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Dynamic Control of Walking and Paw-shaking in the Cat JESSICA GREEN, GENNADY CYMBALYUK, Georgia State University — Multistable central pattern generators (CPGs) are capable of producing multiple rhythmic patterns with different periods. We developed a model of a half center oscillator, consisting of two reciprocally inhibitory neurons. Each neuron contains two slow inward currents, a Na^{+}current, and a Ca^{++} current. We found that a walking rhythm (1 Hz) and a paw-shaking rhythm (10 Hz) do coexist in this model . The kinetics of the inactivations of $I_{NaS}$and I_{CaS} produce this multistability. A paw-shaking response can be demonstrated as a result of a switch in the multistable model or as a transient response of a nearby monostable model. The duration of this transient paw-shaking response depends on pulse duration and the phase of walking at which the pulse is initiated. We also developed a model of two populations with 20 neurons each, in which there are random inhibitory synapses across the two populations and random excitatory synapses within each population. This population model generates similar behavior as the two neuron model.

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