Dynamic Shape Synthesis in Posterior Inferotemporal Cortex

Brincat and Connor, 2006

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Background

Anterior IT is the end of the ventral stream (object recognition)

Posterior IT, the location of neurons in this paper, mediates between it and the earlier areas.

From parts based coding to configuration of parts coding along the stream, also distributed to sparse

Linear vs. nonlinear cells

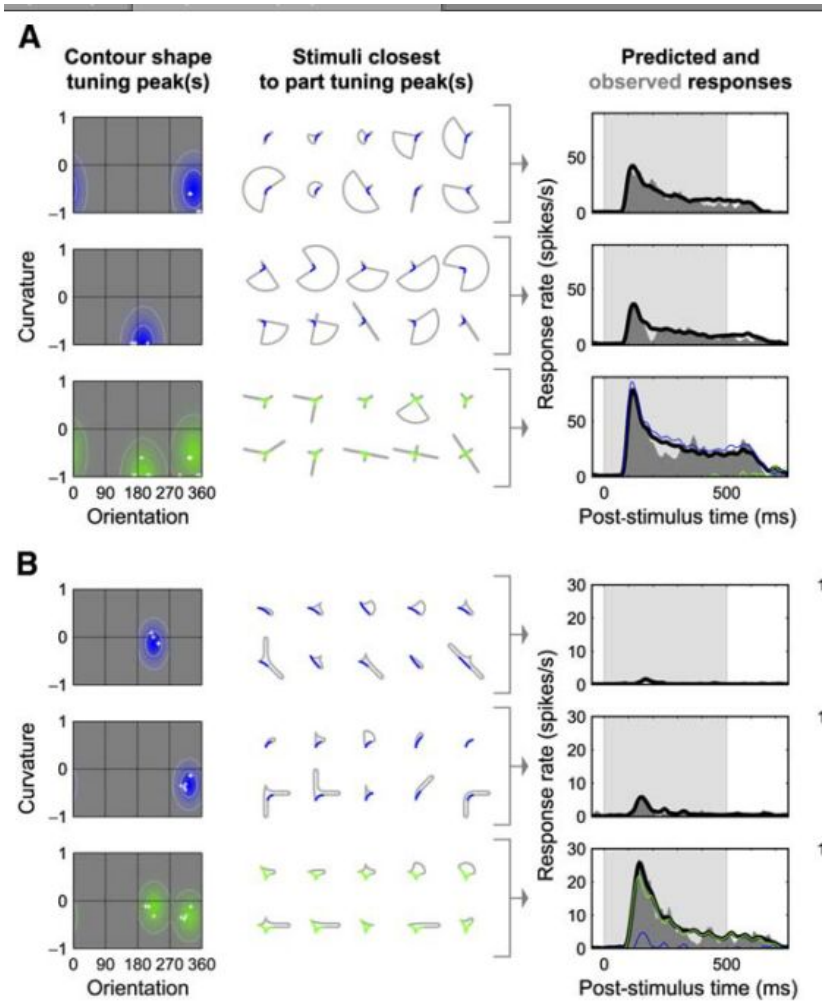
Each neuron's response is fitted by a multiple excitatory and inhibitory (1-6) 4D gaussians model,

2 gaussian example:
(R=aG1+bG2+cG1G2)

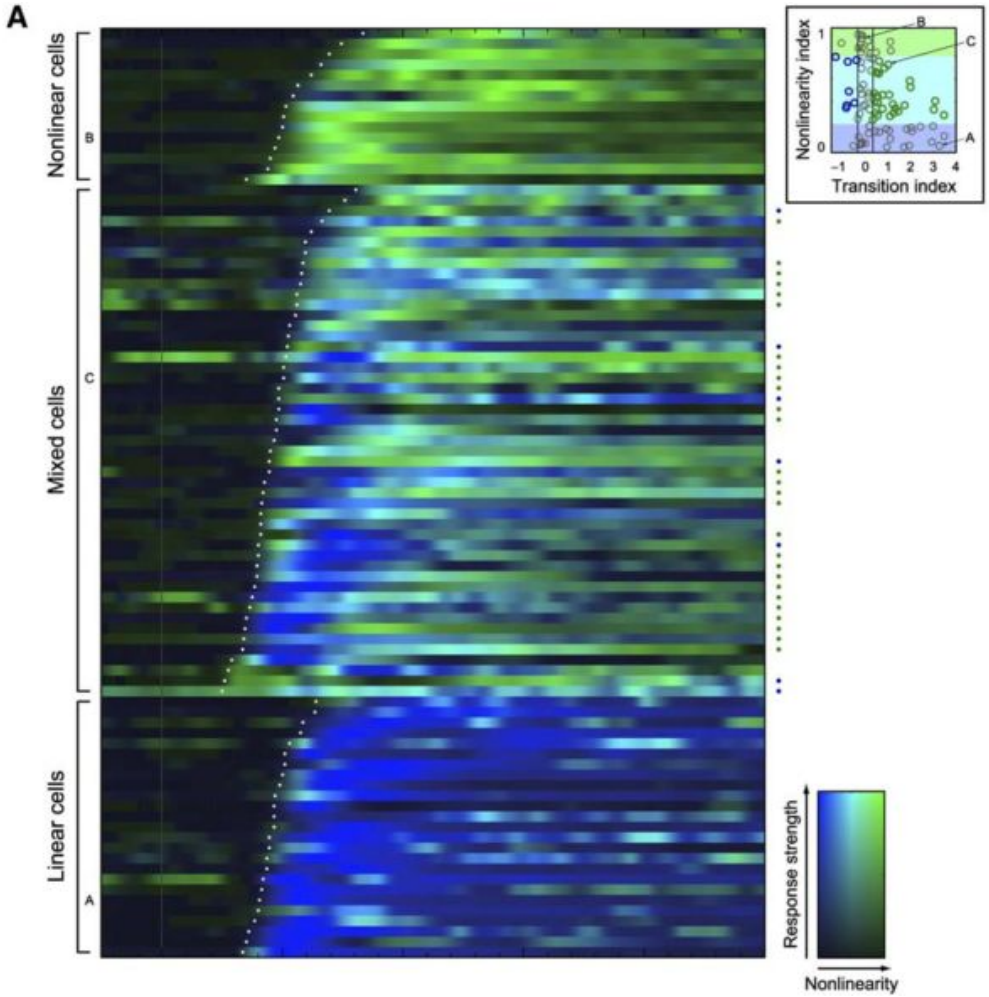
(only excitatory gaussian used in reported results though, unlike 2004 paper)

Dynamics= How do these weights change over the 750ms after 'stimulus onset'

Linear: NL/(L + NL) < .2 etc. (Integrated vs. instantaneous)



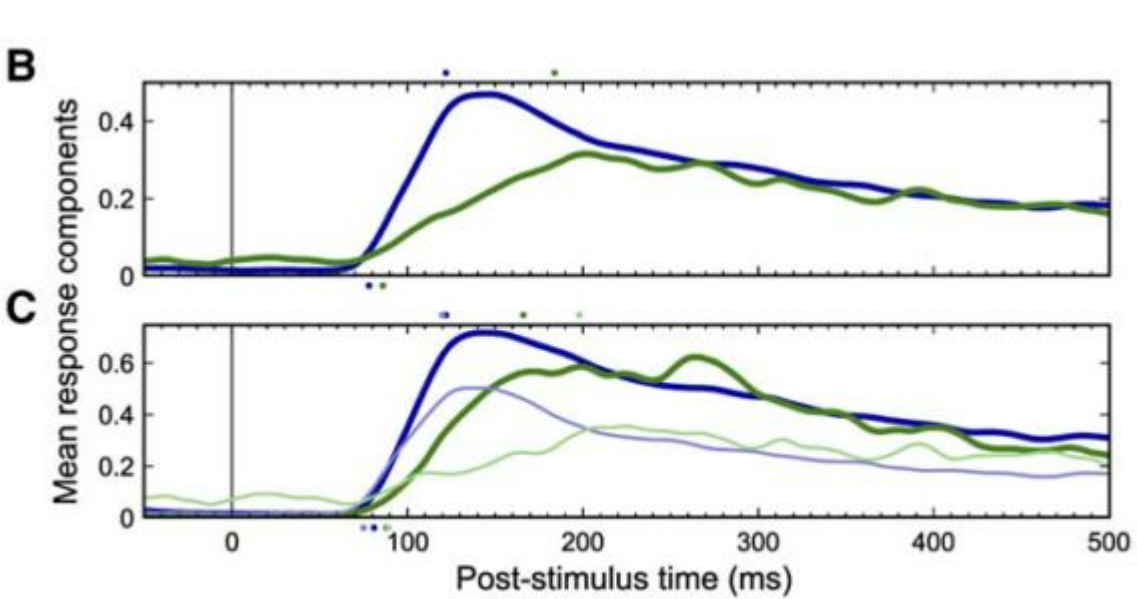
- Brightness: Response Strength
- Green: Nonlinear
- The temporal finding is shown here in the mixed cells that transition from blue to green.

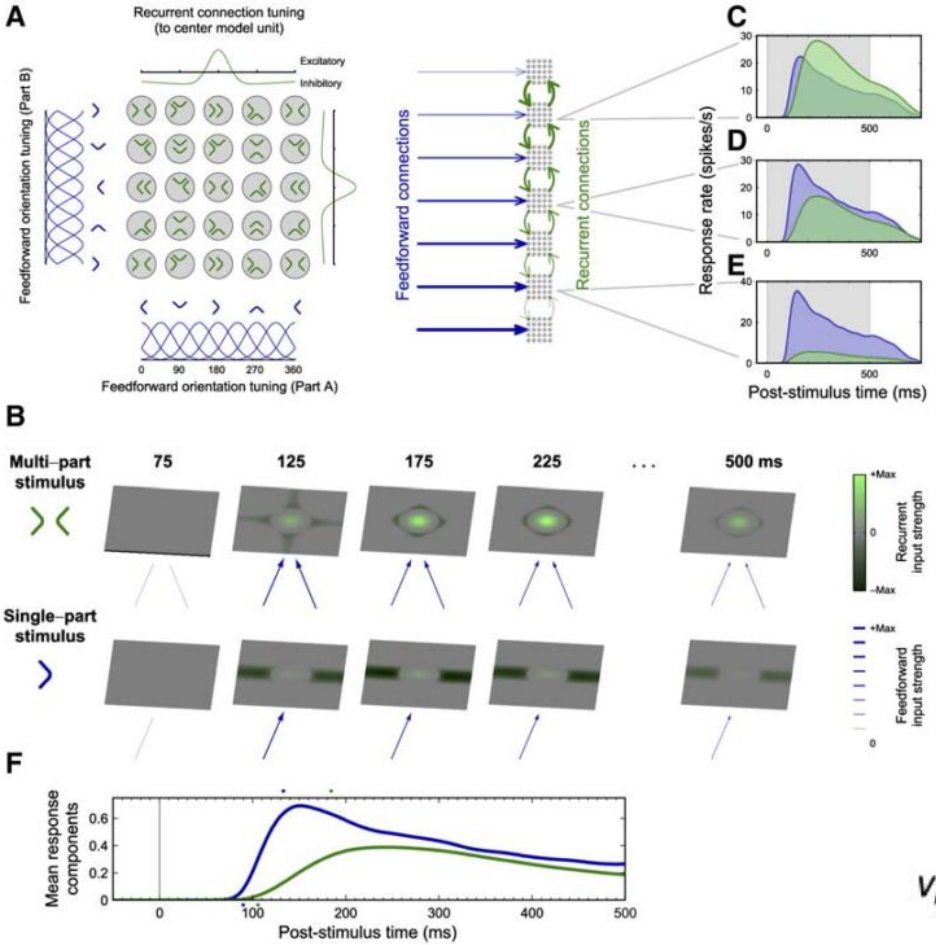


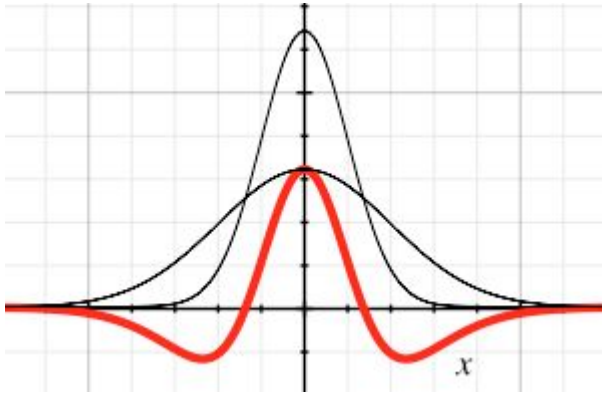
Nonlinear peaks 62 ms after linear

Due to both within and across cell dynamics.

Importance of this delay is connected to psychophysics and **particular face** recog in the discussion, and hypothesised to generalize to the dorsal stream as well.







$$V_i^{rcr}(t) = \sum_j \left[\left(w_{EXC} c_{EXC} e^{\frac{(\Delta\mu_{ij})^2}{-2\sigma_{EXC}^2}} - w_{INH} c_{INH} e^{\frac{(\Delta\mu_{ij})^2}{-2\sigma_{INH}^2}} \right) \cdot R_j(t-1) \right] \quad (3)$$

Model Architecture