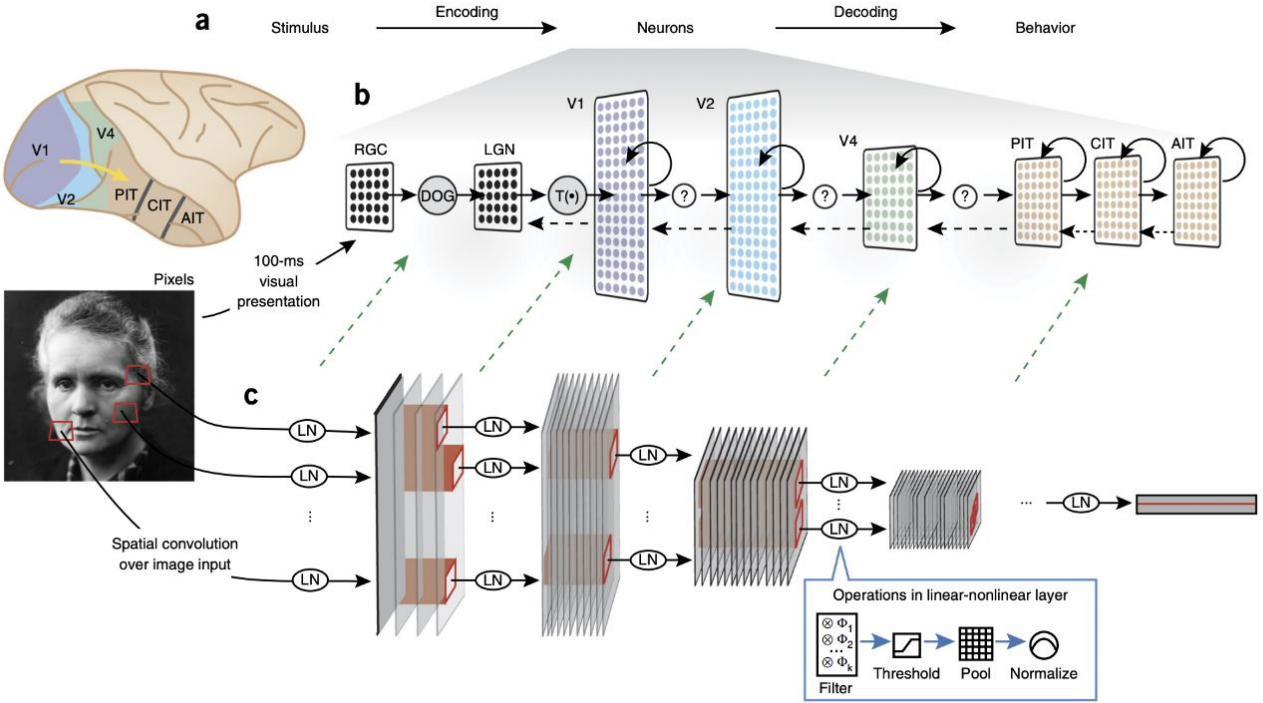
1. V1 is arranged in a spatial map, in a 2D structure, mirroring the structure of the image in the retina
2. V1 contains many simple cells, that can be characterized by a linear function of the image in a small, spatially localized receptive field
3. V1 also contains many complex cells, that are invariant to small shifts in the position of the feature

“Grandmother” cells



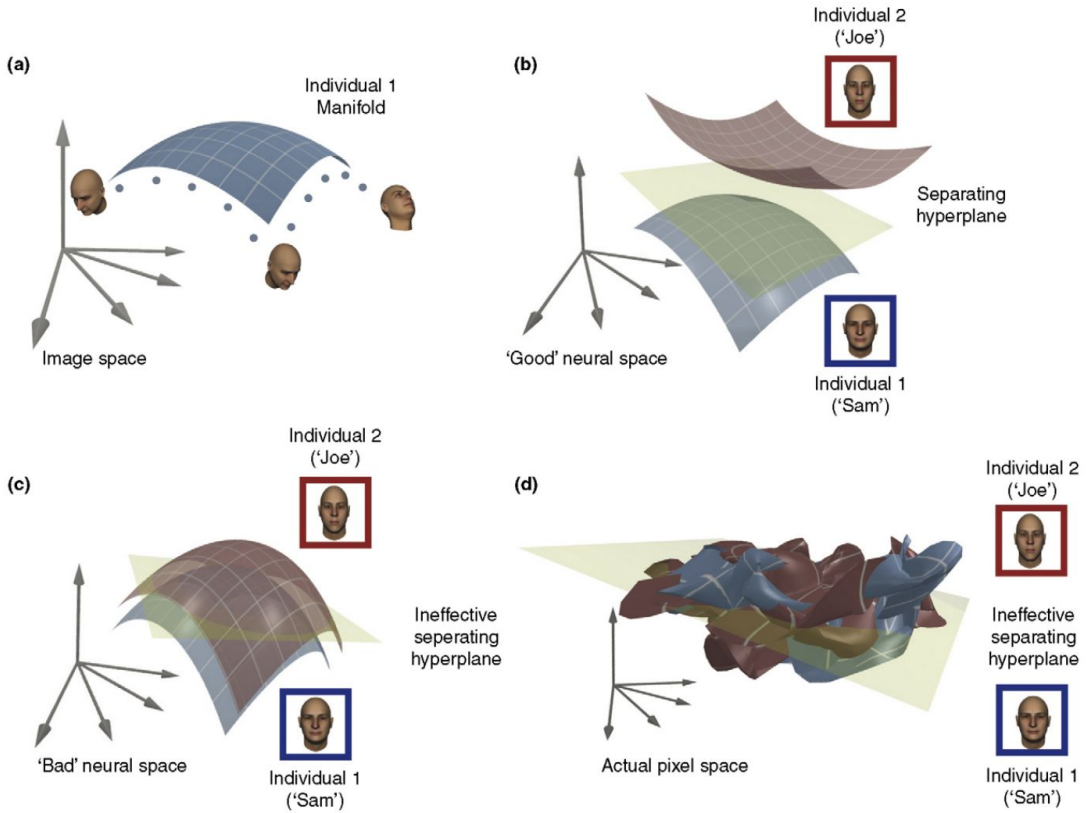
Barwich, Ann-Sophie. "The value of failure in science: The story of grandmother cells in neuroscience." Frontiers in neuroscience 13 (2019): 1121.

Ventral Visual Pathway



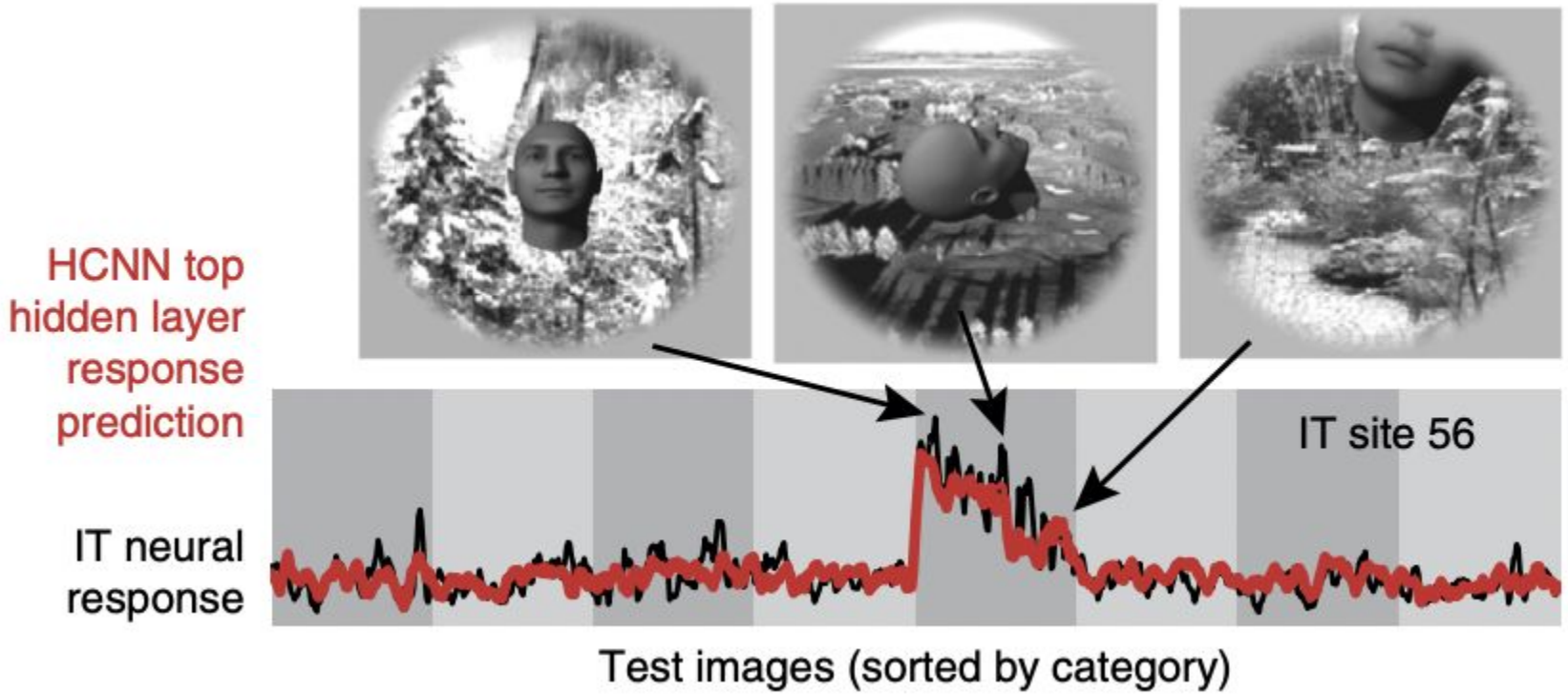
Yamins, Daniel LK, and James J. DiCarlo. "Using goal-driven deep learning models to understand sensory cortex." *Nature neuroscience* 19.3 (2016): 356-365.

Object tangling



DiCarlo, James J., and David D. Cox. "Untangling invariant object recognition." *Trends in cognitive sciences* 11.8 (2007): 333-341.

Visual cortex vs CNN



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