1 Mixed-Models

$$Y = \mu + Group + Cond + Test + ID + Cond:Test + Cond:Group + Test:Group + ID + \epsilon \quad (1)$$

Factor *ID* is nested in *Group*. *Group*, *Test*, *Cond* are crossed factors. *Group* is therefore a between-subject factor, *Cond* and *Test* are within-subject factors.

```
taste product + age + gender + Wechselwirkungen + Error(subject),
data=datA
mod <- aov(taste ~ (product + age + gender)^2 + Error(subject), data = datA)
#Error: subject
# Df Sum Sq Mean Sq F value Pr(>F)
#age 2 51.9 26.0 3.1313 0.04449 *
#gender 1 6.8 6.8 0.8231 0.36470
#age:gender 2 3.8 1.9 0.2295 0.79498
#Residuals 513 4251.9 8.3
#---
#Signif. codes: 0 Õ***Õ 0.001 Õ**Õ 0.01 Õ*Õ 0.05 Õ.Õ 0.1 Õ Õ 1
#
#Error: Within
# Df Sum Sq Mean Sq F value Pr(>F)
#product 3 567.3 189.1 63.4361 <2e-16 ***
#product:age 6 16.5 2.7 0.9207 0.4788
#product:gender 3 3.0 1.0 0.3340 0.8008
#Residuals 1545 4605.3 3.0
```

1.1 Packages in R

There are several possibilities in R to perform a ANOVA with more than just one errorterm. One is `aov` and the other is `lmer`.

Further Reading

Hedeker, D. und Gibbons, D. (2006). *Longitudial Data Analysis*, John Wiley & Sons, Inc. (Repeated Measures ANOVA, chapter 1 bis 4)
Montgomery, D. (2005). *Design and Analysis of Experiments*, John Wiley & Sons, Inc. (Repeated Measures ANOVA, Split-Plot-Models, chapter 13 und 14 und 15.4) Pinheiro, J. C. und Bates, D. (2000). *Mixed-effects models in S and S-Plus*, Springer-Verlag New York, Inc.