

### Neural Networks in Visual System of Frog

The diagram illustrates the neural circuitry of a frog's visual system. It shows the retina with various cell types like rods, cones, and bipolar cells, and the tectal column with its associated neurons. Labels include 'Retina', 'Tectal Column', and 'Output Axon'.

11/2/06 (fig. from Arbib 1995, p. 1039) 19

### Reorganization of Cortex

This figure shows the topographic pattern of hand representations in the cortex. 
 

- A. Nerve Fields of the Hand:** Shows the distribution of nerve fields (D<sub>1</sub> to D<sub>5</sub>) across the hand.
- B. Topographic Pattern of Hand Representations:** Shows the normal cortical map with labels for 'Dorsum' and 'Face'.
- C. Normal Hand Representation:** Shows the standard cortical layout.
- D. Cortex Deprived by Median Nerve Section:** Shows the immediate reorganization after nerve section.
- E. Fully Reorganized Cortex:** Shows the cortex after several months of reorganization.

- Median nerve sectioned to show fluidity of cortical organization
- (C) before
- (D) immediately after
- (E) several months later

11/2/06 (fig. < McClelland & al., *Par. Distr. Proc.* II) 20

### Orientation Columns

A color-coded map of orientation columns in the visual cortex. The map shows different regions of the cortex with varying colors representing preferred orientations. A white box highlights a specific region. Orientation preference is indicated by colored lines on the right side of the map.

11/2/06 (fig. < Nicholls & al., *Neur. to Brain*) 21

### Orientation Columns

A color-coded map of orientation columns in the visual cortex, similar to slide 21, showing the spatial distribution of different orientation preferences across the cortex.

11/2/06 (fig. < Nicholls & al., *Neur. to Brain*) 22

### Slow Potential Neuron

The diagram shows a neuron receiving 'Arriving Action Potentials' which generate 'EPSPs' and 'IPSPs'. These are processed at the cell body as 'Filtered EPSPs' and 'Filtered IPSPs'. The 'Summed potential' is then converted into 'Summed potential converted to outgoing action potentials' which travel along the 'Output Axon'.

11/2/06 (fig. < Anderson, *Intr. Neur. Nets*) 23

### Frequency Coding

The figure displays three graphs showing the relationship between a step function 'Stimulus' and the resulting neuronal firing. The top graph shows a single action potential. The middle graph shows a burst of action potentials. The bottom graph shows a high-frequency, sustained firing rate in response to the stimulus.

11/2/06 (fig. from Anderson, *Intr. Neur. Nets*) 24

### Variations in Spiking Behavior

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### Synapses

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video by Hybrid Medical Animation

### The Synapse

Axon terminal  
Synaptic vesicles  
Synapse  
Dendritic spine

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### Chemical Synapse

1. Action potential arrives at synapse
2. Ca ions enter cell
3. Vesicles move to membrane, release neurotransmitter
4. Transmitter crosses cleft, causes postsynaptic voltage change

11/2/06 (fig. from Anderson, *Intr. Neur. Nets*) 28

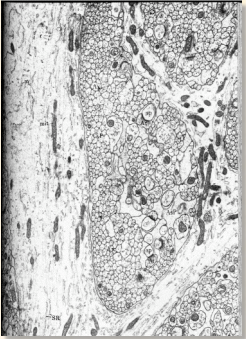
### Typical Receptor

80 Å  
60 Å  
140 Å  
40 Å

11/2/06 (fig. from Anderson, *Intr. Neur. Nets*) 29


### Axon Hillock

11/2/06 (fig. from Peters, Palay & Webster) 30



Dendrite & Dendritic Branches


11/2/06 (fig. from Peters, Palay & Webster) 31



Dendrite & Dendritic Spine

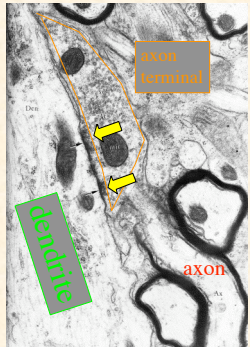
11/2/06 (fig. from Peters, Palay & Webster) 32

Neuropil



11/2/06 (fig. from Peters, Palay & Webster) 33

Myelinated Axon Making Synapse on Dendrite



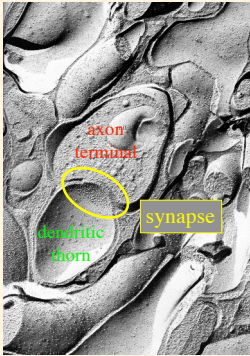
11/2/06 (fig. from Peters, Palay & Webster) 34

Various Synapses



11/2/06 (fig. from Peters, Palay & Webster) 35

Excitatory Synapse Between Axon Terminal and Dendritic Thorn



11/2/06 (fig. from Peters, Palay & Webster) 36

