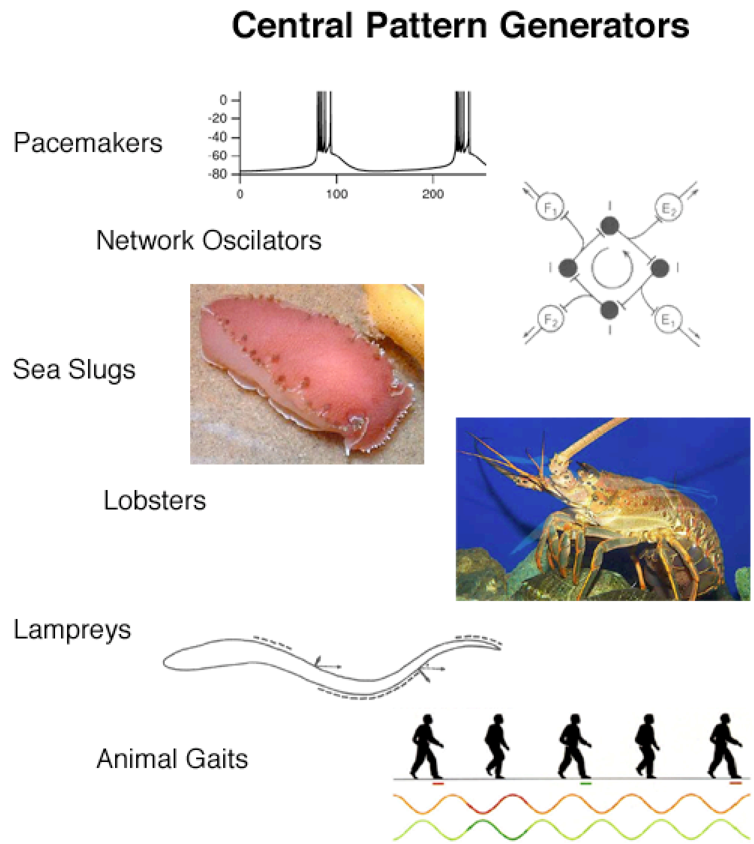
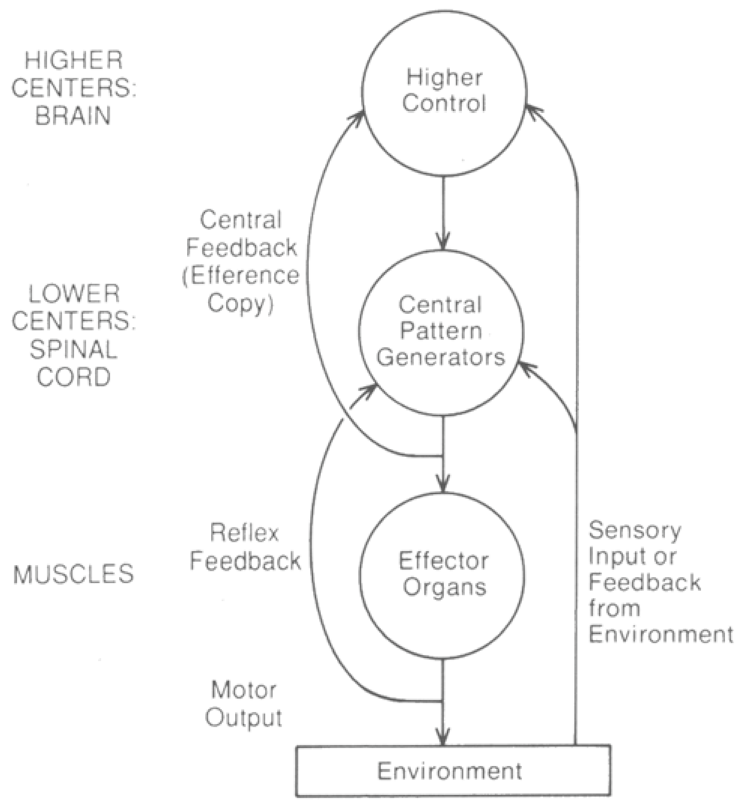
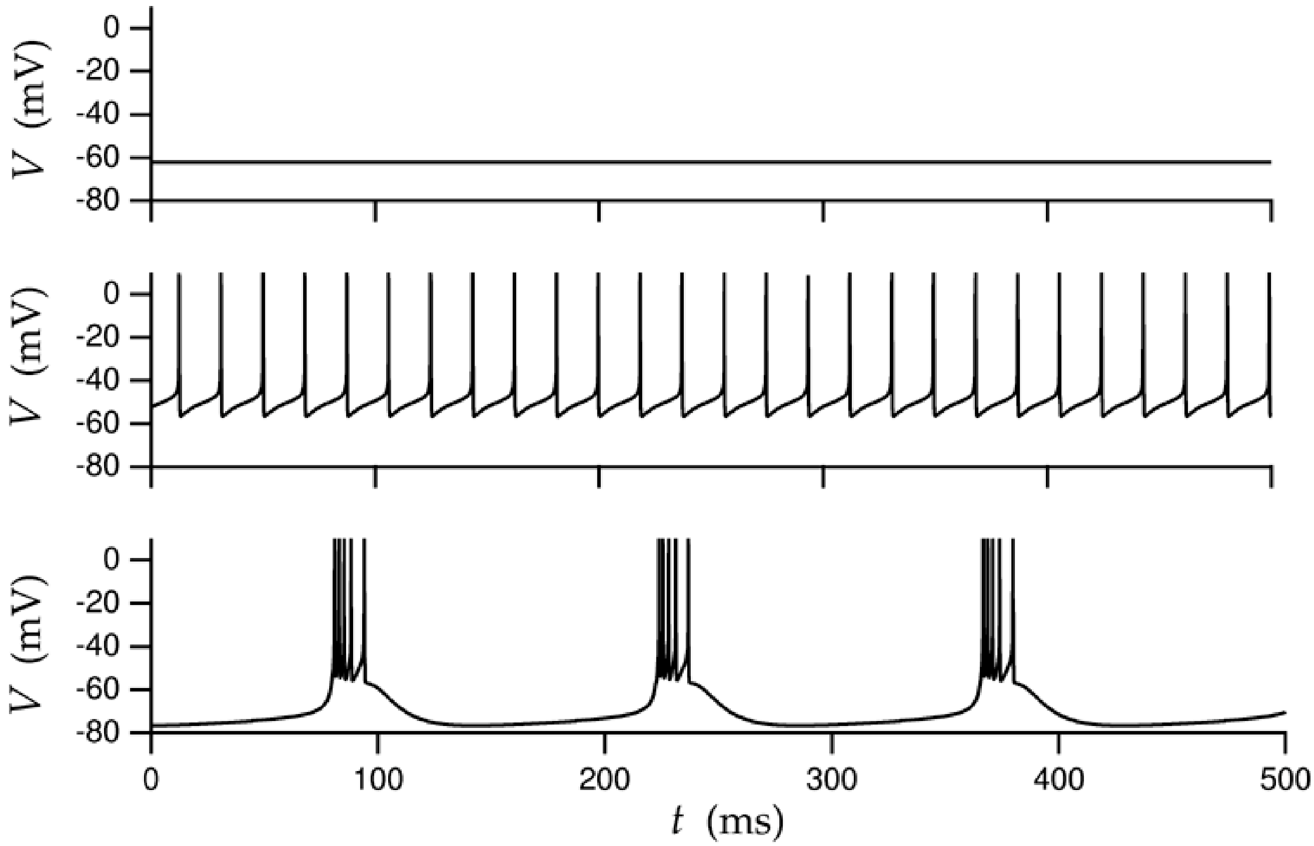


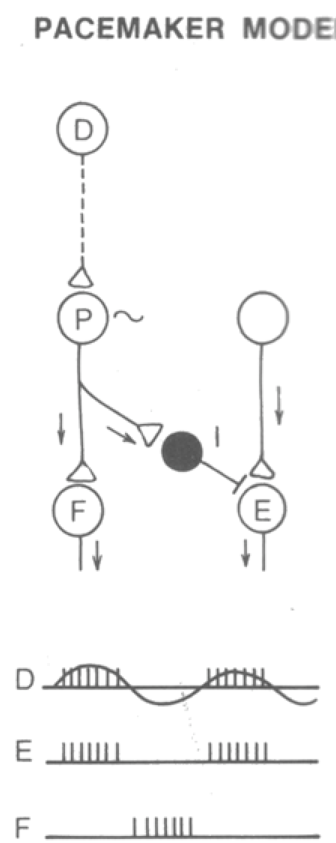
00_title.psd



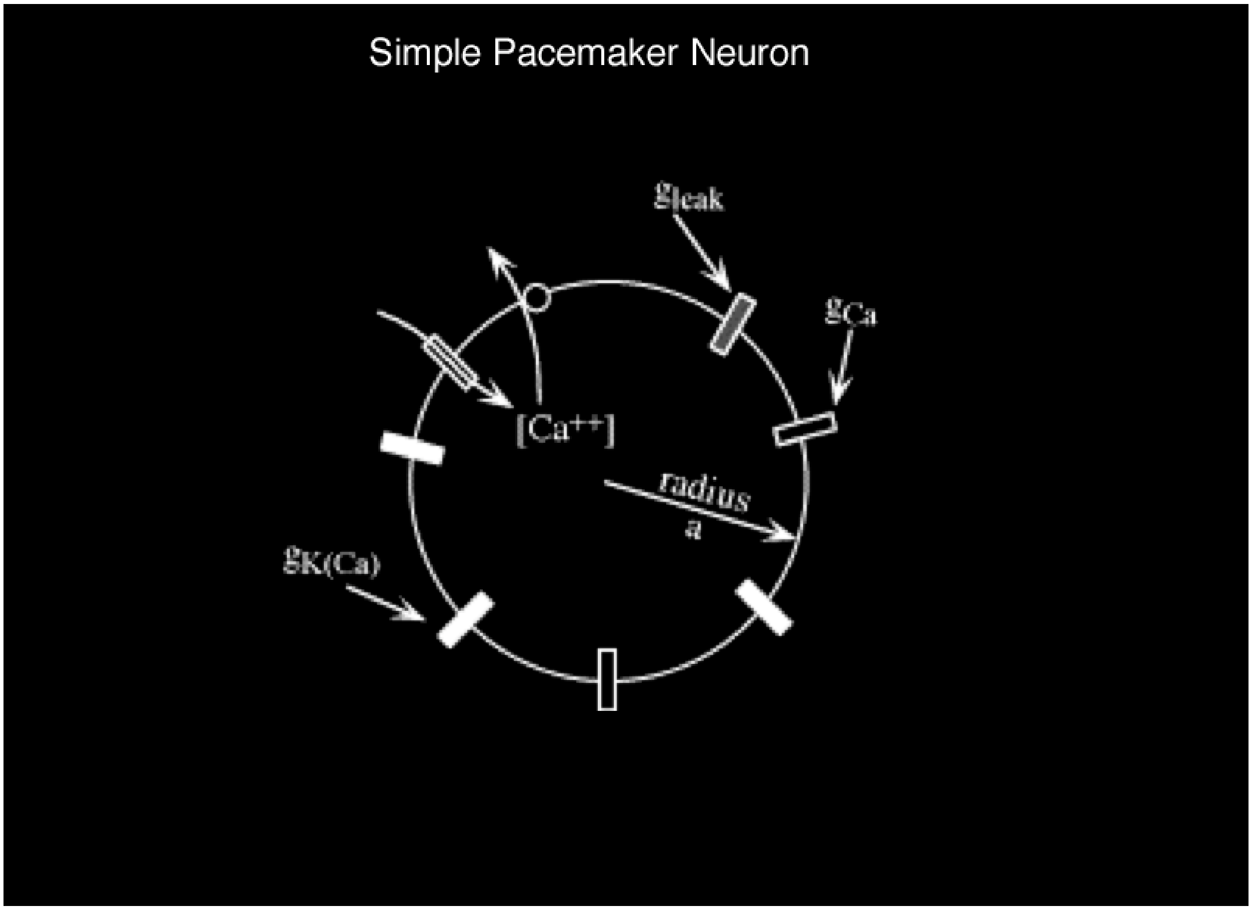
01_Shepard88Fig20_2.psd



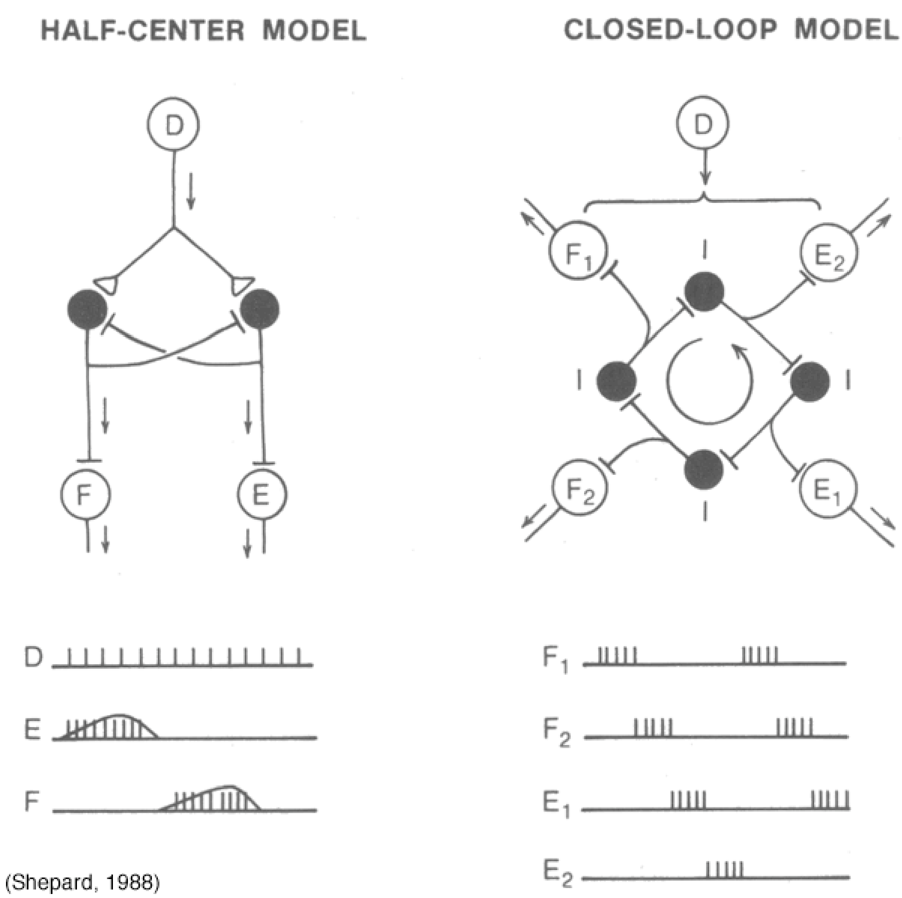
02_ch6fig3.png



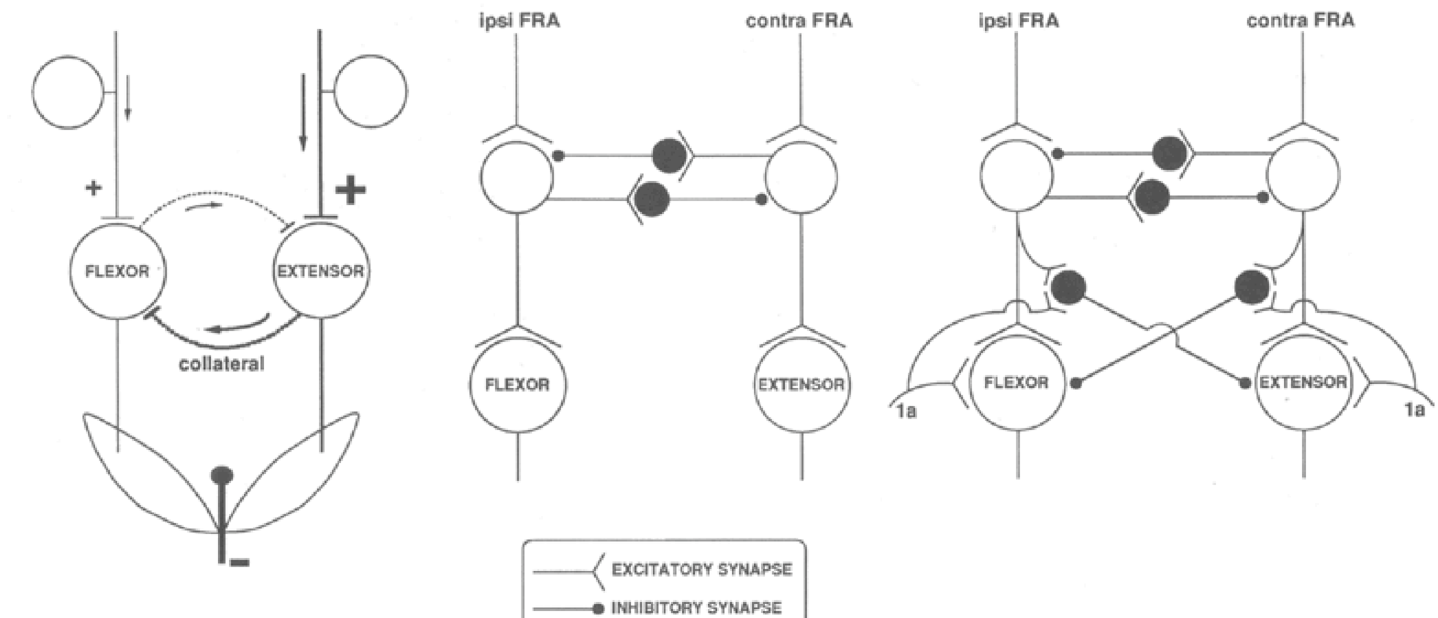
02c_Shepard88Fig20_3C.psd



03_CaSimul.psd

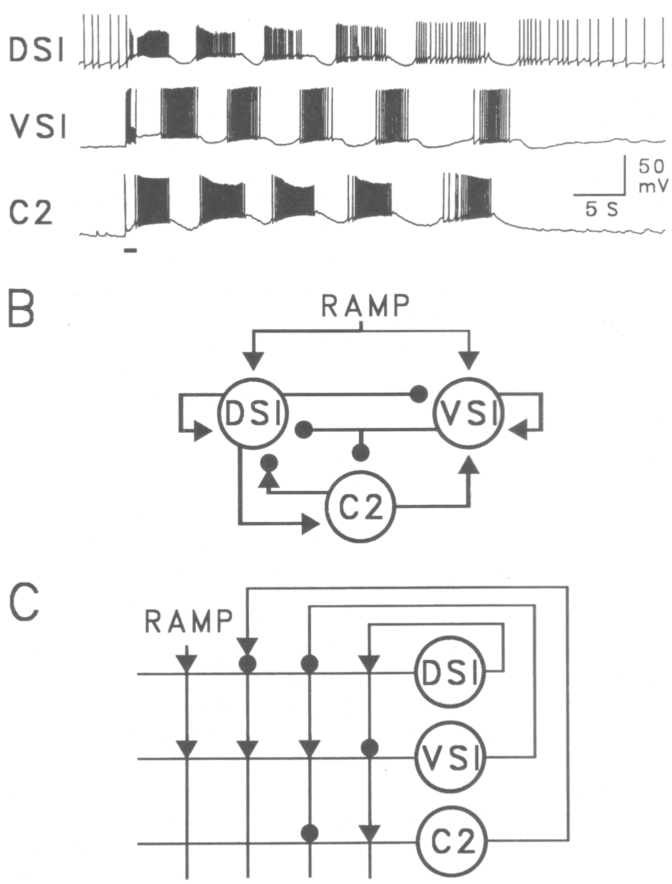


11_Shepard88Fig20_3.psd



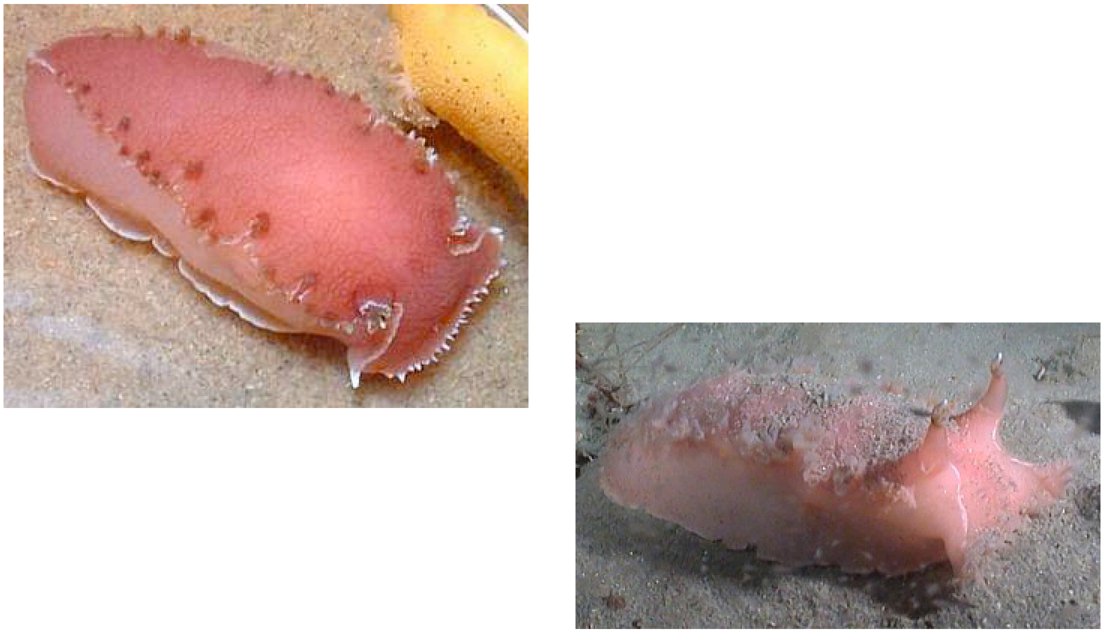
(Lundberg, 1980)

12_Lundberg80Fig.psd



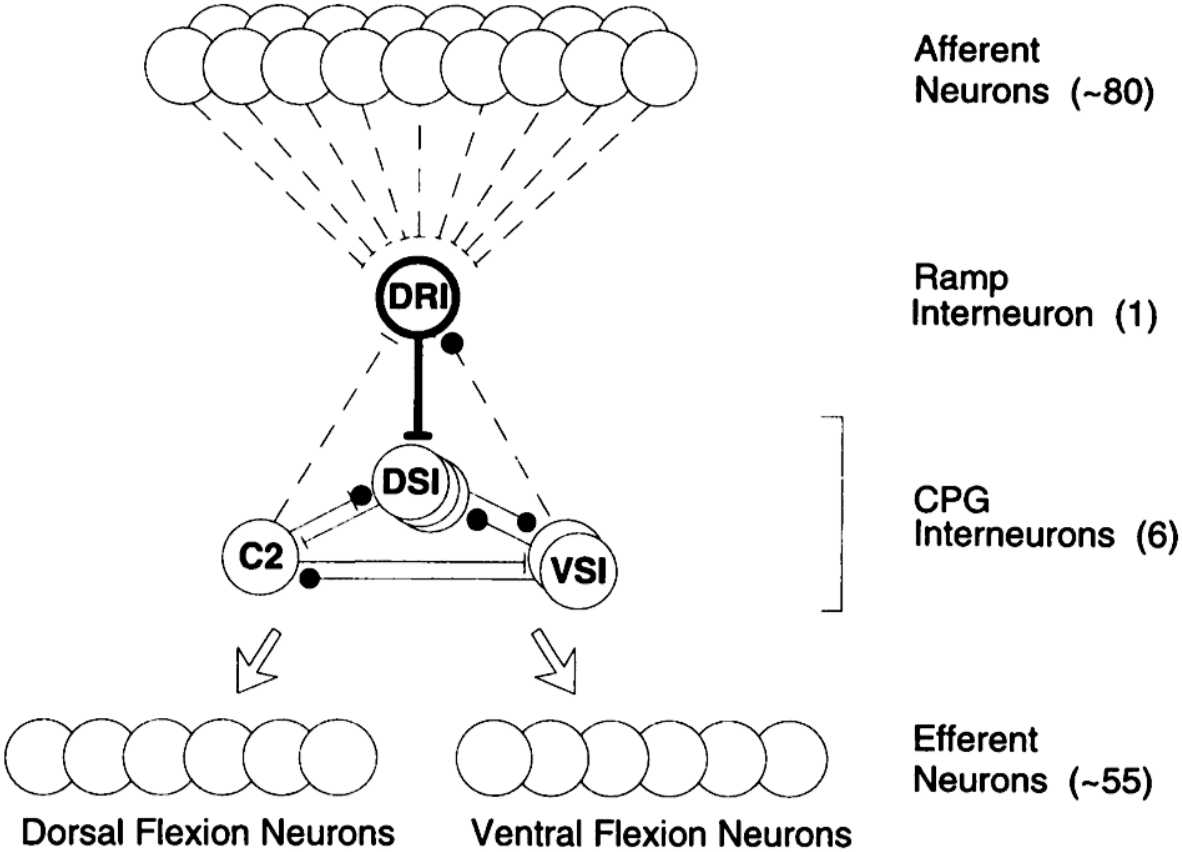
31_Getting89Fig6_1.psd

Tritonia diomedea



32_tritonia.psd

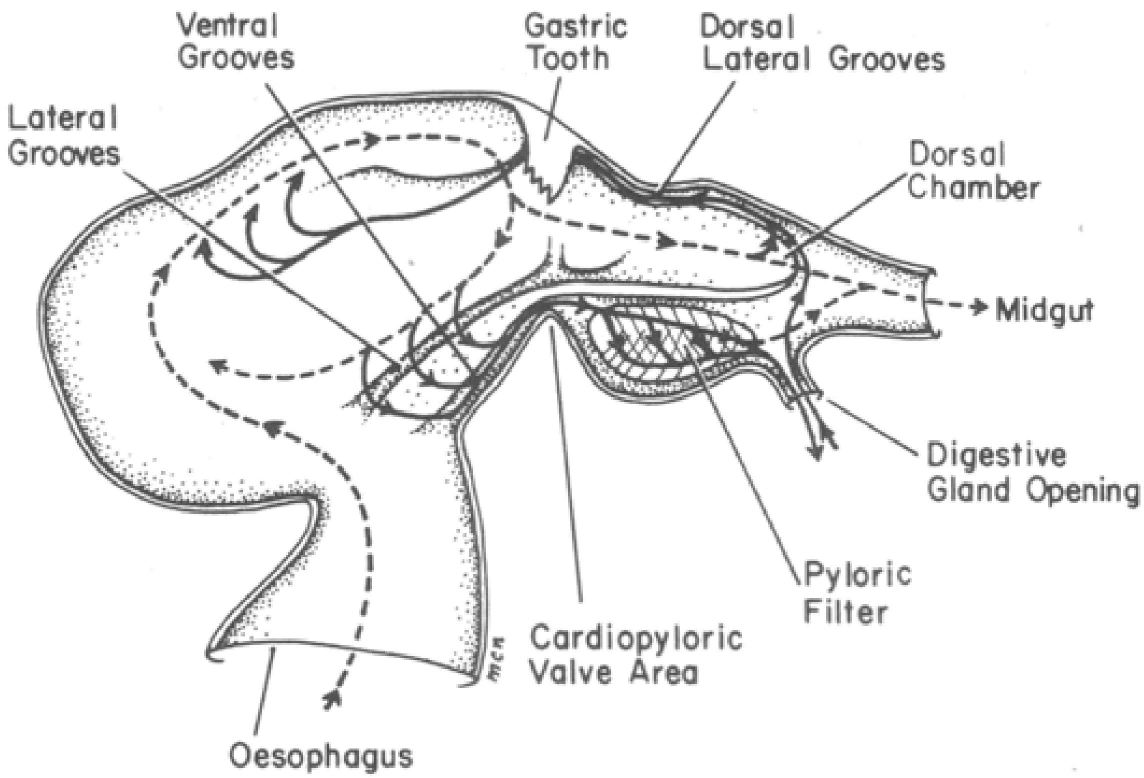
33_tritonia_EscapeSw#24BE92.mov



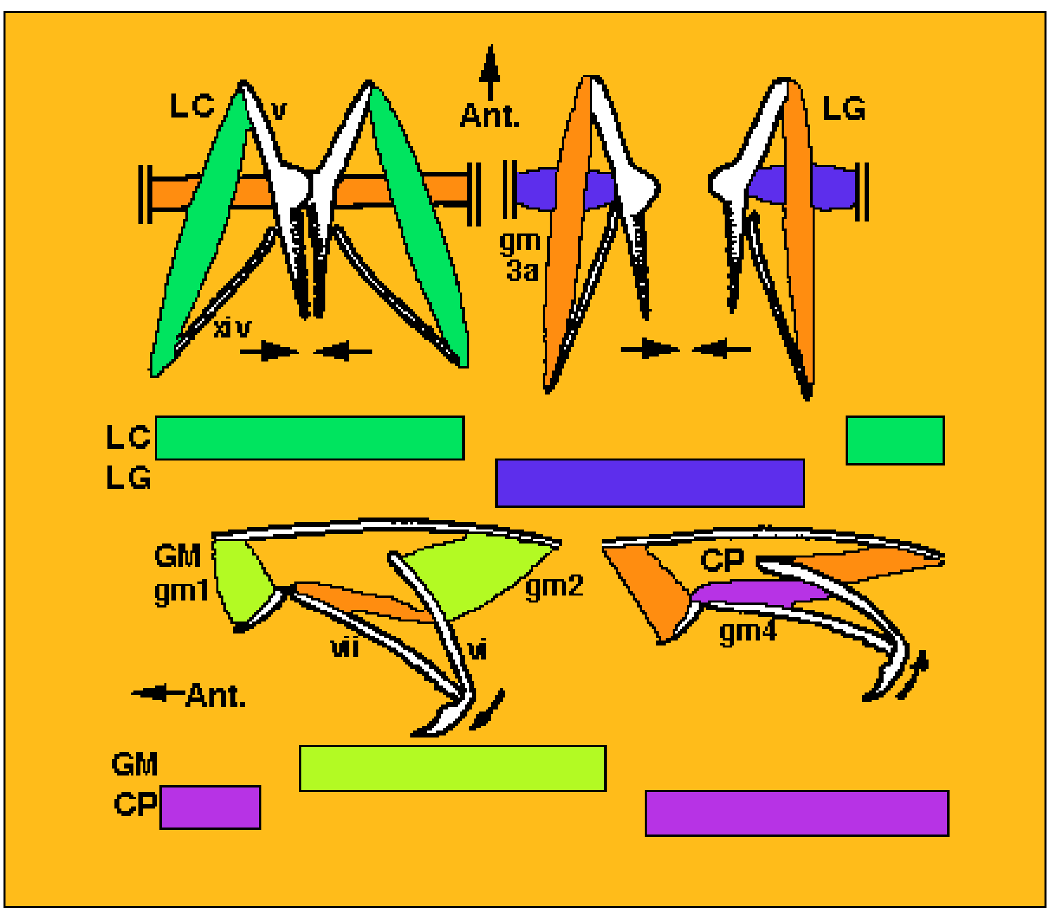
34_Frost96Fig4.png

Panulirus interruptus

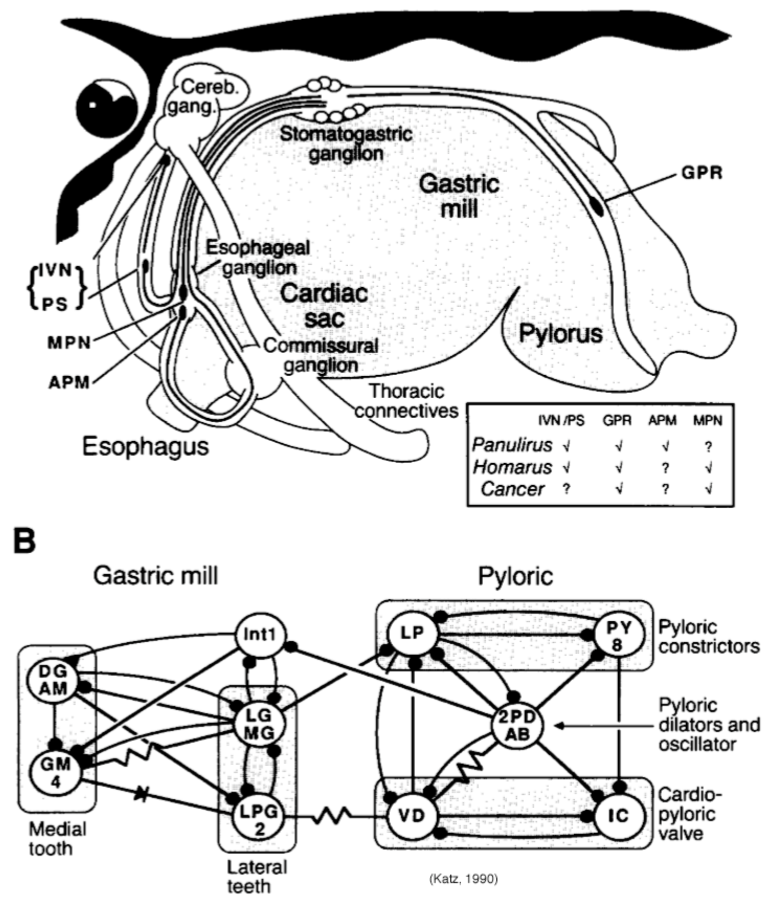
40_Panulirus.psd



42_Johnson92Fig1_2.psd

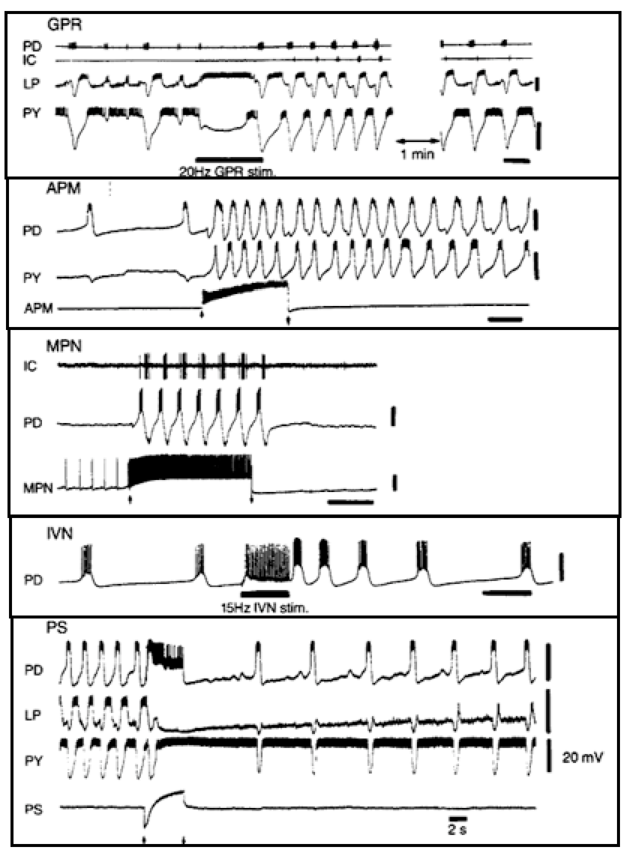


43_teeth.gif



44_Katz90Fig1.psd

Patterns Generated by the STG



Typical effects of the modulatory cells on the pyloric motor pattern:

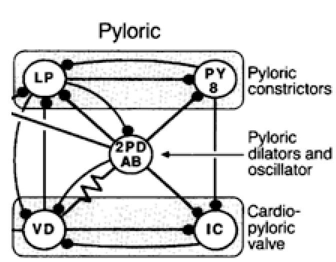
(A) Gastropyloric receptor (GPR) stimulation (20 Hz, 5 s) causes an initial disruption of the slow pyloric pattern, followed by an increase in cycle frequency that lasts over I min.

(B) Anterior pyloric modulator (AP/VI) stimulation (bottom trace) has a prolonged effect on the pyloric rhythm.

(C) Stimulation of the modulatory proctolin-containing neuron (MPN) can turn on the pyloric pattern, but its effects are short-rived

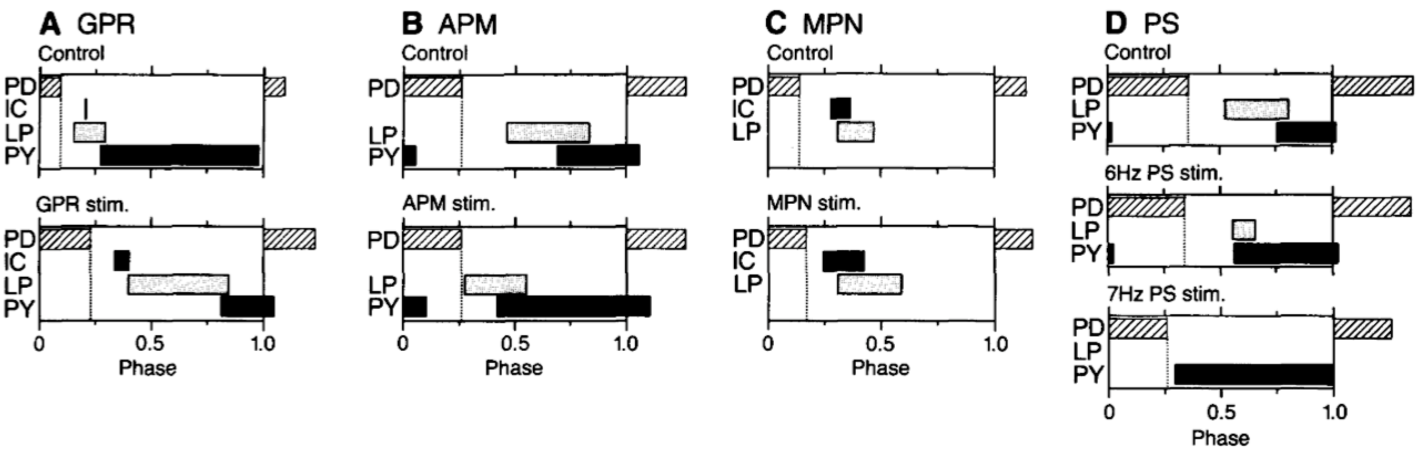
(D) Inferior ventricular nerve cell (IVN) stimulation (15 Hz, 2 s) initially evokes EPSPs in PD, disrupting its activity. Following IVN stimulation, pyloric cycle frequency increases.

(E) Pyloric suppressor (PS) stimulation (bottom trace) also evokes EPSPs in PD, but causes a prolonged suppression of pyloric activity.

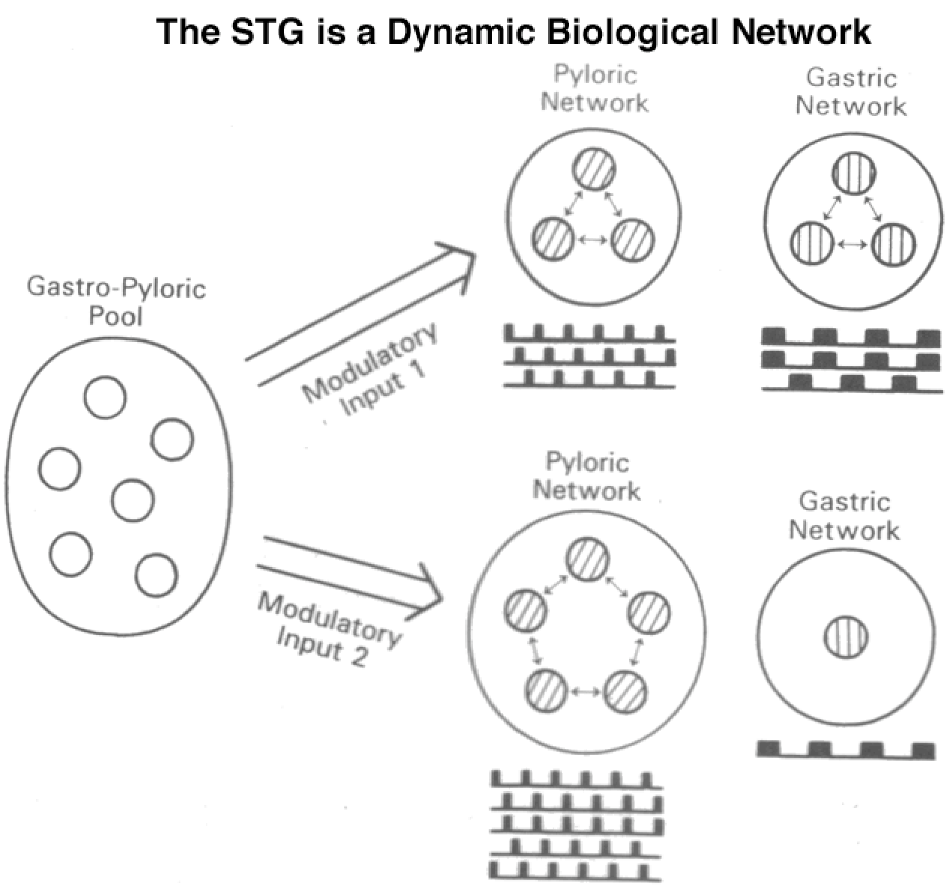


(Katz, 1990)

45_stgPatterns.psd

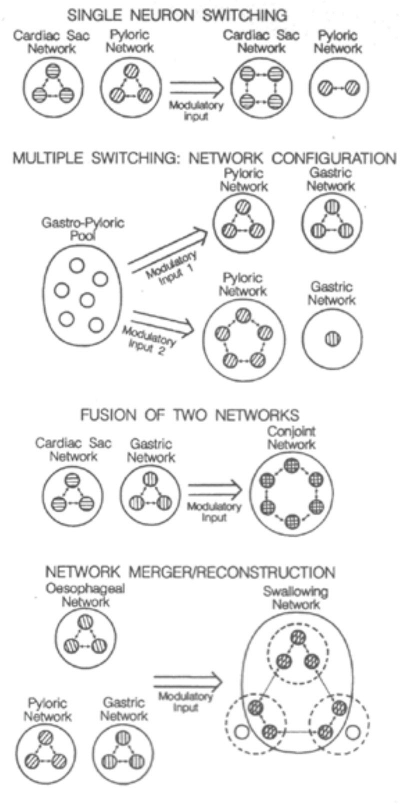


46_Katz90Fig3.png

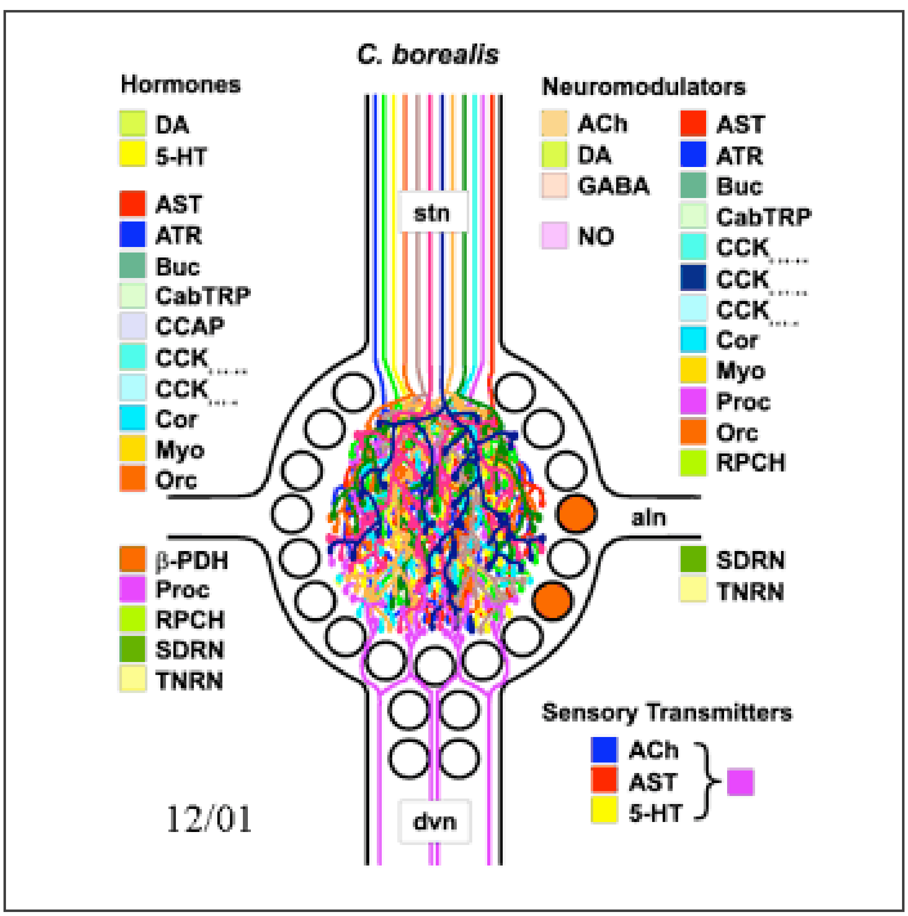


47_Dickinson92Fig4_6.psd

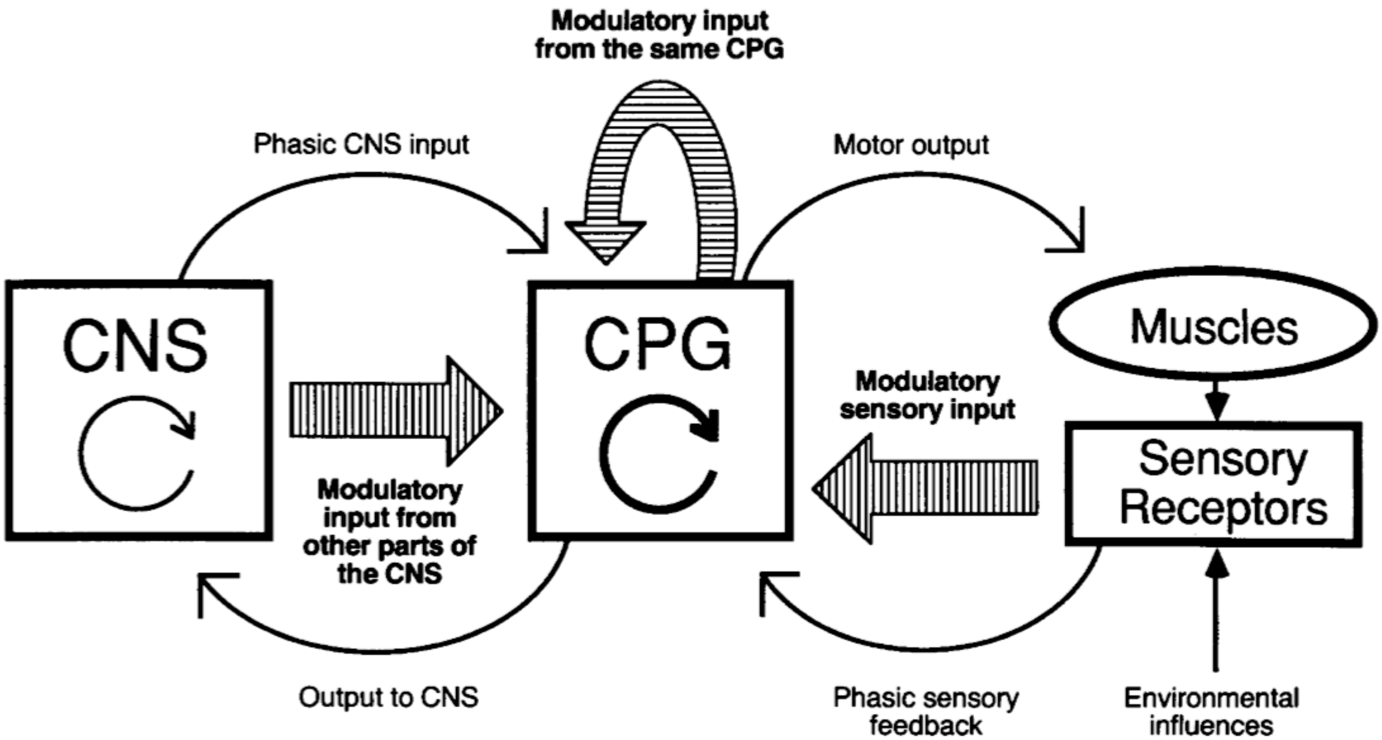
The STG Reconfigures to Support Multiple Patterns



47b_Dickinson92Fig4_13.psd



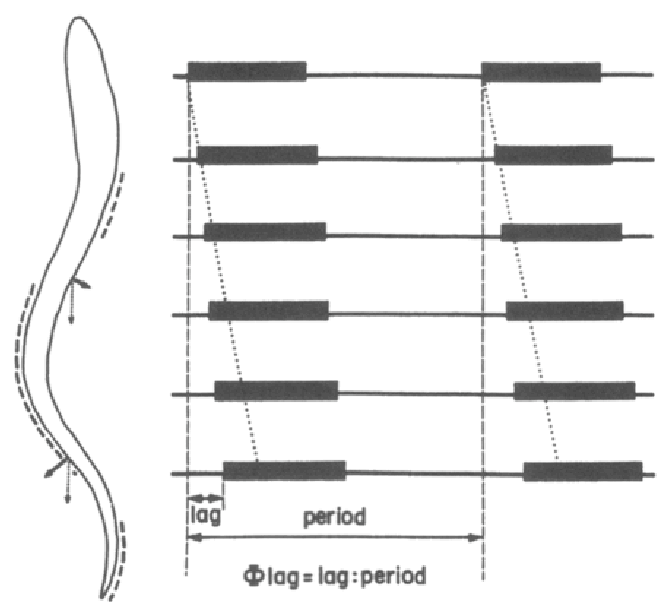
48_stg_modulate.gif



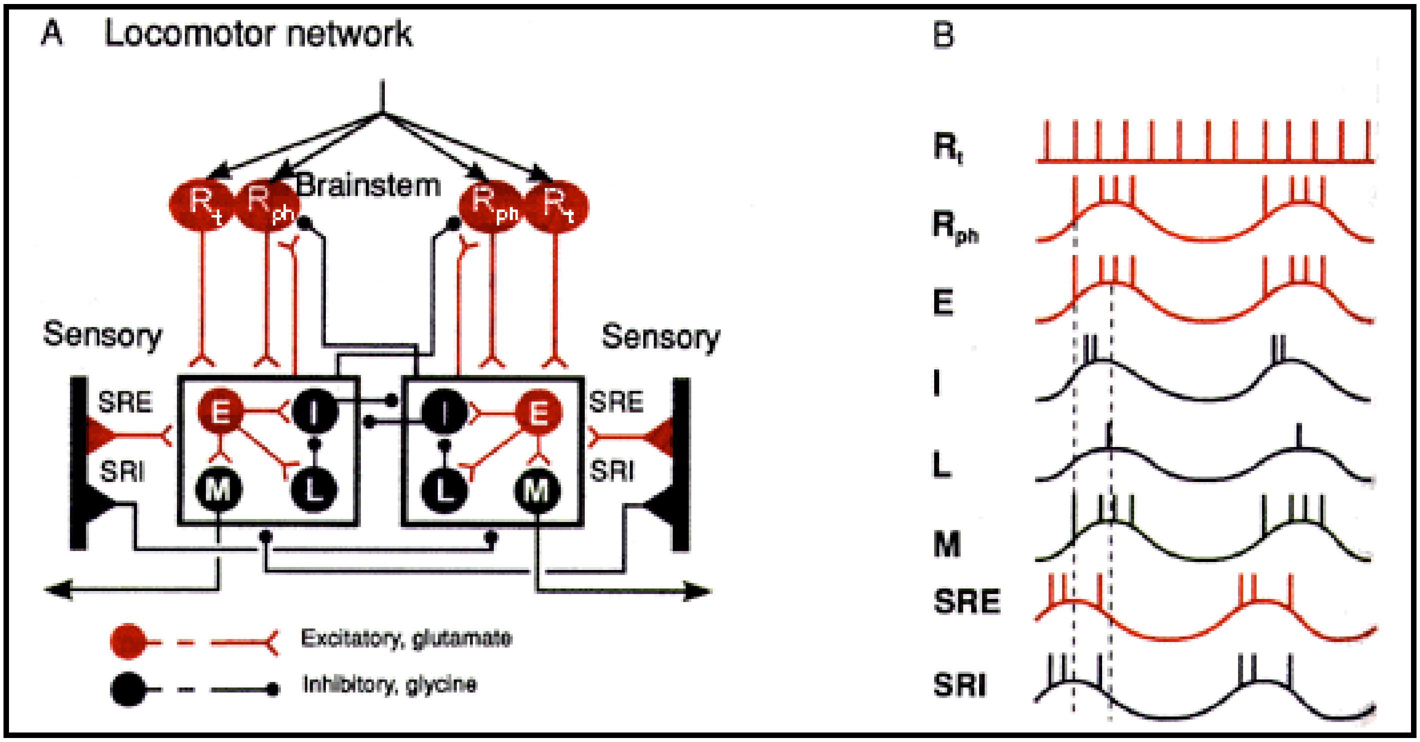
49_Katz90Fig5.png

Lamprey Locomotion

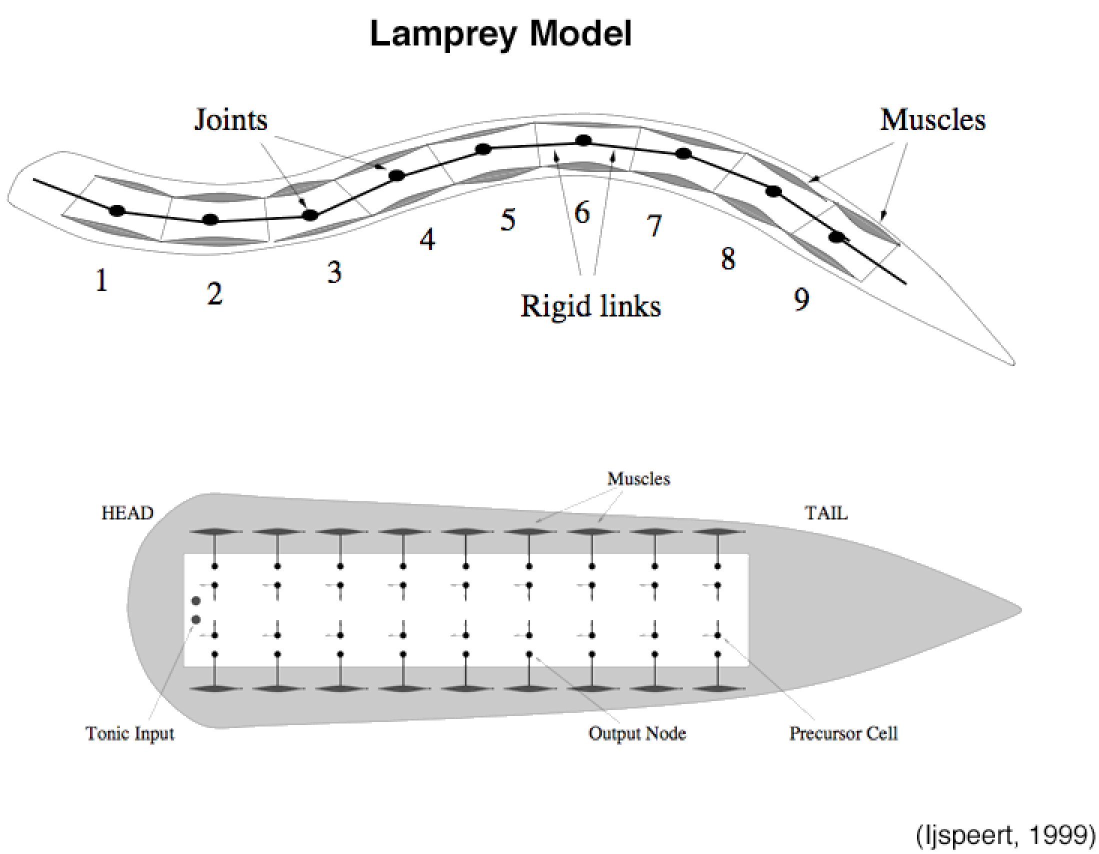
- Sequence of coupled oscillators along the body
- Spatial frequency is shorter than 1 body length
- Constant phase lag between adjacent oscillators
- Coordinated oscillations at a range of frequencies



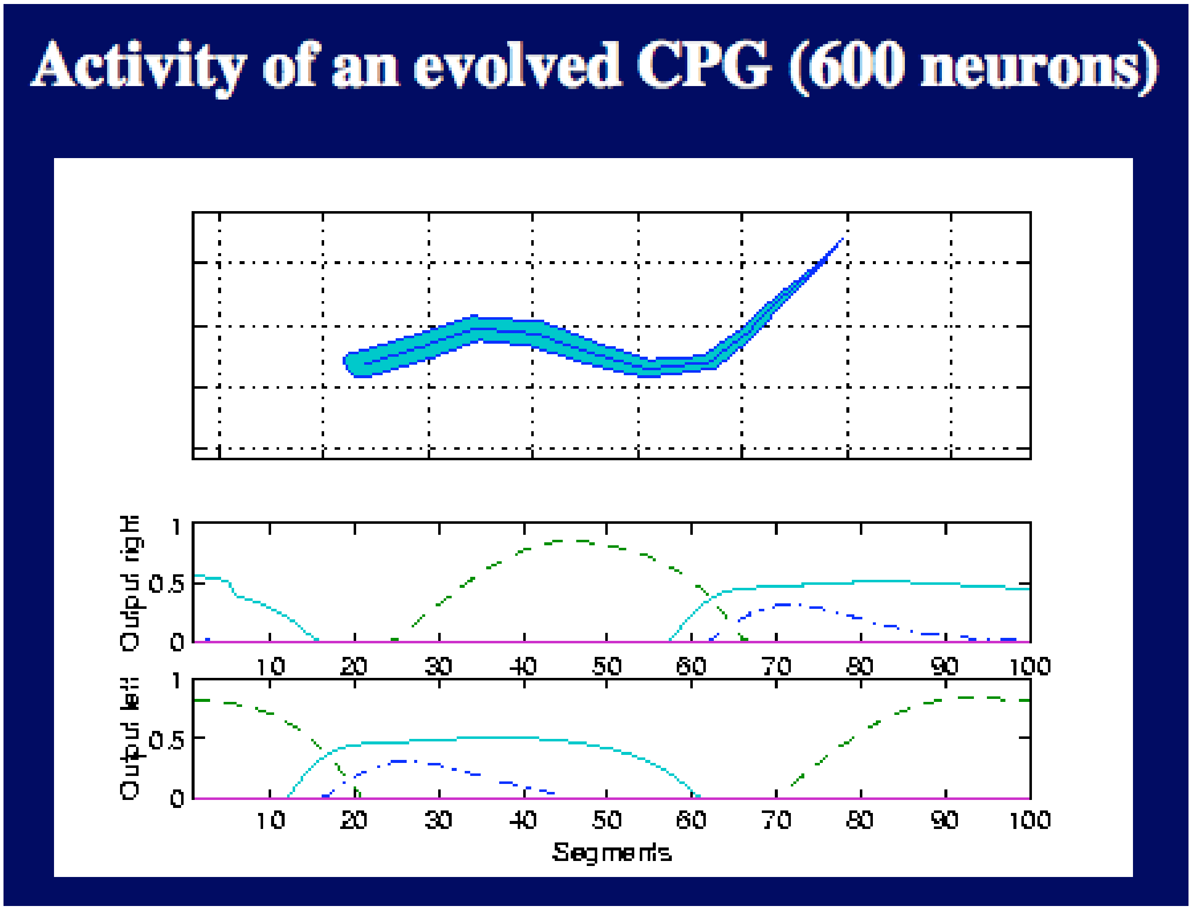
51_lamprey2.psd



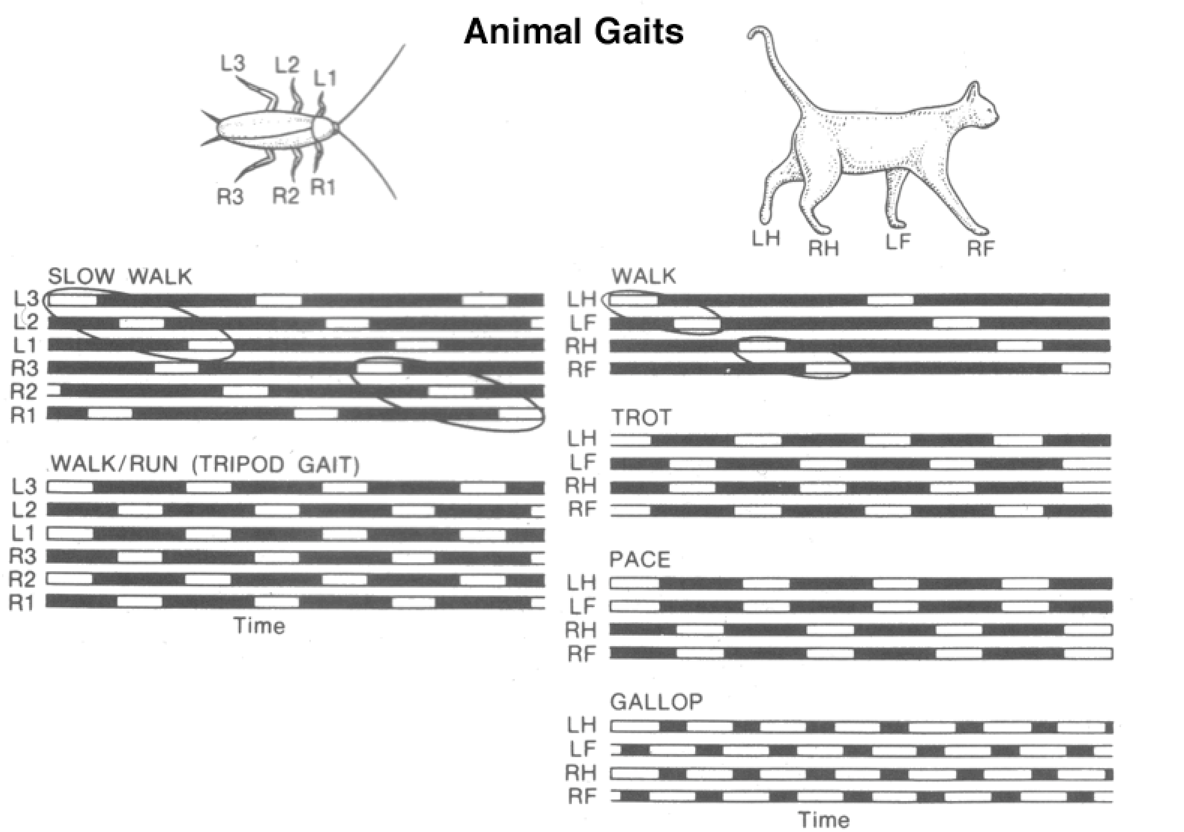
52_lamprey_blockdiagram.gif



53_lampreyModel.psd



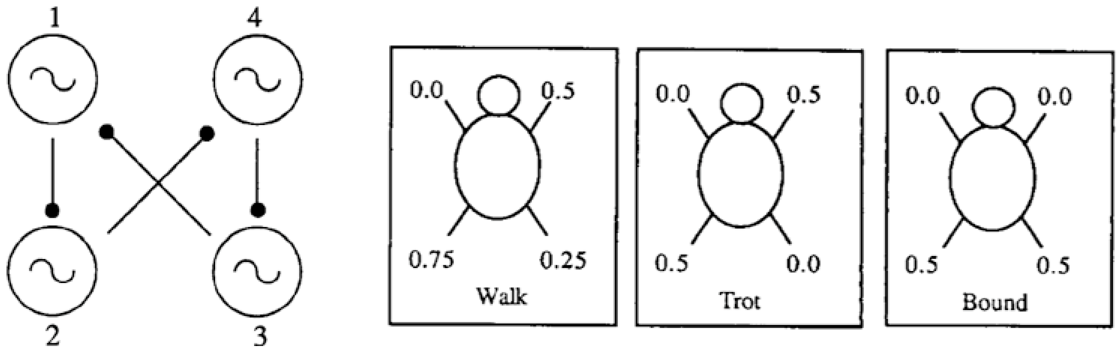
54_Salzman_lamprey.mov



(Pearson, 1976)

60_Gaits.psd

Analysis of Quadruped Gaits as Coupled Oscillators



(Collins, 1994)

61_GaitsOscil.psd

Stein Neuronal Model
(Stein et al. 1974)

$$\dot{x}_i = a \cdot \left[-x_i + \frac{1}{1 + \exp(-f_{ci} - by_i + bz_i)} \right] \qquad \text{for } i = 1, 2, 3, 4$$

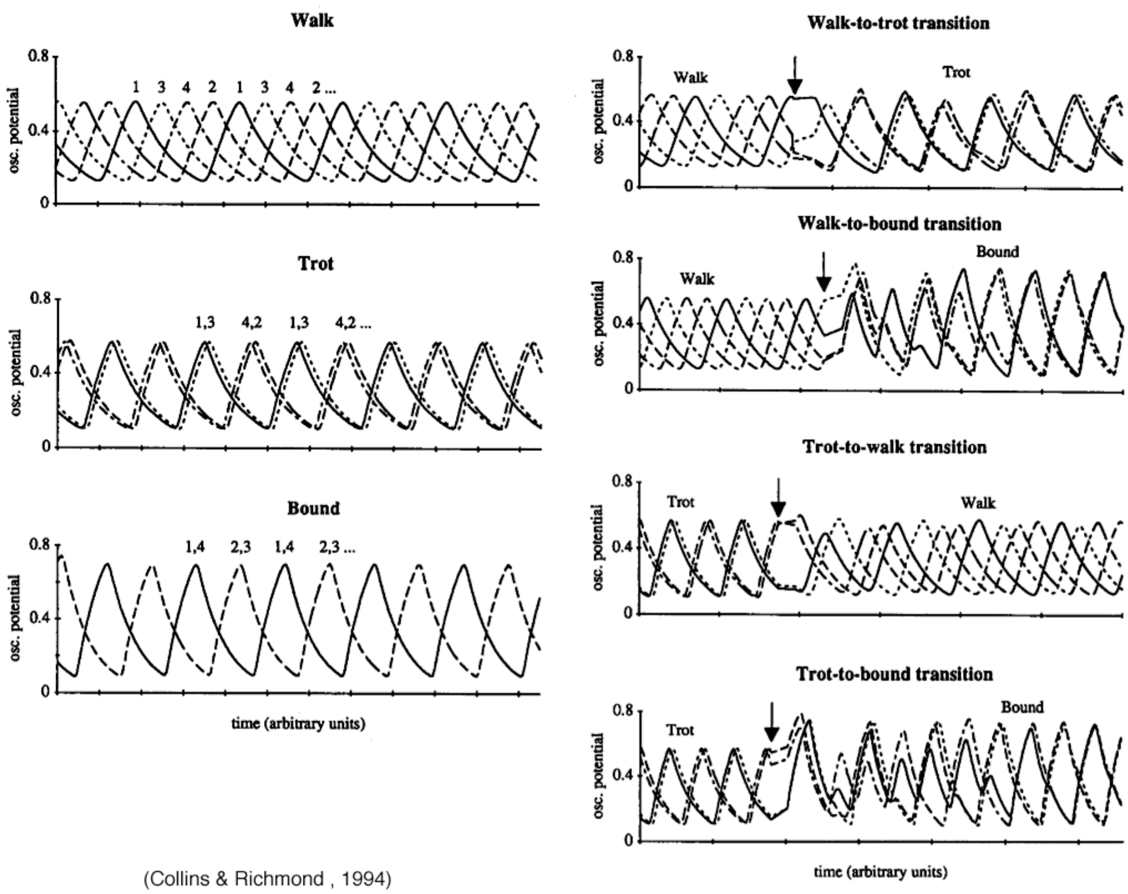
$$\dot{y}_i = x_i - py_i$$

$$\dot{z}_i = x_i - qz_i$$

$$f_{ci} = f \cdot \left[1 + k_1 \sin(k_2 t) + \sum_{j=1}^{4} \lambda_{ji} \cdot x_j \right]$$

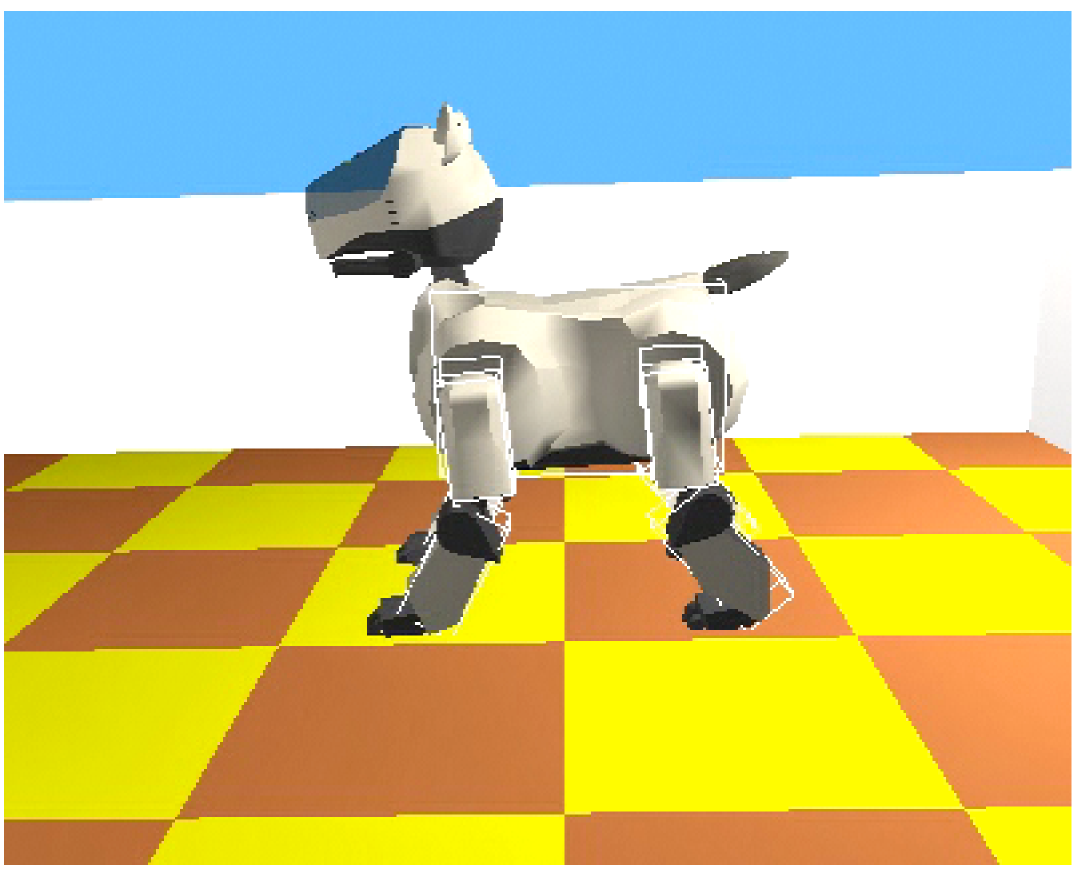
(Collins & Richmond , 1994)

63_SteinModel.psd



(Collins & Richmond , 1994)

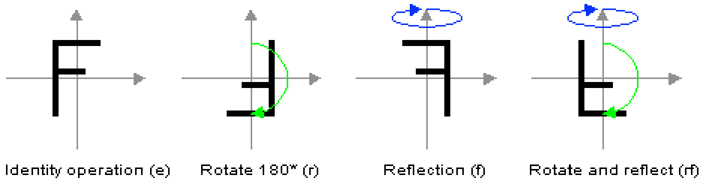
64_Collins94bFig3_4.psd

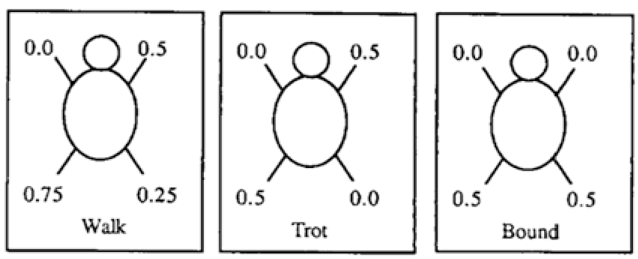


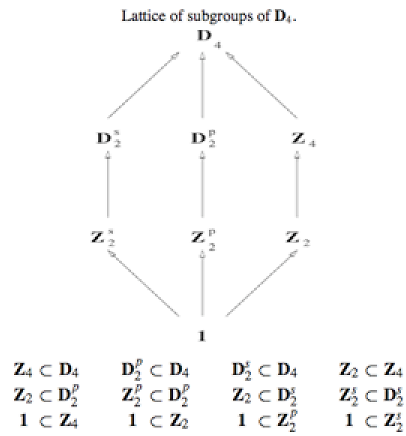
65_Salzman_speed_up.mpeg

Gaits Classified by Dihedral Group

$\mathbf{D}_4$ is the symmetry group of the square, corresponding to a 4-cycle operator, ω, corresponding to 90° rotations, and a reflection, κ.







$$\mathbf{D}_4 \quad \mathbf{D}_2^s = \langle \kappa, \omega^2, \kappa\omega^2 \rangle \quad \mathbf{D}_2^p = \langle \kappa\omega, \omega^2, \kappa\omega^3 \rangle \quad \mathbf{Z}_4 = \langle \omega \rangle$$

$$\mathbf{1} \qquad \mathbf{Z}_2^s = \langle \kappa \rangle \qquad \mathbf{Z}_2^p = \langle \kappa\omega \rangle \qquad \mathbf{Z}_2 = \langle \omega^2 \rangle$$

(Collins, 1994)

66_dihedral.psd