R Syntax for the analyses in the empirical example

```
# ::: load R-data
load(paste(path, 'berlin1_imp.Rdata', sep = ''))

# ::: separate data sets - experiment (dat.r) or quasi-experiment (dat.q)
dat.r <- dat.all[dat.all$los == 'Experiment', ]
dat.q <- dat.all[dat.all$los == ‚Selbstselektion', ]

# ::: unadjusted effect of the English training in the experiment and quasi-experiment
exp <- lm(dat.r$eall~dat.r$interv)
summary(exp)
qexp<- lm(dat.q$eall~dat.q$interv)
summary(qexp)

# EffectLiteR analysis
library(lavaan)
library(EffectLiteR)

# adjusting for manifest English pretest ability
qexp_preeng_manifest <- effectLite(y="eall", x="interv", z="e.a.m", control="Mathematik",
                                   data=dat.q, fixed.cell=FALSE,  missing="fiml",
                                   interactions = "none", syntax.only=FALSE)
qexp_preeng_manifest
```

```
# adjusting for latent English pretest ability
me <- 'E_pre =~ 1*e.a.ma + 1*e.a.mb
e.a.ma ~ 0
e.a.mb ~ 0
e.a.ma~~c(a,a)*e.a.ma
e.a.mb~~c(b,b)*e.a.mb'

qexp_preeng_latent <- effectLite(y="eall", x="interv", z="E_pre", control="Mathematik",
                                 measurement=me, data=dat.q, fixed.cell=FALSE,
                                 missing="fiml", interactions = "none",
syntax.only=FALSE)
qexp_preeng_latent

# adjusting for manifest English pretest ability and latent math pretest ability
mm <- 'M_pre =~ c(g,g)*m.a.ma + 1*m.a.mb
m.a.ma ~ 0
m.a.mb ~ 0
m.a.ma~~m.a.ma
m.a.mb~~c(d,d)*m.a.mb'

qexp_preeng_manifest_math <- effectLite(y="eall", x="interv", z=c("M_pre" ,"e.a.m"),
                                        measurement=mm, control="Mathematik",
                                        data=dat.q, fixed.cell=FALSE,  missing="fiml",
                                        interactions = "none", syntax.only=FALSE)
qexp_preeng_manifest_math
```

```
# adjusting for latent English pretest ability and latent math pretest ability

mme <-  'E_pre =~ 1*e.a.ma + 1*e.a.mb

M_pre =~ c(g,g)*m.a.ma + 1*m.a.mb

e.a.ma ~ 0

e.a.mb ~ 0

m.a.ma ~ 0

m.a.mb ~ 0

e.a.ma~~c(a,a)*e.a.ma

e.a.mb~~c(b,b)*e.a.mb

m.a.ma~~m.a.ma

m.a.mb~~c(d,d)*m.a.mb'


qexp_preeng_latent_math <- effectLite(y="eall", x="interv", z=c("E_pre" ,"M_pre"),
                                      measurement=mme, control="Mathematik",
                                     data=dat.q, fixed.cell=FALSE,  missing="fiml",
                                    interactions = "none", syntax.only=FALSE)

qexp_preeng_latent_math
```