

Stimulus functions

u

$$\dot{\mathbf{x}} = A\mathbf{x} + \sum_{j=1}^m u^{(j)} B^{(j)} \mathbf{x} + C\mathbf{u}$$

Neural state equation

for each x in \mathbf{x}

$$\text{Vasodilatory signal} \\ \dot{s} = x - \kappa s - \gamma(f - 1)$$

Hemodynamic state equations

s

f

s

$$\text{Flow induction} \\ \dot{f} = s$$

f

Balloon model

Changes in volume

$$\dot{v} = \frac{1}{\tau} f - \frac{1}{\tau} v^{\frac{1}{\alpha}}$$

Changes in deoxyhemoglobin content

$$\dot{q} = \frac{1}{\tau} \left[\frac{1 - (1 - E_0)^{\frac{1}{f}}}{E_0} f - \frac{q}{v} v^{\frac{1}{\alpha}} \right]$$

v

v

q

$$\lambda(q, v) = \frac{\Delta S}{S_0} \approx V_0 \left[k_1(1 - q) + k_2 \left(1 - \frac{q}{v} \right) + k_3(1 - v) \right]$$

BOLD signal change equation

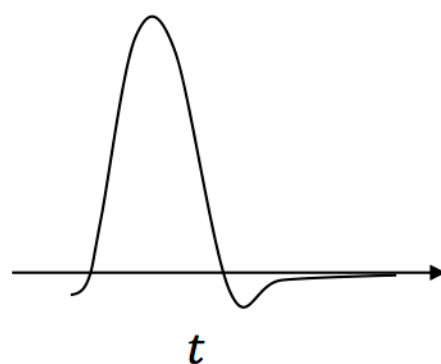
$$k_1 = 4.3 \vartheta_0 E_0 T E$$

$$k_2 = \varepsilon r_0 E_0 T E$$

$$k_3 = 1 - \varepsilon$$

N_n

y



Observable fMRI signal