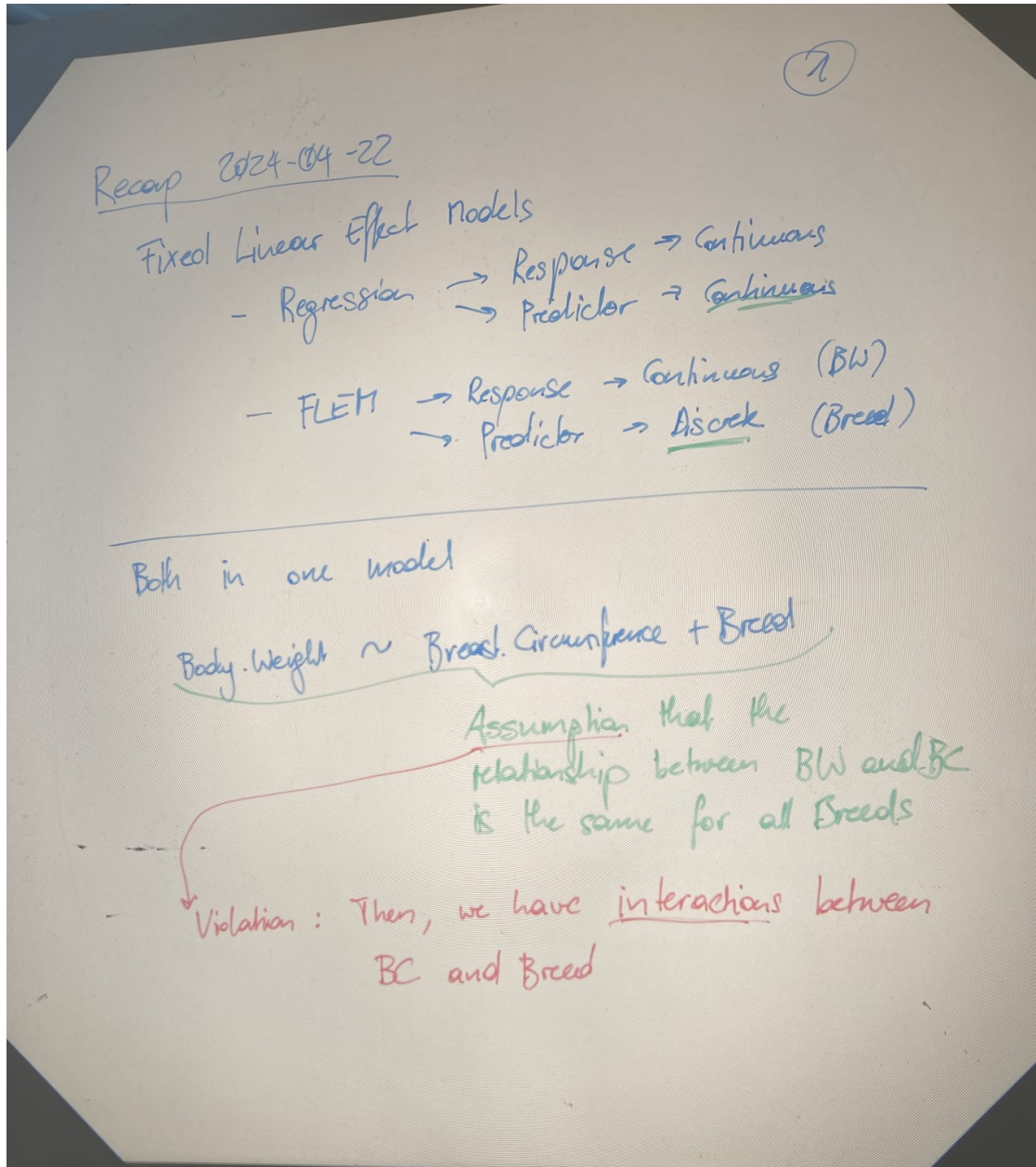


OHP Picture 1



(3)

Interaction Model:

□ Model : $BW \sim BC + \text{Breed}$

$$BW_i = y_i = b_0 + b_1 \cdot BC_i + b_{2i} \cdot BrLi + b_{3i} \cdot BrSi + e_i$$

Intercept

slope of regression line BW on BC

Indicators for breed of animal i

if i is $\begin{cases} AN \Rightarrow b_{2i} = \frac{1}{b_{3i}} = 0 \\ LI \Rightarrow b_{2i} = 1 \\ SI \Rightarrow b_{3i} = 1 \end{cases}$

□ Interaction between BC and Breed means that b_1 has linear relationship with Breed

$$\Rightarrow b_1 = a + b_{4i} \cdot BrLi + b_{5i} \cdot BrSi$$

$$\Rightarrow y_i = b_0 + (a + b_{4i} \cdot BrLi + b_{5i} \cdot BrSi) \cdot BC_i + b_{2i} \cdot BrLi + b_{3i} \cdot BrSi + e_i$$

$$= b_0 + a \cdot BC_i + b_{2i} \cdot BrLi + b_{3i} \cdot BrSi + b_{4i} \cdot BrLi \cdot BC_i + b_{5i} \cdot BrSi \cdot BC_i + e_i$$

OHP Picture 4

(4)

Example

$$y_i = b_0 + b_2 \cdot HEI_i + b_3 \cdot BC_i + b_4 \cdot HEI_i \times BC_i + e_i$$

b_0 Intercept

$b_4 = -0.084$

Model Selection

□ Goal : Given a response variable and more than one predictor variables

Find the set of predictors that give you the "best" model

In R: MASS::stepAIC(...)

BW
→ BC, HEI
Speed, BCS

(5)

Experimental Design

- Traditional experiments have timing problems
- Eg. experiment with dairy cow feeding
 - compare two different regimes
 - many more hidden influence factors e.g. breed, age at calving, days in milk, genetics, ...

How to do it better? 2 possibilities

- Experimental Design \Rightarrow Literature (accurate, sophisticated)
- Simulation \rightarrow easy to do, simplified.

(6)

What is Simulation

- Research Question
 - Example: What is relationship between body weight and breast circumference

- Step 1: Search for already available results
 - Paper: (Intercept) : -1065.1
Slope : 8.67
Residual standard error : 11.08
 - Number of observations : 30
 - Simulate : BC as random normal sample ~~to~~ with same mean and same sd as in paper
 - Simulate BW based on regression

$$BW_i = b_0 + b_1 \cdot BC_i + e_i$$

↓
random residual