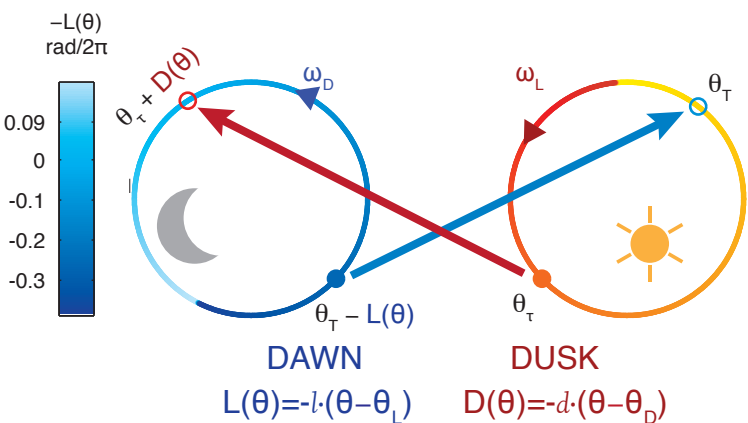
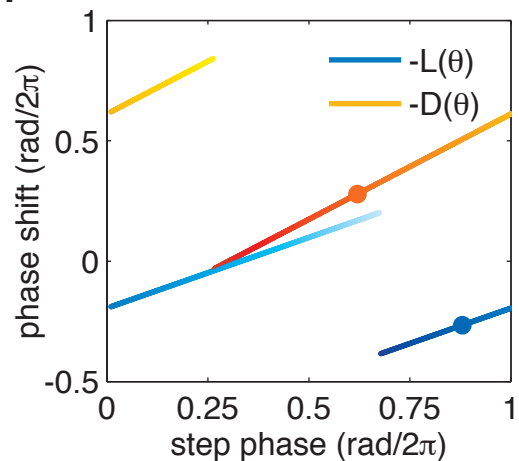


# Figure—Mathematical Appendix.

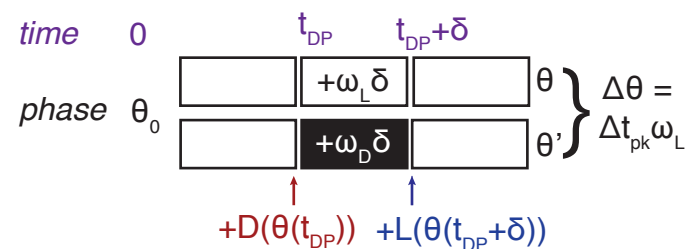
**A.**



**B.**

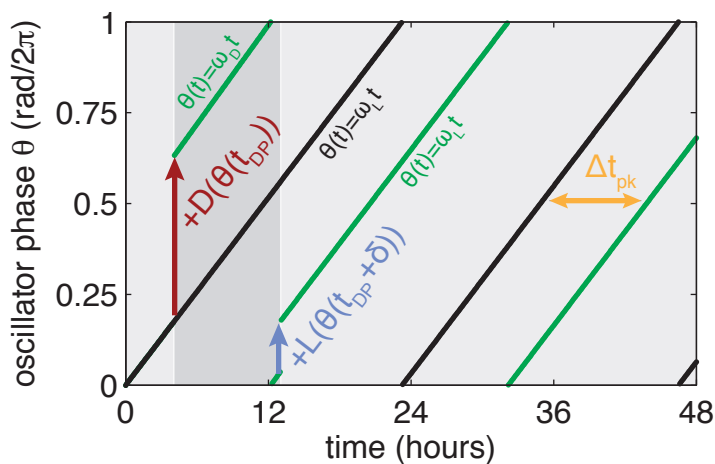


**C. phase response**

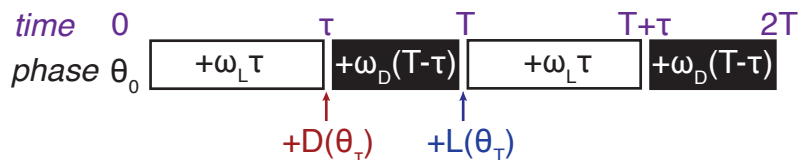


$$\Delta t_{pk}(t, \delta) = \theta_t \left( \frac{1}{\omega_L \beta_2} \right) + \delta \left( 1 + \frac{\beta_1}{\beta_2} \right) - C_1$$

$$\beta_1 = -\frac{(1-l)\frac{\omega_D}{\omega_L}}{d+l-l d} \quad \beta_2 = \frac{1}{d+l-l d}$$



**D. seasonal entrainment**



$$t_{pk} = \tau(1 - \beta_1 - \beta_2) + T\beta_1 + C_2$$

$$\beta_1 = -\frac{(1-l)\frac{\omega_D}{\omega_L}}{d+l-l d} \quad \beta_2 = \frac{1}{d+l-l d}$$

