

DATA 621 - ELMR Exercise 9.1

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// 1. The ratdrink data consist of five weekly measurements of body weight for 27 rats. The first 10 rats are on a control treatment while seven rats have thyroxine added to their drinking water. Ten rats have thiouracil added to their water. Build a model for the rat weights that shows the effect of the treatment.

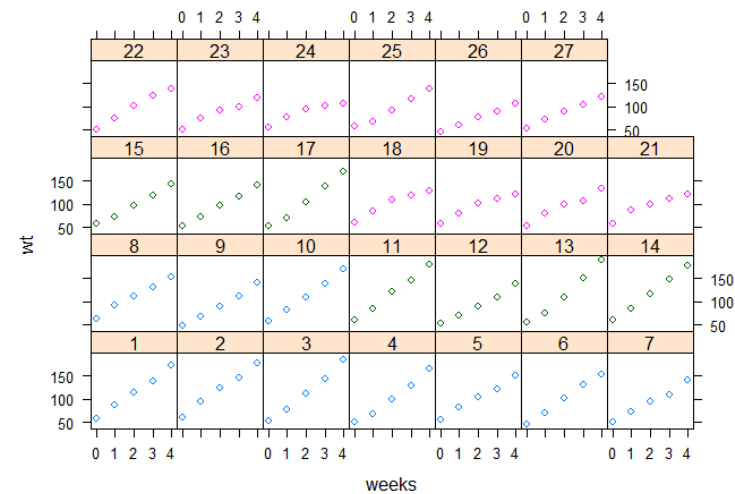
Let's take a look first at the ratdrink data...

No	Variable	Stats / Values	Freqs (% of Valid)	Graph	Valid	Missing
1	wt [numeric]	Mean (sd) : 100.8 (35.9) min ≤ med ≤ max: 46 ≤ 100 ≤ 189 IQR (CV) : 51.5 (0.4)	79 distinct values		135 (100.0%)	0 (0.0%)
2	weeks [integer]	Mean (sd) : 2 (1.4) min ≤ med ≤ max: 0 ≤ 2 ≤ 4 IQR (CV) : 2 (0.7)	0 : 27 (20.0%) 1 : 27 (20.0%) 2 : 27 (20.0%) 3 : 27 (20.0%) 4 : 27 (20.0%)		135 (100.0%)	0 (0.0%)
3	subject [factor]	1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 7. 7 8. 8 9. 9 10. 10 [17 others]	5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 5 (3.7%) 85 (63.0%)		135 (100.0%)	0 (0.0%)
4	treat [factor]	1. control 2. thiouracil 3. thyroxine	50 (37.0%) 50 (37.0%) 35 (25.9%)		135 (100.0%)	0 (0.0%)

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We plot the weight of the 27 rats for the five week duration of the treatment. Rats 1-10 in the treatment group are in blue, rats 11-17 in the thyroxine group are in green and rats 18-27 in the thiouracil group are in pink.



We build the mixed effects model with the `lmer()` function from the **lme4** package with 'weeks' as the fixed effects predictor and 'treat' as the random effects predictor.

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: wt ~ weeks + (1 | treat)
## Data: ratdrink
## REML criterion at convergence: 1069.2
## Random effects:
## Groups Name Std.Dev.
## treat (Intercept) 8.017
## Residual 12.669
## Number of obs: 135, groups: treat, 3
## Fixed Effects:
## (Intercept) weeks
## 54.97 23.18
```

We display the coefficients showing i.) the same fixed effect coefficient and ii.) different intercepts for three treatment groups.

```
## $treat
## (Intercept) weeks
## control 59.26252 23.18148
## thiouracil 45.96656 23.18148
## thyroxine 59.67274 23.18148
##
## attr(,"class")
## [1] "coef.mer"
```