

Duration of interphenophases in winegrapes

Domaine de Vassal

- Research vineyard in France
- Plant many varieties and clones for experiments and data collection
- Vines are planted for 5 years
- Except Chasselas



The data:

- Chasselas is continually grown as the baseline variety
- Phenology is measured relative to Chasselas
- If budbreak for Chasselas is April 15, then
 - April 15 = 0
 - April 14 = -1
 - April 16 = +1

Pinotage 2574

Mo 16

Fertilité taille courte	74	75	76
01	23	23	18

Véraisons à 50%	80	81	82
Tension Pinot N	4-8	3-8	22-7
01 - 1-3556	4-8	3-8	22-7

+0,5

De. veraison - Tension chasselas
01 - 4.8.80(+1) - 3.8.81(+2) - 22.7.82(+1)
(+1,3)

Floraison
01 - 24.5.82(+2) - 20.5.84(-3) - 24.5.86(-4)
(-2)

The data:

- Data years 1956 – 2013
- Hinge year for model = 1980
 - Earliest start year for simulated data will be 1961
 - Years in simulated data count down from the start year



Question:

- Has the duration of interphenophases changed since the 1980s?
- If so, does the change differ between varieties?
- Interphenophase = time between phenophases (budburst to flowering)

Model: Single Slope

Duration.predicted $\sim N(\mu, e)$

$$\mu = a_{\text{var}} + B * \text{year}$$

$$a_{\text{var}} \sim N(\mu_{\text{var}}, \text{sigma}_{\text{var}})$$

$$B = -0.2$$

$$e \sim U(0, 20)$$

Written as an equation:

$$\text{Duration.predicted} = a_{\text{var}} + B * \text{year} + e$$

- **So each variety has unique intercept but will only draw one value from beta's distribution so all varieties have same slope (for now).**

Model: Variety Slope

Duration.predicted $\sim N(\mu, e)$

$$\mu = a_{\text{var}} + B * \text{year}$$

$$a_{\text{var}} \sim N(\mu_{\text{var}}, \sigma_{\text{var}})$$

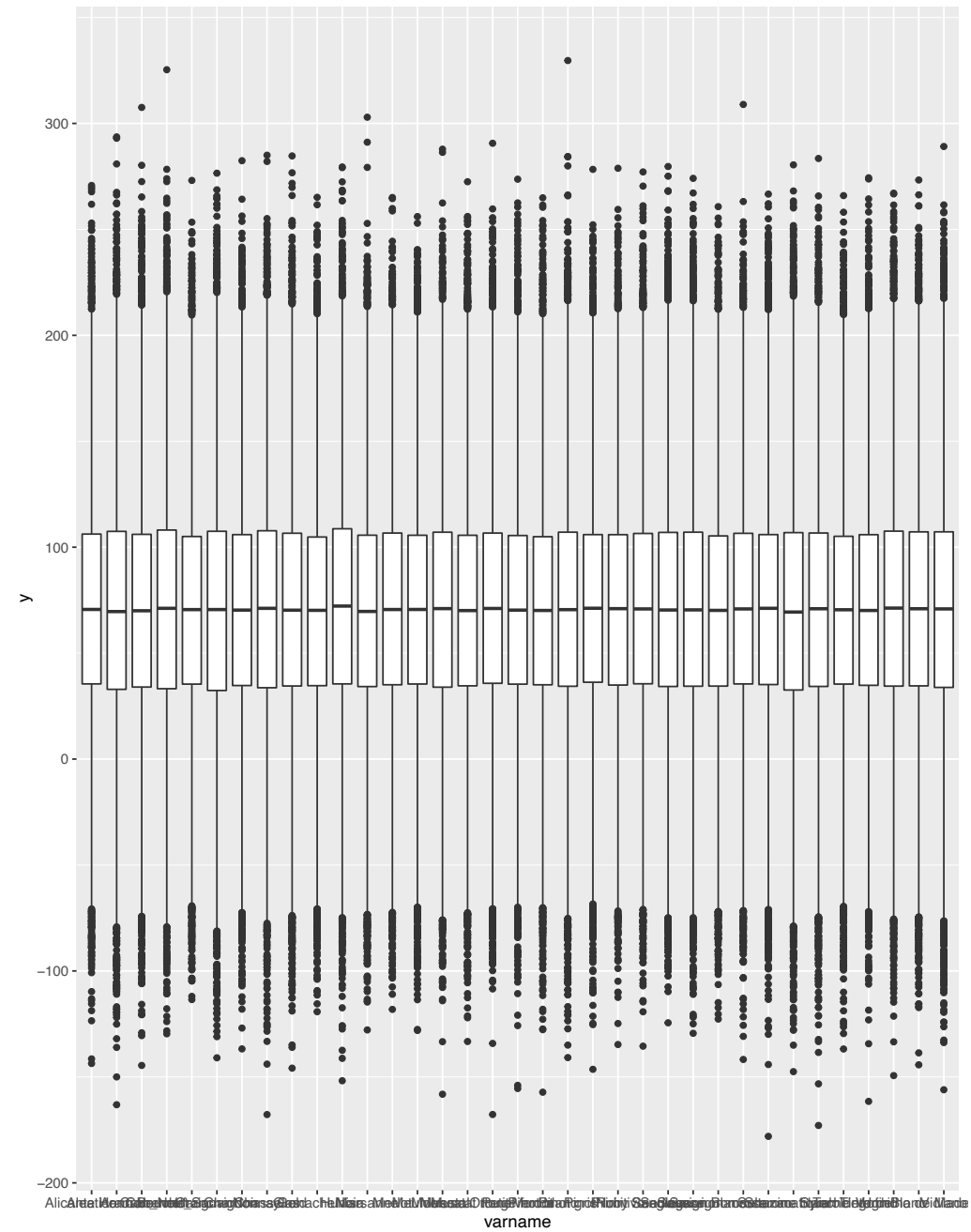
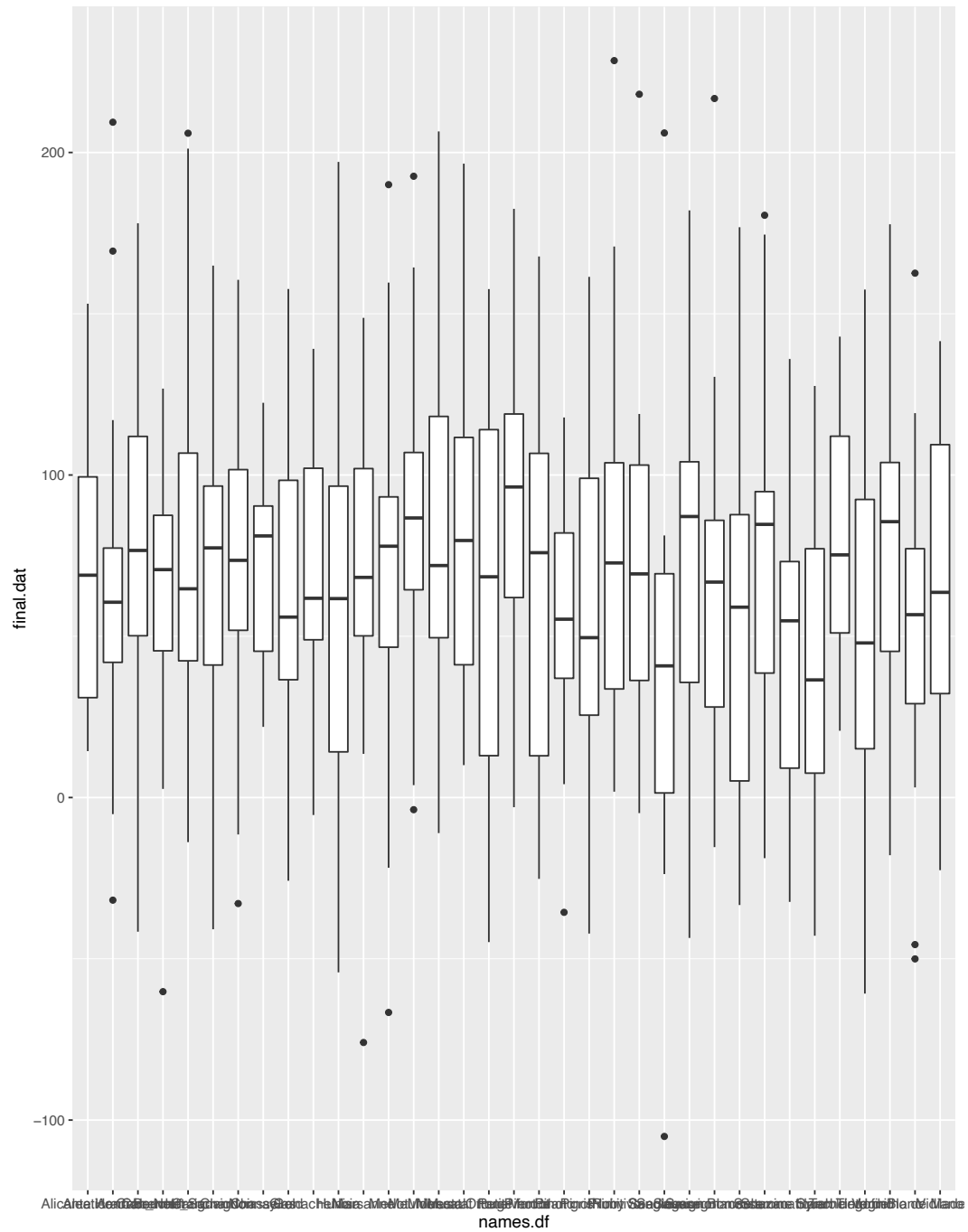
$$B_{\text{var}} \sim N(\mu_v, \sigma_v)$$

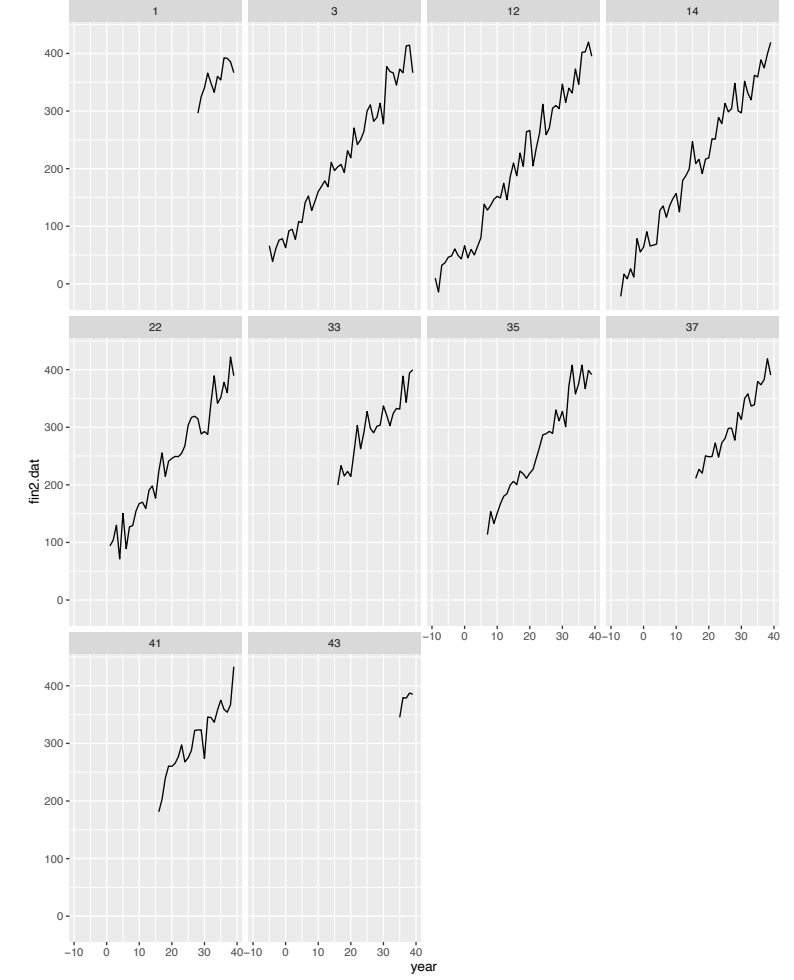
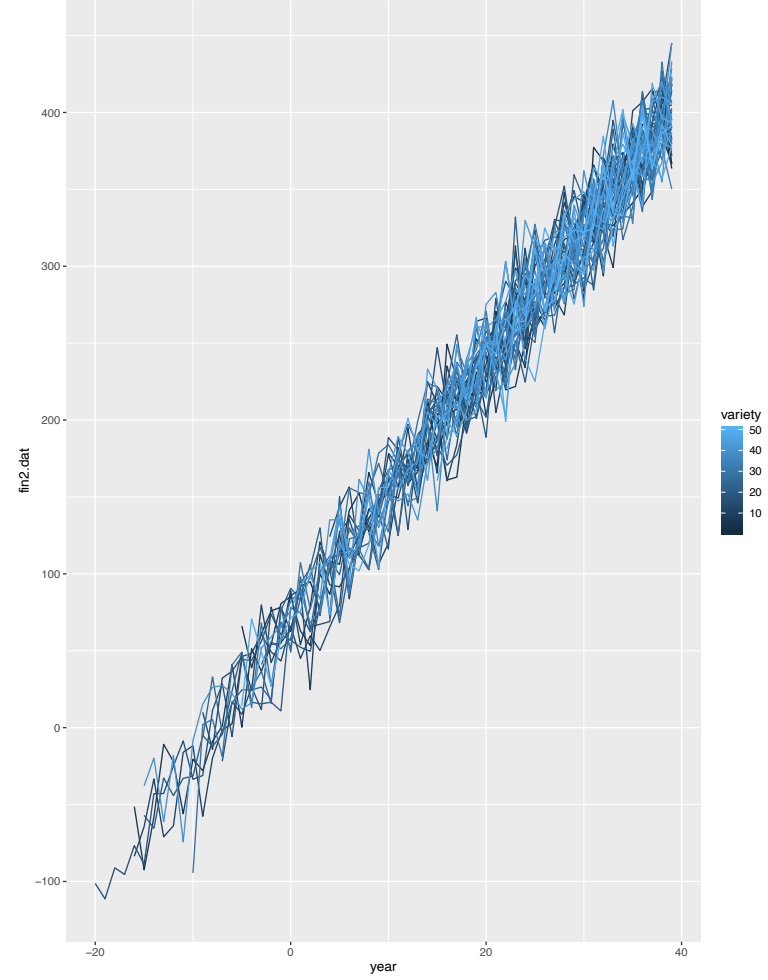
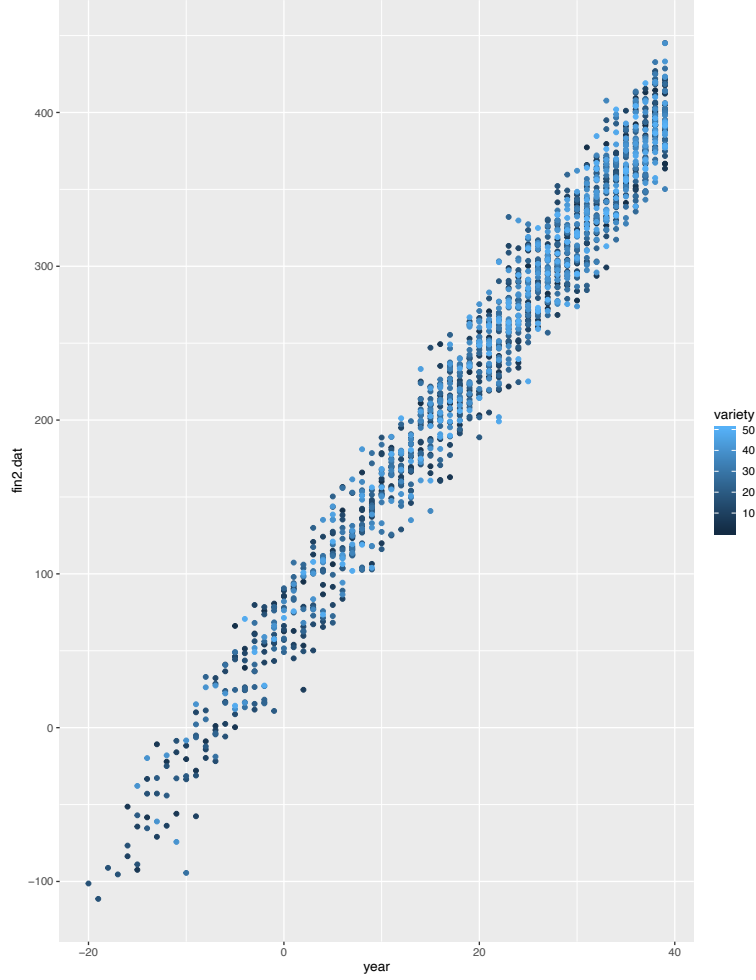
$$e \sim U(0, 20)$$

Written as an equation:

$$\text{Duration.predicted} = a_{\text{var}} + B * \text{year} + e$$

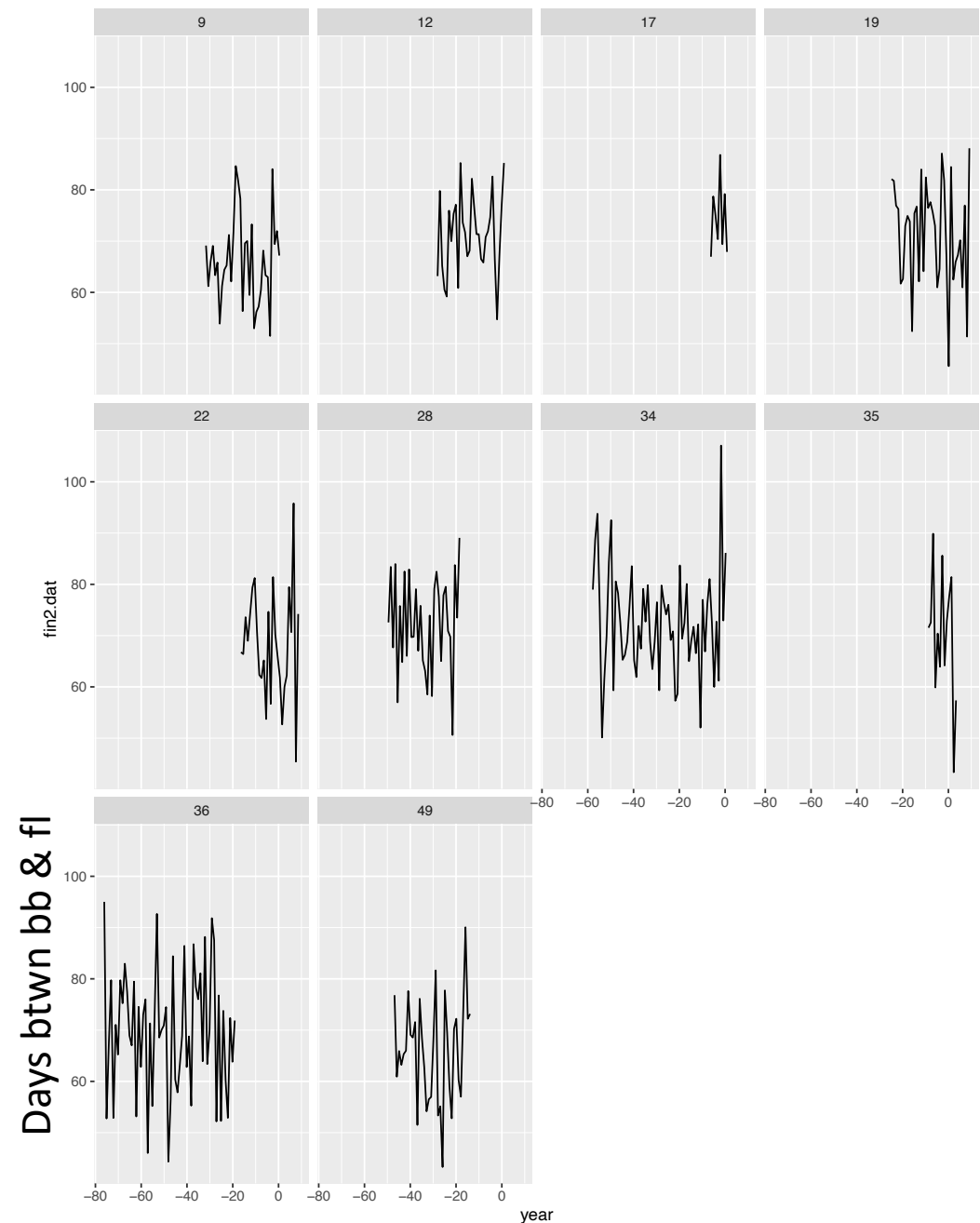
- **So each variety has unique intercept and unique slope.**





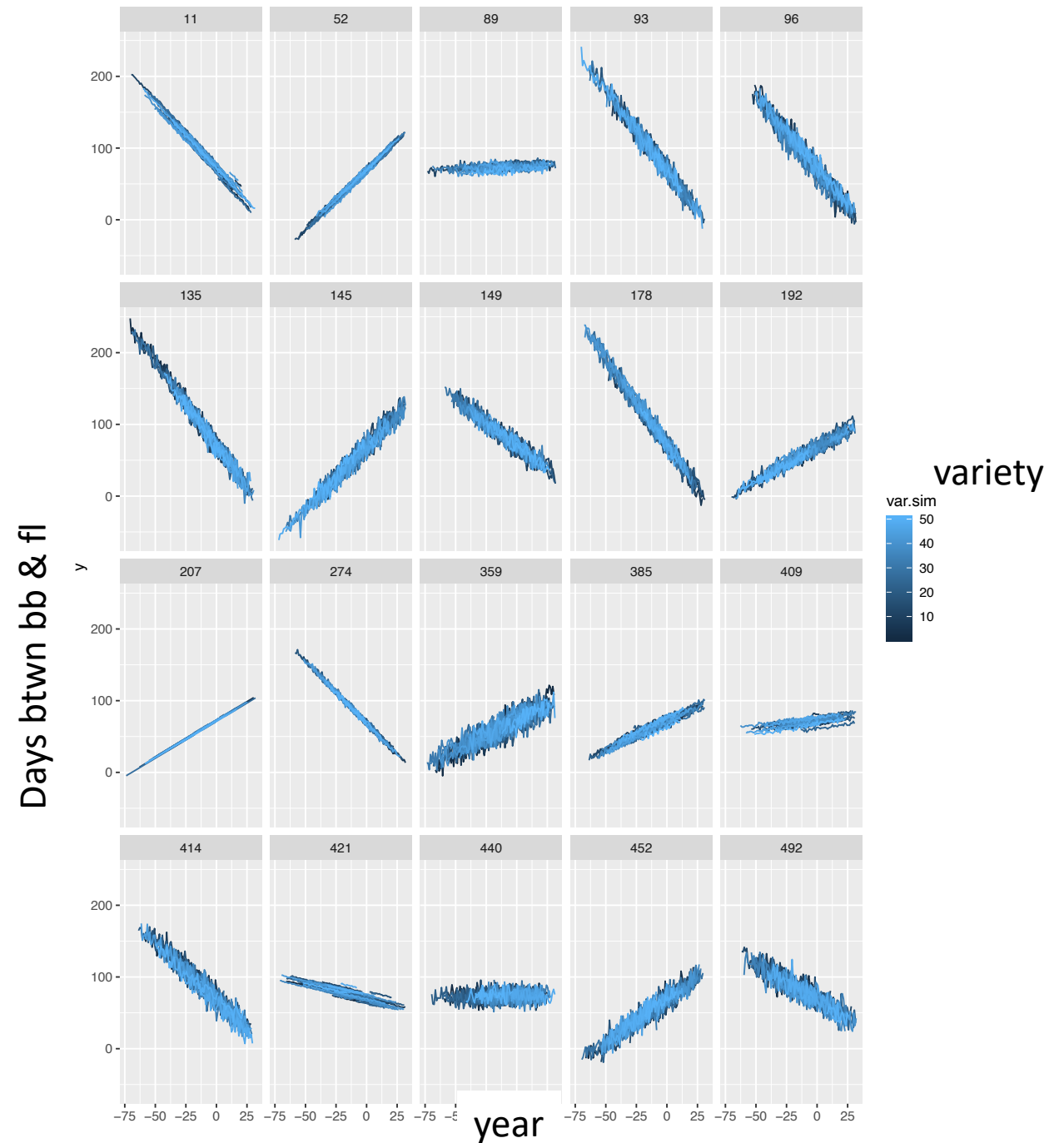
New for April 7

Examples of simulated data



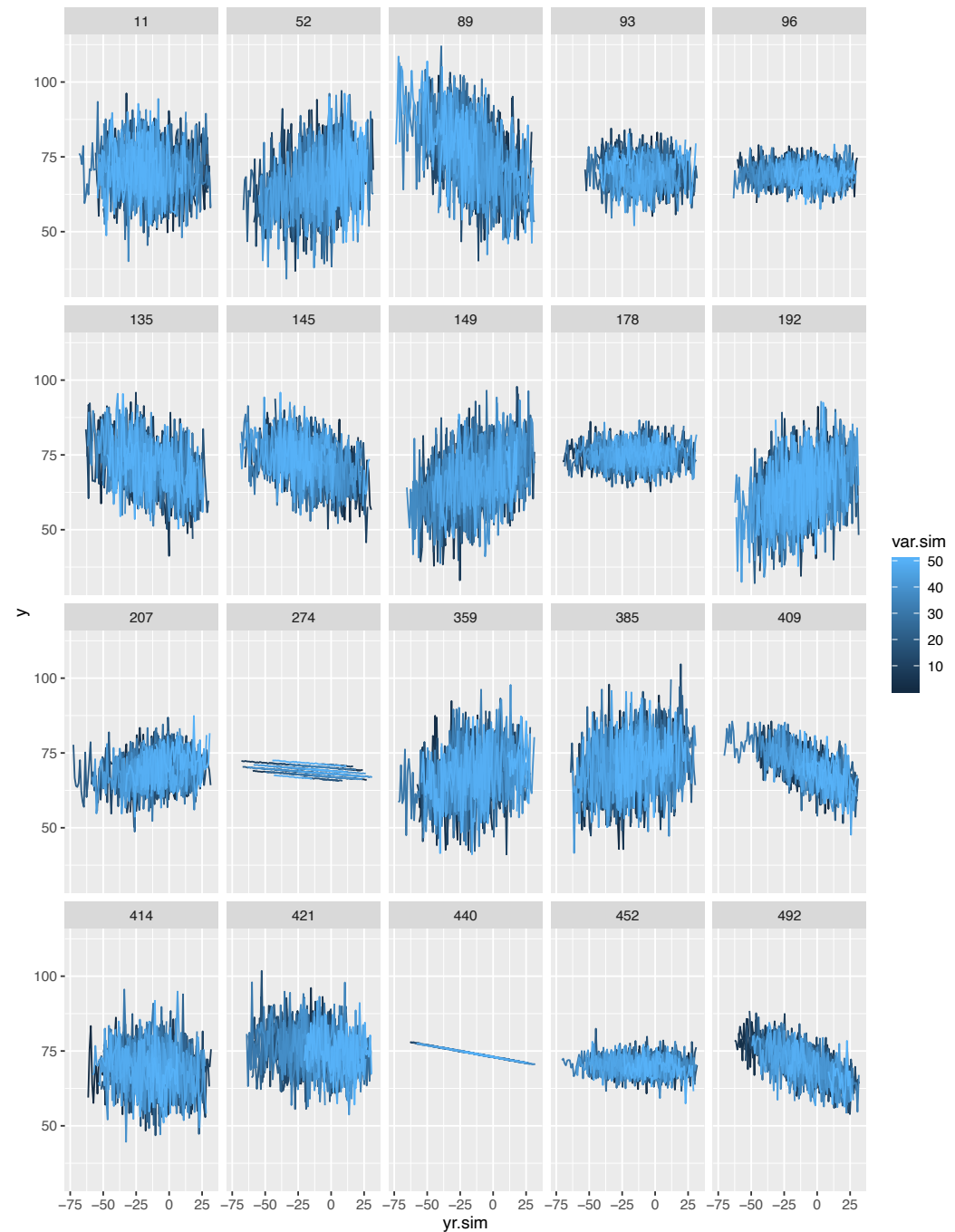
Priors

- $a.\mu \sim N(70, 5)$
- $a.\sigma \sim U(0, 5)$
- $B.\mu \sim N(0, 1)$
- $B.\sigma \sim U(0, 1)$
- $E \sim U(0, 10)$



Prior

- $a.\mu \sim N(70, 2)$
- $a.\sigma \sim U(0, 2)$
- $B.\mu \sim N(0, 0.1)$
- $B.\sigma \sim U(0, 0.1)$
- $E \sim U(0, 10)$



questions

- Need to fix the year so it does not go to -80. Something to do with the start year needing to be late enough so the count down does not go lower than -24
 - Decided to ignore this problem for the moment
- Need to constrain variation - Make error smaller? Slope? Intercept sigma?