Untitled

```
library(lme4)
```

```
## Loading required package: Matrix
```

```
set.seed(101)
ss <- sleepstudy[sample(nrow(sleepstudy), size = round(0.9 * nrow(sleepstudy))), ]

ss <- subset(ss, Subject == 308)

## This is the data used for this example, Jacob, you can use that in SAS to see
## if you can reproduce my results

ss
```

```
##      Reaction Days Subject
## 8   290.1486    7     308
## 7   382.2038    6     308
## 3   250.8006    2     308
## 10  466.3535    9     308
## 5   356.8519    4     308
## 1   249.5600    0     308
## 2   258.7047    1     308
## 6   414.6901    5     308
## 9   430.5853    8     308
```

```
m1 <- lmer(Reaction ~ Days + (1|Subject) + (0+Days|Subject), ss,
           control = lmerControl(check.nlev.gtr.1="ignore"))

summary(m1)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Reaction ~ Days + (1 | Subject) + (0 + Days | Subject)
##    Data: ss
## Control: lmerControl(check.nlev.gtr.1 = "ignore")
##
## REML criterion at convergence: 81.4
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.07771 -0.09856  0.16557  0.52169  1.23737
##
## Random effects:
##  Groups     Name        Variance Std.Dev.
##  Subject    (Intercept) 2624     51.23
##  Subject.1  Days        3682     60.68
##  Residual               2586     50.85
## Number of obs: 9, groups:  Subject, 1
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   241.70      60.13   4.020
## Days           22.01      60.95   0.361
```

```
##
## Correlation of Fixed Effects:
##      (Intr)
## Days -0.041
```

```
fixef(m1)
```

```
## (Intercept)        Days
##    241.70246    22.01372
```

```
dd <- as.function(m1)

ff <- dd(c(0, 0))

opt <- list(par = c(0, 0), fval = ff, conv = 0)

lmod <- lFormula(Reaction ~ Days + (1|Subject) + (0+Days|Subject), ss, control = lmerControl(check.nlev

m1X <- mkMerMod(environment(dd),
                opt,
                lmod$reTrms,
                fr = lmod$fr,
                mc = quote(hacked_lmer()))


buildMM <- function(theta) {

  dd <- as.function(m1)

  ff <- dd(theta)

  opt <- list(par = c(0, 0), fval = ff, conv = 0)

  mm <-
    mkMerMod(environment(dd),
             opt,
             lmod$reTrms,
             fr = lmod$fr,
             mc = quote(hacked_lmer()))

  return(mm)
}

objfun <- function(x, target = c(700, 30)) {

  mm <- buildMM(sqrt(x))

  return(sum((unlist(VarCorr(mm)) - target)^2))
}
```

Here I force the variances to be 700 and 30

```
#' Fix variances to 700 and 30.
s0 <- c(700, 30) / sigma(m1)^2

opt <- optim(fn = objfun, par = s0)
```

```
## Warning in sqrt(x): NaNs produced
```

```
mm_final <- buildMM(sqrt(opt$par))

#' This works fine!
summary(mm_final)
```

```
## Linear mixed model fit by REML ['lmerMod']
##
## REML criterion at convergence: 81.4
##
## Scaled residuals:
##      Min      1Q   Median       3Q      Max
## -2.07771 -0.09856  0.16557  0.52169  1.23737
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Subject   (Intercept) 700      26.458
##  Subject.1 Days          30       5.477
##  Residual              2586      50.849
## Number of obs: 9, groups:  Subject, 1
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)  241.702     41.124   5.877
## Days          22.014      7.894   2.789
##
## Correlation of Fixed Effects:
##      (Intr)
## Days -0.465
```

So, if I fix variances to 700 and 30, the fixed effect estimates are 241.7024558, 22.0137238.