11-10-09

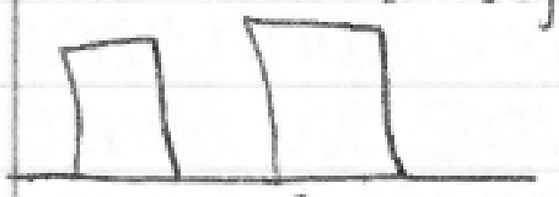
PS8, exam regrades due Thurs
Poster info emailed today to you
detailed instructions on website today

- Posters due Dec 1st - voluntary poster topic check @ any time, but allow 3 day turn around
- Cover at least 2/3 areas of Genetics: mendelian, molecular, evolutionary = 50% Grade
- 25% ELSI
- 25% style
- dimensions MUST BE landscape 3'8" x 2'10"

Quantitative Genetics

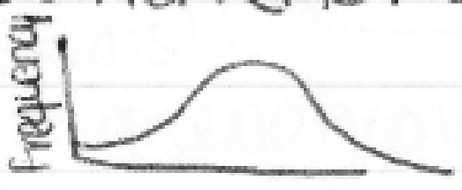
- artificial selection inspired Darwin
  Art. sel. in dogs - chihuahua to great dane
  → huge range in phenotypic variation over short time, imagine over geologic time!
- quant. traits are evolutionarily important
  Viability + Fecundity, e.g.

What is a quantitative trait? controlled by many genes, not one or two. subject to influence of env. considered to have continuous dist. not categorical distribution (not discrete)



Eye Color

- Discrete categories for eye color in humans
- Inherited in Mendelian fashion, little or no env. influence



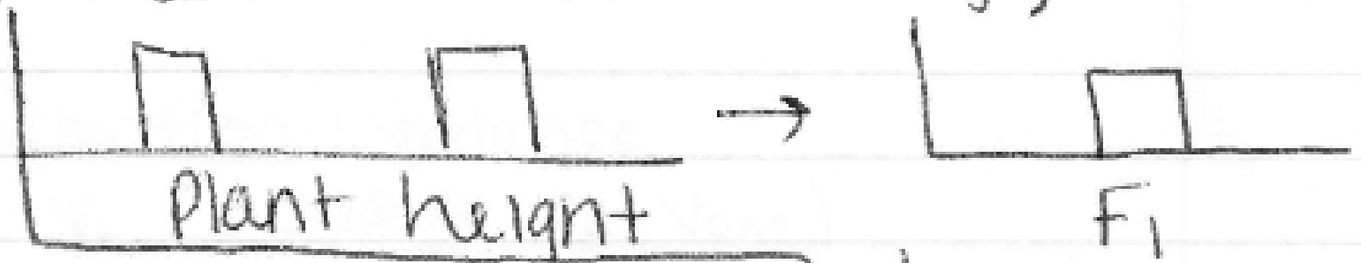
a quant. trait
cont. dist., polygenic, lots of env. influence

11-10-09

Threshhold trait-affected or unaffected
ex: schizophrenia, bipolar. addiction
diabetes, various cardiovascular

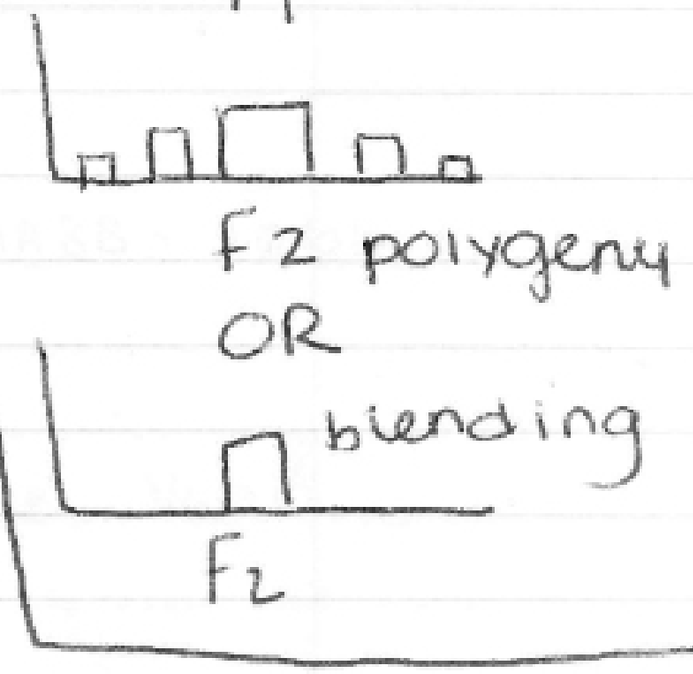
Other favorite quantitative traits
weight, skin color, IQ, cropfield, fruit size, milk yield, carcass weight, juice content in oranges, cat allergenicity

Blending inheritance vs. polygeny
How to distinguish?
testable hypotheses
1) mutations of large effect
2) F_2 same as F_1 (if blending)



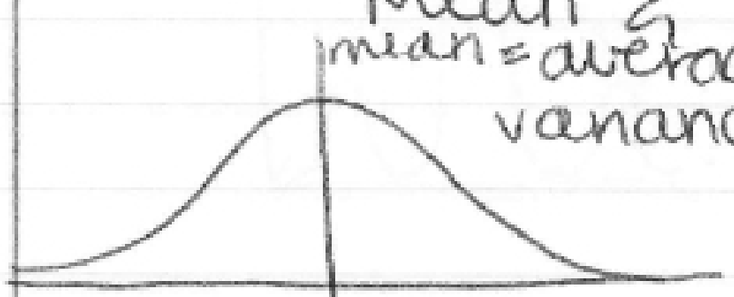
3) NO response to selection
4) ratios predictable if sample size big enough

F_2 ratios { AA Aa aa
AABB AaBB AABb etc... aabb



If lots of genes, phenotypic classes indistinguishable (i.e. continuous dist)
→ must use statistics to describe phenotypic variation

Mean & Variance
mean = average value $\bar{x}$
variance = amt. of scatter around mean, σ^2



$\bar{X} = \sum_{n} x_i / n$ = mean

V_P = phenotypic variance = σ^2

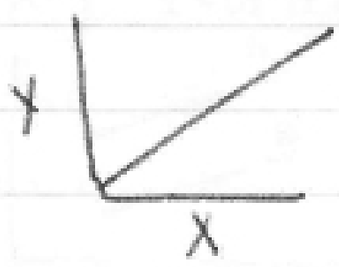
$$V_P = \sum \frac{(x_i - \bar{x})^2}{n-1}$$

n-1 because it is a sample of the pop, not the whole pop

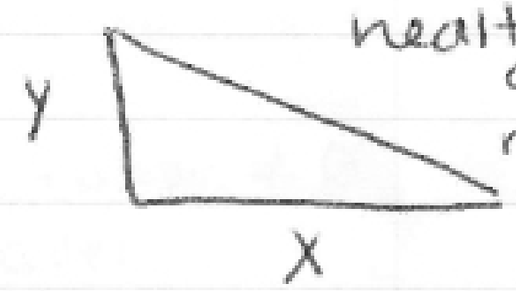
11-10-09

Standard deviation = $\sqrt{\sqrt{P}}$

Correlation: tendency of traits to covary w/ one another



Height + weight
positive correlation



health and age
negatively corr'n

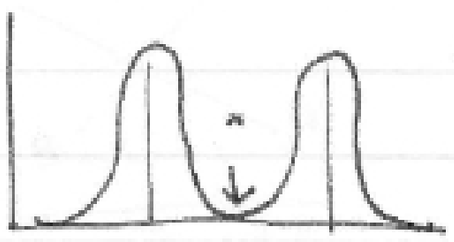
Why is this important? correlation ≠ causation
Correlations can be caused by additional, un-measured factors

OFFICE HOURS TOMORROW
Dr. Wayne only periods 3+4

<u>Compartmentalization</u> : <u>Variance</u>

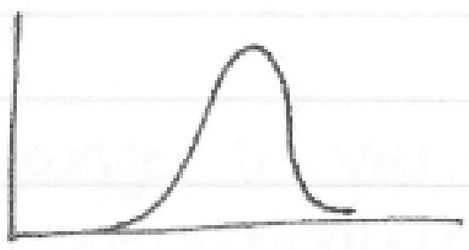
$V_P = V_G + V_E + V_I$ ($V_I = V_{G \times G}$)

Ex) P

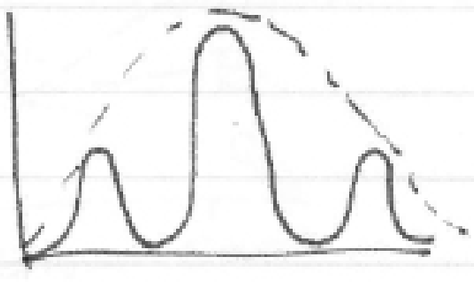


2 homozygous parents
$V_G = \emptyset$, $V_P = V_G$ AABB × aabb

F_1



AaBb, all same $V_G = \emptyset$
$V_P = V_E$



$V_G \neq \emptyset$ 9:3:3:1 or something like that
$V_G \neq \emptyset$ → $V_P = V_G + V_E + (V_I?)$