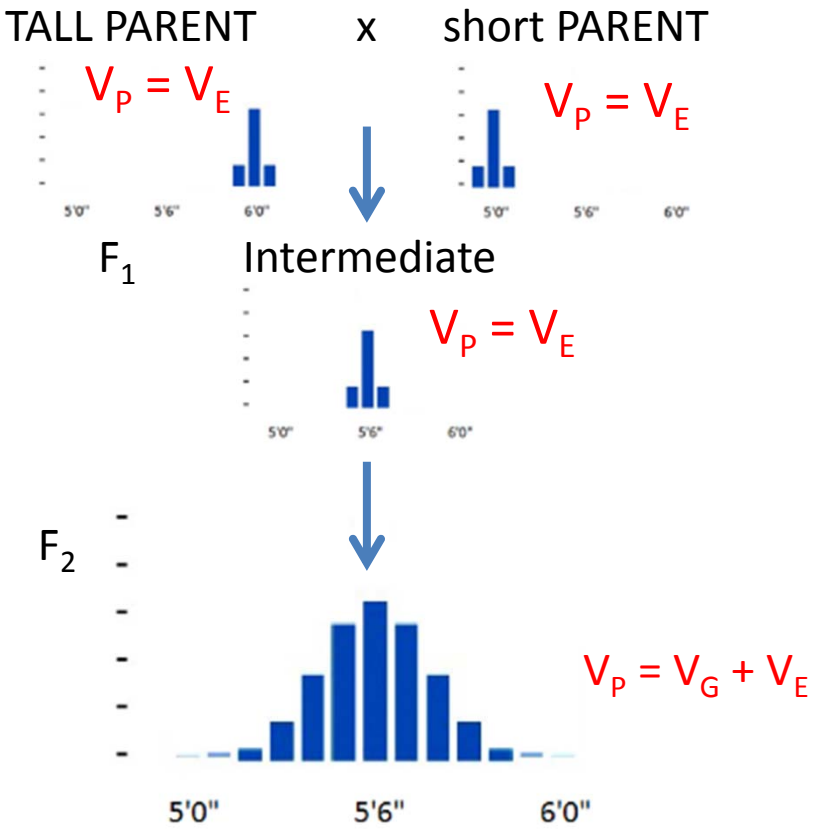
Genes vs. Environment: How much do each contribute? (2)

Estimating heritability from F_2 cross

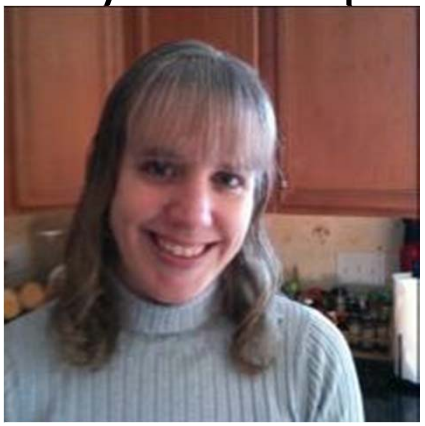


$V_P = V_G + V_E$

Heritability = $V_G/(V_G + V_E)$

Another way to estimate heritability: parent-offspring correlation

- If all variation is genetic (and assume no dominance), then you should be exactly the average of your two parents...



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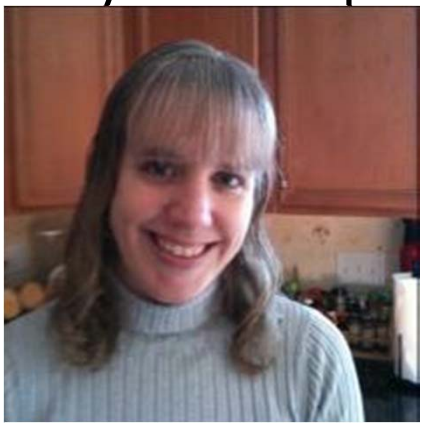
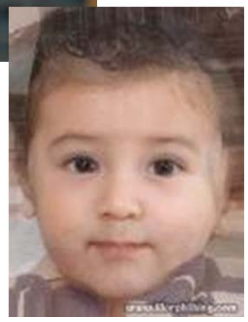


Predicted



Another way to estimate heritability: parent-offspring correlation

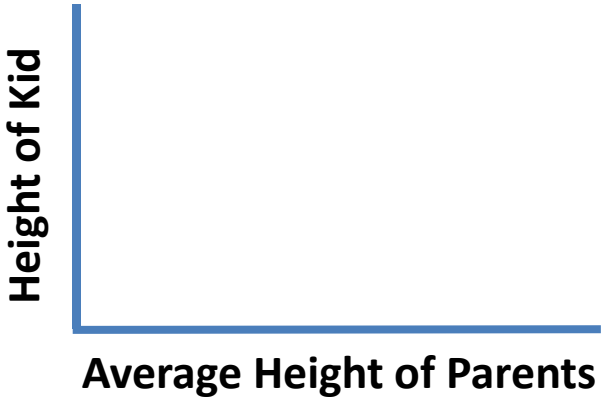
- If all variation is genetic (and assume no dominance), then you should be exactly the average of your two parents...

Predicted

Actual

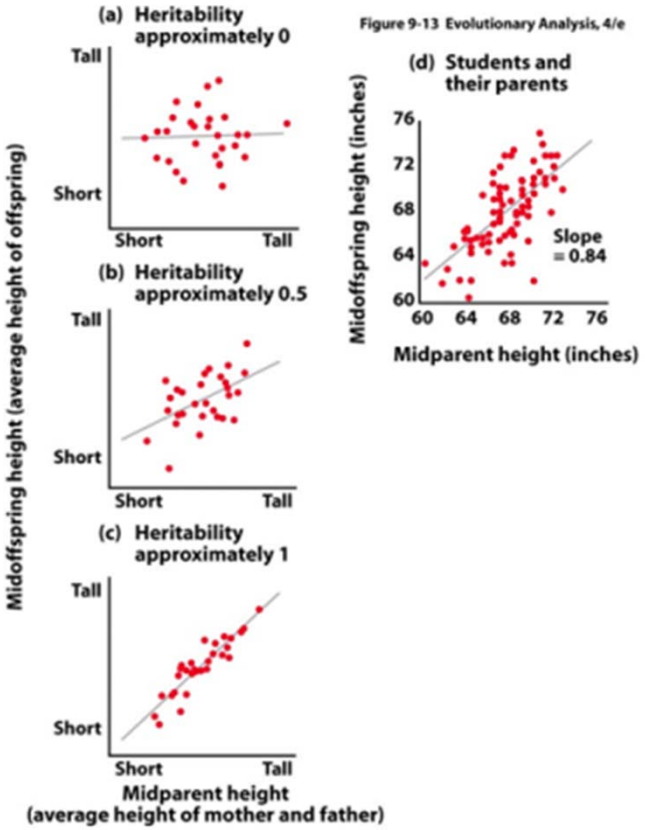
Another way to estimate heritability: parent-offspring correlation

- If all variation is genetic (and assume no dominance), then you should be exactly the average of your two parents...
- Look at lots of individuals, and see how well average-of-parents' traits predicts offspring's trait
  - Strength of correlation (here, slope of line) estimates heritability



Heritability examples

- Figure a
  - Height of parents fails to predict height of offspring
- Figure c
  - Height of parents very well predicts height of offspring
- Figure d
  - Real data...



Reminder- why this matters…

- Your parents get gallstones
  - Is it *worth it* for you to alter diet (environment), or is it predominantly genetic?

- You want to breed a friendlier guinea pig
  - How much will selective breeding matter?
  - Or is friendliness primarily environmental?

… but it isn't always straightforward…

- Parents and offspring may share some **environmental** factors as well as genetic
  - Probably a correlation in food availability & other characteristics
  - Biases upward estimate of heritability

$V_P = V_G + V_E$; Heritability = $V_G / (V_G + V_E)$

… but it isn't always straightforward…

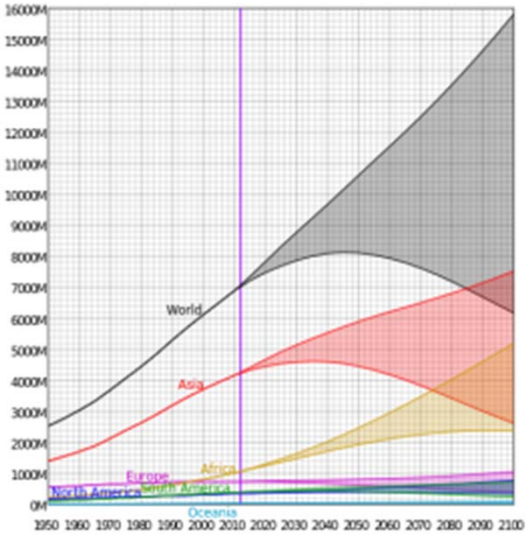
- **Environment** is not "constant"
  - Estimates of heritability will be different in different places because V_E different

- Amount of **genetic** variation also not constant in different families or populations

$V_P = V_G + V_E$; Heritability = $V_G / (V_G + V_E)$

It isn’t perfect…
but it’s a starting point.

Informative for particular circumstances



Next class:

Breeder's Equation for Heritability

Image Credits, Unit 8-3

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