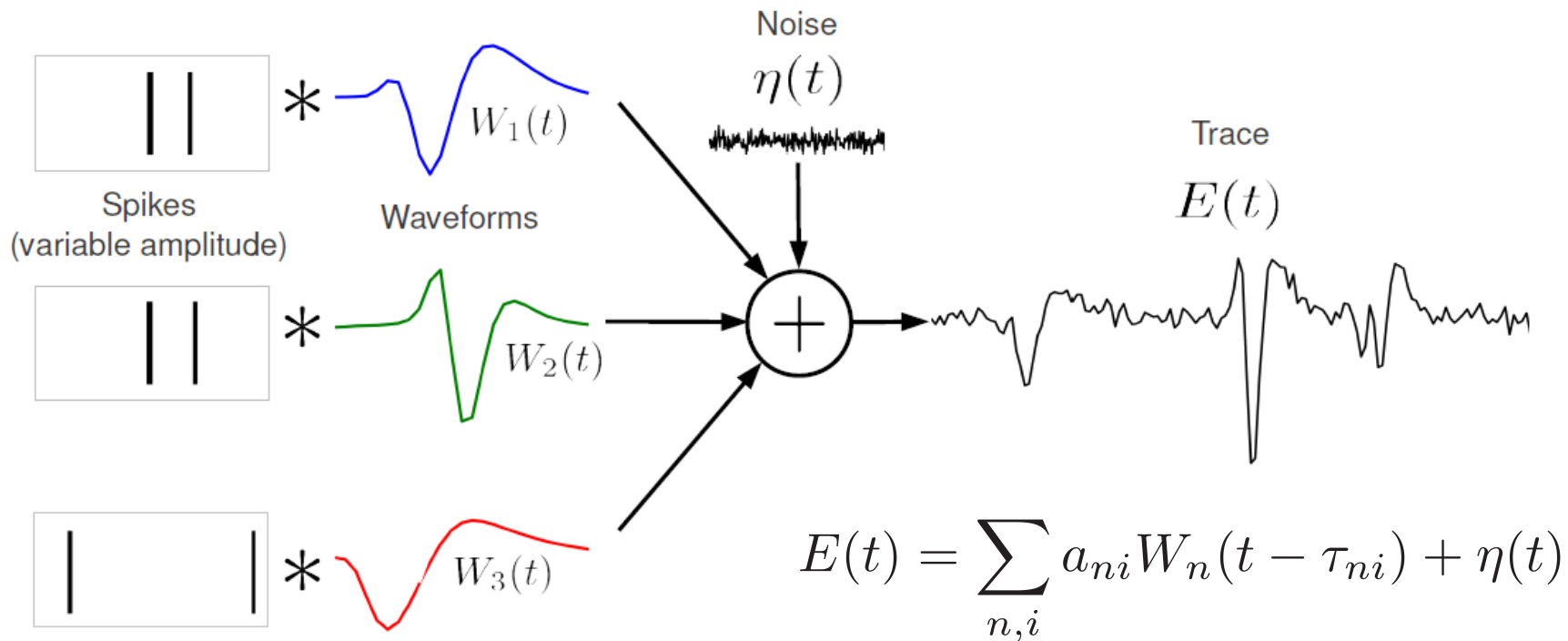# A blind deconvolution method for neural spike identification

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Spotlight presentation, NIPS 2011

$$E(t) = \sum_{n,i} a_{ni} W_n(t - \tau_{ni}) + \eta(t)$$

observed signal $\approx$ **sparse linear** combination of **time-shifted waveforms**

radar, seismic signals, sounds, neural spikes

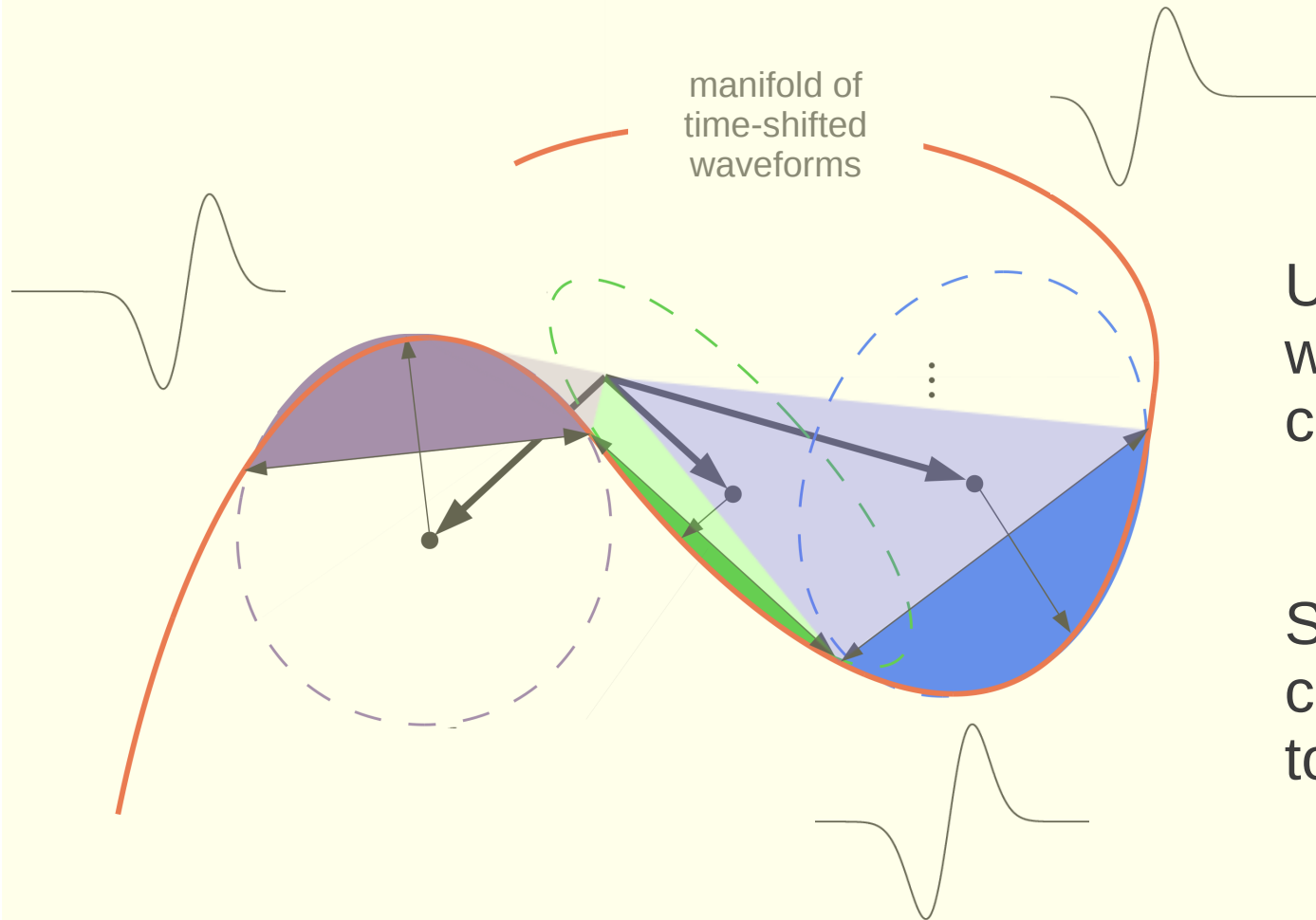recover times and waveforms of spikes for each cell.
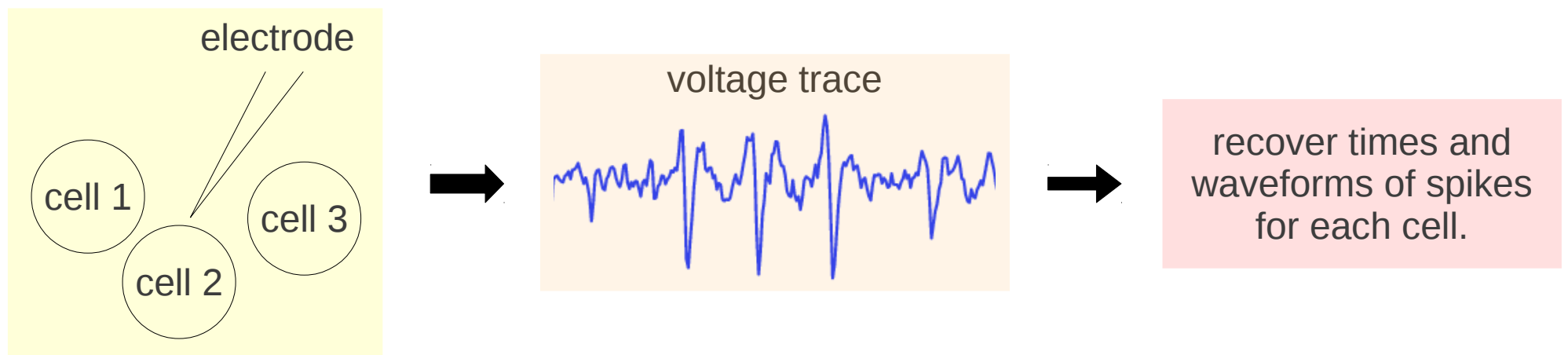
Objective: minimize (reconstruction error) + (sparsity)

solve spikes ⇌ solve waveforms

manifold of
time-shifted
waveforms

Use basis functions
which interpolate
continuous time-shifts

Solve basis
coefficients subject
to constraints

Waveforms learned from real data (Harris 2000)

- other cell
- ground truth cell

Voltage trace

Voltage trace

Estimated spikes

clustering

our method

time

Estimated spikes

time