adv.stats.mod11.R

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#10.1  
install.packages("ISwR", repos = "http://cran.us.r-project.org")

##   
## The downloaded binary packages are in  
## /var/folders/21/1whlzzgd6p7bgc4rz9d1jlp40000gn/T//RtmpaXEvaj/downloaded\_packages

library(ISwR)  
  
ashina$subject<- factor(1:16)  
attach(ashina)  
act<- data.frame(vas= vas.active, subject, treat= 1, period= grp)  
plac<- data.frame(vas= vas.plac, subject, treat= 0, period=ifelse(grp==1,2,1))  
ashina.long<- rbind(act, plac)  
ashina.long$treat<- factor(ashina.long$treat)  
ashina.long$period<- factor(ashina.long$period)  
fit.ashina<- lm(vas~subject+period+treat, data = ashina.long)  
drop1(fit.ashina)

## Single term deletions  
##   
## Model:  
## vas ~ subject + period + treat  
## Df Sum of Sq RSS AIC  
## <none> 19679 241.49  
## subject 15 51137 70816 252.47  
## period 1 1505 21184 241.85  
## treat 1 11603 31282 254.32

anova(fit.ashina)

## Analysis of Variance Table  
##   
## Response: vas  
## Df Sum Sq Mean Sq F value Pr(>F)   
## subject 15 51137 3409.2 2.4254 0.05287 .  
## period 1 4608 4608.0 3.2783 0.09171 .  
## treat 1 11603 11603.3 8.2550 0.01228 \*  
## Residuals 14 19679 1405.6   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

dd<- vas.active-vas.plac  
t.test(dd[grp==1],-dd[grp==2], var.eq=T)

##   
## Two Sample t-test  
##   
## data: dd[grp == 1] and -dd[grp == 2]  
## t = -2.8731, df = 14, p-value = 0.01228  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -137.39089 -19.94244  
## sample estimates:  
## mean of x mean of y   
## -53.50000 25.16667

t.test(dd[grp==1], dd[grp==2], var.eq=T)

##   
## Two Sample t-test  
##   
## data: dd[grp == 1] and dd[grp == 2]  
## t = -1.0348, df = 14, p-value = 0.3183  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -87.05756 30.39089  
## sample estimates:  
## mean of x mean of y   
## -53.50000 -25.16667

#10.3  
a <- gl(2, 2, 8)  
b <- gl(2, 4, 8)  
x <-- 1:8  
y <- c(1:4, 8:5)  
z <- rnorm (8)  
model.matrix(~ a:b) ; lm(z ~ a:b)

## (Intercept) a1:b1 a2:b1 a1:b2 a2:b2  
## 1 1 1 0 0 0  
## 2 1 1 0 0 0  
## 3 1 0 1 0 0  
## 4 1 0 1 0 0  
## 5 1 0 0 1 0  
## 6 1 0 0 1 0  
## 7 1 0 0 0 1  
## 8 1 0 0 0 1  
## attr(,"assign")  
## [1] 0 1 1 1 1  
## attr(,"contrasts")  
## attr(,"contrasts")$a  
## [1] "contr.treatment"  
##   
## attr(,"contrasts")$b  
## [1] "contr.treatment"

##   
## Call:  
## lm(formula = z ~ a:b)  
##   
## Coefficients:  
## (Intercept) a1:b1 a2:b1 a1:b2 a2:b2   
## -1.22473 0.09690 0.72027 -0.01919 NA

model.matrix(~ a \* b) ; lm(z ~ a \* b)

## (Intercept) a2 b2 a2:b2  
## 1 1 0 0 0  
## 2 1 0 0 0  
## 3 1 1 0 0  
## 4 1 1 0 0  
## 5 1 0 1 0  
## 6 1 0 1 0  
## 7 1 1 1 1  
## 8 1 1 1 1  
## attr(,"assign")  
## [1] 0 1 2 3  
## attr(,"contrasts")  
## attr(,"contrasts")$a  
## [1] "contr.treatment"  
##   
## attr(,"contrasts")$b  
## [1] "contr.treatment"

##   
## Call:  
## lm(formula = z ~ a \* b)  
##   
## Coefficients:  
## (Intercept) a2 b2 a2:b2   
## -1.1278 0.6234 -0.1161 -0.6042

#model.matrix(~ a:x) ; lm(z ~ a:x)  
#error: variable lengths differ  
#model.matrix(~ a \* x) ; lm(z ~ a \* x)  
#error: variable lengths differ  
#model.matrix(~ b \* (x + y)) ; lm(z ~ b \* (x + y))  
#error: variable lengths differ  
#R reduces the set of design variables for an interaction point between categorical   
#variables if a main effect is there, but not detect the singularity caused by the presence of the   
#intercept. neither of the two variables contain singularities   
#involving a categorical and a continuous variable, but the first one has one parameter less   
#(common-intercept model) The last example has a "coincidental" singularity (x and y are proportional   
#within each level of b) which R cannot detect. You can see that the model matrix   
#is singular since the sum of the last two columns (b2:x and b2;) is  
#proportional to the second (b2), also the difference between x and y columns is a   
#linear combination of b2 and b2:x