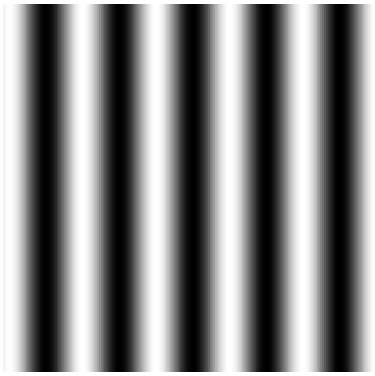
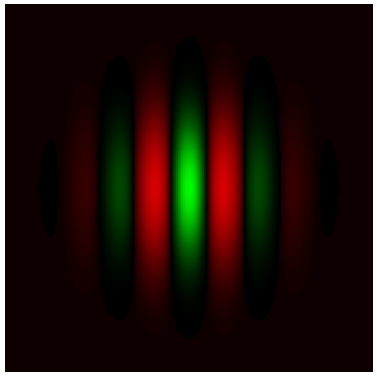
The ‘Linear-Nonlinear’ model

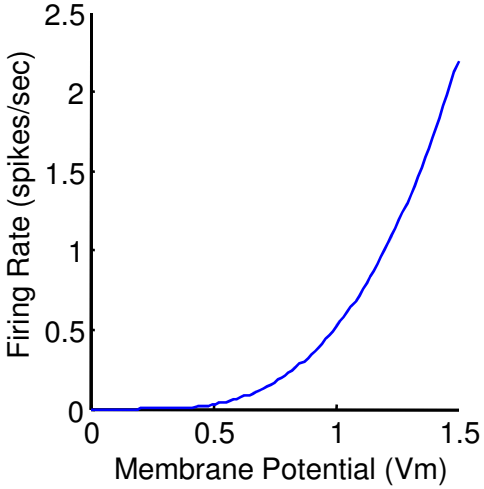
Stimulus



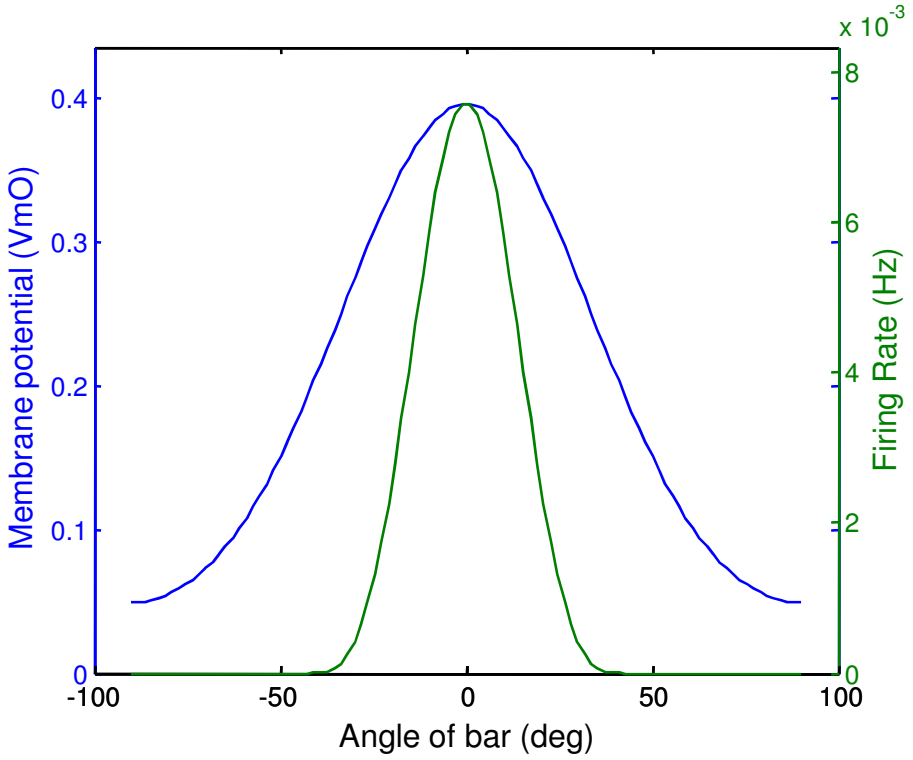
Linear Receptive Field



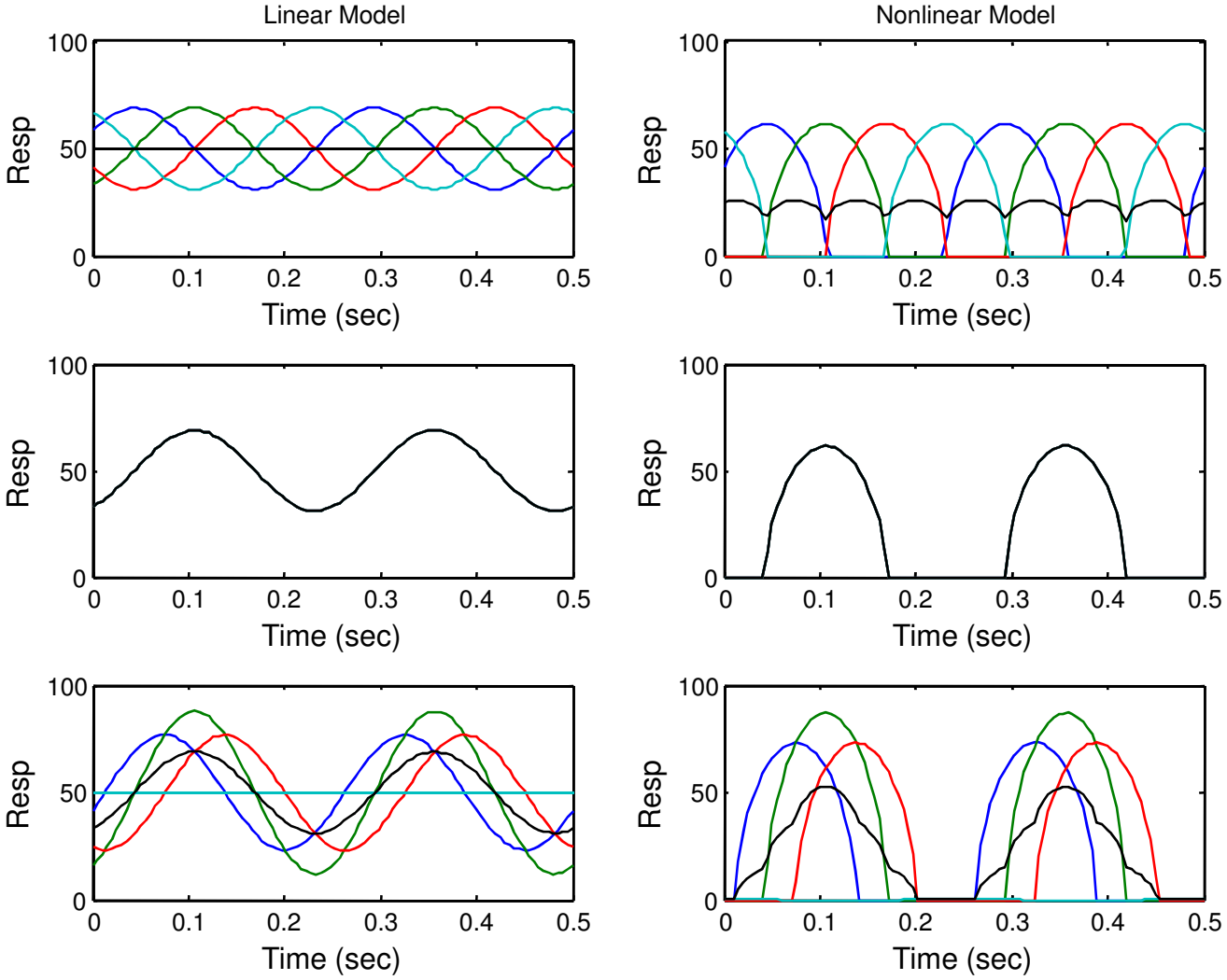
Threshold & Nonlinearity



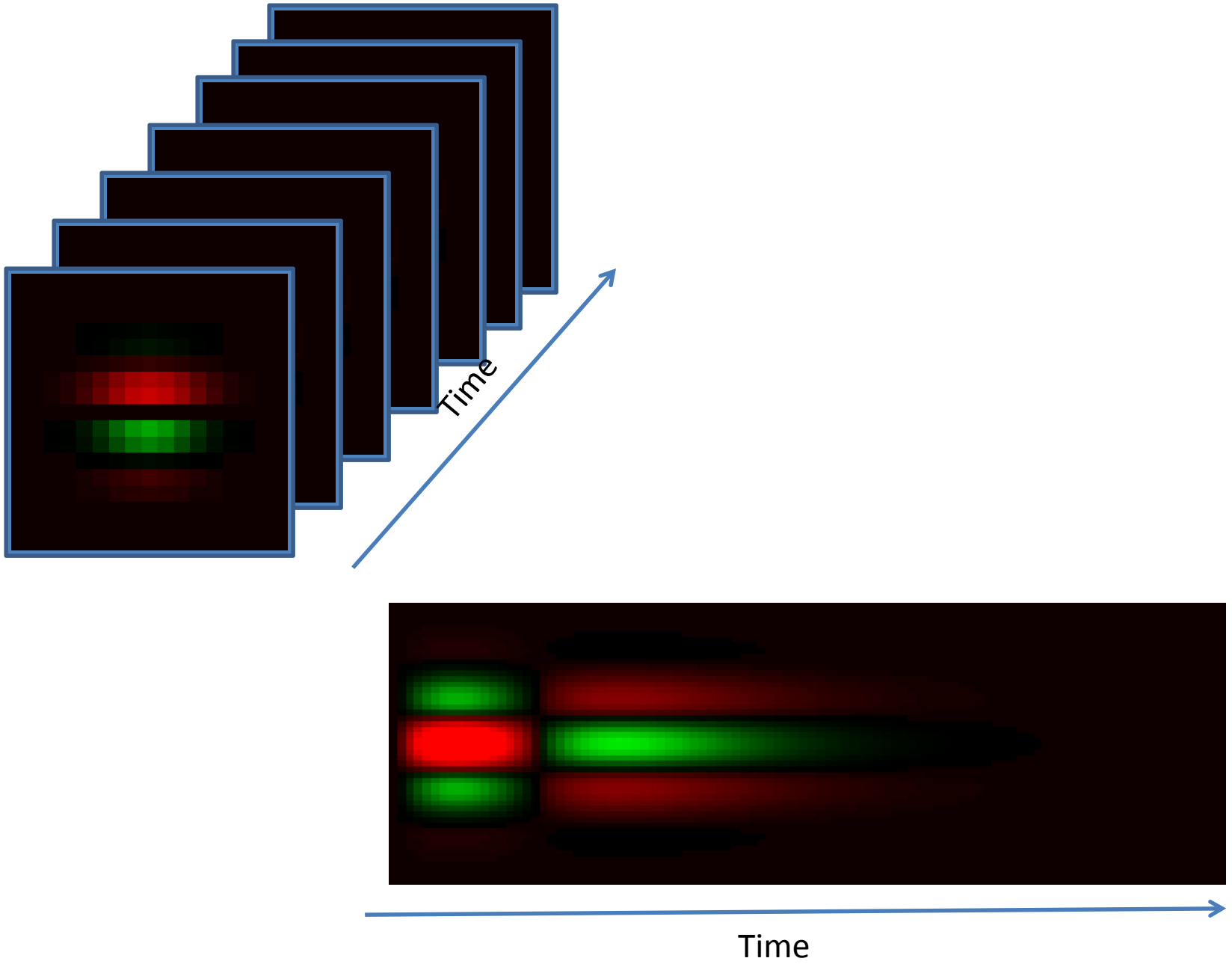
The ‘Linear-Nonlinear’ model:
Predicting sharpening of orientation tuning

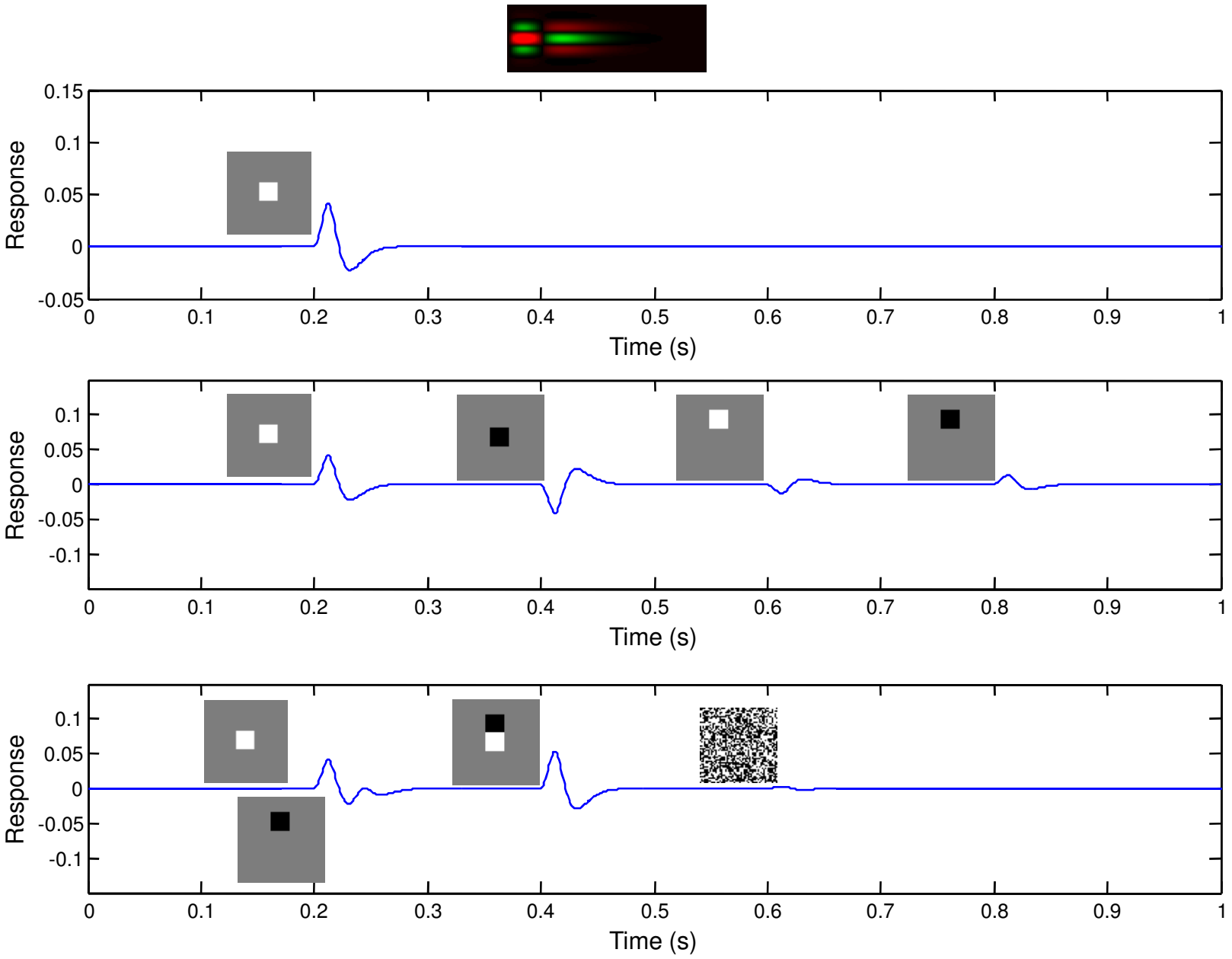


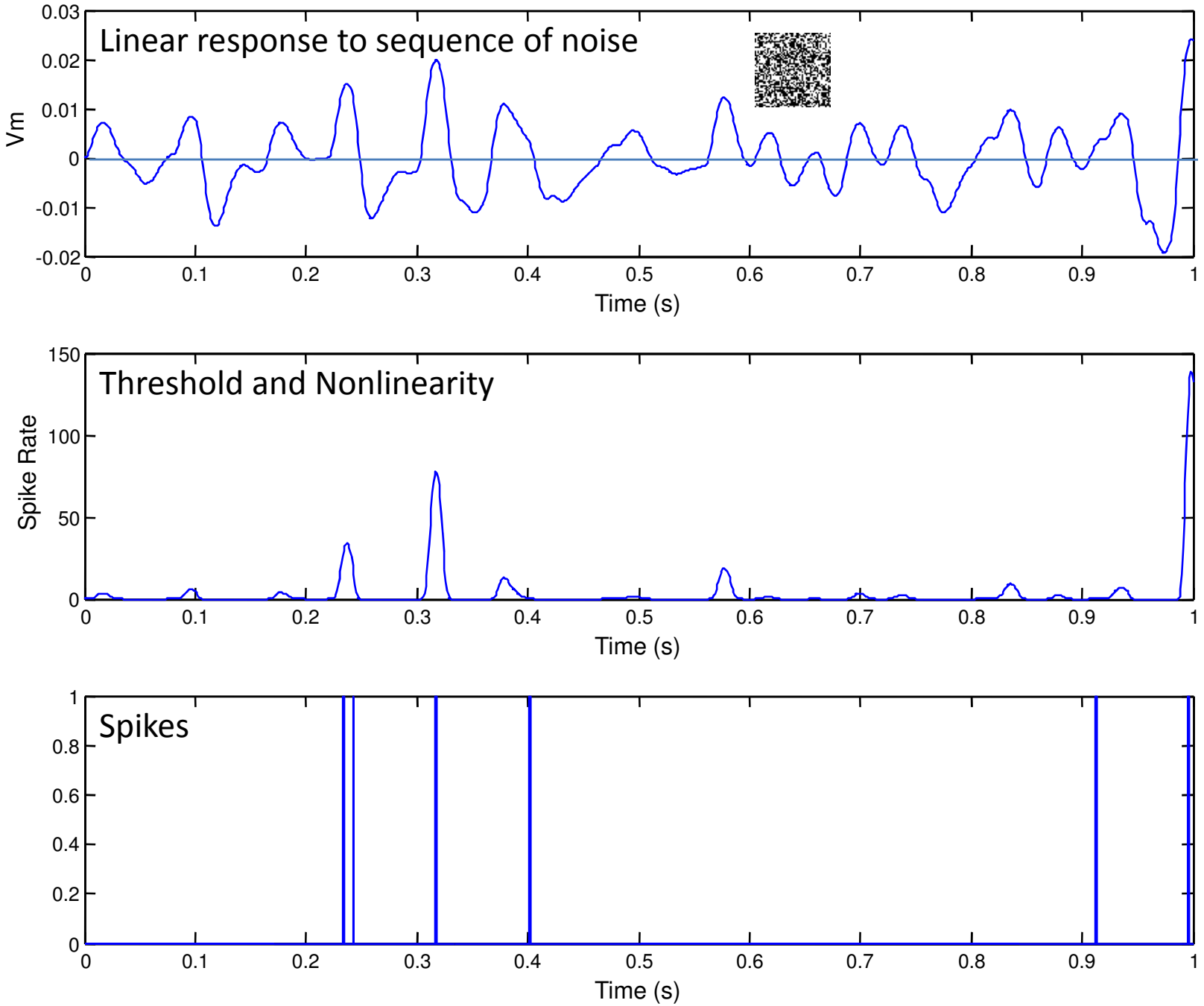
The ‘Linear-Nonlinear’ model:
Predicts Cross-Orientation Suppression
(though not very well)



Linear receptive field in space and time




Response
Time (s)
0.15
0.1
0.05
0
-0.05
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Linear response to sequence of noise
Vm
0.03
0.02
0.01
0
-0.01
-0.02
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Time (s)
Threshold and Nonlinearity
Spike Rate
150
100
50
0
Time (s)
Spikes
1
0.8
0.6
0.4
0.2
0
Time (s)

‘Spike Triggered Average’ or ‘reverse correlation’:

For each spike, go back and find the sequence of stimuli that preceded it and average all of these sequences together. With enough spikes, the average sequence that created a spike will be the linear receptive field.