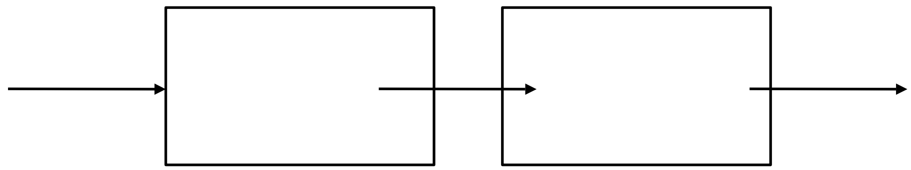
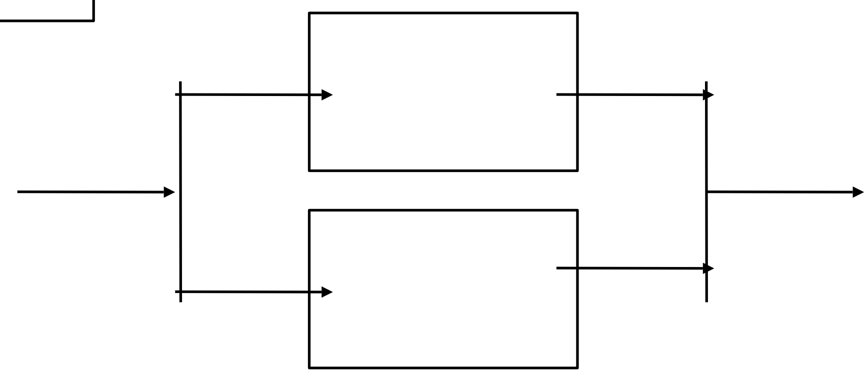
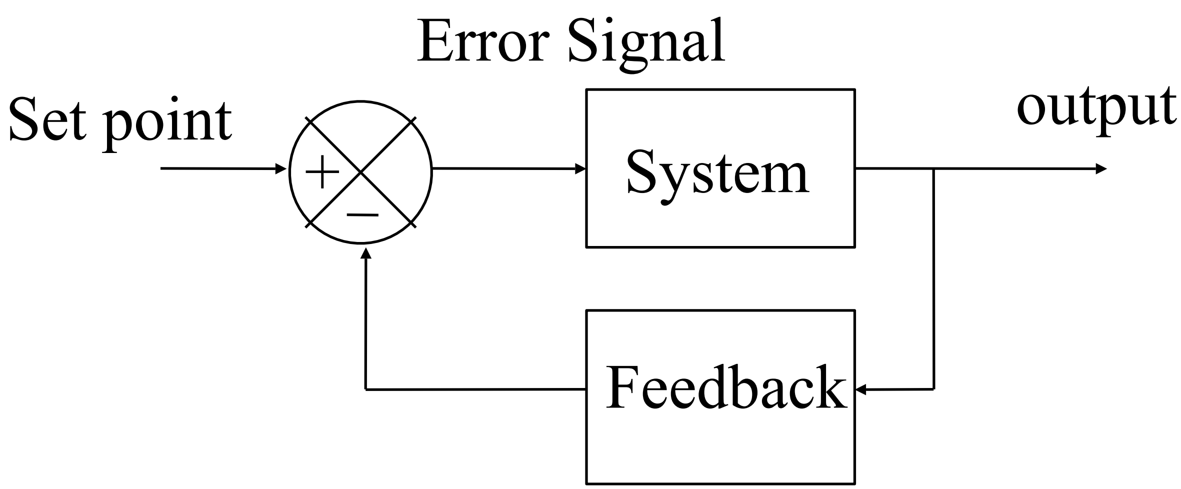




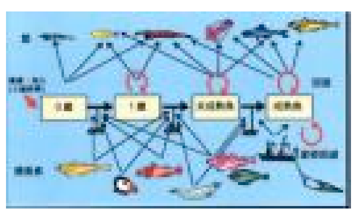

Error Signal
Set point
+
−
System
output
Feedback

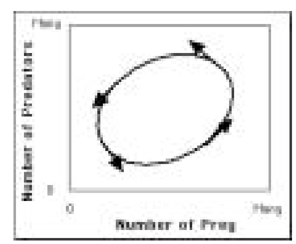
So how can I implement this thinking in a very different context?

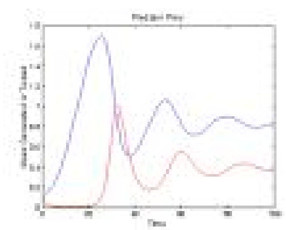
or: What happens when a biophysics guy plays in the wrong sandbox.

$$dP/dt = (r_P - d_P)P + c\, aV$$
$$dV/dt = (r_V - d_V)V - c\, V$$

1. Find a control
2. Re-define equations in a transfer function context
3. Coupled systems are like feedback.





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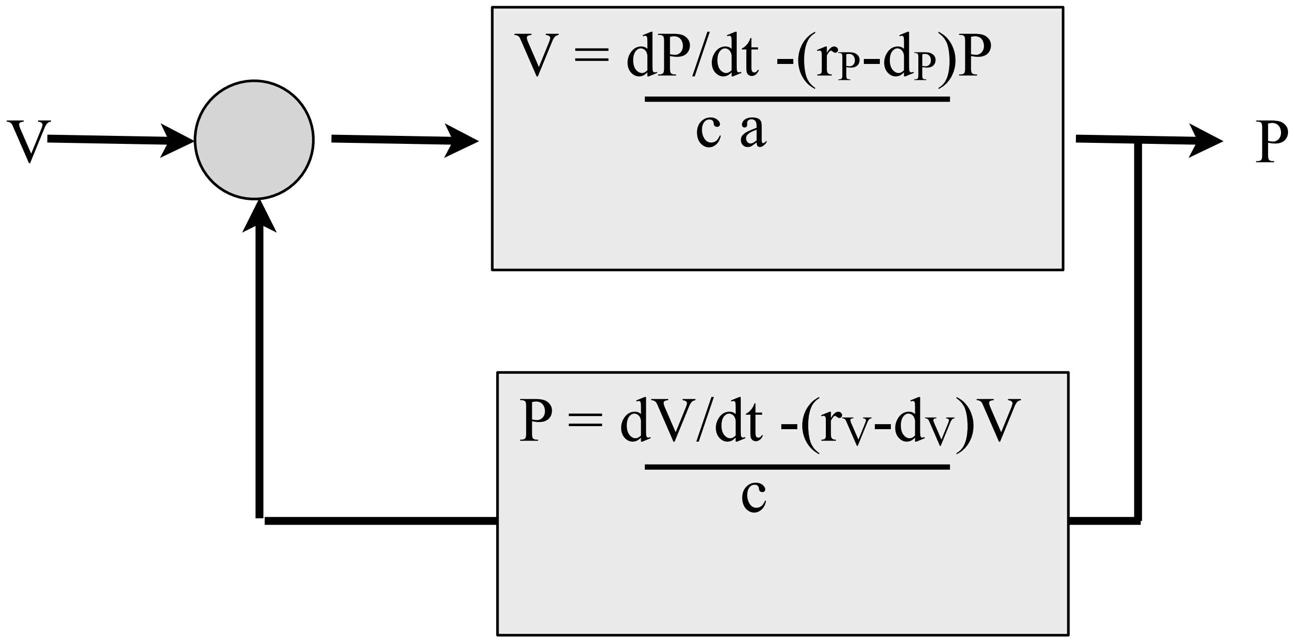

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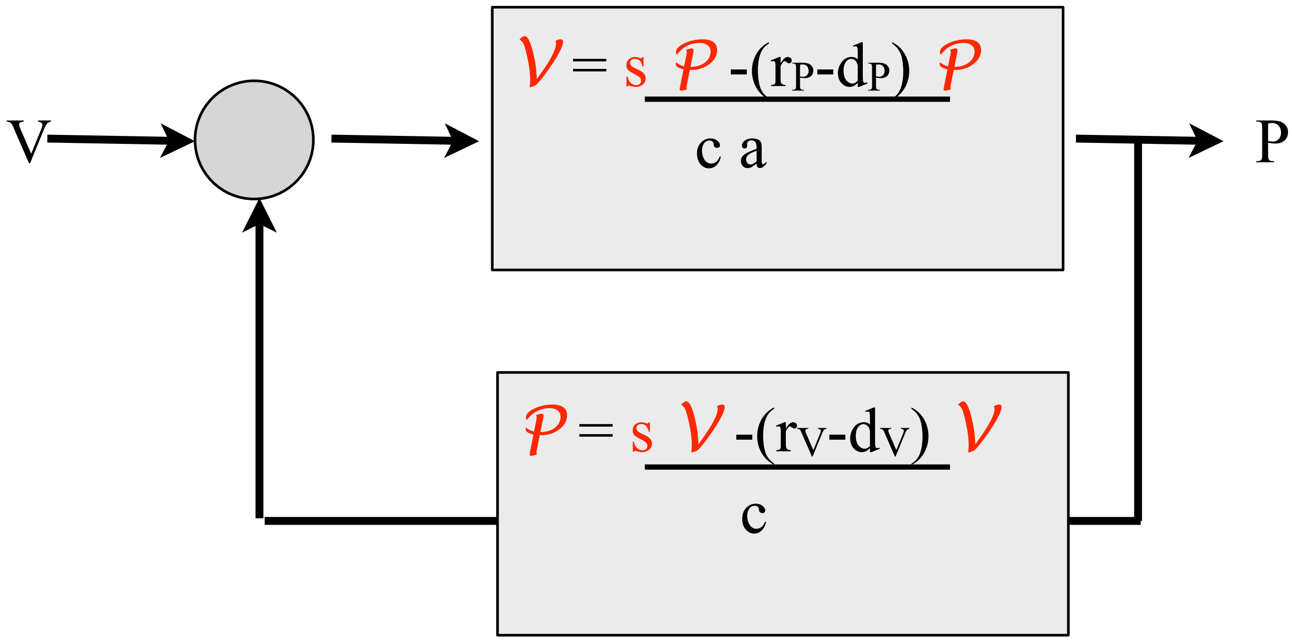
$$\mathcal{L}(P) = \mathcal{P}$$

$$\mathcal{L}(V) = \mathcal{V}$$



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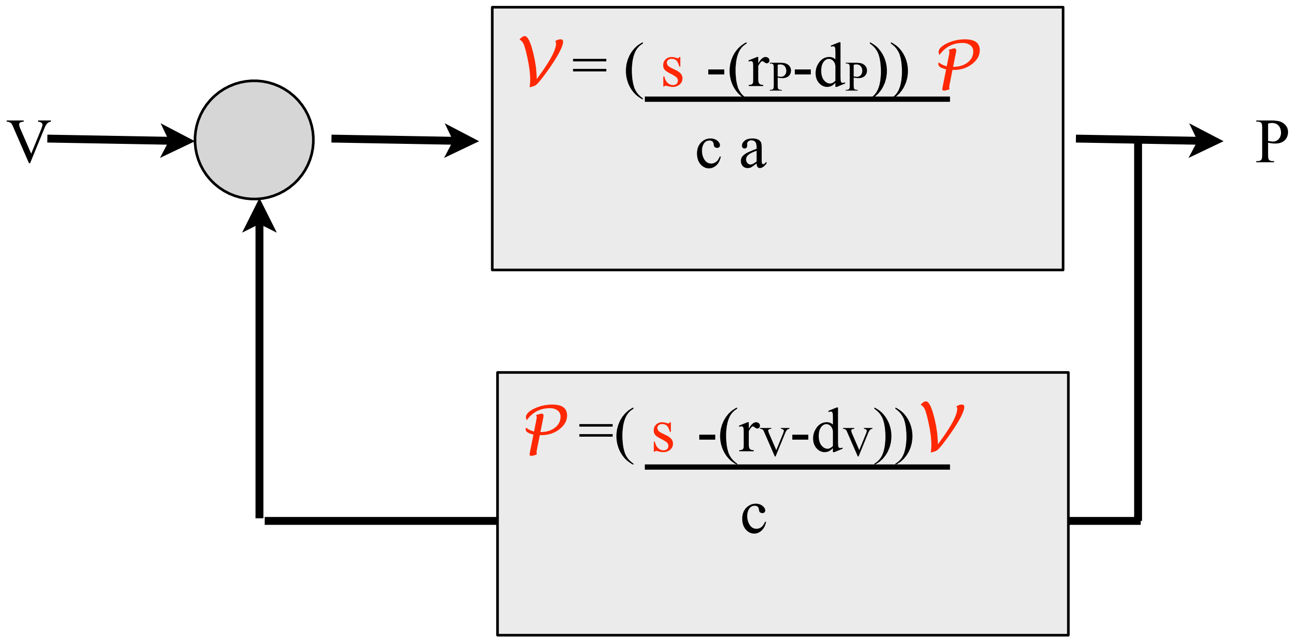

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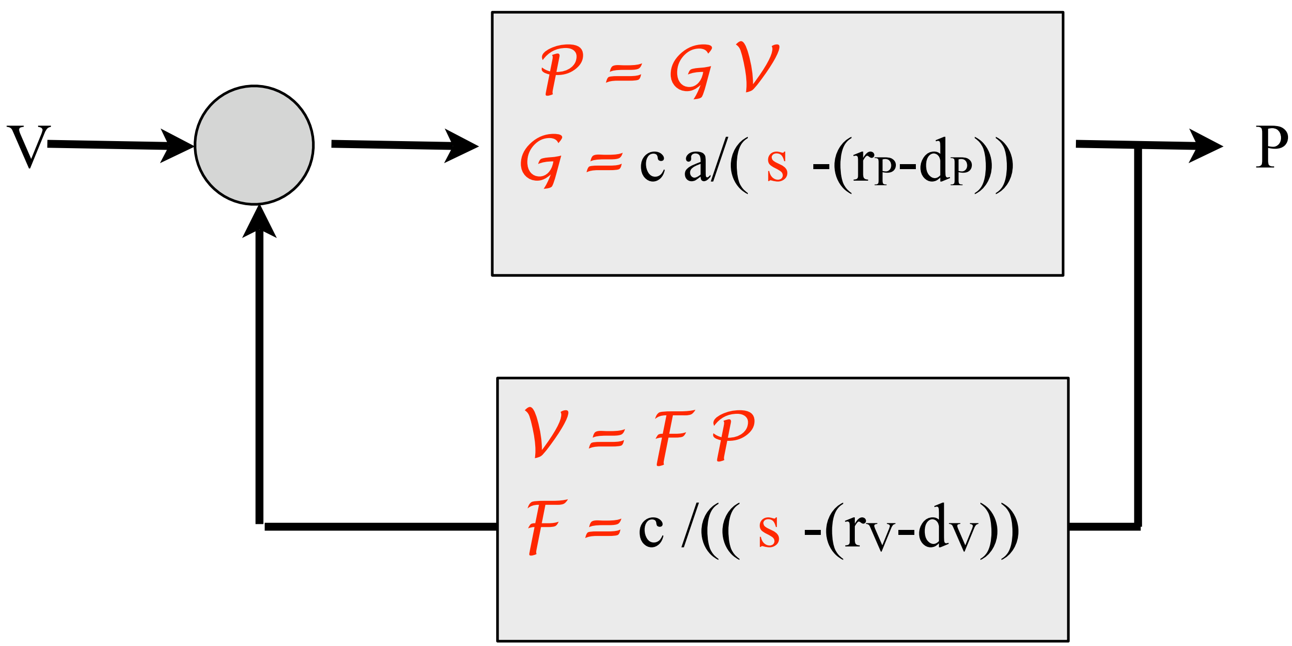

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$\mathcal{L}(P) = \mathcal{P}$

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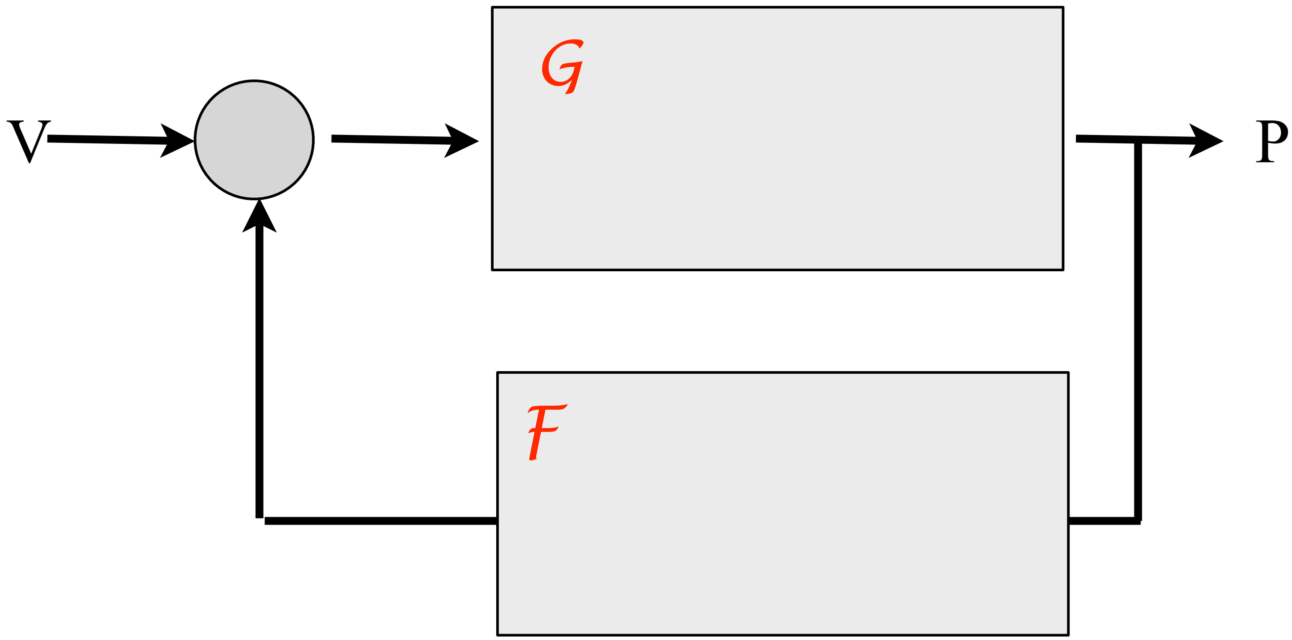
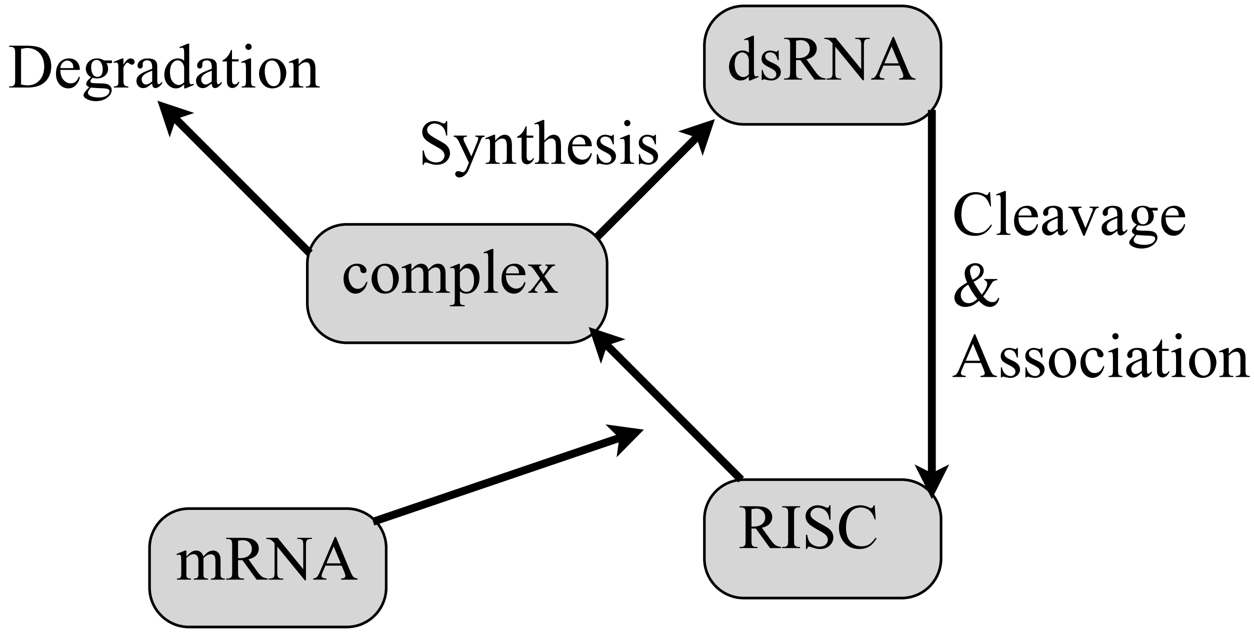
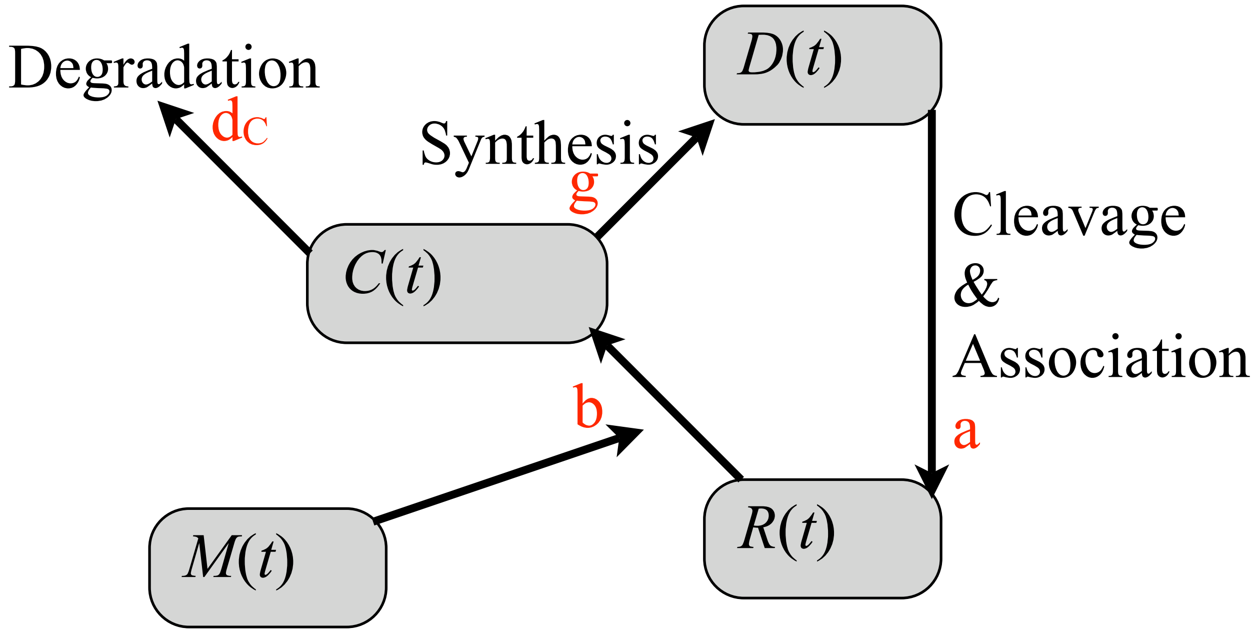
Transfer Function =
G/(1 + F G)



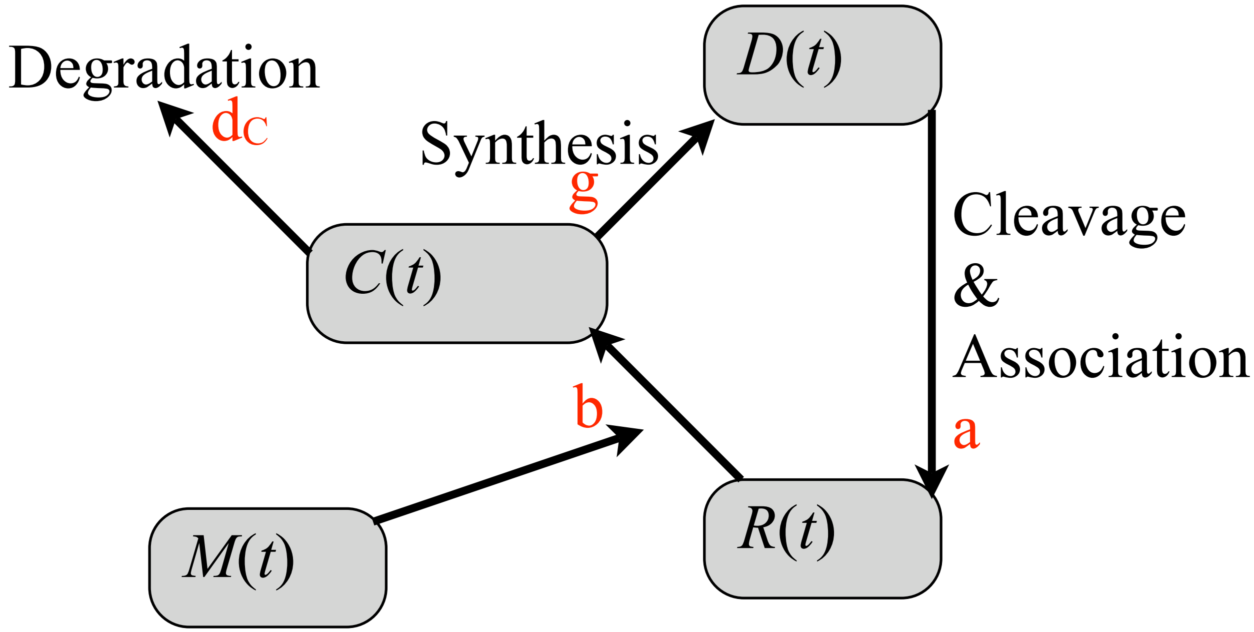


Making control models from differential equation systems: a peak at Carl's curious dsRNAs.

Bergstrom et al., 2003, PNAS, 11511-11516. *Mathematical models of RNA silencing: unidirectional amplification limits accidental self-directed reactions.*



$$D'(t) = -\, a\, D(t) + g\, C(t)$$
$$R'(t) = a\, n\, D(t) - d_R\, R(t) - b\, R(t)\, M(t)$$
$$C'(t) = b\, R(t)\, M(t) - (g + d_C)\, C(t)$$
$$M'(t) = h - d_M\, M(t) - b\, R(t)\, M(t)$$



$D'(t) = - a\ D(t) + g\ C(t)$

$C = (D' + a\ D)/g$

$C = D(s+a)/g$

$D = G1\ C$

$G1 = g/(s+a)$