

Goal: to demonstrate how different neurons can reinforce a message, and how synaptic connections can integrate.

Histamine Releaser:

Several Pain Sensors:

Sensor Neuron: responds to eye getting dry.

Sensor Neuron: responds to object getting close to eye.

Sensor Neuron: responds to bright light.

Target Neuron: connects to muscle.

Muscle: blinks eye.

Have one student be the target neuron. Run an axon from him/her to the target cells, muscles that make the eye blink (have him wave a piece of cardboard). Now set up another student as a sensor neuron. Run a line from the second student to the first student, a dendrite. If student #2 is stimulated by sunlight he/she pulls the dendrite to let student #1 know to blink the eyelids. Add student #3 in the same way. #3 reacts if an object gets close to the eye. Student #4 blinks when the surface of the eye senses it is getting dry. (Note that if student #5 is the surface of the eye that you have built a negative feedback loop. Worth doing and demonstrating). Now have several students be pain sensors on the surface of the eye and connect them to the eye blinker. Simulate what happens if a speck of dust gets on the eye. (One pain sensor repeatedly signals until enough blinks remove the dust). What happens if the eye is washed with insect repellent, stinging it? All the pain sensors kick in, so the system should blink vigorously. Finally, have another student be the histamine releaser on the eye (she can cry or spray the air with a spray bottle), and connect the pain cells to the histamine releaser. Thus, when they feel pain they simultaneously tell the eye to blink and to release histamine, so the histamine releaser floods the eye with histamine and it swells up and cries. Make sure the setup is such that the pain cell has to stimulate the histamine releaser when it stimulates the blink response.

Muscle to blink eye (wave cardboard).

Neuron to tell muscle to blink.

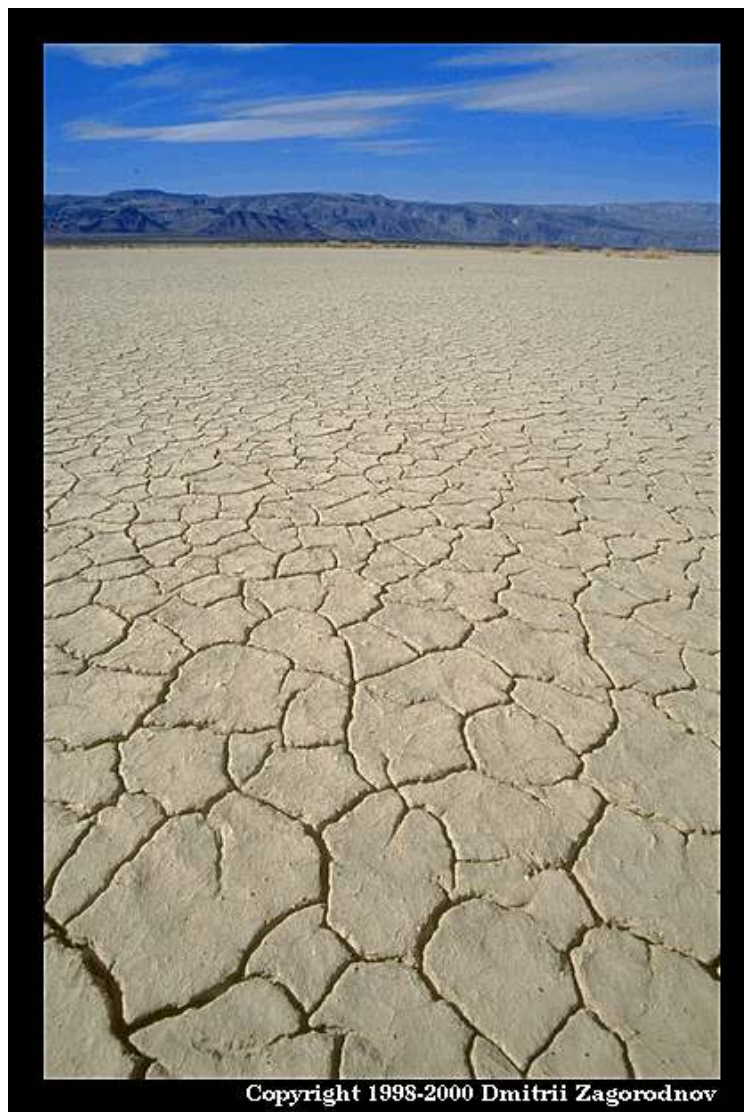
Sensory neurons: respond to pain, or bright light, or dry eye.

Histamine releaser: floods eye with histamine so it swells and cries.

PAIN SENSOR

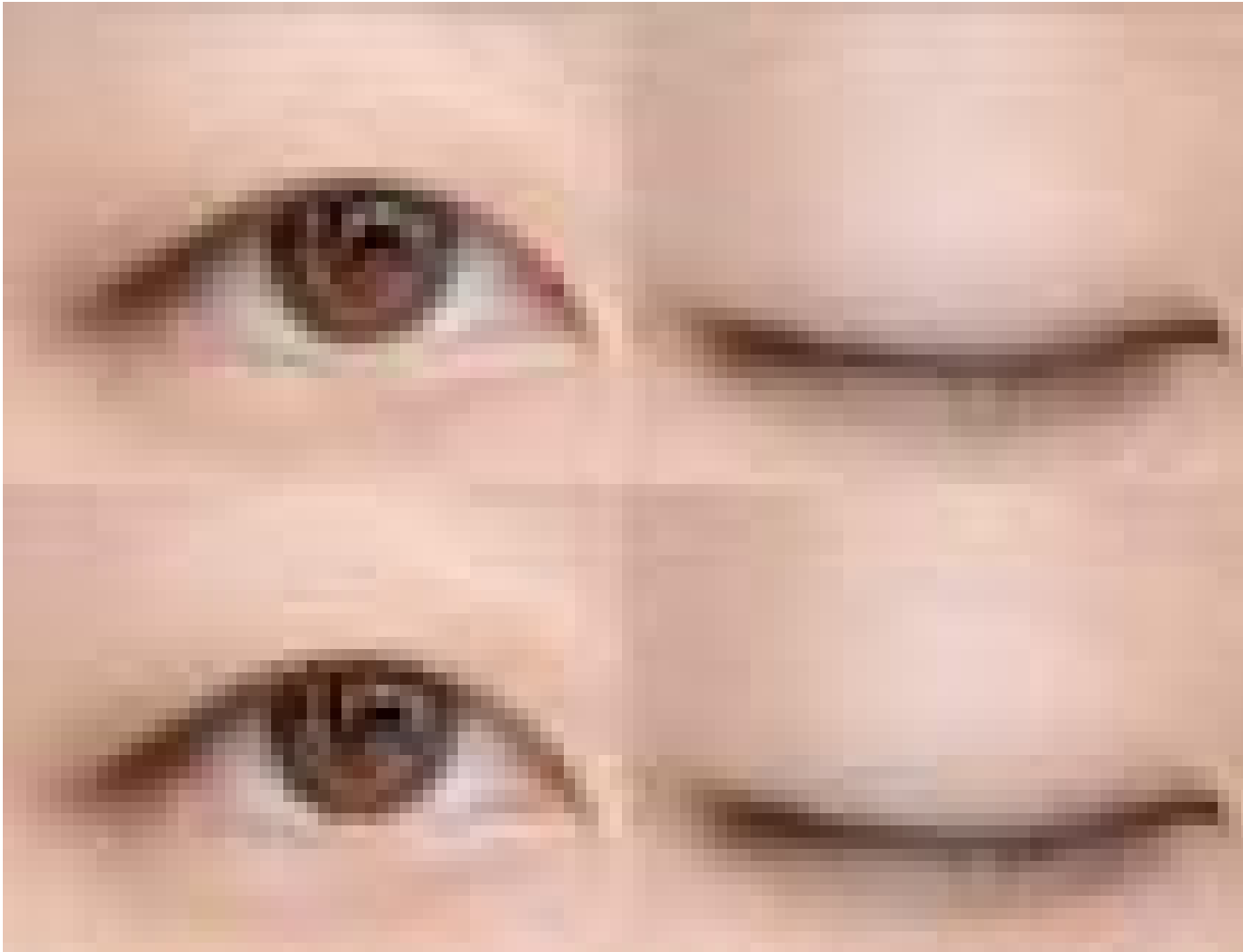


DRY SENSOR



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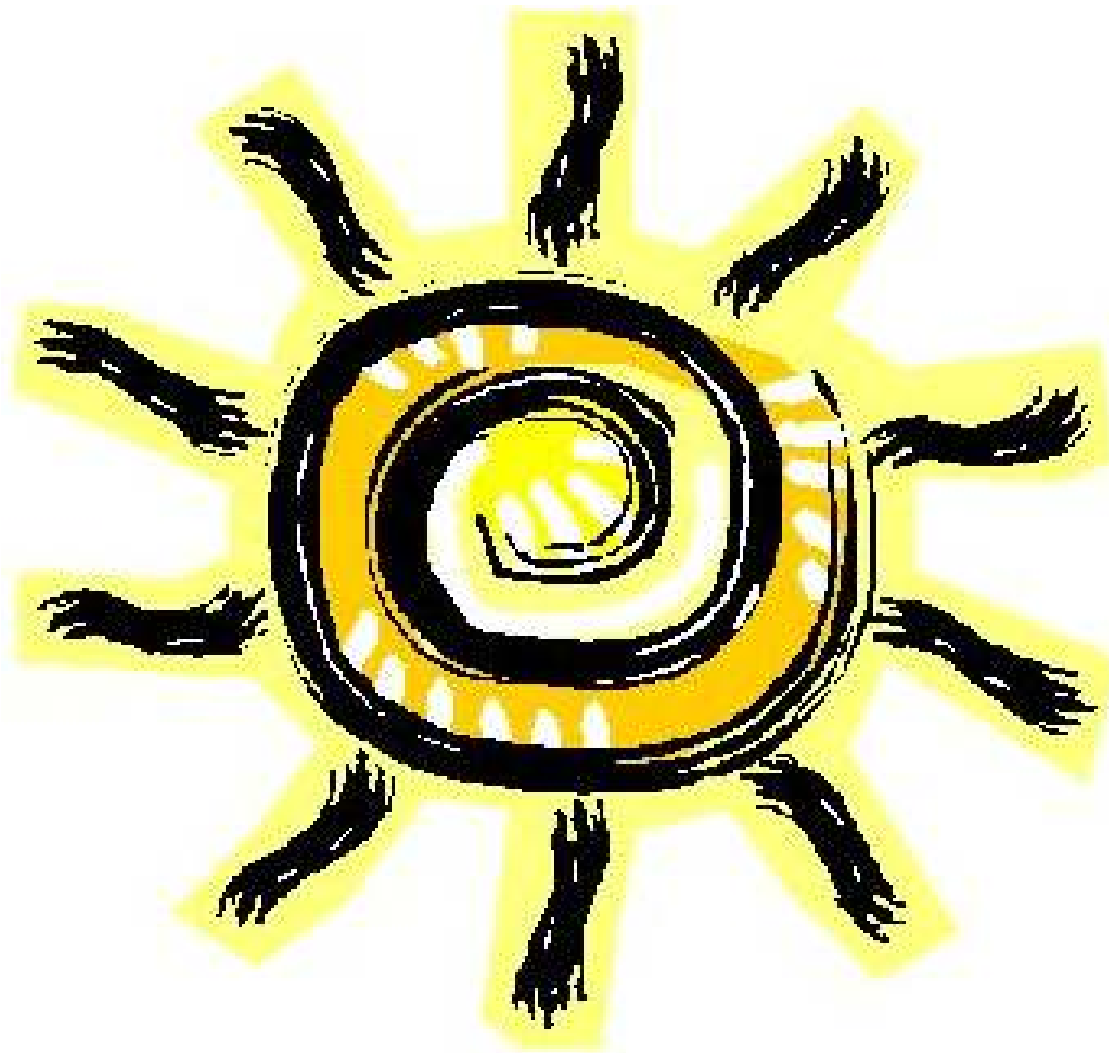
BLINK



TEAR RELEASER



BRIGHT LIGHT SENSOR



MUSCLE



TARGET NEURON

