

CAP6938

Neuroevolution and
Artificial Embryogeny

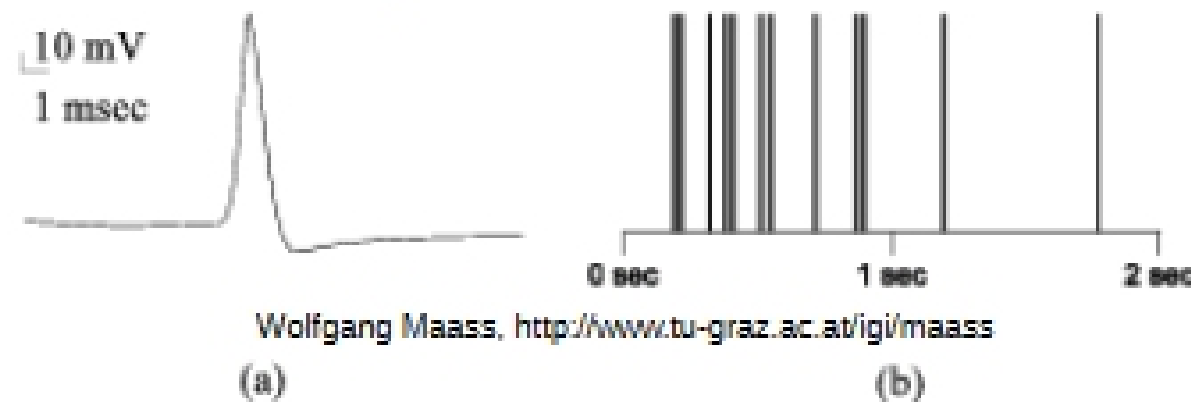
**Leaky Integrator Neurons and
CTRNNs**

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Artificial Neurons are a *Model*

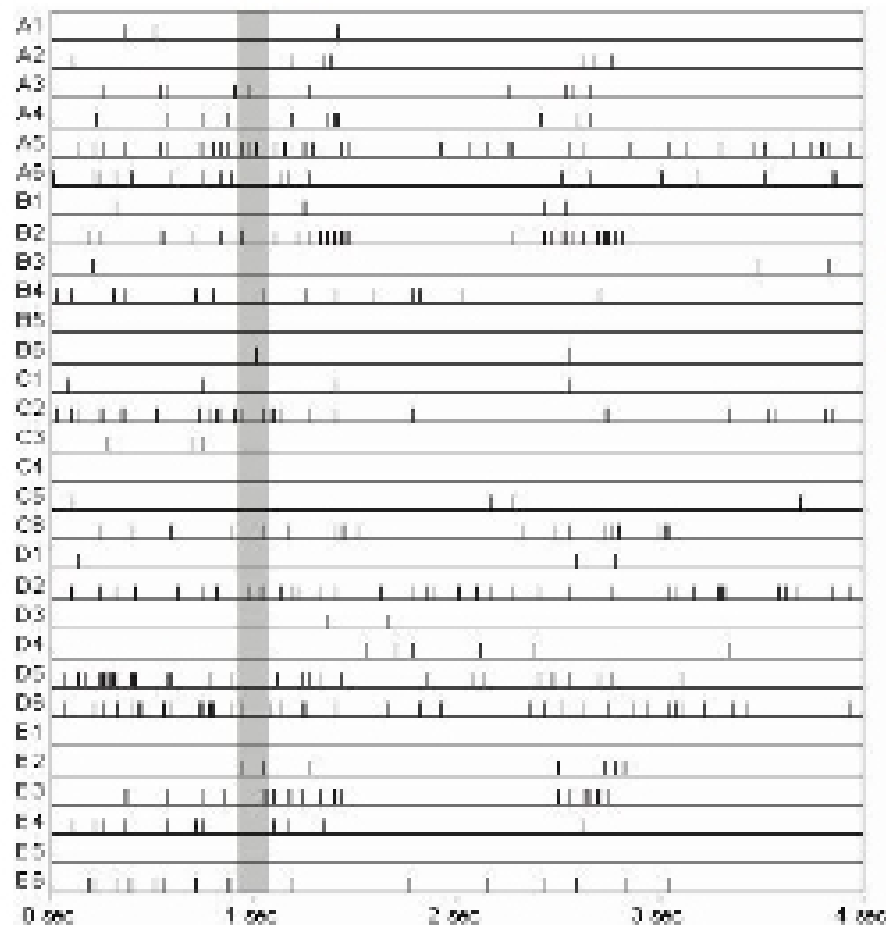
- Standard activation model $H_j = \sigma \left[\sum_{i=1}^n x_i w_{ij} \right]$
- But a real neuron doesn't have an activation level
 - Real neurons fire in *spike trains*



- Spikes/second is a *rate*
- Therefore, standard activation can be thought of as outputting a *firing rate* at discrete timesteps (i.e. rate encoding)

What is Lost in Rate Encoding?

- Timing information
- Synchronization
- Activity between discrete timesteps



30 Neurons Firing in a monkey's striate cortex

From Krüger and Aiple [Krüger and Aiple, 1988].

Reprinted from www.igi.tugraz.at/maass/123/node2.html