

Functional phase resetting and the pyloric circuit

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Phase resetting theory was developed for oscillators. Within the context of a central pattern generator (CPG), the oscillatory elements, or pacemakers, are often bursting neurons. Burst phase resetting curves, or the resetting of burst timing in response to a burst in another neuron, have been used to characterize pacemakers such as the AB/PD kernel in the pyloric circuit of the stomatogastric ganglion of the crab and lobster. However, not all components of CPGs are endogenous bursters. Other elements, such as post-inhibitory rebound (PIR) neurons or other types of follower neurons can be analyzed using the phase resetting formalism if the phase response is measured in response to a contingent pulse repeatedly applied at a fixed delay after burst initiation. We call this type of phase resetting curve a functional phase resetting curve. The contribution of the nonpacemakers, LP and PY, to the pyloric triphasic rhythm can be better understood using this protocol.