Summation Encyclopedia Article

Summation

The following sections of this BookRags Literature Study Guide is offprint from Gale's For Students Series: Presenting Analysis, Context, and Criticism on Commonly Studied Works: Introduction, Author Biography, Plot Summary, Characters, Themes, Style, Historical Context, Critical Overview, Criticism and Critical Essays, Media Adaptations, Topics for Further Study, Compare & Contrast, What Do I Read Next?, For Further Study, and Sources.

(c)1998-2002; (c)2002 by Gale. Gale is an imprint of The Gale Group, Inc., a division of Thomson Learning, Inc. Gale and Design and Thomson Learning are trademarks used herein under license.

The following sections, if they exist, are offprint from Beacham's Encyclopedia of Popular Fiction: "Social Concerns", "Thematic Overview", "Techniques", "Literary Precedents", "Key Questions", "Related Titles", "Adaptations", "Related Web Sites". (c)1994-2005, by Walton Beacham.

The following sections, if they exist, are offprint from Beacham's Guide to Literature for Young Adults: "About the Author", "Overview", "Setting", "Literary Qualities", "Social Sensitivity", "Topics for Discussion", "Ideas for Reports and Papers". (c)1994-2005, by Walton Beacham.

All other sections in this Literature Study Guide are owned and copyrighted by BookRags, Inc.

Contents

Summation Encyclopedia Article.....1

Contents.....2

Summation.....3

Summation

When an excitatory neuron is stimulated, the cell body (presynaptic neuron) creates an action potential which travels down the cell's axon to the synapse, releasing neurotransmitters. These chemical messengers stimulate the adjacent cell--the postsynaptic neuron--to rise above resting potential (or threshold), which is approximately -70 millivolts (mV). An action potential is thus stimulated in that neuron. Motor and sensory messages are carried throughout the nervous system in this manner.

In the central nervous system (CNS), however, one presynaptic action potential alone is seldom sufficient to stimulate the postsynaptic neuron above threshold. In the CNS there are two types of presynaptic potentials: excitatory (EPSP) which are positive but subthreshold and degrade (become weaker) as they travel; and inhibitory (IPSP), which are negatively charged and lower the cell membrane's resting potential even further. *Summation* is the cumulative effect of many subthreshold and negative charges. If the aggregate is greater than the postsynaptic cell's membrane potential, the cell fires and its output signal travels down its axon to the next cell. There are two types of summation--temporal and spacial. Temporal summation is the convergence of many rapid-firing signals from a single synapse onto the postsynaptic axon hillock--the part of the axon closest to the cell body. When EPSP signals are sent in rapid succession, they cumulatively stimulate the postsynaptic cell. Spacial summation is the simultaneous convergence of one signal from several different synapses onto the axon hillock of a single postsynaptic neuron. In both types of summation, EPSPs and IPSPs can converge at the same time on the same postsynaptic axon hillock. In such instances, the cumulative strength of the EPSPs must cancel out the negative IPSPs and be strong enough to excite the cell above -55mV in order to trigger an all-or-none response.