Practical 9: Further issues

Data

1. The `PEFR data`.
   This dataset holds the data described in Chapter 1. They concern measures of peak-expiratory-flow rate (PEFR) taken with two instruments on 17 people in an experiment reported by Bland and Altman (*Lancet* I, 1986, 307-310). The two instruments were the Standard Wright and the Mini Wright peak flow meter. Each method was used twice. The variables are:

```
id              Participant identifier
wp1             Standard Wright measure at 1st occasion
wp2             Standard Wright measure at 2nd occasion
wm1             Mini Wright measure at 1st occasion
wm2             Mini Wright measure at 2nd occasion
```

Questions

1. Read the data and plot all the 4 measures against the person identifier using:

```
. twoway  ///
    (scatter wm1 id,ms(circle)) (scatter wm2 id,ms(circle_hollow)) ///
    (scatter wp1 id,ms(T))(scatter wp2 id,ms(D)), ///
    xtitle(Subject id) xlabel(1/17) ytitle(MW Measurements) ///
    legend( order(1 "WM-1" 2 "WM-2" 3 "WR-1" 4 "WR-2"))
```

   What do you notice?

2. "Doubly reshape" the data as described in the lecture.

3. Fit a 2 level random intercept model to the data, using REML. Make a note of the restricted maximum likelihood. How do you interpret the results?

4. Add the explanatory variable `mini` and fit the model using REML. Make a note of the restricted maximum likelihood.

5. Fit a 3 level random intercept model to the data, as shown in the lecture, using REML, without any explanatory variables. Make a note of the restricted maximum likelihood. How do you interpret the results?

6. Refit this last model using MLE. What do you find?

7. Which of these are nested and which are not? Fill in the values in this table.

Question	**Model**	**log restr lik**	**k**
3)	2 levels, no expl vars		
4)	2 levels, with `mini`		
5)	3 levels, no expl vars		

k: total number of parameters.

8. Use the LRT to compare some of these models.