

Specifying Contrasts for linear model

At the moment my motivation for making this available is so that someone can tell me if I'm doing what I want to do.

Get `tidyverse` for data wrangling and `lme4` for modelling and load some data that I prepared earlier.

```
library(tidyverse)
library(lme4)

load("rti_narrative_data.Rda")
```

This loads a data frame called `Df` that looks like this:

```
##      Subno      T1234      Condition      score      cond_by_task
##  2      :  4      T1:161      comp:500      Min.       : 0.000      T1.comp:125
##  3      :  4      T2:161      int :144      1st Qu.:  4.000      T2.comp:125
##  5      :  4      T3:161                      Median :  6.000      T3.comp:125
##  7      :  4      T4:161                      Mean   :  5.571      T4.comp:125
##  8      :  4                      3rd Qu.:  8.000      T1.int :  36
##  9      :  4                      Max.    :10.000      T2.int :  36
## (Other):620                      NA's    :5          (Other):  72
```

`T1234` is a factor representing tests at four different time points.

`Condition` comprises two groups, `comp` and `int`

I am constructing comparisons as follows.

Create a “flat” single factor representing all cells in the design.

```
Df <- Df %>%
  mutate(cond_by_task = interaction(T1234,Condition))
summary(Df$cond_by_task)
```

```
## T1.comp T2.comp T3.comp T4.comp T1.int T2.int T3.int T4.int
##      125      125      125      125      36      36      36      36
```

Then define some contrasts:

Main effect of group

```
cond <- cbind(c(-1,-1,-1,-1,1,1,1,1))
colnames(cond) <- c('group')
```

Main effects of time with separate contrasts giving slope, averaged across groups, between T1 and T2, T2 and T3, and T3 and T4.

```
time <- cbind(rep(c(-1,1,0,0),2),
              rep(c(0,-1,1,0),2),
              rep(c(0,0,-1,1),2))
colnames(time) <- c('T12','T23','T34')
```

Interaction effects. This asks whether there the slopes for the two groups differ, looking separately at slopes between T1 and T2, T2 and T3, and T3 and T4.

```
inter <- cbind(c(1,-1,0,0,-1,1,0,0),
               c(0,1,-1,0,0,-1,1,0),
               c(0,0,1,-1,0,0,-1,1))
colnames(inter) <- c('T12:group','T23:group','T34:group')
```

Then put these all together and assign them to the `cond_by_task` factor.

```
conds <- cbind(cond,time,inter)
contrasts(Df$cond_by_task, how.many = ncol(conds)) <- conds
contrasts(Df$cond_by_task)
```

```
##           group  T12  T23  T34  T12:group  T23:group  T34:group
## T1.comp      -1  -1   0   0           1           0           0
## T2.comp      -1   1  -1   0          -1           1           0
## T3.comp      -1   0   1  -1           0          -1           1
## T4.comp      -1   0   0   1           0           0          -1
## T1.int        1  -1   0   0          -1           0           0
## T2.int        1   1  -1   0           1          -1           0
## T3.int        1   0   1  -1           0           1          -1
## T4.int        1   0   0   1           0           0           1
```

You don't need an intercept because `lmer` gives you it for free (and won't allow you to use your own contrast but specify no intercept in the model).

Then run the model and get the coefficients.

```
m <- lmer(score ~ cond_by_task + (1|Subno),
          data = Df)

summary(m)$coef
```

```
##           Estimate Std. Error  t value
## (Intercept)      5.0411258   0.1375121 36.659499
## cond_by_task group    -0.9775574   0.1375121 -7.108881
## cond_by_task T12       2.8194592   0.1346592 20.937743
## cond_by_task T23       3.3848072   0.1559507 21.704337
## cond_by_task T34       1.7137108   0.1362447 12.578185
## cond_by_task T12:group  0.1607760   0.1346592  1.193947
## cond_by_task T23:group  0.6034408   0.1559507  3.869433
## cond_by_task T34:group  0.3936612   0.1362447  2.889370
```

So, the question is: Is this set of contrasts giving me what I've claimed it's giving me? If not, what am I doing wrong?