1. Transform the non-Gaussian outcome ‘tot.vase.days’ into a longitudinal binary outcome (i.e. fresh=1/not fresh=0), and analyze the data taking into account the available covariates.

* GEE, only taking into account flowerID as clustering effect
* Or generalised linear mixed model? Where time,

We have conducted an additional small experiment on the width of the flower and would like you to answer the following questions:

- Very helpful model about fitting GLMM in R: <https://www.youtube.com/watch?v=Yqf91pPzkU4>

- for GEE: geeglm() provides robust/empirical standard error estimate.

GEE:

Where is the probability that the ith flower stays "fresh" on day jth. Compoundk : compound-specific dummies. The slope is interpreted as the log odds ratio that a flower stays fresh with any compound compared to water.

- link:

(b) Analyze the Gaussian outcome ‘width of the flower’ taking into account the covariates and the subplot effect.

(c) Explore/Visualize the Gaussian outcome ‘width of the flower’ (T0 up to T20) with a multivariate method.

- EDA: Evolution over-time of width of each compound

- PCA: https://www.datacamp.com/tutorial/pca-analysis-r

(d) Confirm (part of) the conclusions of your data analysis on the Guassian outcome ‘width of the flower’ using a multivariate method.

2 initial questions for the count\_data\_G17 dataset (non-Gaussian outcome) (our proposed experiment):

(e) analyze tot.vase.days outcome using linear mixed-effect model (normal assumption)

(f) analyze tot.vase.days outcome using generalized mixed-effect model (poisson distribution)

* **Meeting 090524**

1. Model formulation for each question – from now to Saturday morning – consult report from Gorup 3.
2. Model and interpretation – from now to Saturday – work on code, review code. Saturday morning: final decision regarding models and code. Come up with the interpretation. Saturday evening: ready to be shared.
   1. Git hub. Same code/different code ?

To do list 090524

* Read report from Bernard
* Do EDA for question a : box plot of tot.vas.days per compound
* Gee and glmm for a.
  + Gee for nested model
  + Glmm with marginal interpretation
* Pca for c
* Note: contrast (multiple comparison mixed effects model in R - [(1) What about Multiple comparisons in a linear mixed model in R? | ResearchGate](https://www.researchgate.net/post/What-about-Multiple-comparisons-in-a-linear-mixed-model-in-R) - [Comparisons and contrasts in emmeans (r-project.org)](https://cran.r-project.org/web/packages/emmeans/vignettes/comparisons.html) - [Contrast Methods (r-project.org)](https://cran.r-project.org/web/packages/contrast/vignettes/contrast.html)
* Interesting posts I found on mixed-effects model:
  + difference between fixed effect, random effect in mixed effect models? - <https://stats.stackexchange.com/questions/4700/what-is-the-difference-between-fixed-effect-random-effect-in-mixed-effect-model>
  + mixed effects model tutorial: <https://ourcodingclub.github.io/tutorials/mixed-models/>
  + Is it a fixed or random effect? <https://dynamicecology.wordpress.com/2015/11/04/is-it-a-fixed-or-random-effect/>
  + How many terms? On model complexity - <https://dynamicecology.wordpress.com/2015/02/05/how-many-terms-in-your-model-before-statistical-machismo/>
  + More on model complexity - <https://dynamicecology.wordpress.com/2014/12/02/why-are-your-statistical-models-more-complex-these-days/>
  + some of the fixed and random effects definitions gathered by Gelman - <http://www.stat.columbia.edu/~gelman/research/published/AOS259.pdf>
  + Interpreting random effects:
    - <https://www.r-bloggers.com/2012/11/making-sense-of-random-effects/>
    - <https://www.theanalysisfactor.com/understanding-random-effects-in-mixed-models/>
    - <https://bodowinter.com/tutorial/bw_LME_tutorial.pdf>
  + GEE compared with lmer:
    - https://stats.stackexchange.com/questions/380207/gee-vs-lme-non-normal-distribution/380399#380399
* Checking mixed model assumptions:
  + plot(mixed.lmer)
  + qqnorm(resid(mixed.lmer))
  + qqline(resid(mixed.lmer))
* Now I understand the distinction between “crossed – partially crossed and nested” random factors
* excellent visualisation of random intercepts and slopes - <https://mfviz.com/hierarchical-models/>

**Meeting 110524**

* final code version before 8pm today for the other group to check
* model notation –
* check Gorkem’s code -> how to proceed? Voting is good!

**Luong 230524**

* Read different tests in glmm, and their conditions:
  + Likelihood ratio test is the second best option to compare the model with and without a fix effect. Command:
    - anova() – for glmer objects
    - for lmer objects, set REML = FALSE