EE126 Mini-Project 1

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October 19, 2014

$$x = \text{Number of WW}$$
$$y = \text{Number of Wg}$$
$$z = \text{Number of gg}$$

List of "random" things in the simulation:

- Randomly pair

- Children traits (Punnett square)

- Death

At each timestep, pick two moths to breed (table of probability):

	WW, WW	WW, Wg	WW, gg	Wg, Wg	Wg, gg	gg, gg
WW	1	1/2	0	1/4	0	0
Wg	0	1/2	1	1/2	1/2	0
gg	0	0	0	1/4	1/2	1
	$(\frac{N(WW)}{N(all)})^2$	$2(\frac{N(WW)}{N(all)})(\frac{N(Wg)}{N(all)})$	$2(\frac{N(WW)}{N(all)})(\frac{N(gg)}{N(all)})$	$(\frac{N(Wg)}{N(all)})^2$	$2(\frac{N(WW)}{N(all)})(\frac{N(gg)}{N(all)})$	$(\frac{N(gg)}{N(all)})^2$

So the probabilities of birth for each genotype should be:

$$b_{WW} = \left(\frac{WW}{all}\right)^2 + \frac{WW * gg}{all^2} + \frac{1}{4}\left(\frac{Wg}{all}\right)^2$$
$$b_{Wg} = \frac{WW * Wg}{all^2} + \frac{1}{2}\left(\frac{Wg * gg}{all^2}\right) + \frac{1}{2}\left(\frac{Wg}{all}\right)^2 + 2 * \frac{WW * gg}{all^2}$$
$$b_{gg} = \left(\frac{gg}{all}\right)^2 + \frac{gg * Wg}{all^2} + \frac{1}{4}\left(\frac{Wg}{all}\right)^2$$

In addition, at each timestep we certainly kill a moth, but we randomly choose which moth to kill. The probability is greater for white instead of gray.

$$d_{WW} = \frac{d(WW)}{WW + Wg}$$
$$d_{Wg} = \frac{d(Wg)}{WW + Wg}$$
$$d_{gg} = 1 - d$$