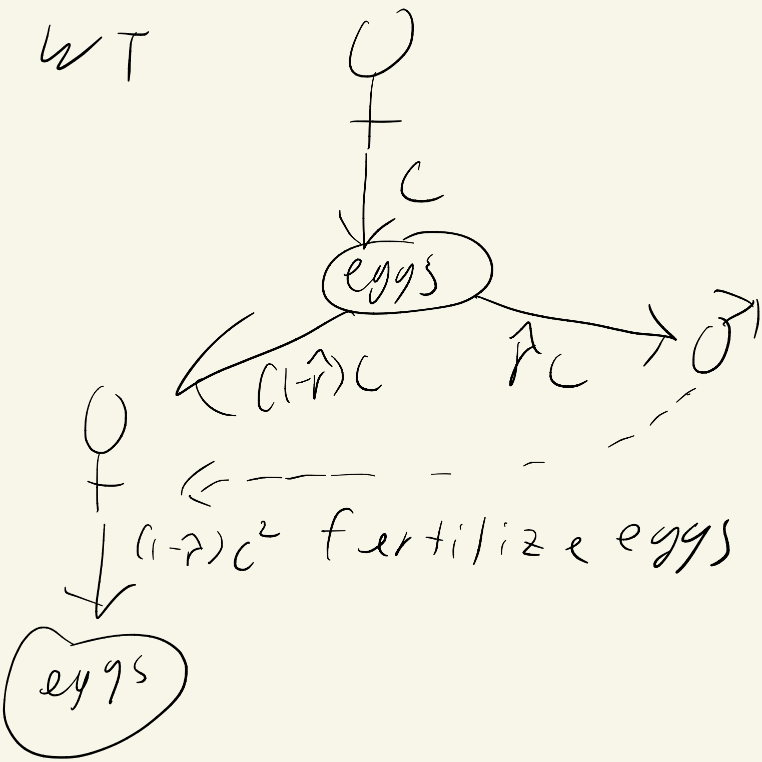
Sex Allocation

$C \equiv$ Clutch Size $\qquad N \equiv$ # wt

$\hat{r} \equiv$ wt % ♂

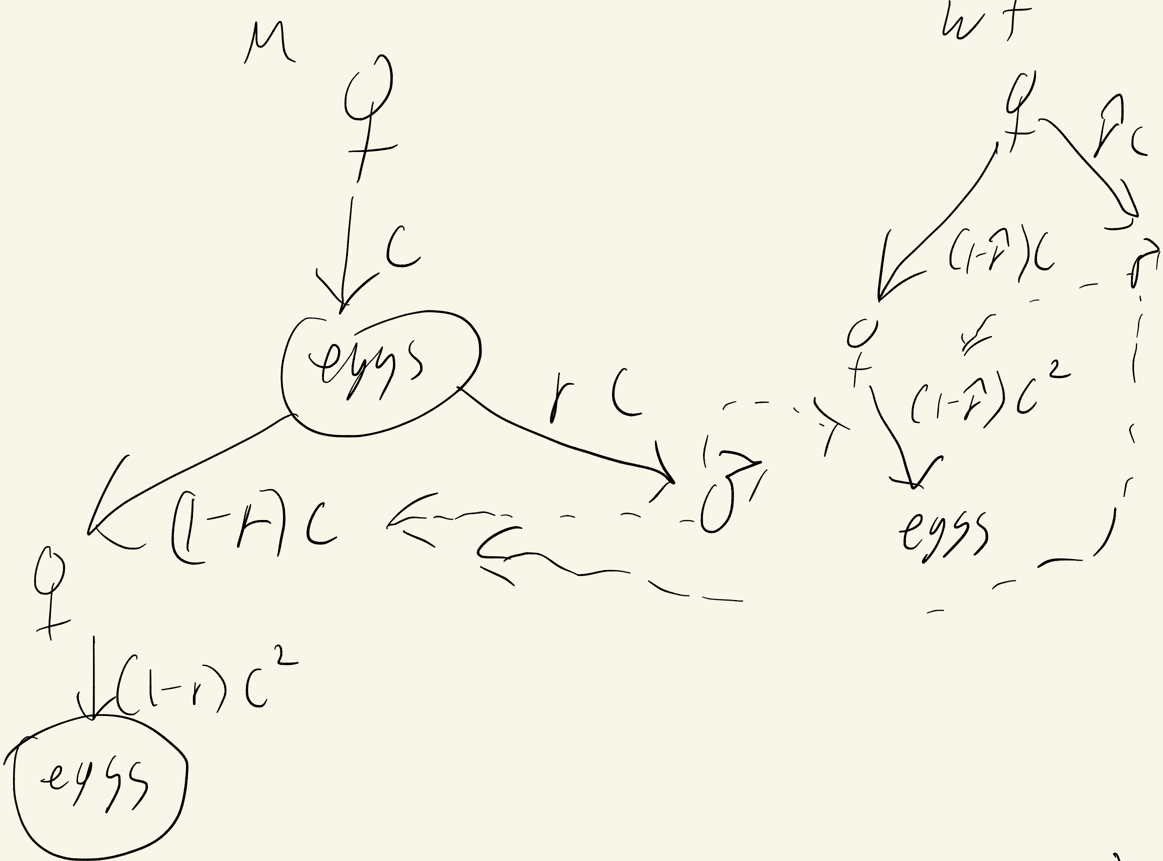
$r \equiv$ mutant % ♂

For WT



$$\overset{wt}{\hat{R}_0} = (1-\hat{r})C^2$$

for mutant



$$R_0 = \frac{1}{2}(1-r)\,c^2 + \frac{1}{2}\,\frac{rc}{rc + N\hat{r}c}\left((1-r)c^2 + (1-\hat{r})c^2 N\right)$$

$$R_0 \approx \frac{1}{2}(1-r)\,c^2 + \frac{1}{2}\,\frac{r\cancel{c}}{\cancel{N}\hat{r}\cancel{c}}\left(1-\hat{r}\right)c^2\cancel{N}$$

$$R_0 \approx \frac{1}{2}(1-r)\,c^2 + \frac{1}{2}\,\frac{r}{\hat{r}}\left(1-\hat{r}\right)c^2$$

$$\lambda(r,\hat{r}) = \frac{R_0}{\hat{R}_0} = \frac{1}{2}\left(\frac{1-r}{1-\hat{r}} + \frac{r}{\hat{r}}\right)$$

♀ success ♂ success

$$\frac{d\lambda(r,\hat{r})}{dr} = \frac{1}{2}\left(\frac{-1}{1-\hat{r}} + \frac{1}{\hat{r}}\right)$$

is $\frac{d\lambda}{dr} > 0$? yes if $\frac{1}{\hat{r}} > \frac{1}{1-\hat{r}}$

$$\to \quad 1-\hat{r} > \hat{r}$$