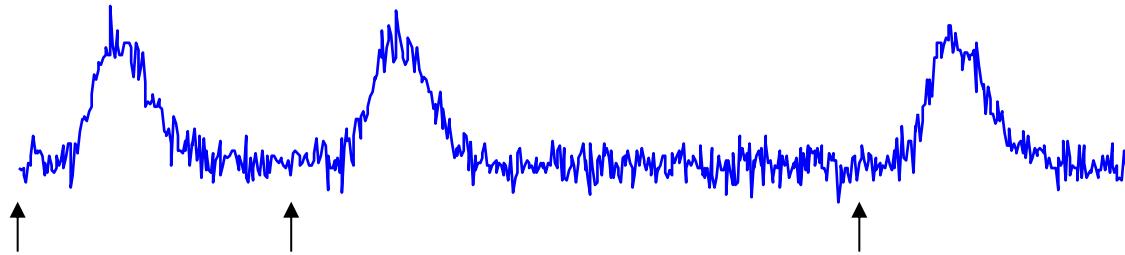


fMRI data analysis

Part 3: Deconvolution

Deconvolution

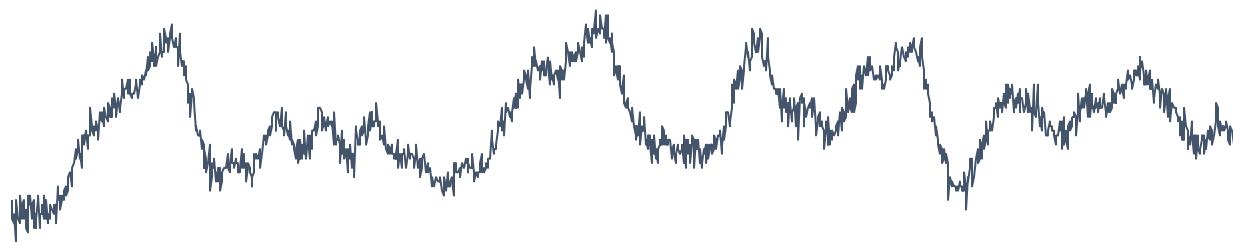


Are there any significant signal changes
time-locked with my stimulus?

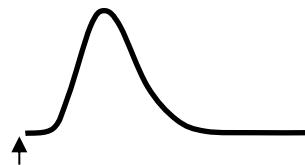
What do those changes look like?

(I'm not going to assume any particular shape of the ideal response)

Deconvolution

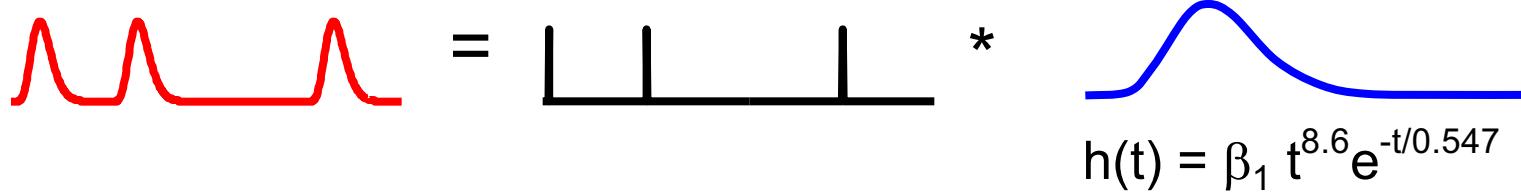


?

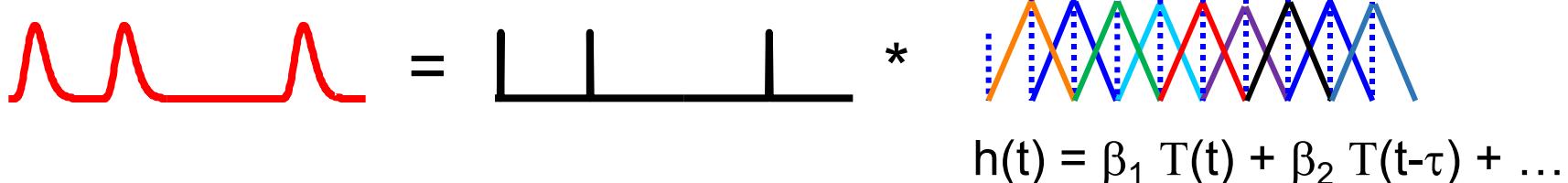


Multiple Regression

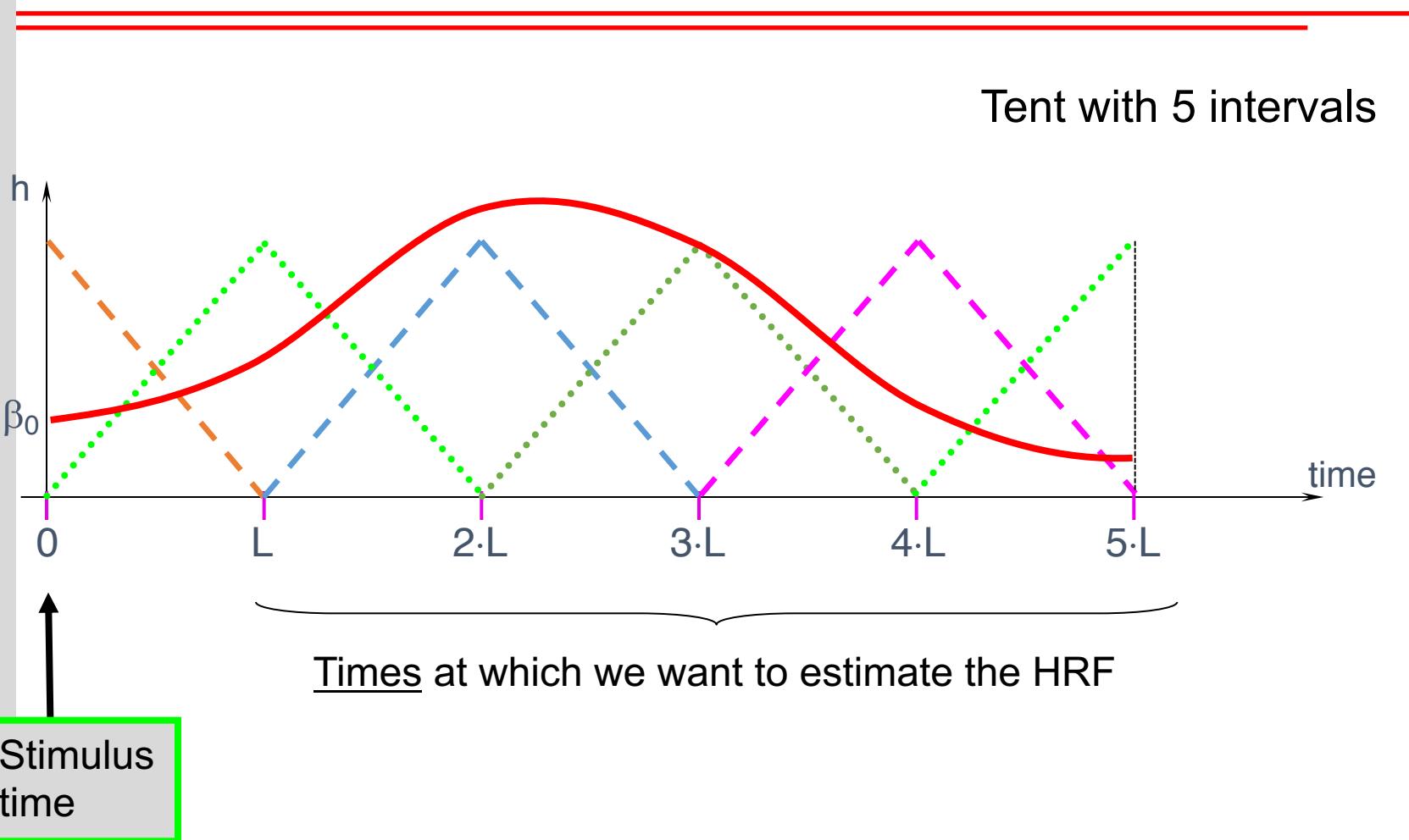
Fixed HRF shape



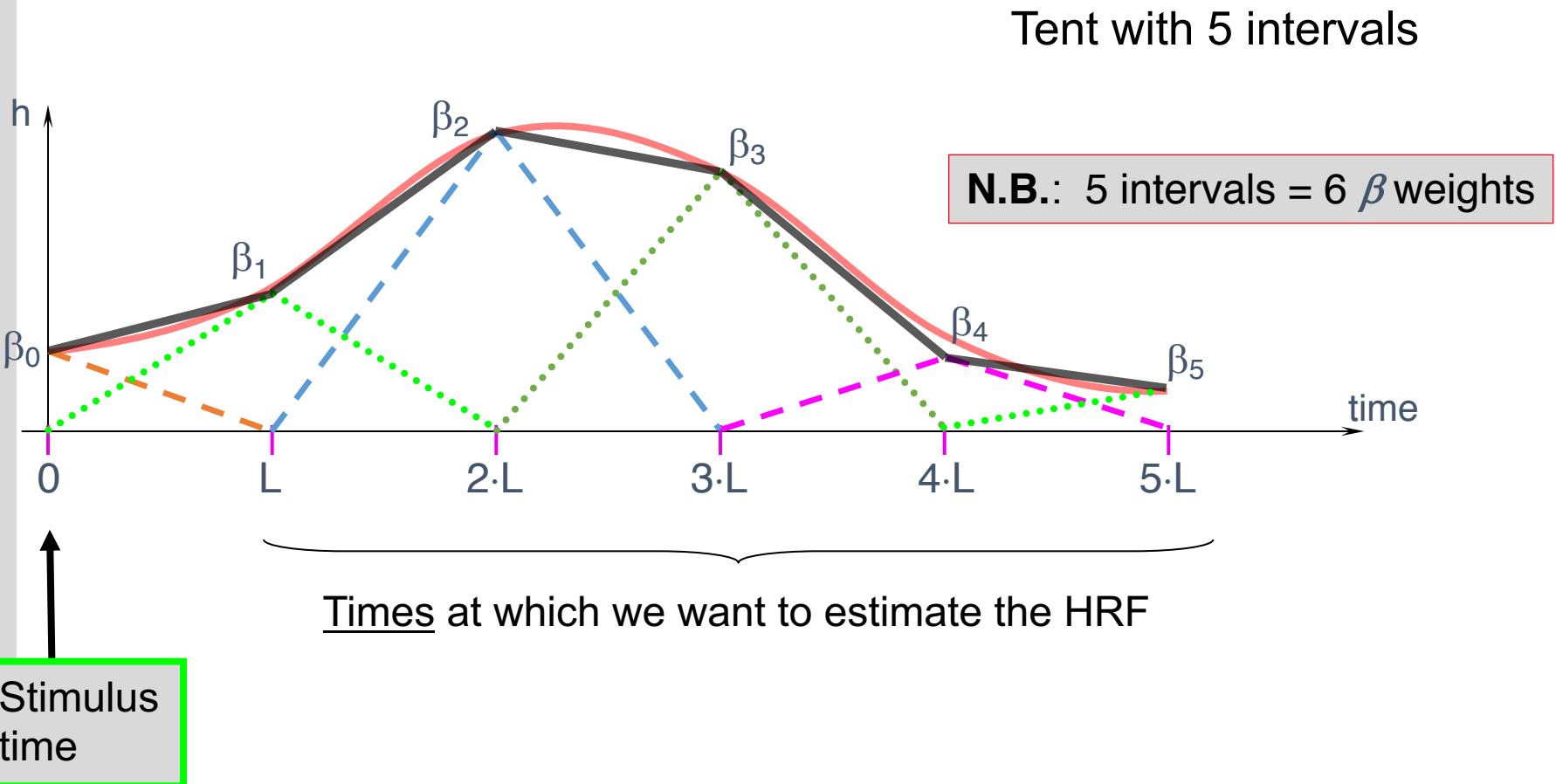
Flexible HRF shape



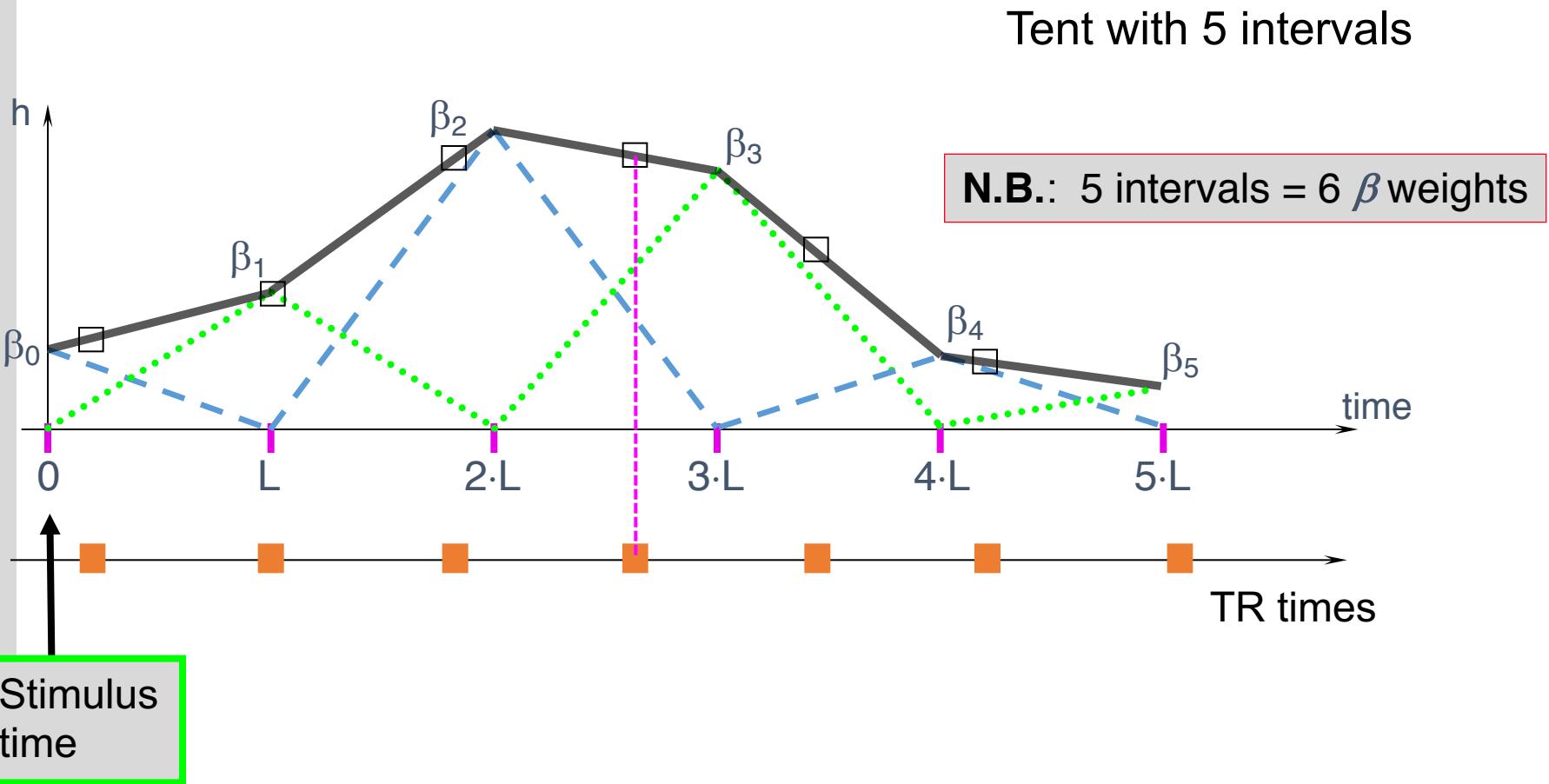
Tent functions



Tent functions

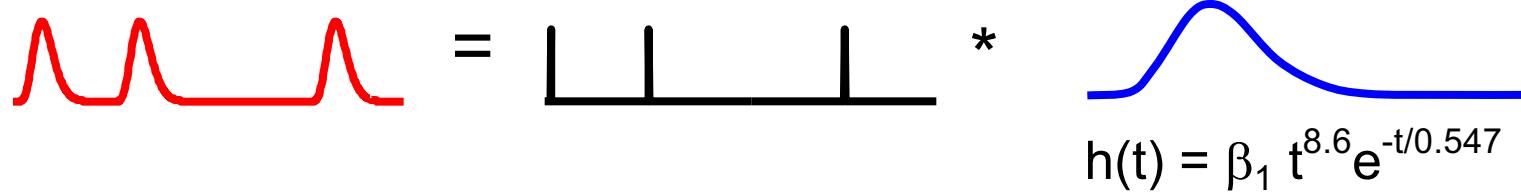


Tent functions

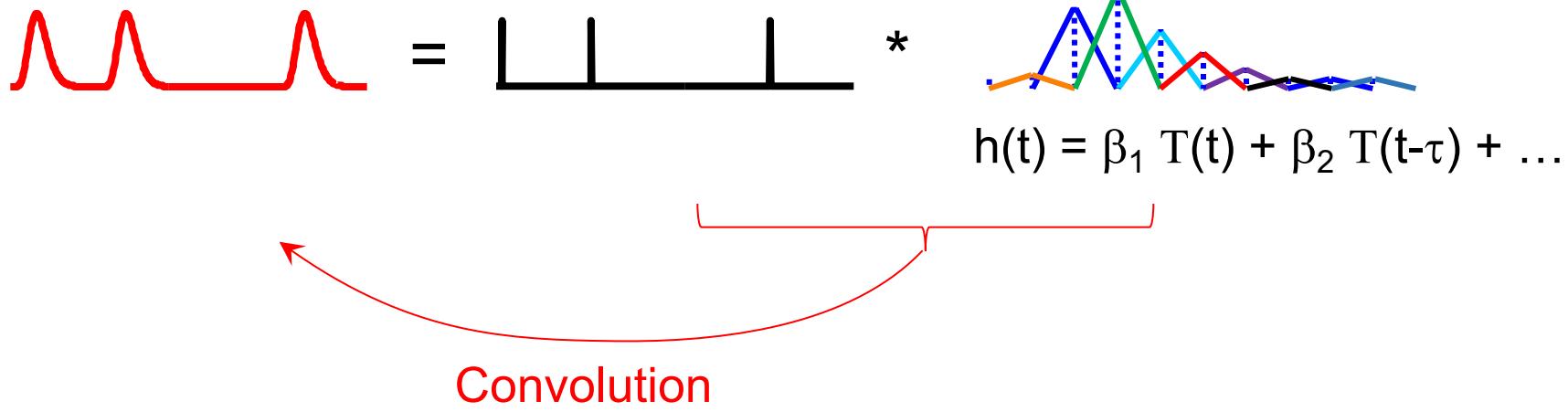


Multiple Regression

Fixed HRF shape



Flexible HRF shape



Multiple Regression

Fixed HRF shape

A red step function representing a binary mask is multiplied by a blue bell-shaped curve representing a fixed Hemodynamic Response Function (HRF) shape. The result is a red step function with three peaks.

$$\text{Red Step Function} = \text{Binary Mask} * h(t) = \beta_1 t^{8.6} e^{-t/0.547}$$

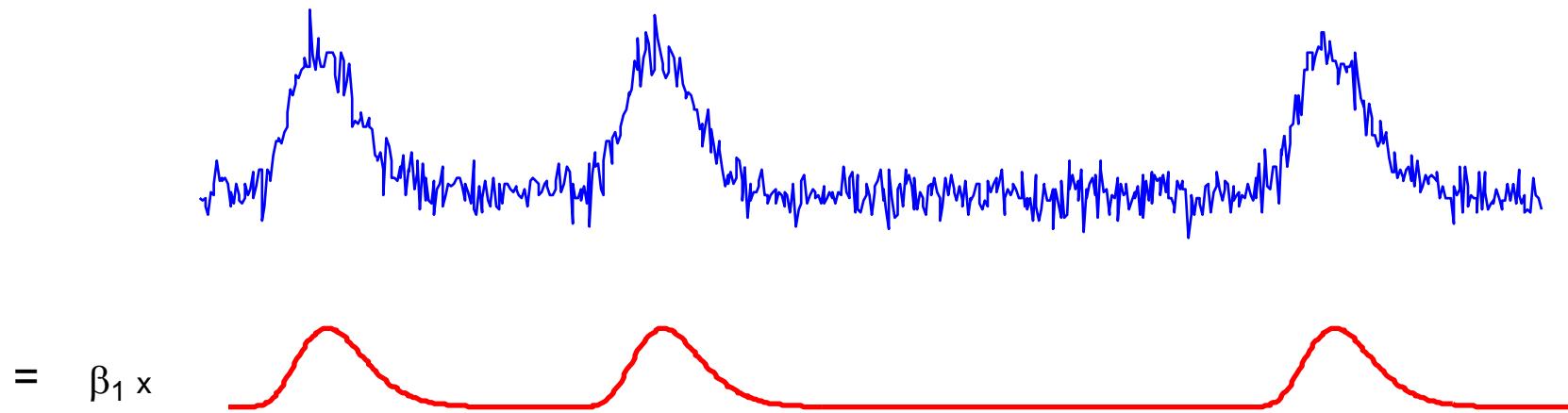
Flexible HRF shape

A red step function representing a binary mask is multiplied by a blue bell-shaped curve representing a flexible HRF shape. The result is a red step function with three peaks.

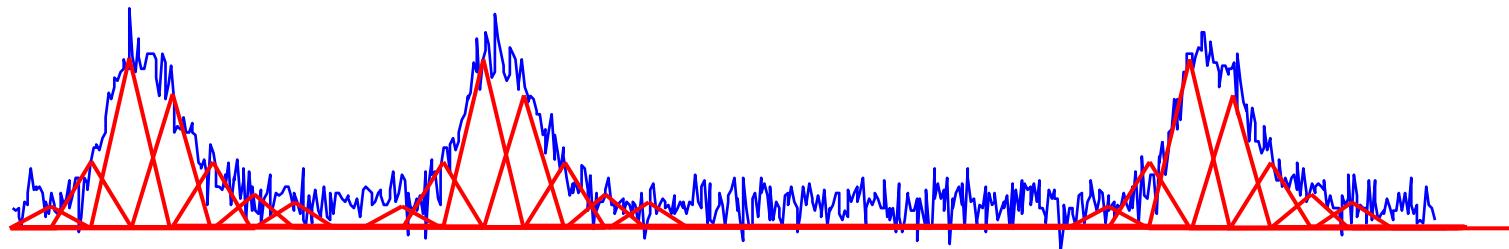
$$h(t) = \beta_1 T(t) + \beta_2 T(t-\tau) + \dots$$

Deconvolution

Fixed HRF

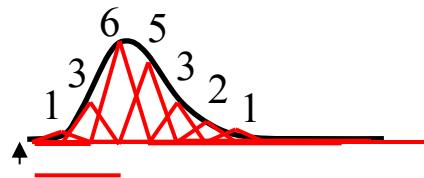


Tent Functions



$$= \begin{array}{l} 1 \times \\ + 3 \times \\ + 6 \times \\ + 5 \times \\ + 3 \times \\ + 2 \times \\ + 1 \times \end{array}$$

A series of seven horizontal red lines representing the components of a function. The lines are labeled with their respective coefficients: 1 x, + 3 x, + 6 x, + 5 x, + 3 x, + 2 x, and + 1 x. The lines show various piecewise linear segments, with the last two being relatively flat.

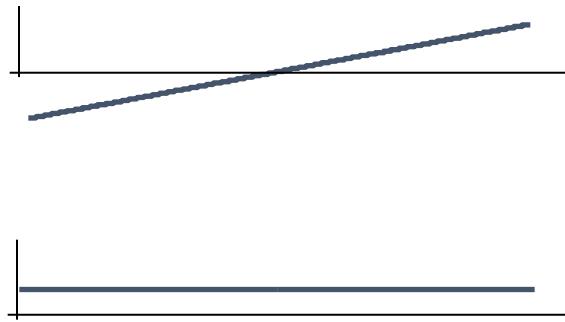
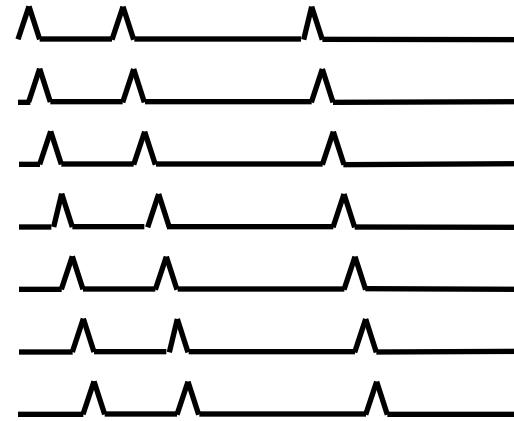


Regressors – 1 task vs. control

Design Matrix



Regressors – deconvolution (“tents”)



Design Matrix

