Why Do People Cooperate with the Police and Criminal Courts? A Test of Procedural Justice Theory in 30 Countries

Supporting materials, Section S8 (Part 2): R code and output for supplementary analysis

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Introduction

This document shows the R code that was used for the supplementary analyses that are reported in Supplements S5-S7, and output from them.

The code starts from the point where we read in datasets and previous estimated models in a form which is ready for the analysis. Please see Supplement_S8_1 for information on how these data and results were obtained.

Supplement S5. Adding police-initiated contact to the models

```
library(lavaan)
library(rmeta)
library(lme4)

#################################################################################
# Reading in previous data and model objects
coopdata <- readRDS("coopdata.rds")
coopdata <- coopdata[!is.na(coopdata$stop),]
country.estimates <- readRDS("country_estimates.rds")
coop.estimates.main <- readRDS("coop_estimates_mainpaper.rds")
sem.fitted.models.main <- readRDS("sem_fitted_models_mainpaper.rds")
step1.se.contributions <- readRDS("step1_se_contributions.rds")

#################################################################################
# Analysis
#########################################################

## (1) Comparisons of models for all respondents,
##  comparing models with and without contact with the police included.

# Centre satisfaction at 0 (neither nor)
# If no contact, set satisfaction also at 0 (but also use a no-contact dummmy)
coopdata$nocontact <- abs(coopdata$stop-1)
coopdata$contactsat <- coopdata$stopSat-3
coopdata$contactsat[coopdata$nocontact==1] <- 0

table(coopdata$stop,coopdata$nocontact)
```

```
##
```

```
##         0     1
##   0     0 39709
##   1 18860     0
```

```
table(coopdata$nocontact,coopdata$contactsat)
```

```
##
##        -2    -1     0     1     2
##   0  1876  2274  2841  7846  3970
##   1     0     0 39709     0     0
```

```
table(coopdata$stopSat,coopdata$contactsat)
```

```
##
##       -2   -1    0    1    2
##   1 1876    0    0    0    0
##   2    0 2274    0    0    0
##   3    0    0 2841    0    0
##   4    0    0    0 7846    0
##   5    0    0    0    0 3970
```

```
mod.spec <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.156*obey1 +2.728*obey2 +2.495*obey3
  obey1 ~ 5.702*1; obey2~6.100*1; obey3~5.881*1
  obey1~~4.102*obey1; obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3+nocontact+contactsat
  dj~1+age+female+educ2+educ3+nocontact+contactsat
  lawf~1+age+female+educ2+educ3+nocontact+contactsat
  eff~1+age+female+educ2+educ3+nocontact+contactsat
  foc~1+age+female+educ2+educ3+nocontact+contactsat
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
```

```
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+nocontact+contactsat
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+nocontact+contactsat
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid+nocontact+contactsat
'
mod.spec.SA <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.728*obey2 +2.495*obey3
  obey2~6.100*1; obey3~5.881*1
  obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3+nocontact+contactsat
  dj~1+age+female+educ2+educ3+nocontact+contactsat
  lawf~1+age+female+educ2+educ3+nocontact+contactsat
  eff~1+age+female+educ2+educ3+nocontact+contactsat
  foc~1+age+female+educ2+educ3+nocontact+contactsat
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+nocontact+contactsat
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+nocontact+contactsat
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid+nocontact+contactsat
'

# Fitting the models:

countries <- levels(coopdata$country)
sem.fitted.models2 <- vector("list",length(countries))
names(sem.fitted.models2) <- countries

for(country.i in countries){
  #cat(country.i,"\n")
  data.tmp <- coopdata[coopdata$country==country.i,]
```

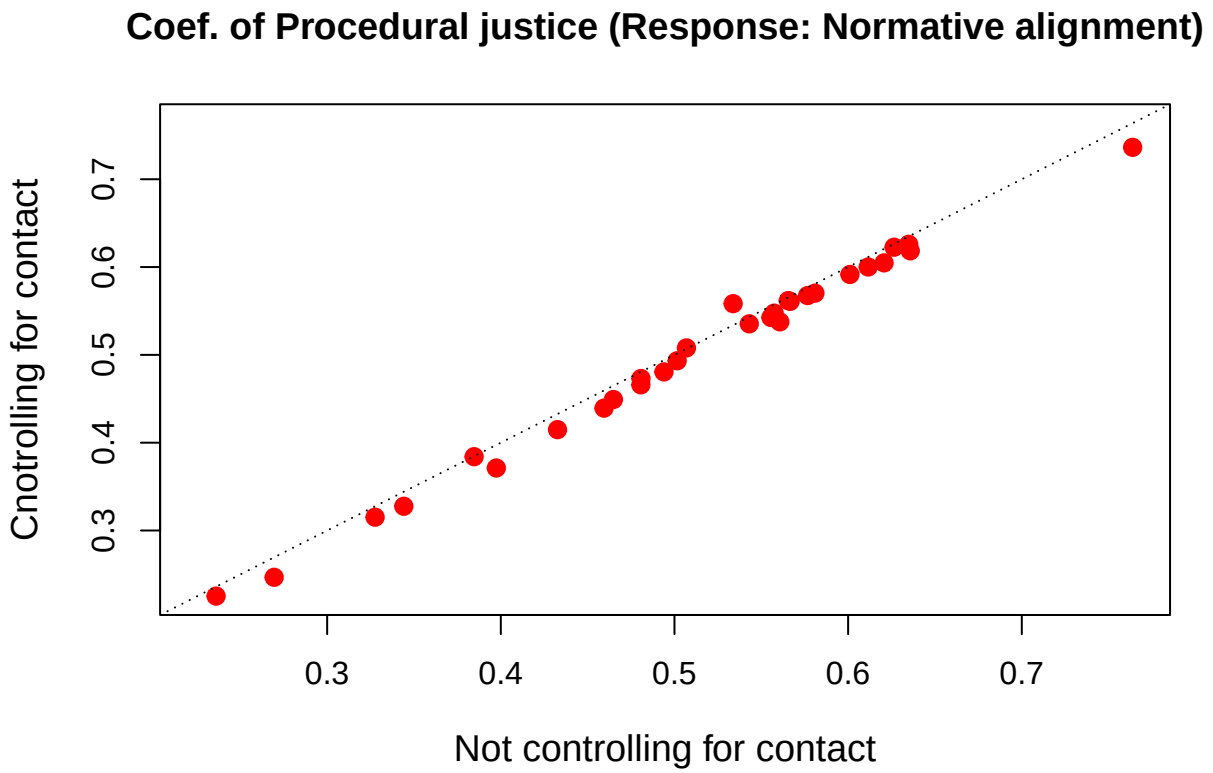
```
  if(country.i!="SA"){
    sem.fitted.models2[[country.i]] <- sem(mod.spec,data=data.tmp,missing="fiml")
  }
  if(country.i=="SA"){
    sem.fitted.models2[[country.i]] <- sem(mod.spec.SA,data=data.tmp,missing="fiml")
  }
}

coop.estimates2 <- vector("list",2)
names(coop.estimates2) <- c("summary.stats.by.country","sems")
coop.estimates2[[1]] <- country.estimates
coop.estimates2[[2]] <- vector("list",length(countries))
names(coop.estimates2[[2]]) <- countries

for(country.i in countries){
  #cat(country.i,"\n")
  #  summary(sem.fitted.models[[i]])
  coop.estimates2$sems[[country.i]] <- parameterEstimates(sem.fitted.models2[[country.i]])
}

# Collecting all the coefficients in one data frame:

country.names <- data.frame(
        short=
        c("AT","BE","BG","CH","CY","CZ","DE","DK","EE","ES",
          "FI","FR","GB","GR","HR","HU","IE","IL","LT","NL",
          "NO","PL","PT","RU","SE","SI","SK","UA","SA","US"),
        long=
        c("Austria","Belgium","Bulgaria","Switzerland","Cyprus",
          "Czech R","Germany","Denmark","Estonia","Spain",
          "Finland","France","UK","Greece","Croatia",
          "Hungary","Ireland","Israel","Lithuania","Netherlands",
          "Norway","Poland","Portugal","Russia","Sweden",
          "Slovenia","Slovakia","Ukraine","SA","US"),
        extra.space=
        c(4,2,3,0,2,1,0,0,3,3,
          3,3,4,2,3,1,4,5,2,0,
          2,3,2,3,1,2,2,2,4,4)
        )
country.names[,1] <- as.character(country.names[,1])
country.names[,2] <- as.character(country.names[,2])

get.estimates <- function(lhs,rhs,op="~",estimates=coop.estimates$sems,
                          include=c("est","se","pvalue","ci.lower","ci.upper"),add.spaces=NULL,
          include.step.1.var=T,step1.se=step1.se.contributions){
        if(op!="country.means" & op!="country.means.w"){
        countries <- names(estimates)
        res <- data.frame(matrix(NA,length(countries),4+length(include)))
        names(res) <- c("country","lhs","op","rhs",include)
        res$country <- countries
        res$lhs <- lhs
        res$op <- op
        res$rhs <- rhs
```

```
        for(i in seq_along(countries)){
                ests.i <- estimates[[countries[i]]]
                ind.i <- (ests.i[,"lhs"]==lhs)&(ests.i[,"op"]==op)&(ests.i[,"rhs"]==rhs)
                res[i,5:ncol(ests.i)] <- ests.i[ind.i,include]
                if(include.step.1.var){
                  se1.i <- step1.se[,c("lhs","op","rhs",countries[[i]])]
                  se1.i <- se1.i[(se1.i[,"lhs"]==lhs)&(se1.i[,"op"]==op)&(se1.i[,"rhs"]==rhs),4]
                  res[i,"se"] <- sqrt(res[i,"se"]^2+se1.i^2)
                }
        }
        ind <- match(res[,"country"],country.names[,1])
        res[,"country"] <- country.names[ind,2]
        }
        if(op=="country.means"){
                res <- data.frame(country=estimates[,"country"],
                        lhs=lhs,op=op,rhs=NA,
                        est=estimates[,paste(lhs,"mean",sep=".")],
                        se=estimates[,paste(lhs,"mean.se",sep=".")],
                        p.value=NA,ci.lower=NA,ci.upper=NA)
                res$p.value <- 2*(1-pnorm(abs(res$est/res$se)))
                res$ci.lower <- res$est-qnorm(.975)*res$se
                res$ci.upper <- res$est+qnorm(.975)*res$se
                ind <- match(res[,"country"],country.names[,1])
                res[,"country"] <- country.names[ind,2]
        }
  if(op=="country.means.w"){
    res <- data.frame(country=estimates[,"country"],
                      lhs=lhs,op=op,rhs=NA,
                      est=estimates[,paste(lhs,"mean.w",sep=".")],
                      se=estimates[,paste(lhs,"mean.w.se",sep=".")],
                      p.value=NA,ci.lower=NA,ci.upper=NA)
    res$p.value <- 2*(1-pnorm(abs(res$est/res$se)))
    res$ci.lower <- res$est-qnorm(.975)*res$se
    res$ci.upper <- res$est+qnorm(.975)*res$se
    ind <- match(res[,"country"],country.names[,1])
    res[,"country"] <- country.names[ind,2]
  }
        if(!is.null(add.spaces)){
                res[,"country"] <- add.space(res[,"country"],add.spaces)
        }
        res
}


collect.coefs2 <- function(data=coop.estimates2$sems){
  res <- data.frame(country=get.estimates(lhs="obey",rhs="pj",include.step.1.var=F,
                                          estimates=coop.estimates2$sems)$country)
  lhs <- c("obey","moralid")
  rhs <- c("pj","dj","lawf","eff","foc","nocontact","contactsat")
  for(lhs.i in lhs){
    for(rhs.i in rhs){
      nam.i <- paste(lhs.i,".ON.",rhs.i,sep="")
      res[,nam.i] <- get.estimates(lhs=lhs.i,rhs=rhs.i,include.step.1.var=F,
```

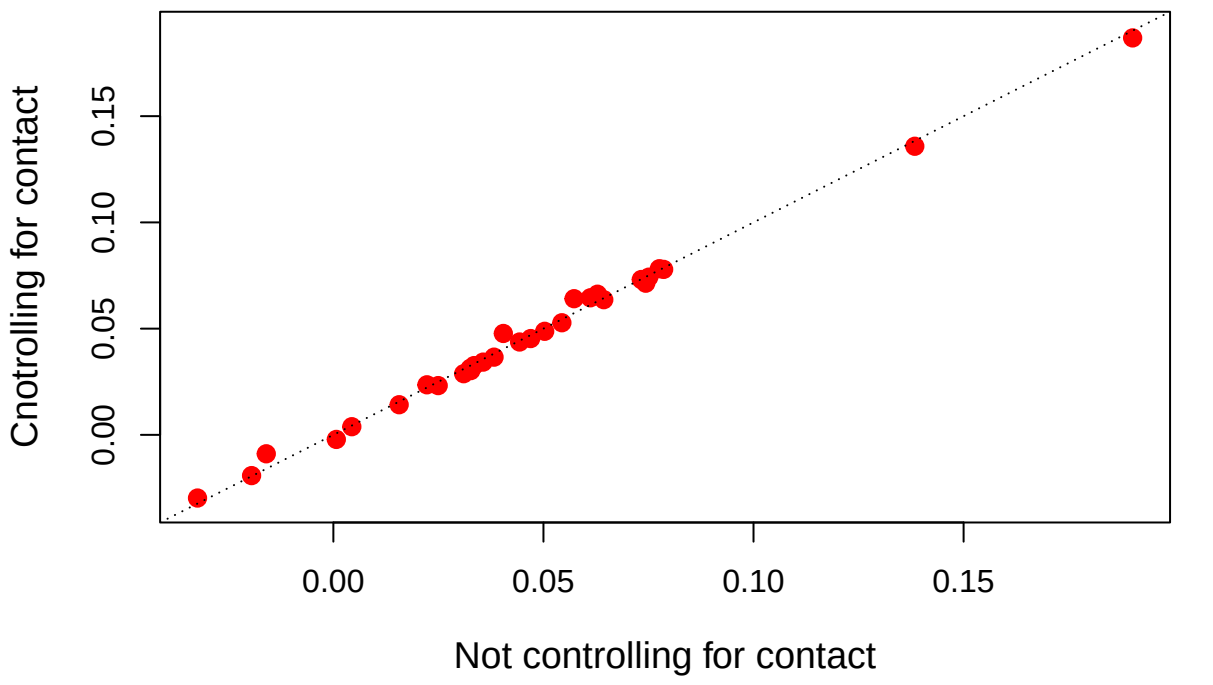
```
                                    estimates=coop.estimates2$sems)$est
    }
  }
  lhs <- c("coop")
  rhs <- c("pj","eff","foc","obey","moralid","nocontact","contactsat")
  for(lhs.i in lhs){
    for(rhs.i in rhs){
      nam.i <- paste(lhs.i,".ON.",rhs.i,sep="")
      res[,nam.i] <- get.estimates(lhs=lhs.i,rhs=rhs.i,include.step.1.var=F,
                                    estimates=coop.estimates2$sems)$est
    }
  }
  res
}

coop.estimates2$sem.coefs <- collect.coefs2()

## Comparison plots of coefficients from models with and without contact

get.estimates2 <- function(lhs,rhs,op="~",estimates=coop.estimates$sems,
         include=c("est","se","pvalue","ci.lower","ci.upper"),add.spaces=NULL,
         include.step.1.var=F,step1.se=step1.se.contributions){
  if(op!="country.means" & op!="country.means.w"){
    countries <- names(estimates)
    res <- data.frame(matrix(NA,length(countries),4+length(include)))
    names(res) <- c("country","lhs","op","rhs",include)
    res$country <- countries
    res$lhs <- lhs
    res$op <- op
    res$rhs <- rhs
    for(i in seq_along(countries)){
      ests.i <- estimates[[countries[i]]]
      ind.i <- (ests.i[,"lhs"]==lhs)&(ests.i[,"op"]==op)&(ests.i[,"rhs"]==rhs)
      res[i,5:ncol(ests.i)] <- ests.i[ind.i,include]
      if(include.step.1.var){
        se1.i <- step1.se[,c("lhs","op","rhs",countries[[i]])]
        se1.i <- se1.i[(se1.i[,"lhs"]==lhs)&(se1.i[,"op"]==op)&(se1.i[,"rhs"]==rhs),4]
        res[i,"se"] <- sqrt(res[i,"se"]^2+se1.i^2)
      }
    }
    ind <- match(res[,"country"],country.names[,1])
    res[,"country"] <- country.names[ind,2]
  }
  if(op=="country.means"){
    res <- data.frame(country=estimates[,"country"],
                      lhs=lhs,op=op,rhs=NA,
                      est=estimates[,paste(lhs,"mean",sep=".")],
                      se=estimates[,paste(lhs,"mean.se",sep=".")],
                      p.value=NA,ci.lower=NA,ci.upper=NA)
    res$p.value <- 2*(1-pnorm(abs(res$est/res$se)))
    res$ci.lower <- res$est-qnorm(.975)*res$se
    res$ci.upper <- res$est+qnorm(.975)*res$se
    ind <- match(res[,"country"],country.names[,1])
```

```
    res[,"country"] <- country.names[ind,2]
  }
  if(op=="country.means.w"){
    res <- data.frame(country=estimates[,"country"],
                      lhs=lhs,op=op,rhs=NA,
                      est=estimates[,paste(lhs,"mean.w",sep=".")],
                      se=estimates[,paste(lhs,"mean.w.se",sep=".")],
                      p.value=NA,ci.lower=NA,ci.upper=NA)
    res$p.value <- 2*(1-pnorm(abs(res$est/res$se)))
    res$ci.lower <- res$est-qnorm(.975)*res$se
    res$ci.upper <- res$est+qnorm(.975)*res$se
    ind <- match(res[,"country"],country.names[,1])
    res[,"country"] <- country.names[ind,2]
  }
  if(!is.null(add.spaces)){
    res[,"country"] <- add.space(res[,"country"],add.spaces)
  }
  res
}

plot.compare <- function(lhs,rhs,op="~"){
  without.tmp <- get.estimates(lhs=lhs,rhs=rhs,estimates=coop.estimates.main$sems)
  with.tmp <- get.estimates2(lhs=lhs,rhs=rhs,estimates=coop.estimates2$sems)
  lim.tmp <- range(c(without.tmp$est,with.tmp$est))

  plot(without.tmp$est,with.tmp$est,
       xlim=lim.tmp,ylim=lim.tmp,col="red",pch=19,cex=1.2,
       xlab="Not controlling for contact",ylab="Cnotrolling for contact",cex.lab=1.2)
  abline(a=0,b=1,lty="dotted")

    var.names <- rbind(
      c("contact","Contact with police"),
      c("pj","Procedural justice"),
      c("dj","Distributive justice"),
      c("obey","Duty to obey"),
      c("moralid","Normative alignment"),
      c("coop","Cooperation"),
      c("lawf","Lawfulness"),
      c("eff","Effectiveness"),
      c("foc","Fear of crime")
    )

    t.text <- "Coef. of "
    if(op=="~") t.text <- paste0(t.text,var.names[var.names[,1]==rhs,2]," (Response: ")
    if(op=="~1")t.text <- paste0(t.text,"Contact with police"," (Response: ")

    t.text <- paste0(t.text,var.names[var.names[,1]==lhs,2],")")
    title(main=t.text)#,cex.main=1.2)

    return(cbind(without.tmp$se,with.tmp$se))
}

se.comp <- NULL
```

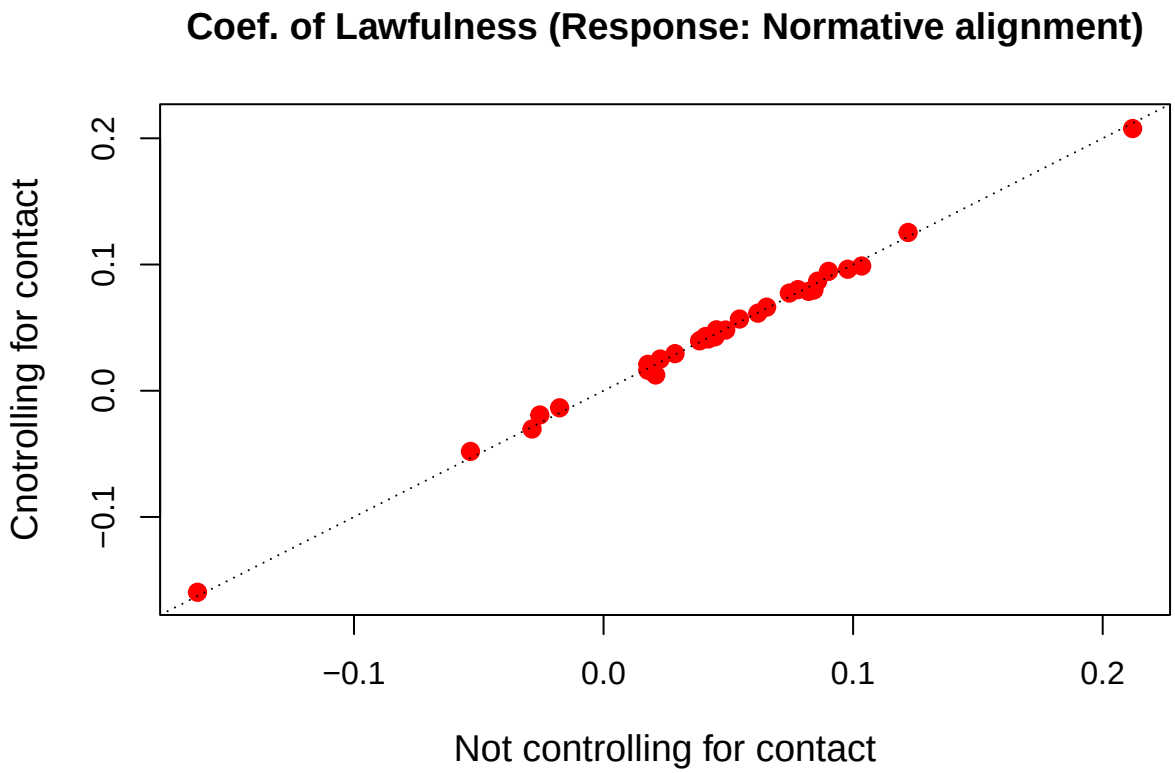
```r
se.comp <- rbind(se.comp,plot.compare(lhs="moralid",rhs="pj"))
```



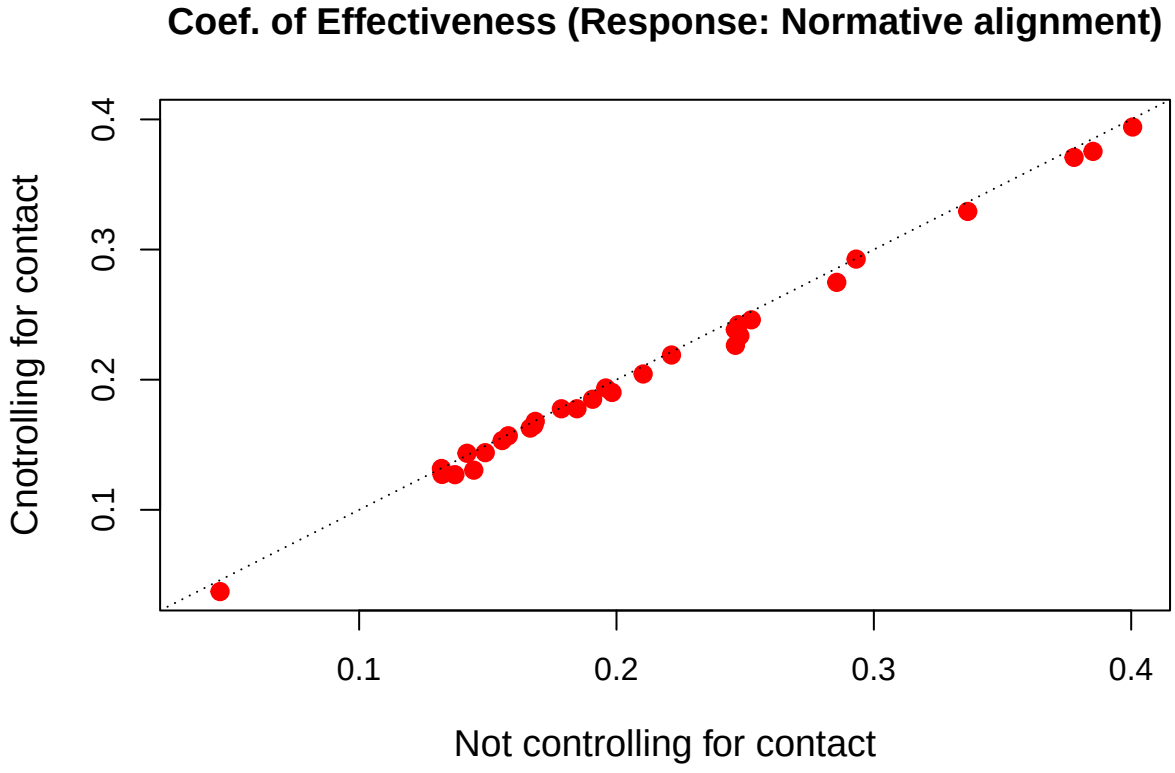

```r
se.comp <- rbind(se.comp,plot.compare(lhs="moralid",rhs="dj"))
```



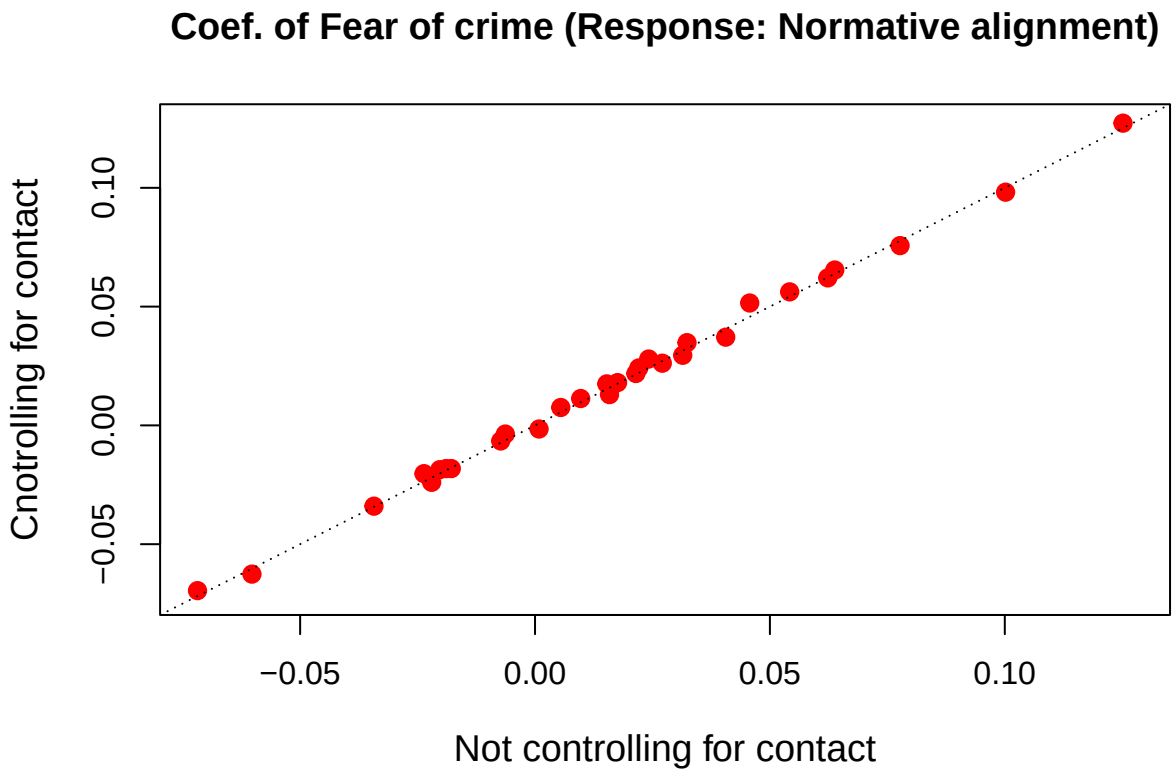
```r
se.comp <- rbind(se.comp,plot.compare(lhs="moralid",rhs="lawf"))
```



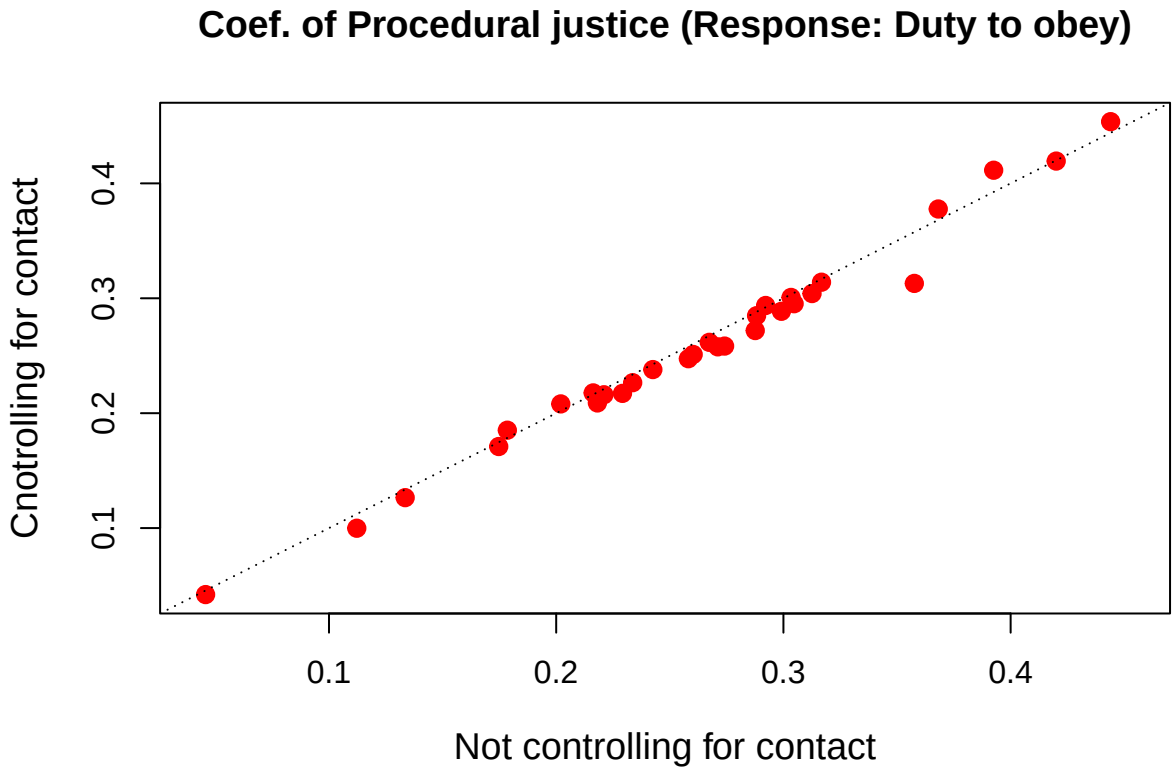

```r
se.comp <- rbind(se.comp,plot.compare(lhs="moralid",rhs="eff"))
```



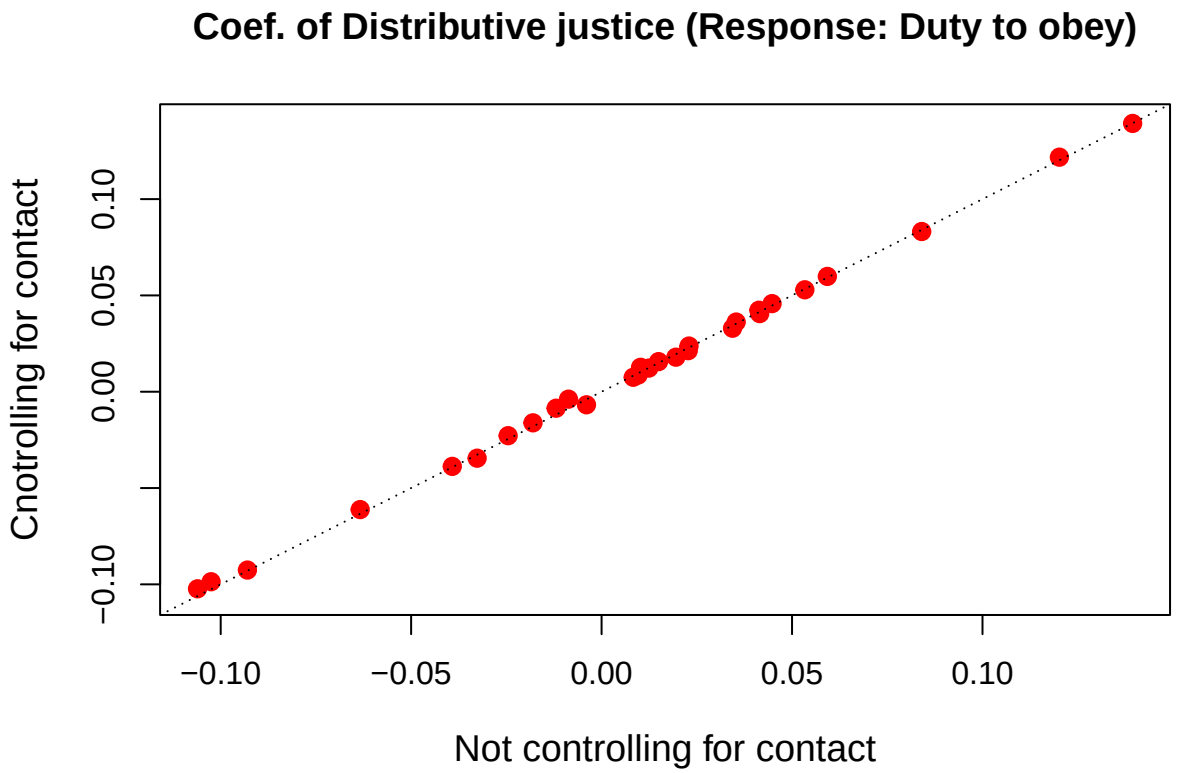
```
se.comp <- rbind(se.comp,plot.compare(lhs="moralid",rhs="foc"))
```



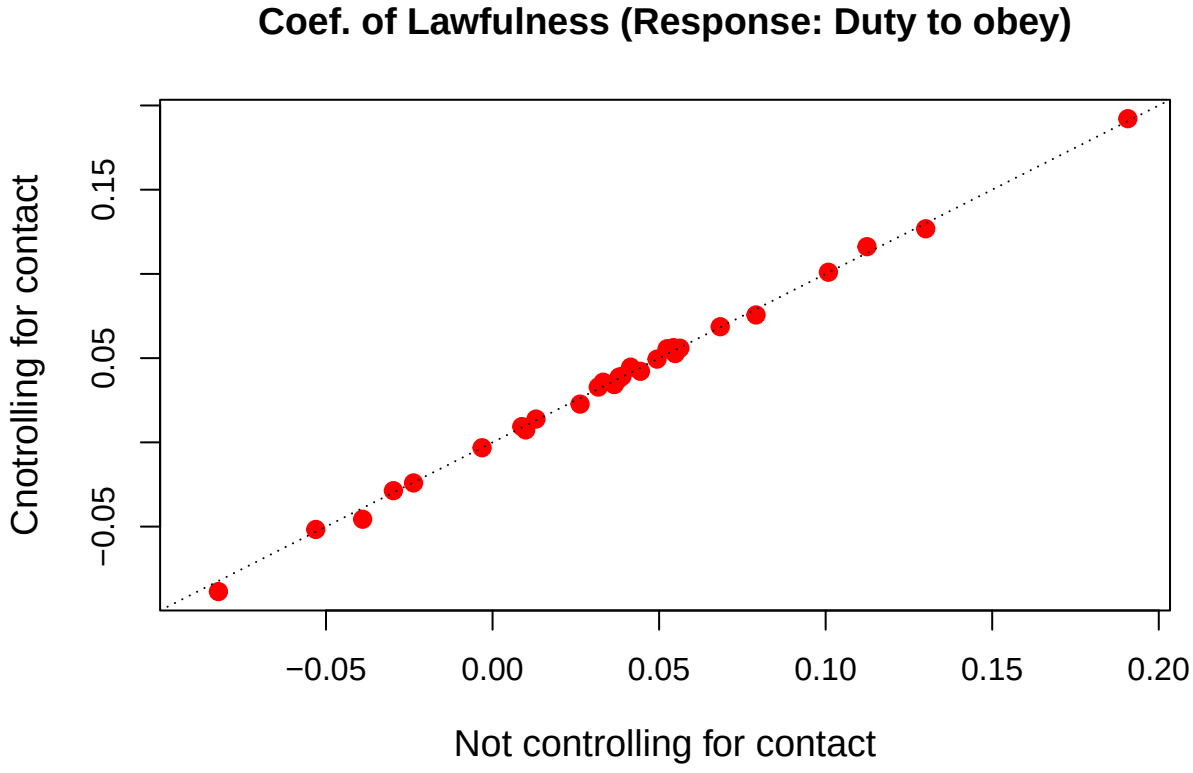

```
se.comp <- rbind(se.comp,plot.compare(lhs="obey",rhs="pj"))
```



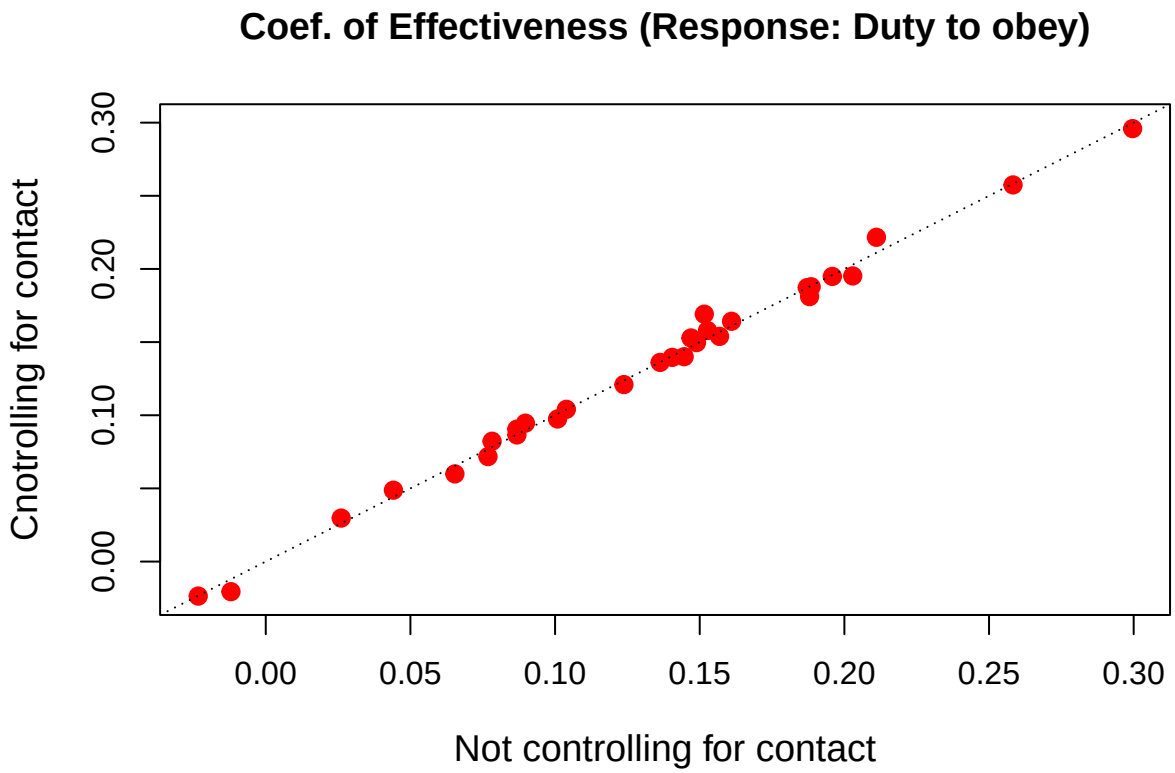
```
se.comp <- rbind(se.comp,plot.compare(lhs="obey",rhs="dj"))
```



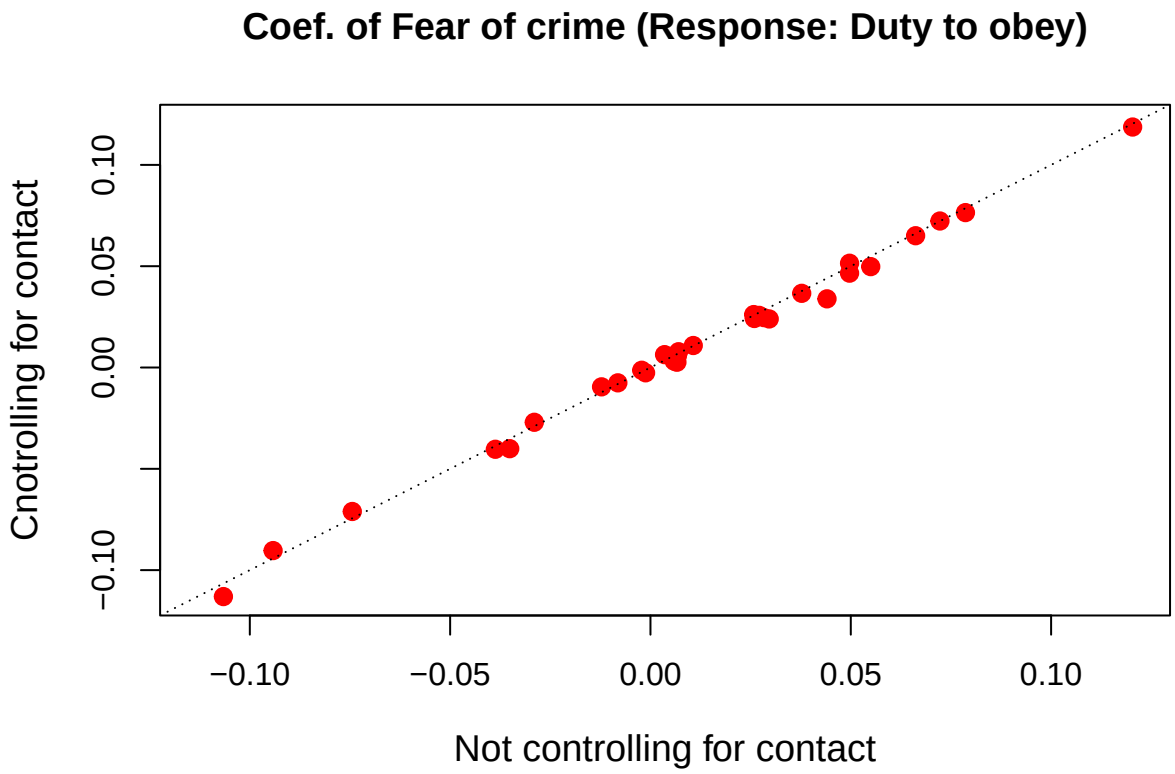

```
se.comp <- rbind(se.comp,plot.compare(lhs="obey",rhs="lawf"))
```



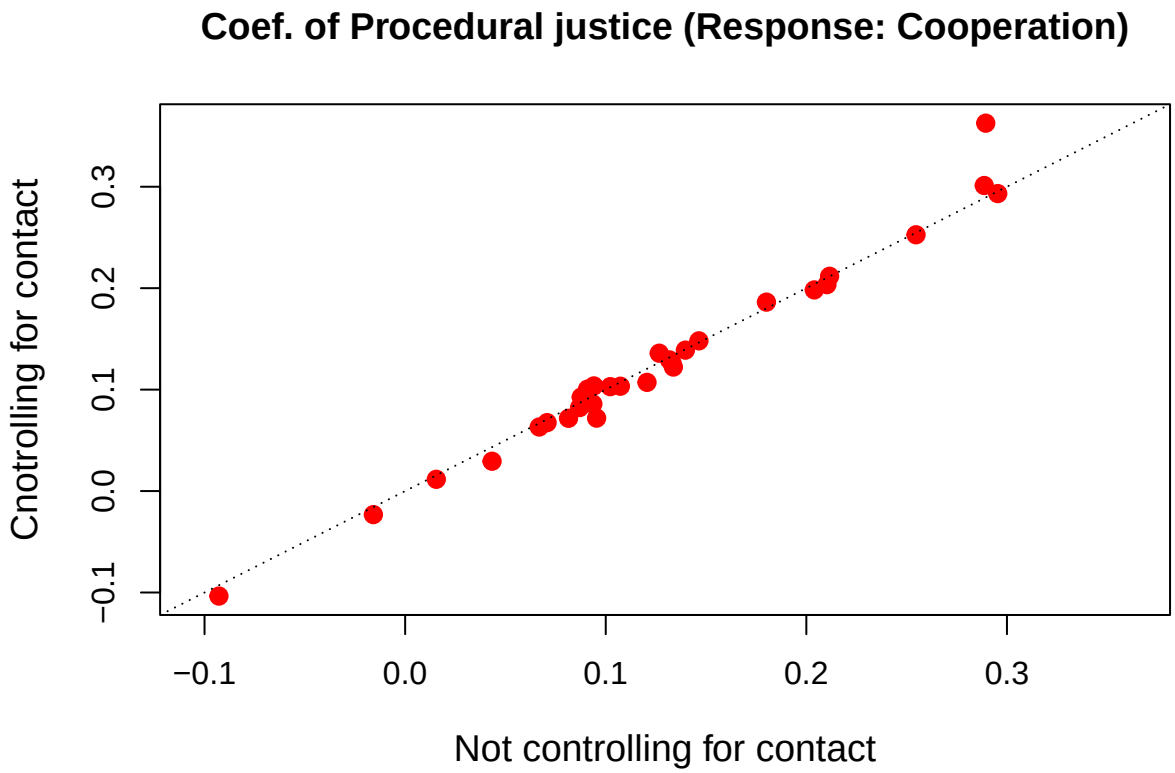
```
se.comp <- rbind(se.comp,plot.compare(lhs="obey",rhs="eff"))
```



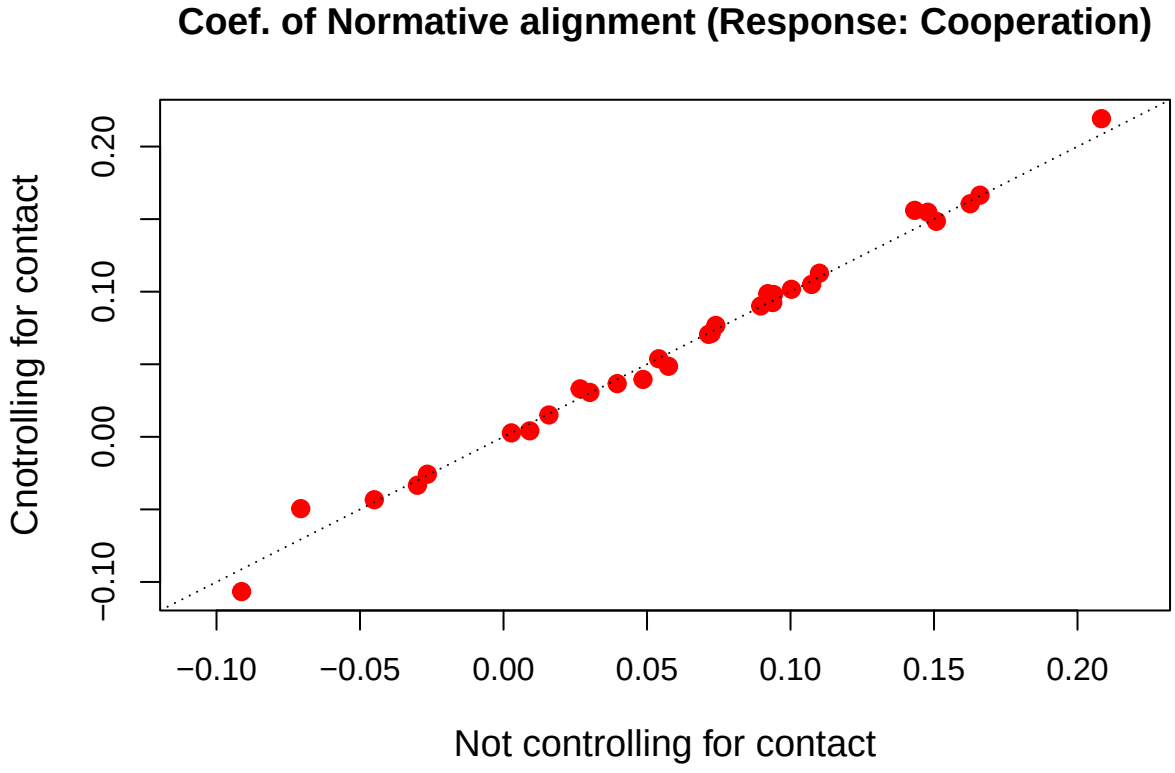

```
se.comp <- rbind(se.comp,plot.compare(lhs="obey",rhs="foc"))
```



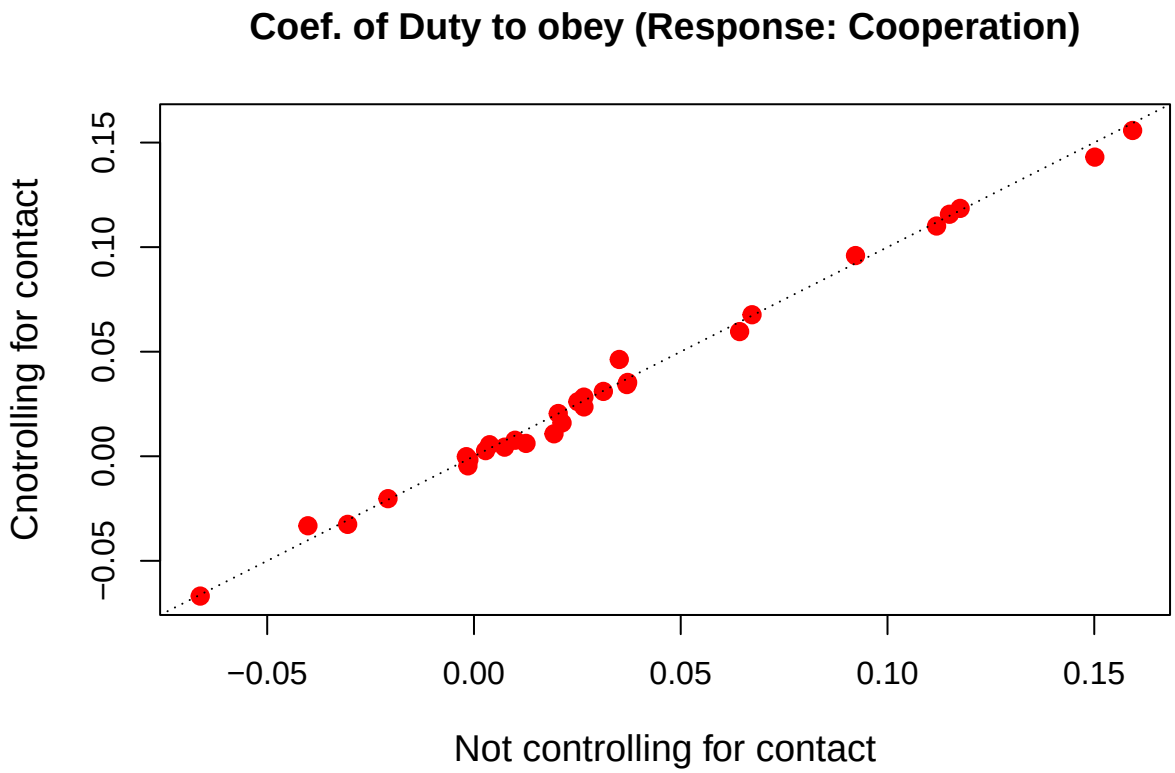
```r
se.comp <- rbind(se.comp,plot.compare(lhs="coop",rhs="pj"))
```



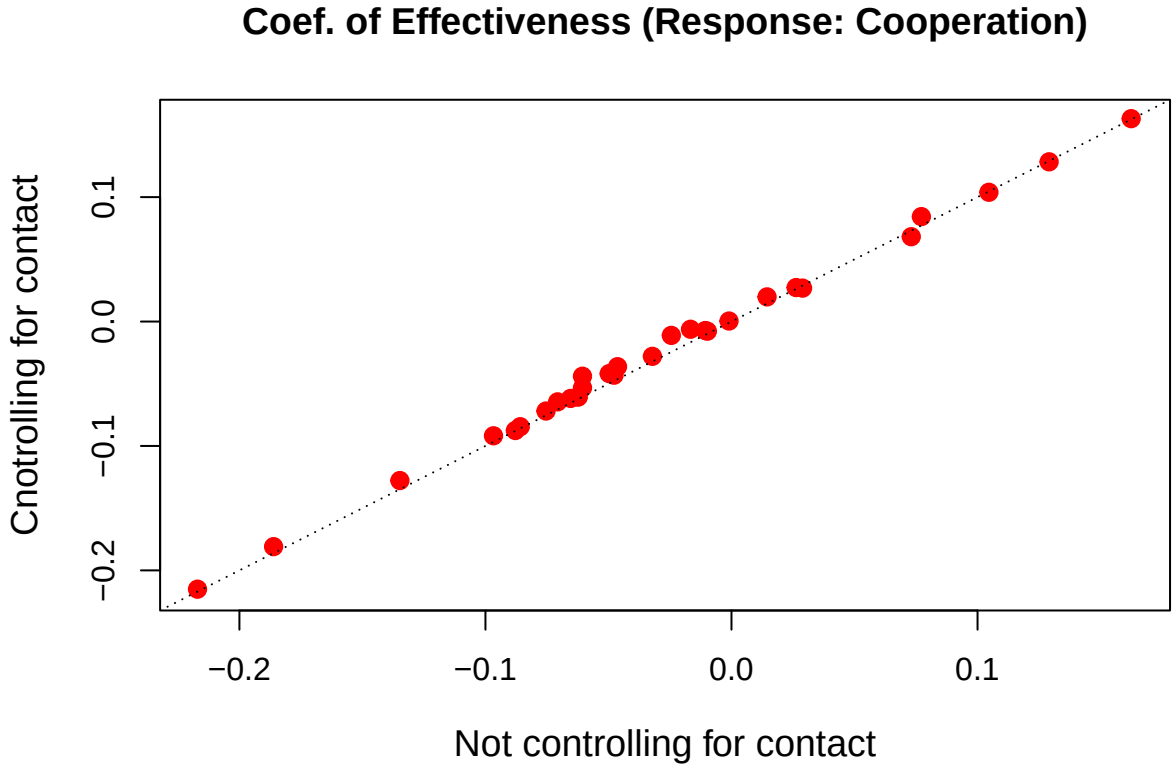

```r
se.comp <- rbind(se.comp,plot.compare(lhs="coop",rhs="moralid"))
```



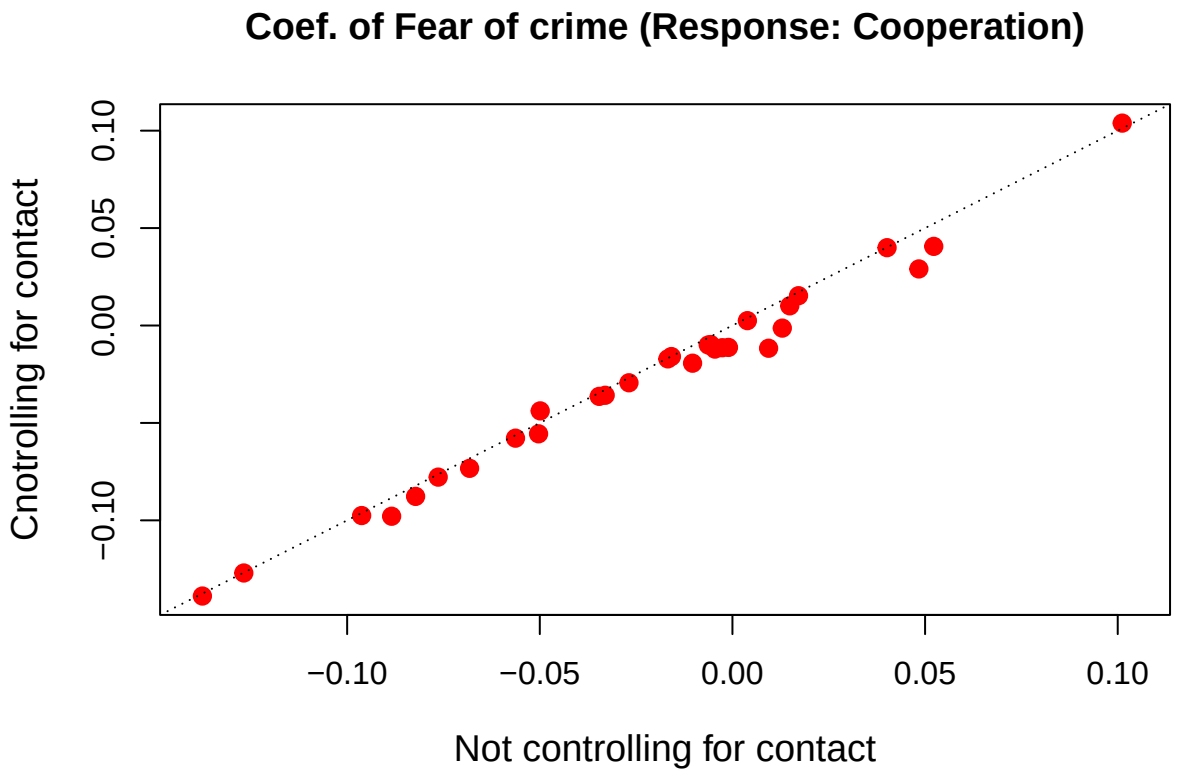
```
se.comp <- rbind(se.comp,plot.compare(lhs="coop",rhs="obey"))
```




```
se.comp <- rbind(se.comp,plot.compare(lhs="coop",rhs="eff"))
```



```
se.comp <- rbind(se.comp,plot.compare(lhs="coop",rhs="foc"))
```




```
# Average increase in estimated standard errors of coefficients
# when controlling also for contact with police.
se.comp <- cbind(se.comp, (se.comp[,2]-se.comp[,1])/se.comp[,1])
colMeans(se.comp)
```

```
## [1] 0.034339452 0.034513220 0.003673722
```

```
#########################################################
## (2) Models fitted separately for those who had vs. had not had contact with the police.

mod.spec <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.156*obey1 +2.728*obey2 +2.495*obey3
  obey1 ~ 5.702*1; obey2~6.100*1; obey3~5.881*1
  obey1~~4.102*obey1; obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
```

```
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid
'
mod.spec.SA <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.728*obey2 +2.495*obey3
  obey2~6.100*1; obey3~5.881*1
  obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
```

```
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid
'

# Model where the models for moralid, obey and coop are the same between contact groups

mod.spec.constrained <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.156*obey1 +2.728*obey2 +2.495*obey3
  obey1 ~ 5.702*1; obey2~6.100*1; obey3~5.881*1
  obey1~~4.102*obey1; obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~c(v1,v1)*1+c(v2,v2)*age+c(v3,v3)*female+
    c(v4,v4)*educ2+c(v5,v5)*educ3+c(v6,v6)*pj+c(v7,v7)*dj+
    c(v8,v8)*lawf+c(v9,v9)*eff+c(v10,v10)*foc
  moralid~c(w1,w1)*1+c(w2,w2)*age+c(w3,w3)*female+
    c(w4,w4)*educ2+c(w5,w5)*educ3+c(w6,w6)*pj+
    c(w7,w7)*dj+c(w8,w8)*lawf+c(w9,w9)*eff+c(w10,w10)*foc

  obey~~c(c1,c1)*obey
  moralid~~c(c2,c2)*moralid
  obey~~c(c3,c3)*moralid
#
  coop~c(b1,b1)*1+c(b2,b2)*age+c(b3,b3)*female+c(b4,b4)*educ2+
    c(b5,b5)*educ3+c(b6,b6)*pj+c(b7,b7)*eff+c(b8,b8)*foc+
```

```
    c(b9,b9)*obey+c(b10,b10)*moralid
  coop~~c(c4,c4)*coop
'

mod.spec.constrained.SA <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.728*obey2 +2.495*obey3
  obey2~6.100*1; obey3~5.881*1
  obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~c(v1,v1)*1+c(v2,v2)*age+c(v3,v3)*female+
    c(v4,v4)*educ2+c(v5,v5)*educ3+c(v6,v6)*pj+c(v7,v7)*dj+
    c(v8,v8)*lawf+c(v9,v9)*eff+c(v10,v10)*foc
  moralid~c(w1,w1)*1+c(w2,w2)*age+c(w3,w3)*female+
    c(w4,w4)*educ2+c(w5,w5)*educ3+c(w6,w6)*pj+
    c(w7,w7)*dj+c(w8,w8)*lawf+c(w9,w9)*eff+c(w10,w10)*foc

  obey~~c(c1,c1)*obey
  moralid~~c(c2,c2)*moralid
  obey~~c(c3,c3)*moralid
#
  coop~c(b1,b1)*1+c(b2,b2)*age+c(b3,b3)*female+c(b4,b4)*educ2+
    c(b5,b5)*educ3+c(b6,b6)*pj+c(b7,b7)*eff+c(b8,b8)*foc+
    c(b9,b9)*obey+c(b10,b10)*moralid
  coop~~c(c4,c4)*coop
'

## Fitting models with different parameter constraints between the models for contact
```

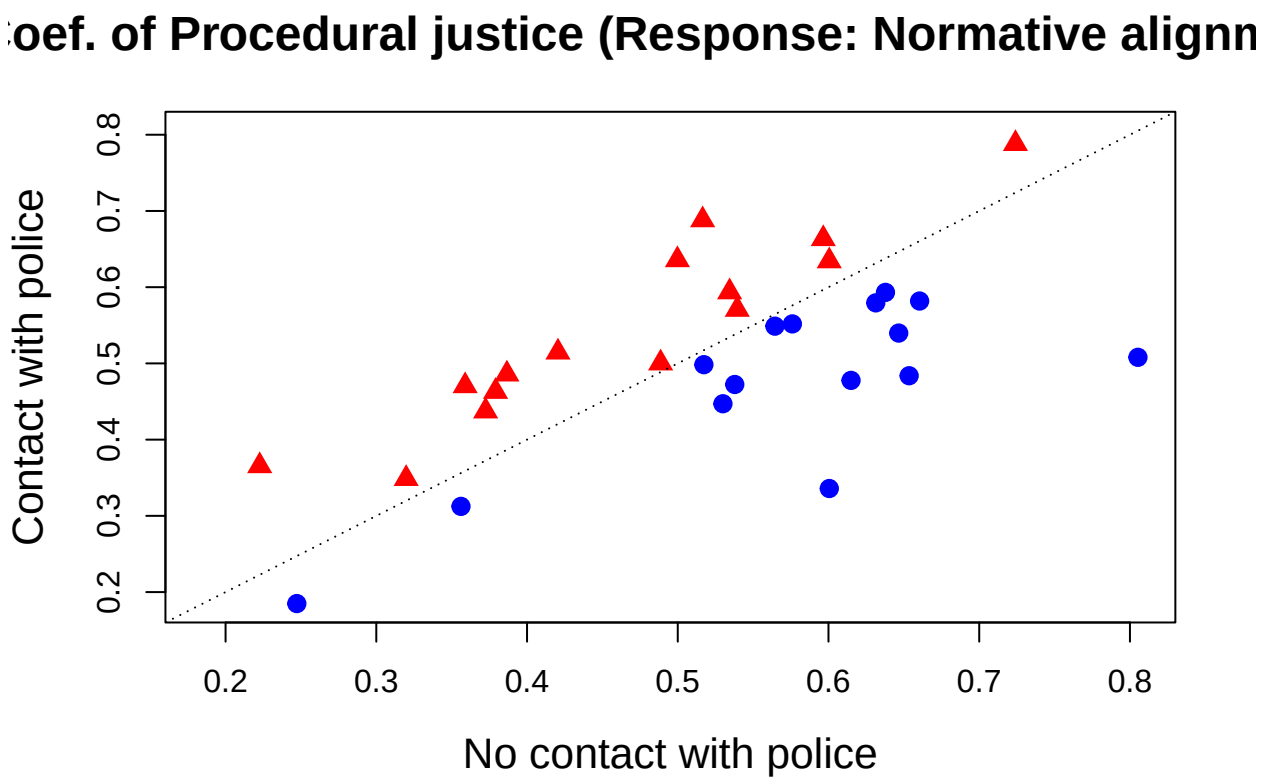
```r
## and non-contact groups.

countries <- levels(coopdata$country)
sem.fitted.models.2G <- vector("list",length(countries))
names(sem.fitted.models.2G) <- countries
models2 <- vector("list",3)
names(models2) <- c("equal","partially.equal","not.equal")

for(country.i in countries){
  #cat(country.i,"\n")
  data.tmp <- coopdata[coopdata$country==country.i,]
  if(country.i!="SA"){
    sem.fitted.models.2G[[country.i]]$equal <- sem(mod.spec,data=data.tmp,missing="fiml",
          group="stop",
          group.equal=c("means","regressions","lv.variances","lv.covariances",
                        "intercepts","residuals","residual.covariances"))
    sem.fitted.models.2G[[country.i]]$partially.equal <- sem(mod.spec.constrained,data=data.tmp,missing=
                                                group="stop")
    sem.fitted.models.2G[[country.i]]$not.equal <- sem(mod.spec,data=data.tmp,missing="fiml",
                                               group="stop")
  }
  if(country.i=="SA"){
    sem.fitted.models.2G[[country.i]]$equal <- sem(mod.spec.SA,data=data.tmp,missing="fiml",
                                               group="stop",
                                               group.equal=c("means","regressions","lv.variances","lv.
                                                             "intercepts","residuals","residual.covaria
    sem.fitted.models.2G[[country.i]]$partially.equal <- sem(mod.spec.constrained.SA,data=data.tmp,missi
                                                  group="stop")
    sem.fitted.models.2G[[country.i]]$not.equal <- sem(mod.spec.SA,data=data.tmp,missing="fiml",
                                                group="stop")
  }
}

country.table <- cbind(table(coopdata$country,coopdata$stop),
      round(prop.table(table(coopdata$country,coopdata$stop),1),2),NA,NA,NA)
colnames(country.table) <- c("freq.no","freq.yes","pr.no","pr.yes",
                             "p.eq.neq1","p.eq.neqfull","p.neq1.neqfull")

# LR tests of different specifications of the structural model:
#  no group differences vs. no group differences in models for moralid, obey and coop
#  no group differences vs. group differences everywhere
#  no group differences in models for moralid, obey and coop vs. group differences everywhere

for(i in seq(nrow(country.table))){
  sems.tmp <- sem.fitted.models.2G[[row.names(country.table)[i]]]
  country.table[i,"p.eq.neq1"] <- round(lavTestLRT(sems.tmp$equal,sems.tmp$partially.equal)$`Pr(>Chisq)
  country.table[i,"p.eq.neqfull"] <- round(lavTestLRT(sems.tmp$equal,sems.tmp$not.equal)$`Pr(>Chisq)`[2]
  country.table[i,"p.neq1.neqfull"] <- round(lavTestLRT(sems.tmp$partially.equal,sems.tmp$not.equal)$`Pr
}

country.table
```

```
##    freq.no freq.yes pr.no pr.yes p.eq.neq1 p.eq.neqfull p.neq1.neqfull
```

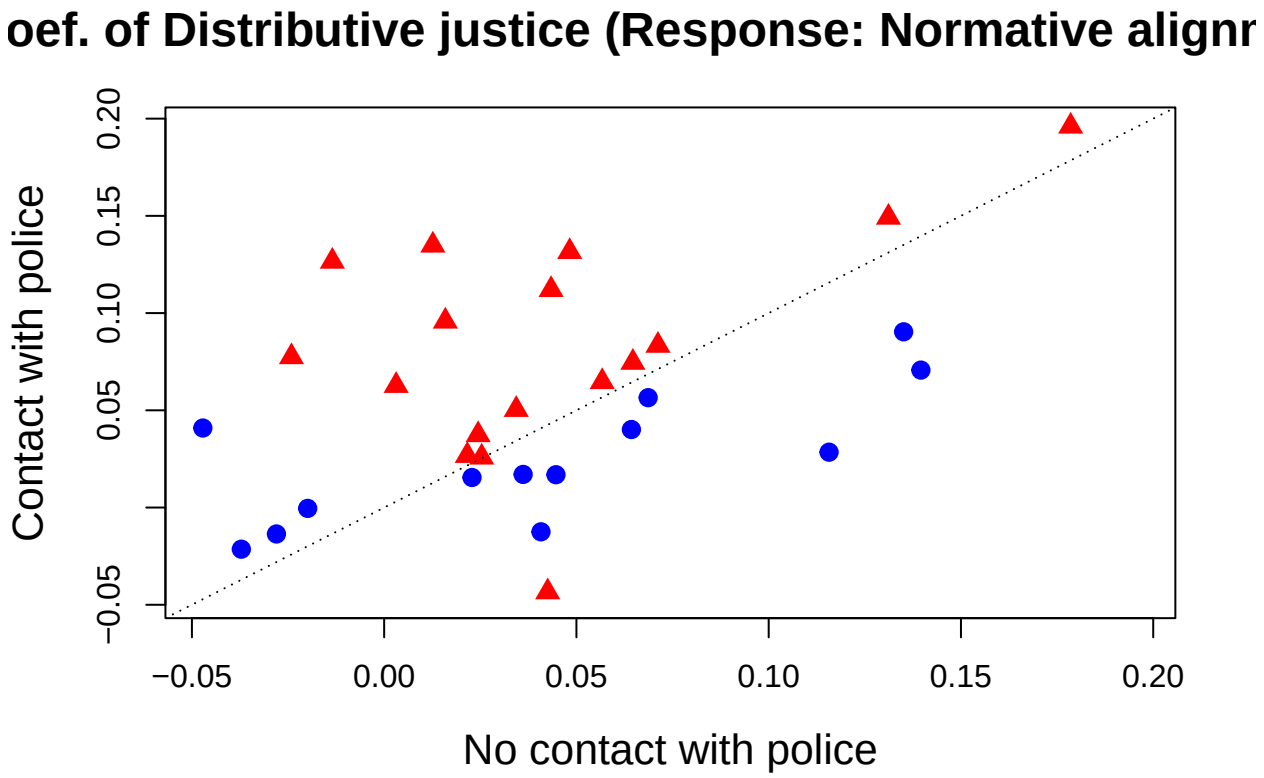
```
## AT    1581      659  0.71   0.29     0.000        0.000          0.000
## BE     890      814  0.52   0.48     0.009        0.000          0.000
## BG    2050      374  0.85   0.15     0.000        0.000          0.299
## CH     857      646  0.57   0.43     0.003        0.001          0.036
## CY     664      419  0.61   0.39     0.000        0.000          0.000
## CZ    1581      794  0.67   0.33     0.000        0.000          0.173
## DE    1905     1121  0.63   0.37     0.000        0.000          0.000
## DK    1104      472  0.70   0.30     0.005        0.001          0.025
## EE    1092      701  0.61   0.39     0.058        0.001          0.001
## ES    1161      722  0.62   0.38     0.000        0.000          0.005
## FI     927      951  0.49   0.51     0.000        0.000          0.000
## FR    1148      577  0.67   0.33     0.000        0.000          0.002
## GB    1527      892  0.63   0.37     0.000        0.000          0.000
## GR    2053      656  0.76   0.24     0.000        0.000          0.000
## HR    1091      537  0.67   0.33     0.000        0.000          0.000
## HU     992      568  0.64   0.36     0.000        0.000          0.001
## IE    1609      956  0.63   0.37     0.000        0.000          0.000
## IL    1859      411  0.82   0.18     0.000        0.000          0.002
## LT    1316      359  0.79   0.21     0.035        0.001          0.005
## NL    1070      754  0.59   0.41     0.071        0.004          0.010
## NO     950      598  0.61   0.39     0.004        0.001          0.038
## PL    1212      532  0.69   0.31     0.000        0.000          0.000
## PT    1639      508  0.76   0.24     0.000        0.000          0.638
## RU    1957      615  0.76   0.24     0.000        0.000          0.000
## SE     750      742  0.50   0.50     0.009        0.010          0.177
## SI     905      489  0.65   0.35     0.065        0.090          0.356
## SK    1309      532  0.71   0.29     0.000        0.000          0.000
## UA    1541      366  0.81   0.19     0.000        0.000          0.024
## SA    1951      525  0.79   0.21     0.000        0.000          0.004
## US    1018      570  0.64   0.36     0.009        0.006          0.129
```

```
# Plots of comparisons of coefficients

## Collecting estimates into one list
coop.estimates.2group <- vector("list",length(countries))
names(coop.estimates.2group) <- countries

for(country.i in countries){
  #cat(country.i,"\n")
  #  summary(sem.fitted.models[[i]])
  coop.estimates.2group[[country.i]] <- parameterEstimates(sem.fitted.models.2G[[country.i]]$not.equal)
}

plot.2group.coefs <- function(lhs,rhs,op,data=coop.estimates.2group,plot=T){
  t.coefs <- matrix(NA,length(data),2)
  rownames(t.coefs) <- names(data)
  dimnames(t.coefs) <- list(names(data),c("No contact","Contact"))
  for(i in seq(length(data))){
    data.i <- data[[i]]
    ind <- data.i$lhs==lhs & data.i$rhs==rhs & data.i$op==op
    t.coefs[i,] <- data.i[ind,"est"]
  }
#  i0 <- t.coefs[,1]>t.coefs[,2]
  i0 <- abs(t.coefs[,1])>abs(t.coefs[,2])
```

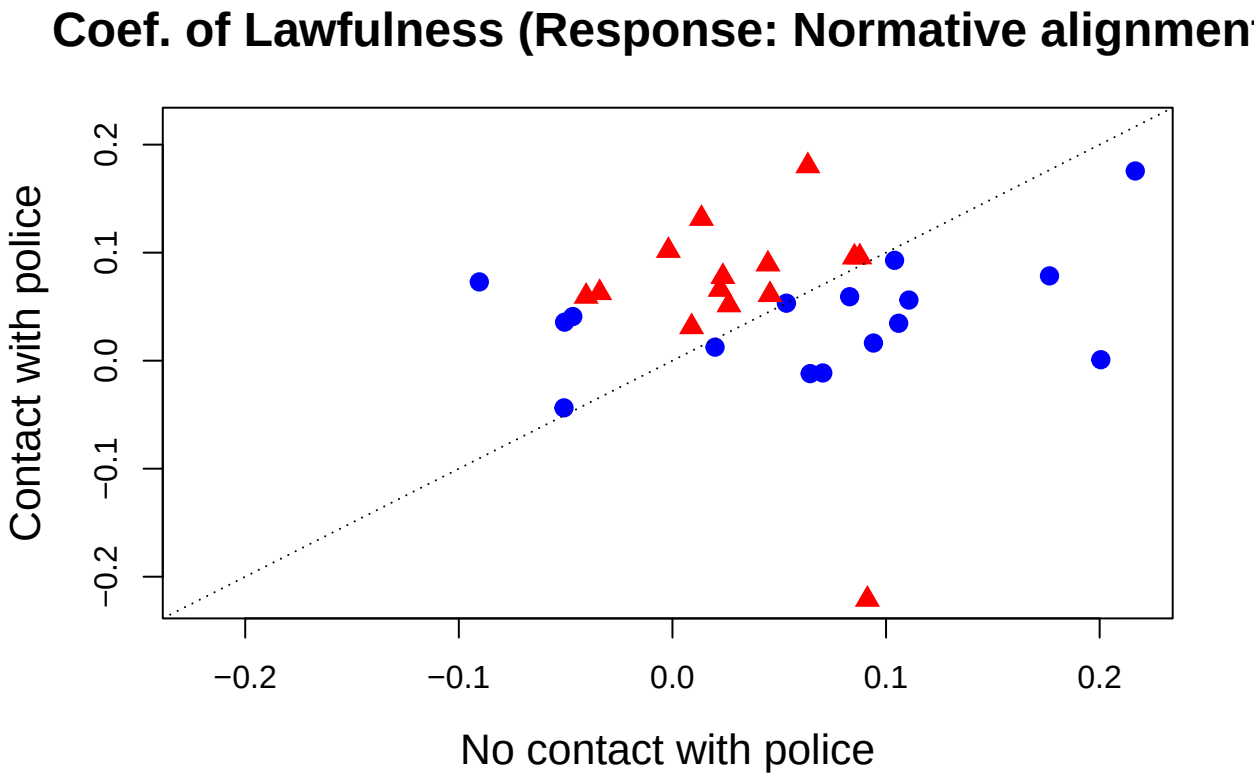
```
  if(plot){
  plot(t.coefs[i0,1],t.coefs[i0,2],
       xlim=range(t.coefs),ylim=range(t.coefs),
       xlab="No contact with police",ylab="Contact with police",
       col="blue",pch=19,cex.lab=1.3,cex=1.2)
  points(t.coefs[!i0,1],t.coefs[!i0,2],col="red",pch=17,cex=1.3)
  abline(a=0,b=1,lty="dotted")

  var.names <- rbind(
    c("contact","Contact with police"),
    c("pj","Procedural justice"),
    c("dj","Distributive justice"),
    c("obey","Duty to obey"),
    c("moralid","Normative alignment"),
    c("coop","Cooperation"),
    c("lawf","Lawfulness"),
    c("eff","Effectiveness"),
    c("foc","Fear of crime")
  )

  t.text <- "Coef. of "
  if(op=="~") t.text <- paste0(t.text,var.names[var.names[,1]==rhs,2]," (Response: ")
  if(op=="~1")t.text <- paste0(t.text,"Contact with police"," (Response: ")

  t.text <- paste0(t.text,var.names[var.names[,1]==lhs,2],")")
  title(main=t.text,cex.main=1.5)
  }
  if(!plot)return(t.coefs)
}

plot.2group.coefs(lhs="moralid",rhs="pj",op="~")
```



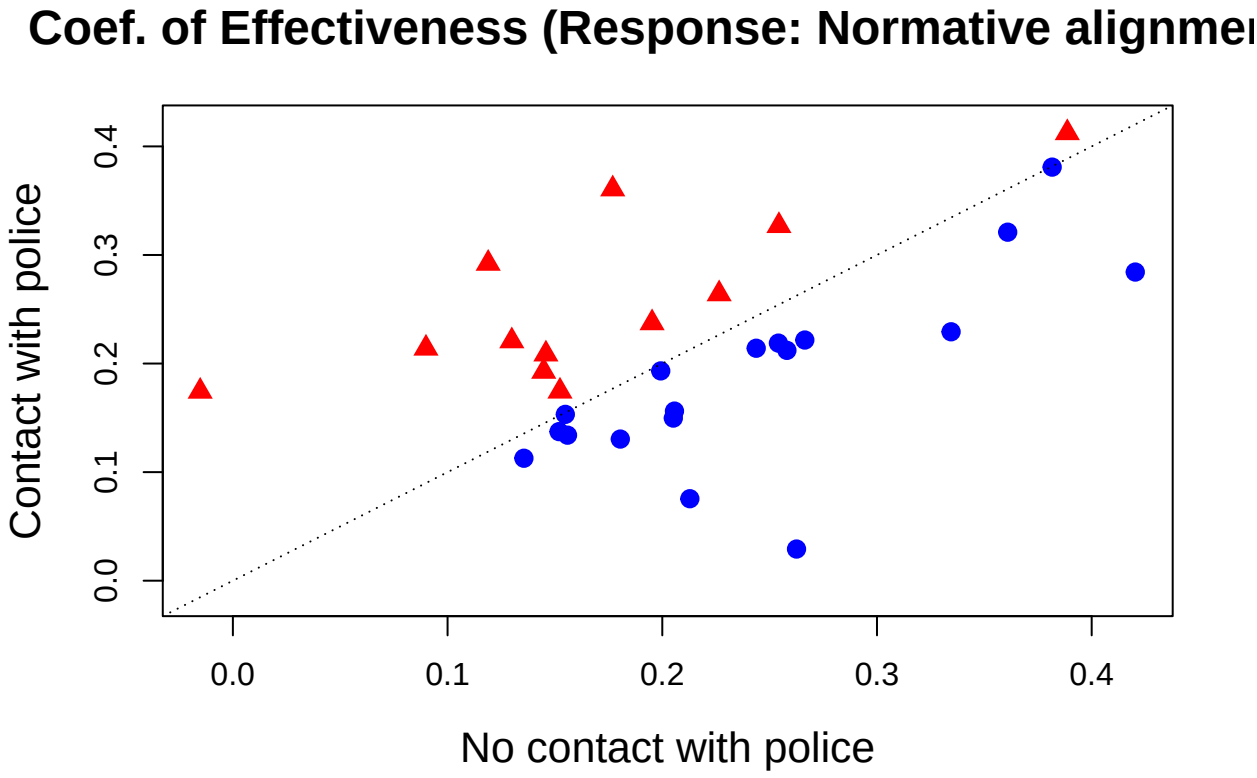

```
plot.2group.coefs(lhs="moralid",rhs="dj",op="~")
```



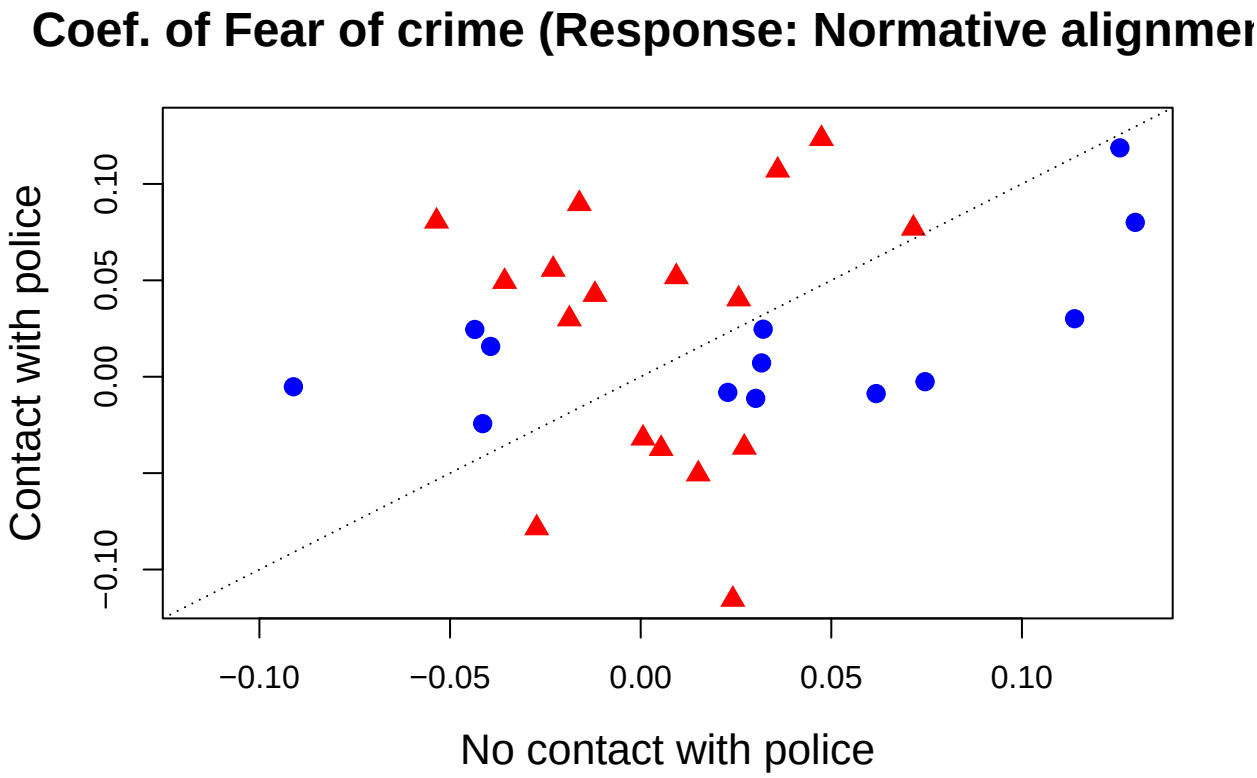
```
plot.2group.coefs(lhs="moralid",rhs="lawf",op="~")
```



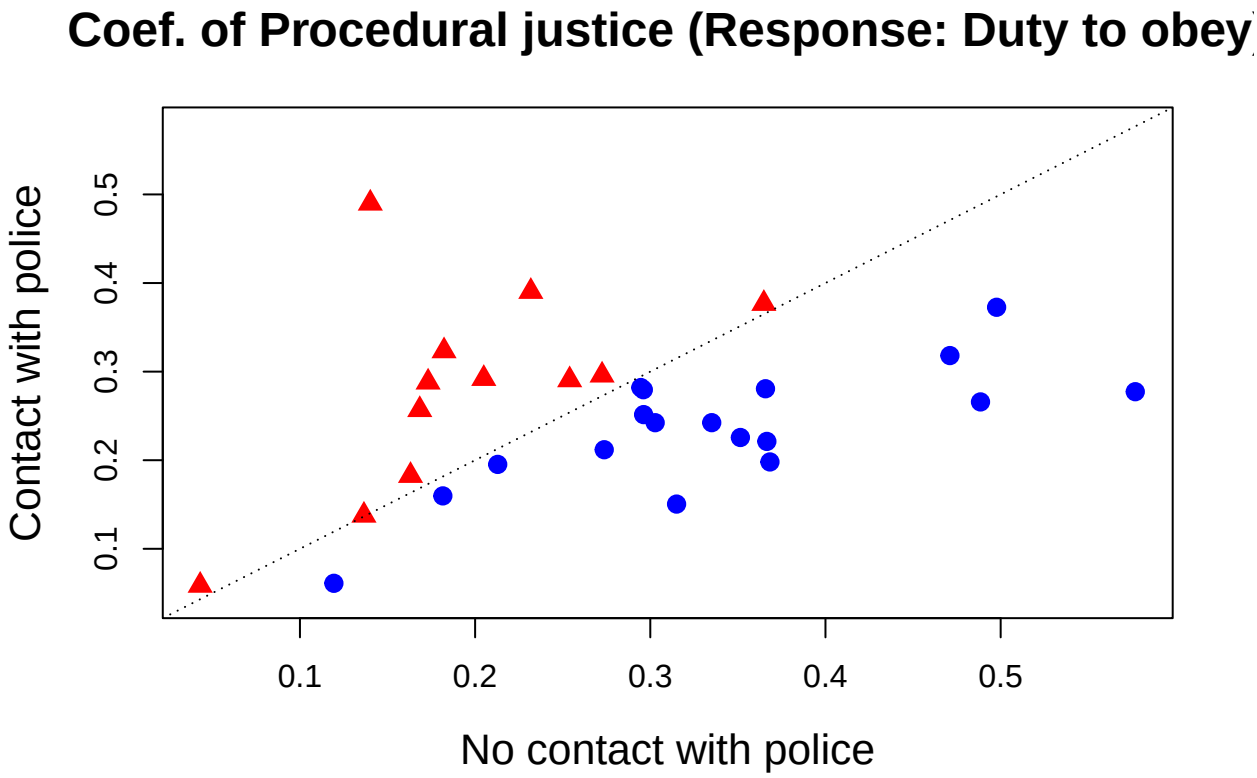

```
plot.2group.coefs(lhs="moralid",rhs="eff",op="~")
```



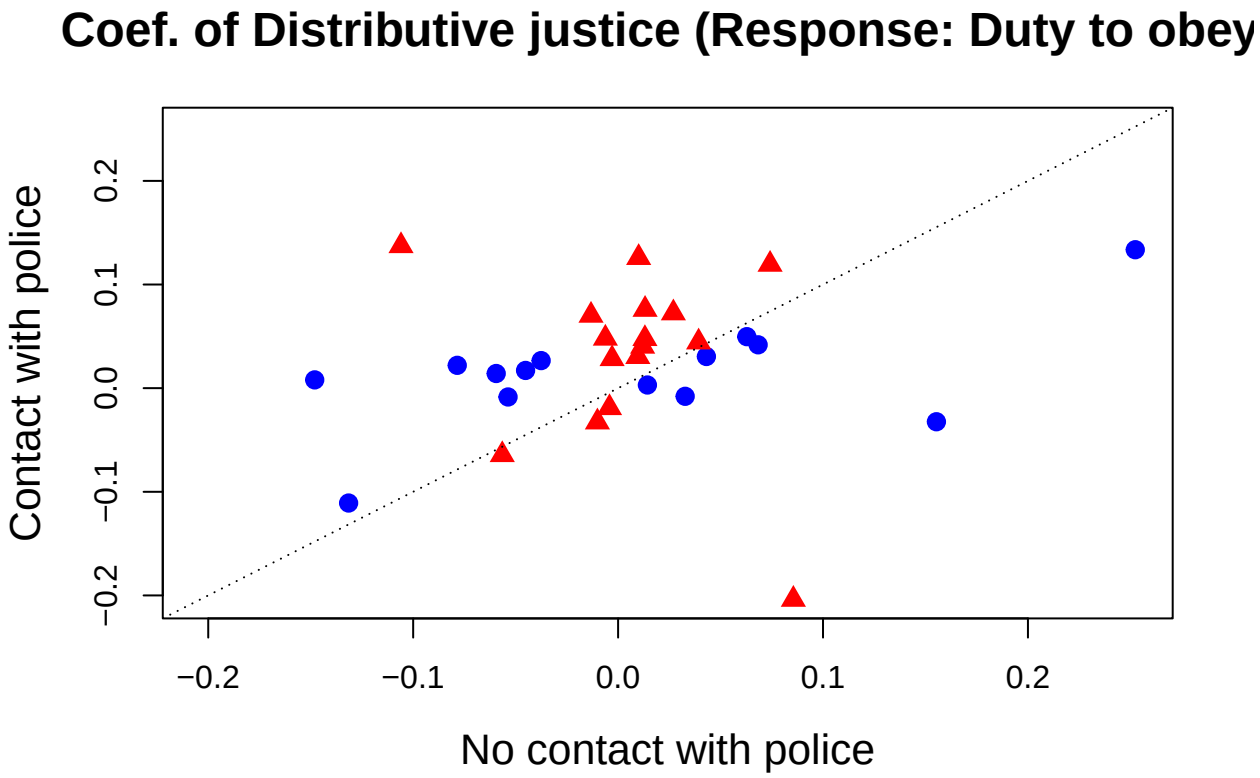
```
plot.2group.coefs(lhs="moralid",rhs="foc",op="~")
```



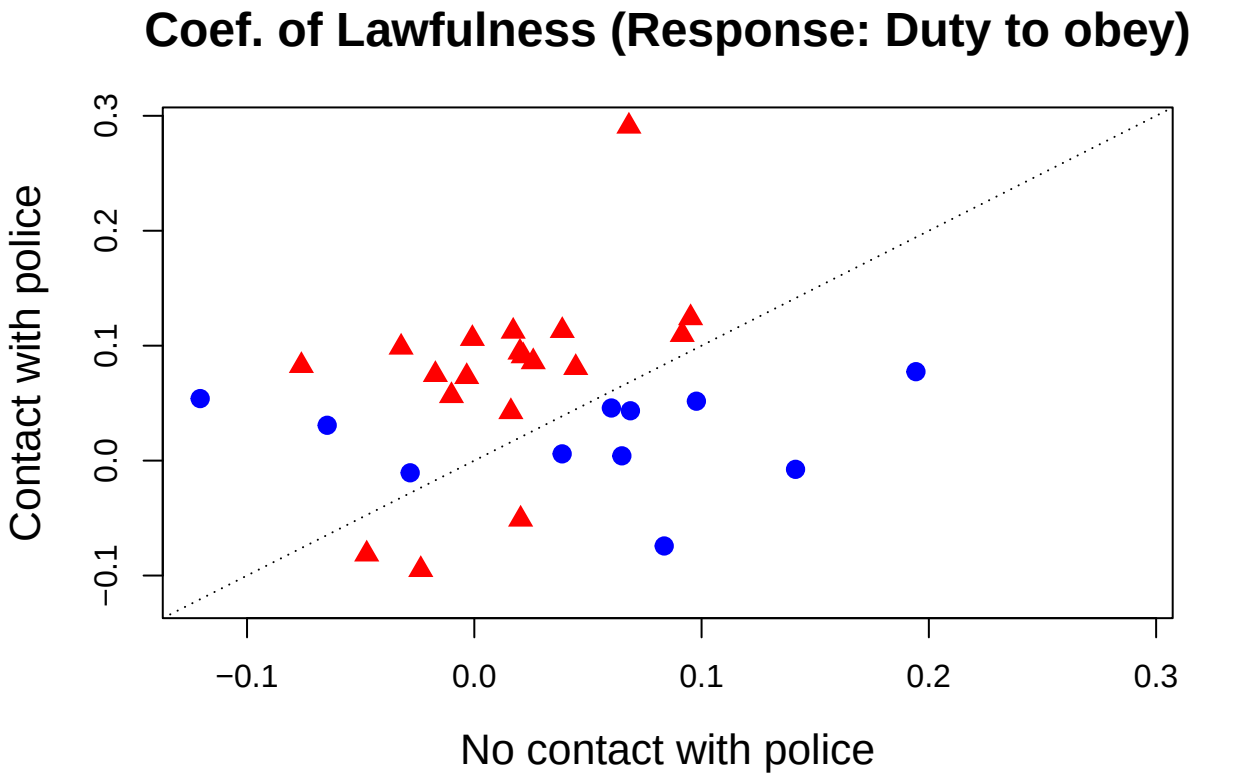

```
plot.2group.coefs(lhs="obey",rhs="pj",op="~")
```



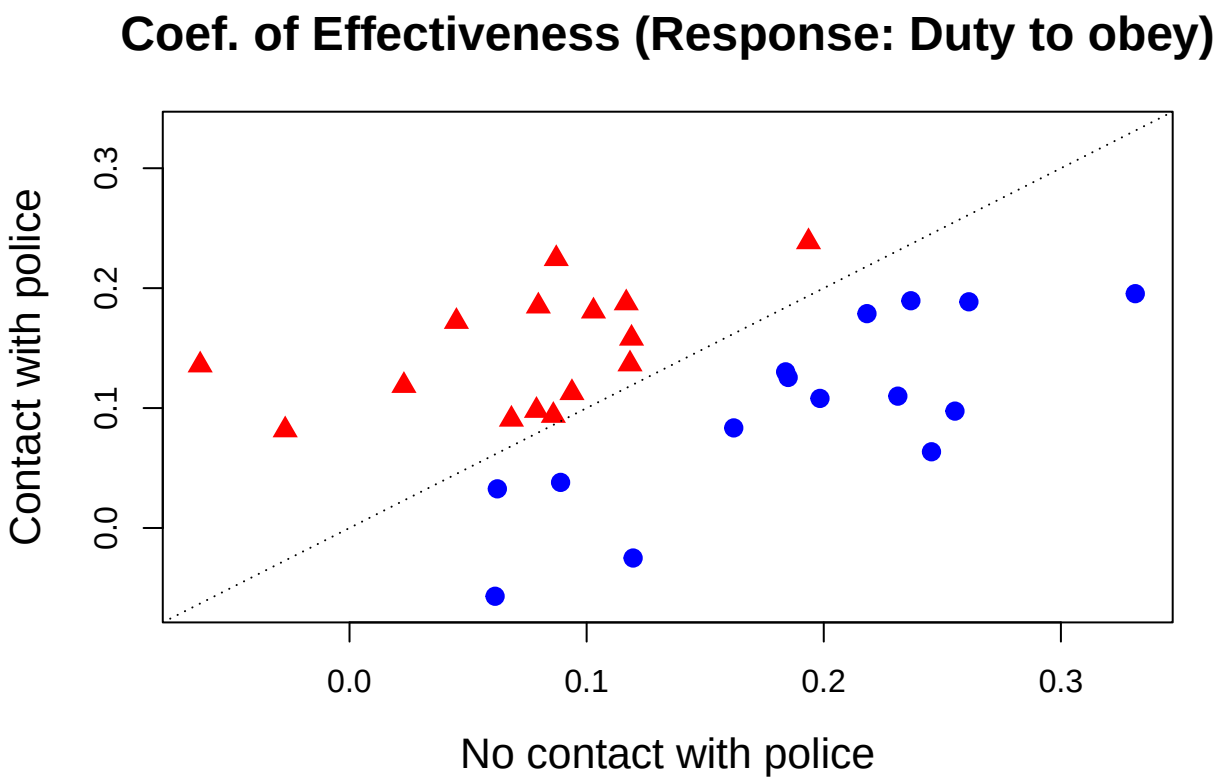
```
plot.2group.coefs(lhs="obey",rhs="dj",op="~")
```



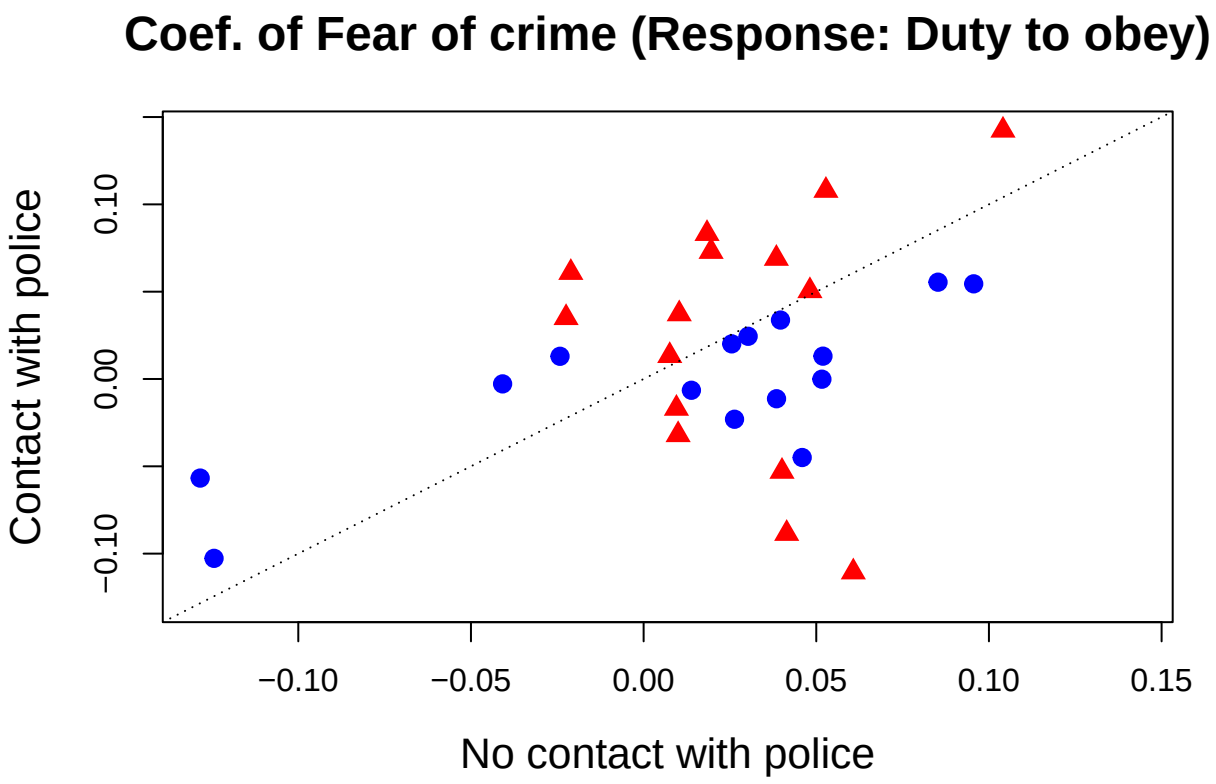

```
plot.2group.coefs(lhs="obey",rhs="lawf",op="~")
```



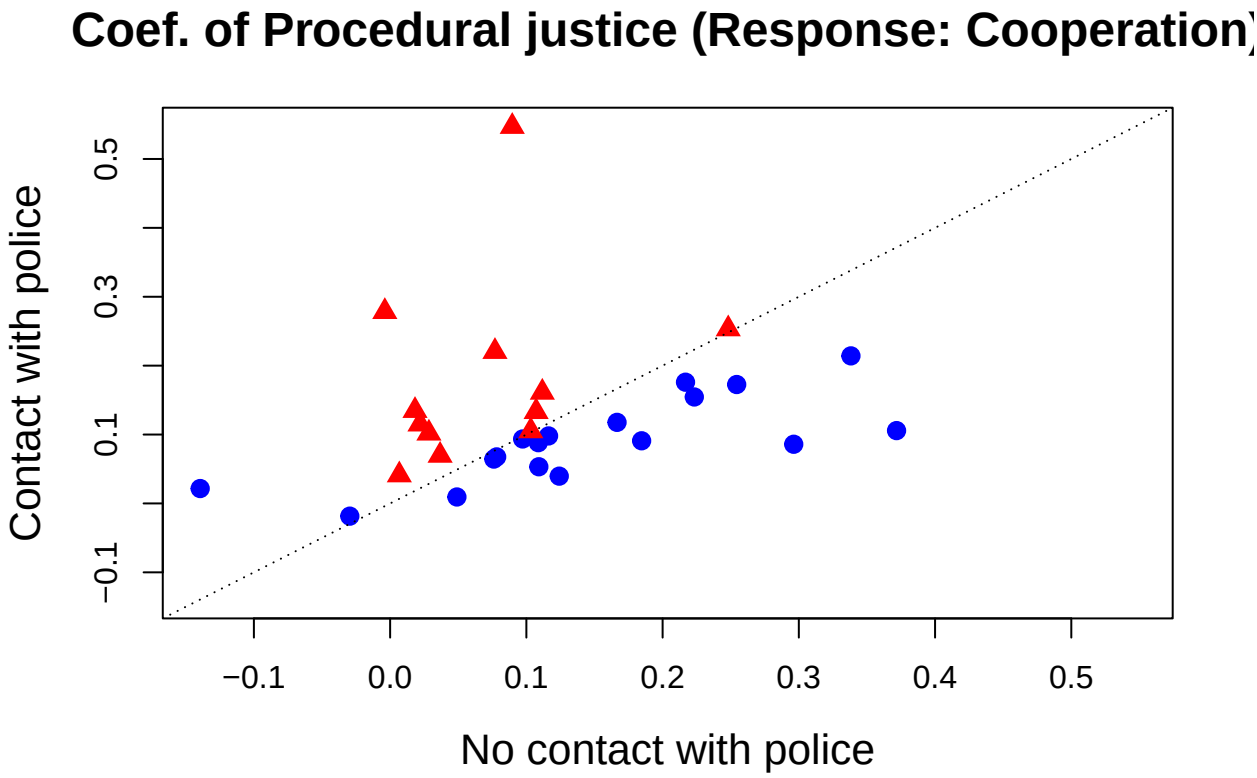
```
plot.2group.coefs(lhs="obey",rhs="eff",op="~")
```



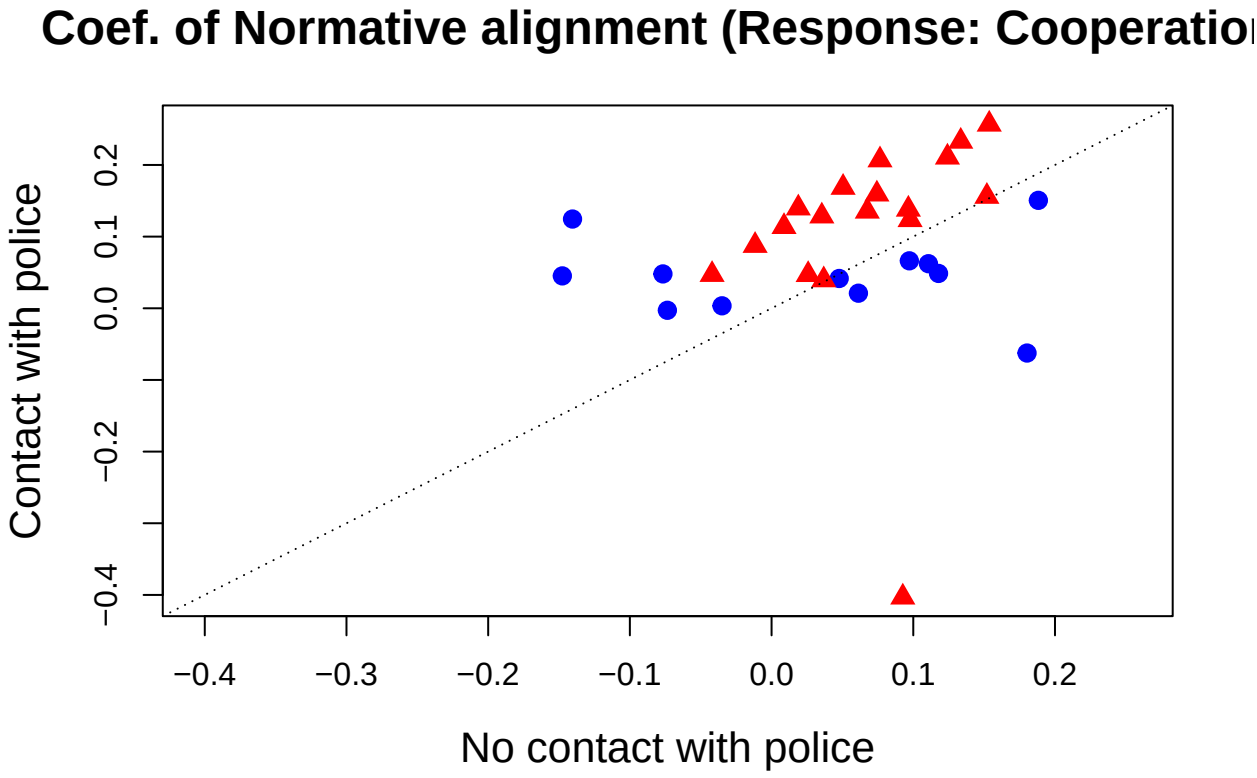

```
plot.2group.coefs(lhs="obey",rhs="foc",op="~")
```



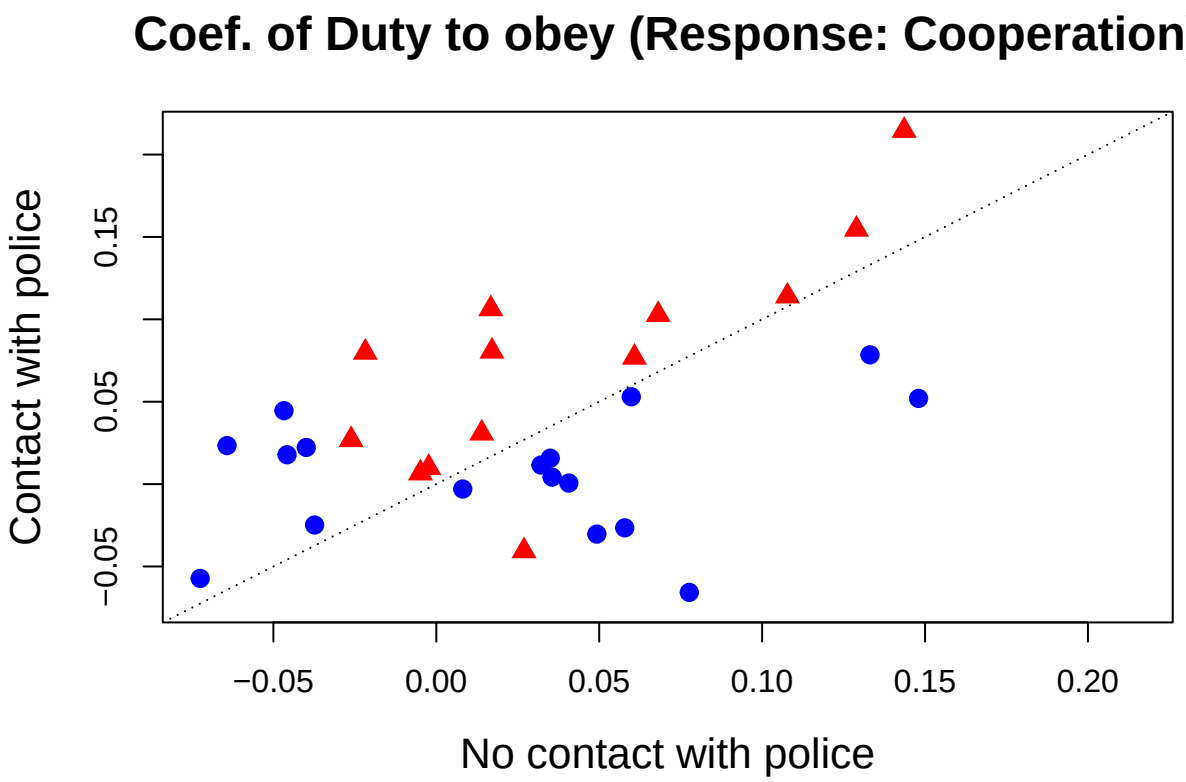
```
plot.2group.coefs(lhs="coop",rhs="pj",op="~")
```



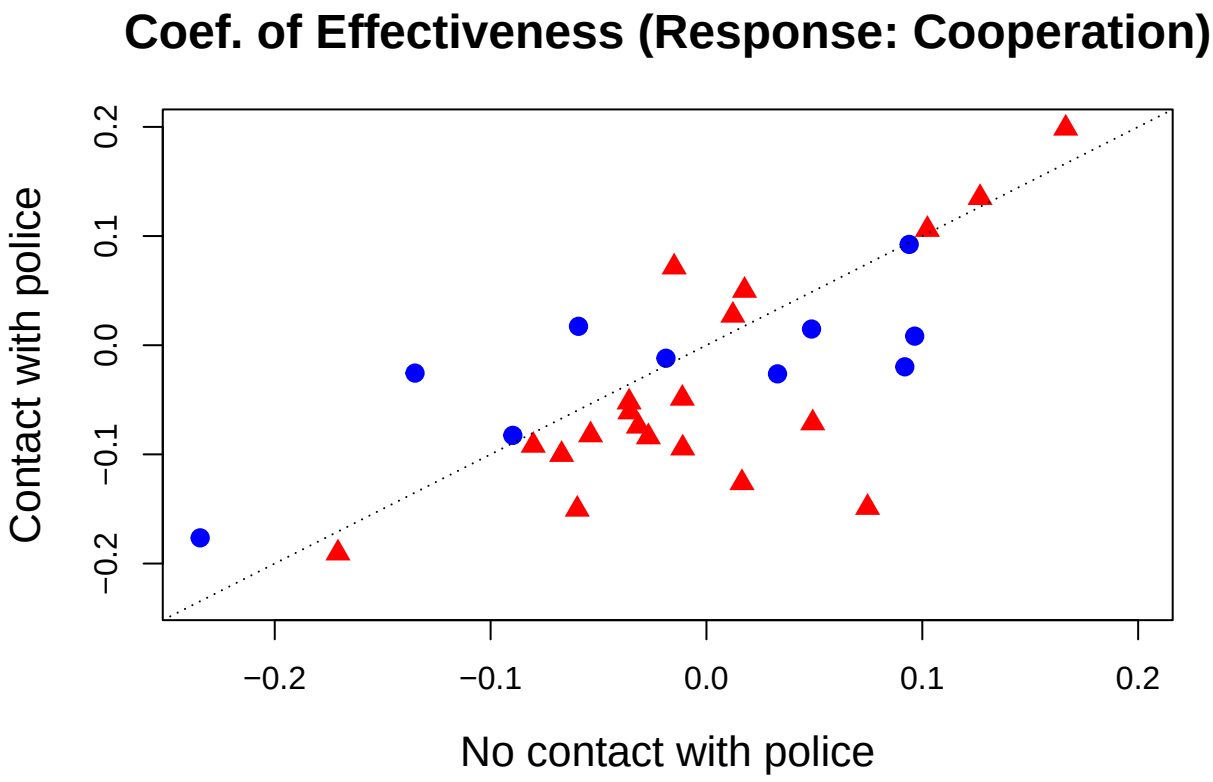

```
plot.2group.coefs(lhs="coop",rhs="moralid",op="~")
```



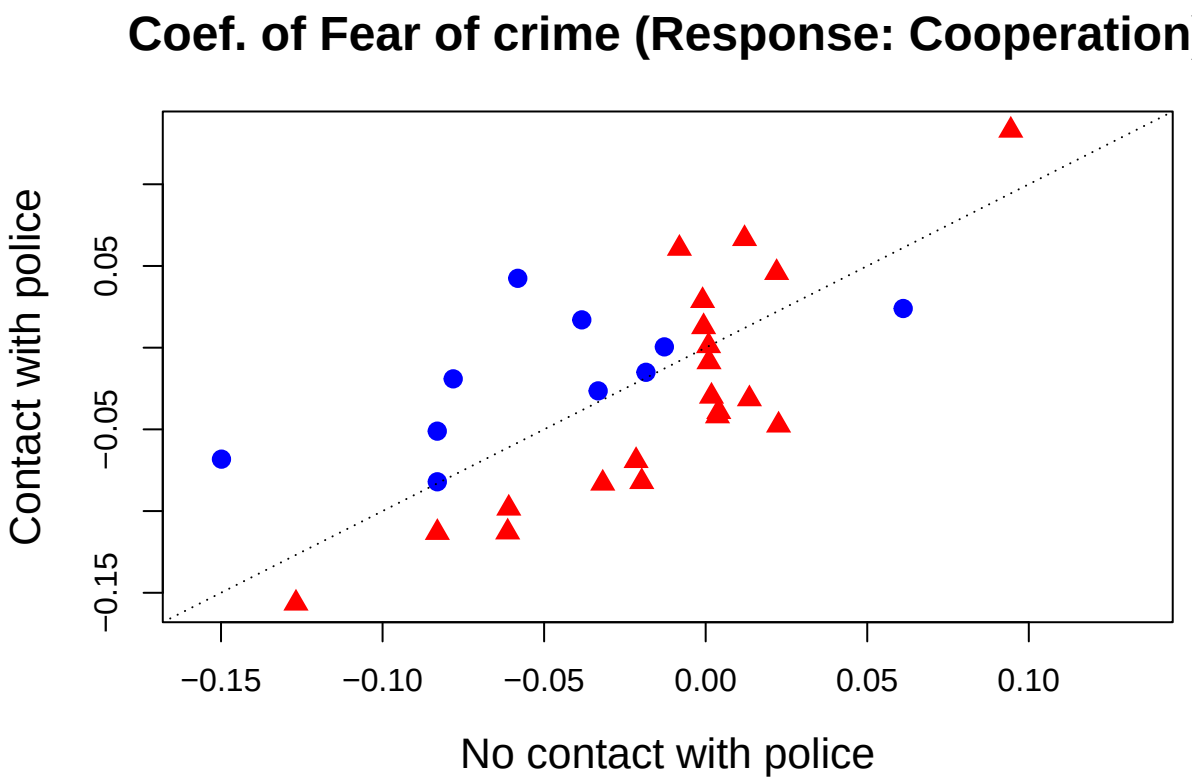
```
plot.2group.coefs(lhs="coop",rhs="obey",op="~")
```




```
plot.2group.coefs(lhs="coop",rhs="eff",op="~")
```



```r
plot.2group.coefs(lhs="coop",rhs="foc",op="~")
```




```r
##########
# Check if there are systematic patterns in which countries have positive or negative differences in th
#
group2.comp <- matrix(NA,length(coop.estimates.2group),15)
row.names(group2.comp) <- names(coop.estimates.2group)
i <- 0
cn.tmp <- NULL
#
i <- i+1
l.tmp <- "moralid"
r.tmp <- "pj"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "dj"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "lawf"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
```

```
#
i <- i+1
r.tmp <- "eff"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "foc"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
l.tmp <- "obey"
r.tmp <- "pj"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "dj"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "lawf"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "eff"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "foc"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
l.tmp <- "coop"
r.tmp <- "pj"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "moralid"
```

```
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "obey"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "eff"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
i <- i+1
r.tmp <- "foc"
cn.tmp <- c(cn.tmp,paste0(l.tmp,".ON.",r.tmp))
p.tmp <- plot.2group.coefs(lhs=l.tmp,rhs=r.tmp,op="~",plot=F)
group2.comp[,i] <- as.numeric(abs(p.tmp[,2])>abs(p.tmp[,1]))
#
colnames(group2.comp) <- cn.tmp
#group2.comp

rowSums(group2.comp)
```

```
## AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IL LT NL NO PL PT RU SE SI
##  9  9  8  8  6  9  8  8  6  9  8  9  9  6  8 11  7 11  7  4  6 10 10  7  7  3
## SK UA SA US
##  9 10  7  6
```

```
summary(rowSums(group2.comp))
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   3.000   7.000   8.000   7.833   9.000  11.000
```

```
table(rowSums(group2.comp))
```

```
##
##  3  4  6  7  8  9 10 11
##  1  1  5  5  6  7  3  2
```

```
table(group2.comp)
```

```
## group2.comp
##   0   1
## 215 235
```

```r
# 215 larger in absolute value in non-contact group, 235 in contact group

# P-value for simple test from a binomial distribution
# If count of 1s in each country is Bin(15,.5) and countries are independent,
# then the sum of counts over countries is Bin(30*15,.5)

pbinom(225-(235-225),450,.5,lower.tail=T)+pbinom((235-1),450,.5,lower.tail=F)
```

```
## [1] 0.3704476
```

```r
# P=0.370

# Binory logistic random intercepts model
dat.tmp <- rbind(
  data.frame(country=rep(1:30,rowSums(group2.comp)),contact.larger=1),
  data.frame(country=rep(1:30,15-rowSums(group2.comp)),contact.larger=0)
)
summary(glmer(contact.larger~(1|country),data=dat.tmp,family=binomial,nAGQ=20))
```

```
## Generalized linear mixed model fit by maximum likelihood (Adaptive
##   Gauss-Hermite Quadrature, nAGQ = 20) [glmerMod]
##  Family: binomial  ( logit )
## Formula: contact.larger ~ (1 | country)
##    Data: dat.tmp
##
##      AIC      BIC   logLik deviance df.resid
##    626.9    635.2   -311.5    622.9      448
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.0455 -1.0455  0.9565  0.9565  0.9565
##
## Random effects:
##  Groups  Name        Variance Std.Dev.
##  country (Intercept) 0        0
## Number of obs: 450, groups:  country, 30
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.08895    0.09437   0.942    0.346
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```r
## Difference from main estimates

plotB.2group.coefs <- function(lhs,rhs,op,data=coop.estimates.2group,
              data.main=coop.estimates.main$sems,
                              plot=T){
  t.coefs <- matrix(NA,length(data),2)
  rownames(t.coefs) <- names(data)
  dimnames(t.coefs) <- list(names(data),c("No contact","Contact"))
  for(i in seq(length(data))){
```

```
    data.i <- data[[i]]
    data.main.i <- data.main[[i]]
    ind <- data.i$lhs==lhs & data.i$rhs==rhs & data.i$op==op
    t.coefs[i,] <- data.i[ind,"est"]
    ind <- data.main.i$lhs==lhs & data.main.i$rhs==rhs & data.main.i$op==op
    coefs.main.i <- data.main.i[ind,"est"]
    t.coefs[i,] <- (t.coefs[i,]-coefs.main.i)
  }
  i0 <- t.coefs[,1]>t.coefs[,2]
  if(plot){
    plot(t.coefs[i0,1],t.coefs[i0,2],
         xlim=range(t.coefs),ylim=range(t.coefs),
         xlab="No contact with police",ylab="Contact with police",
         col="blue",pch=19,cex.lab=1.2,cex=1.2)
    points(t.coefs[!i0,1],t.coefs[!i0,2],col="red",pch=19,cex=1.2)
    abline(a=0,b=1,lty="dotted")

    var.names <- rbind(
      c("contact","Contact with police"),
      c("pj","Procedural justice"),
      c("dj","Distributive justice"),
      c("obey","Duty to obey"),
      c("moralid","Normative alignment"),
      c("coop","Cooperation"),
      c("lawf","Lawfulness"),
      c("eff","Effectiveness"),
      c("foc","Fear of crime")
    )

    t.text <- "Coef. of "
    if(op=="~") t.text <- paste0(t.text,var.names[var.names[,1]==rhs,2]," (Response: ")
    if(op=="~1")t.text <- paste0(t.text,"Contact with police"," (Response: ")

    t.text <- paste0(t.text,var.names[var.names[,1]==lhs,2],")")
    title(main=t.text)#,cex.main=1)
  }
  if(!plot)return(t.coefs)
}
r.tmp <- NULL
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="moralid",rhs="pj",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="moralid",rhs="dj",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="moralid",rhs="lawf",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="moralid",rhs="eff",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="moralid",rhs="foc",op="~",plot=F))

r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="obey",rhs="pj",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="obey",rhs="dj",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="obey",rhs="lawf",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="obey",rhs="eff",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="obey",rhs="foc",op="~",plot=F))

r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="coop",rhs="pj",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="coop",rhs="moralid",op="~",plot=F))
```

```
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="coop",rhs="obey",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="coop",rhs="eff",op="~",plot=F))
r.tmp <- rbind(r.tmp,plotB.2group.coefs(lhs="coop",rhs="foc",op="~",plot=F))

mean(abs(r.tmp))
```

```
## [1] 0.03516175
```

```
table(abs(r.tmp)>.1)
```

```
##
## FALSE  TRUE
##   851    49
```

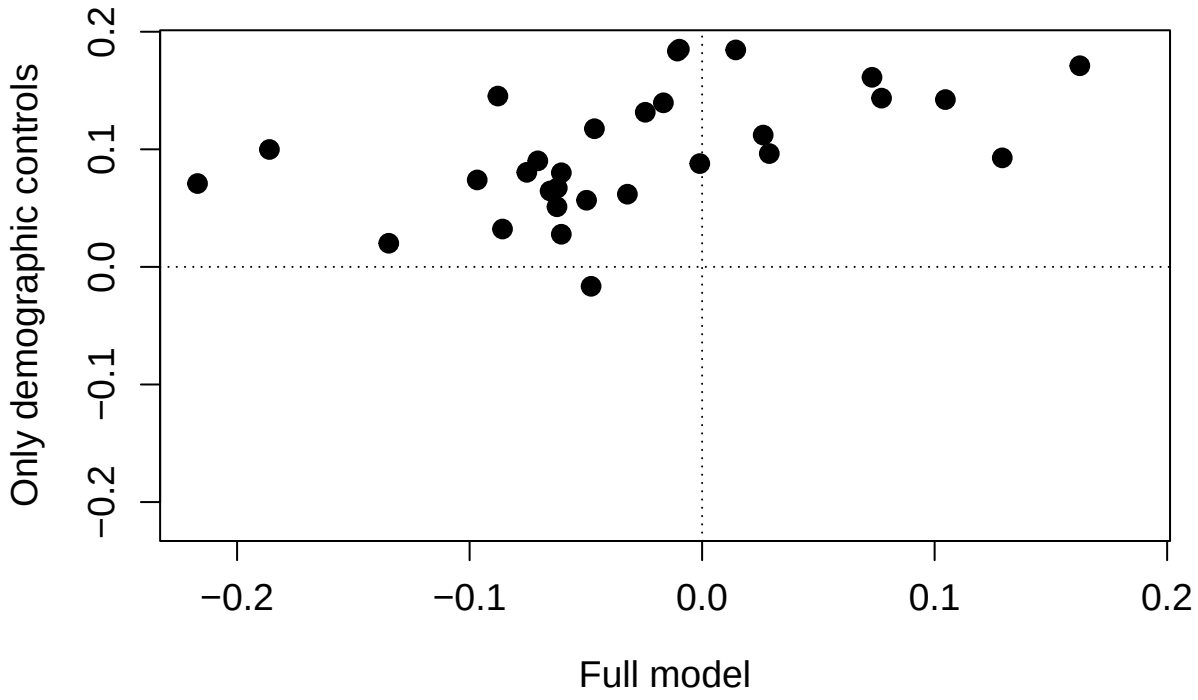
```
############################
```

Supplement S6. Further comments on police effectiveness as a predictor of cooperation

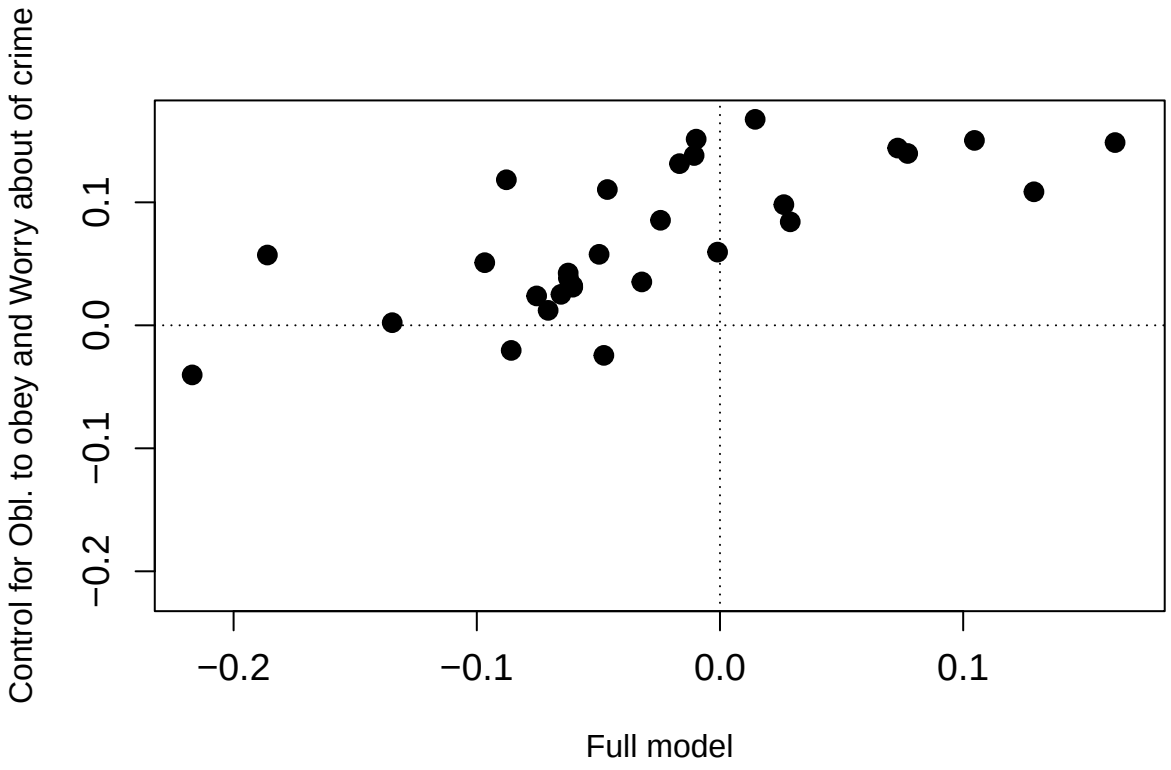
```
########################
# Fitting the models:
#   Here the models are fitted as shown in the code in Supplement S8 (Part 1),
#     except that the model for cooperation is changed as follows:
# Full model (as in the main paper):
#   coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid
# (*) Only police effectiveness and demographic controls:
#   coop~1+age+female+educ2+educ3+eff
# (*) + worry about crime and obligation to obey the police:
#   coop~1+age+female+educ2+educ3+eff+foc+obey
# (*) + normative alignment
#   coop~1+age+female+educ2+educ3+eff+moralid
# (*) + procedural justice
#   coop~1+age+female+educ2+educ3+eff+pj

# The models were fitted and estimated coefficients saved earlier:
b.coop.on.eff <- readRDS("b_coop_on_eff.rds")
head(b.coop.on.eff)
```

```
##       country  full.model no.control          pj         foc        obey
## 1     Austria -0.21702854 0.07089492 -0.17436855 0.035101467 0.001851464
## 2     Belgium  0.02888895 0.09640622  0.04036536 0.095424034 0.085199935
## 3    Bulgaria -0.00979885 0.18515777  0.02005820 0.181324063 0.154283938
## 4 Switzerland -0.06242312 0.05114144 -0.04643806 0.045126411 0.048661048
## 5      Cyprus -0.13477270 0.02009697 -0.14869002 0.007266782 0.016361702
## 6     Czech R  0.01445350 0.18452742  0.04586183 0.179884976 0.172388850
##        moralid     foc.obey
## 1 -0.063947789 -0.040323906
## 2  0.042417305  0.084159010
## 3  0.077623010  0.151367509
## 4 -0.043204276  0.042508476
## 5 -0.002910535  0.002152421
## 6  0.077367160  0.167477982
```

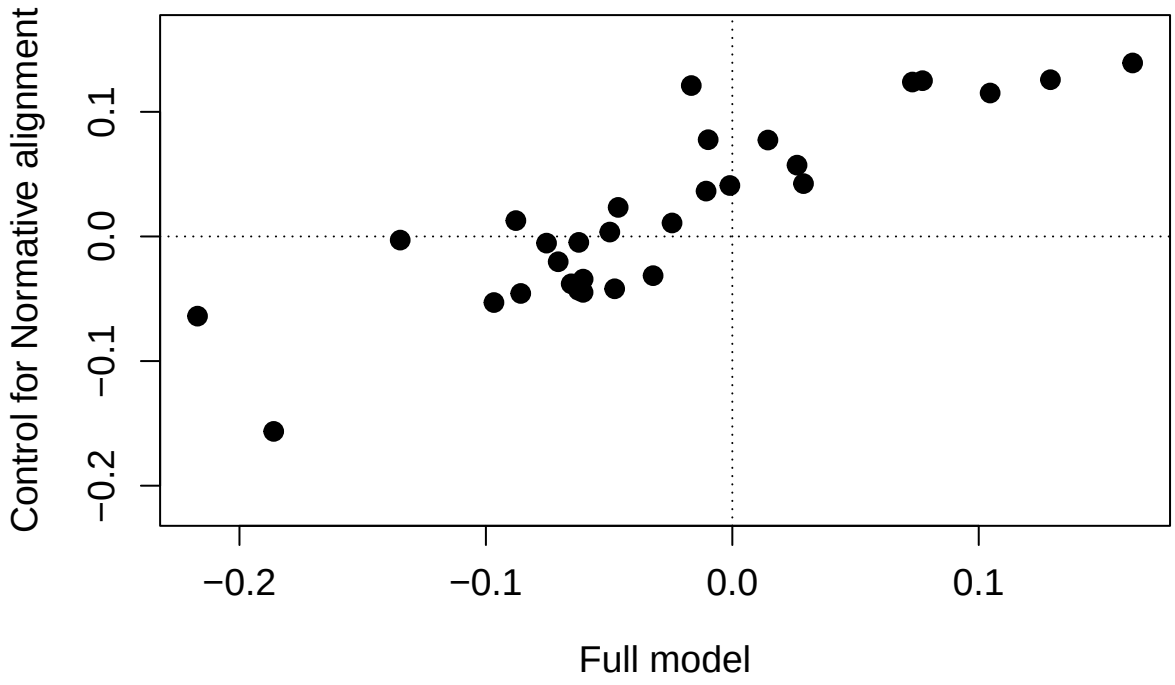
```
## The plots included in Supplement S6

num.tmp <- c(2,3)
plot(b.coop.on.eff[,num.tmp[1]],b.coop.on.eff[,num.tmp[2]],
     xlim=range(b.coop.on.eff[,num.tmp]),
     ylim=range(b.coop.on.eff[,num.tmp]),
     pch=19,xlab="Full model",ylab="Only demographic controls",
     cex=1.3,cex.lab=1.2,cex.axis=1.2)
abline(h=0,lty="dotted")
abline(v=0,lty="dotted")
```



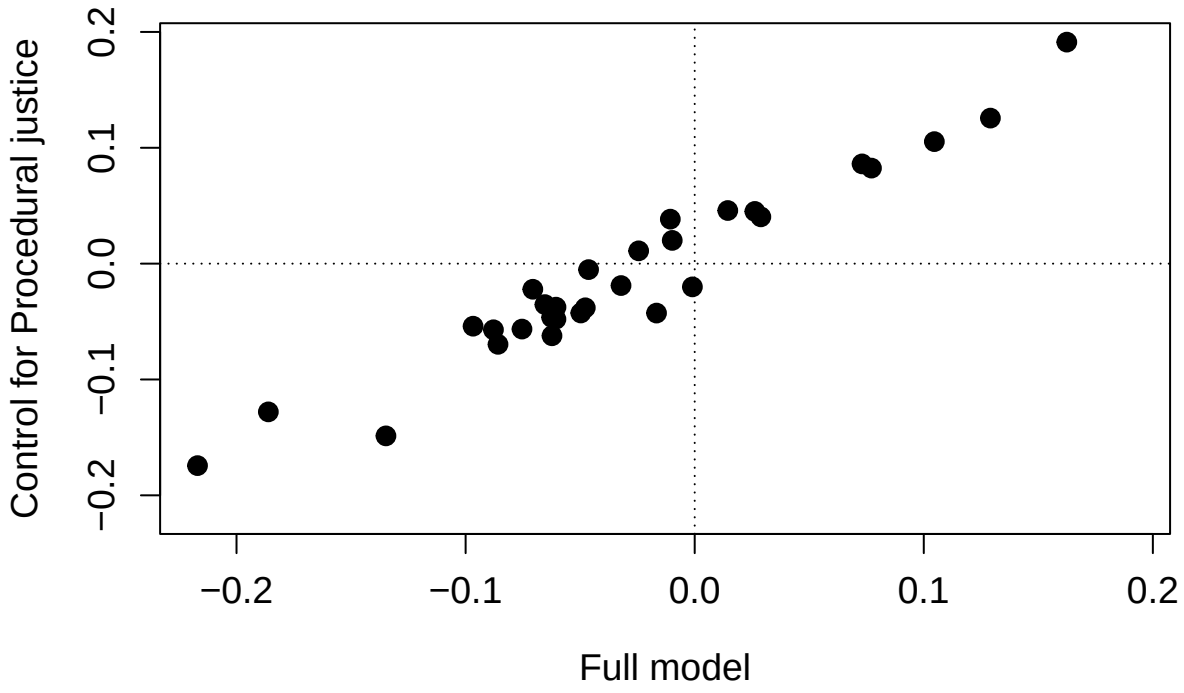

```
num.tmp <- c(2,8)
plot(b.coop.on.eff[,num.tmp[1]],b.coop.on.eff[,num.tmp[2]],
     xlim=range(b.coop.on.eff[,num.tmp]),
     ylim=range(b.coop.on.eff[,num.tmp]),
pch=19,xlab="Full model",ylab="Control for Obl. to obey and Worry about of crime",
cex=1.3,cex.lab=1,cex.axis=1.2)
abline(h=0,lty="dotted")
abline(v=0,lty="dotted")
```




```
num.tmp <- c(2,7)
plot(b.coop.on.eff[,num.tmp[1]],b.coop.on.eff[,num.tmp[2]],
     xlim=range(b.coop.on.eff[,num.tmp]),
     ylim=range(b.coop.on.eff[,num.tmp]),
pch=19,xlab="Full model",ylab="Control for Normative alignment",
cex=1.3,cex.lab=1.2,cex.axis=1.2)
abline(h=0,lty="dotted")
abline(v=0,lty="dotted")
```




```
num.tmp <- c(2,4)
plot(b.coop.on.eff[,num.tmp[1]],b.coop.on.eff[,num.tmp[2]],
     xlim=range(b.coop.on.eff[,num.tmp]),
     ylim=range(b.coop.on.eff[,num.tmp]),
     pch=19,xlab="Full model",ylab="Control for Procedural justice",
     cex=1.3,cex.lab=1.2,cex.axis=1.2)
abline(h=0,lty="dotted")
abline(v=0,lty="dotted")
```



Supplement S7. Supplementary models for South Africa

```
# (1) 2010 dataset for South Africa was created and the same model as in the main
#   paper was fitted to it.

coopdata.SA2010 <- readRDS("coopdata_SA2010.rds")

mod.spec <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.156*obey1 +2.728*obey2 +2.495*obey3
  obey1 ~ 5.702*1; obey2~6.100*1; obey3~5.881*1
  obey1~~4.102*obey1; obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid
'

sem.fitted.main.SA2010 <- sem(mod.spec,data=coopdata.SA2010,missing="fiml")
summary(sem.fitted.main.SA2010)
```

```
## lavaan 0.6-19 ended normally after 113 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        74
##
##                                                   Used       Total
```

```
##   Number of observations                          3111        3183
##   Number of missing patterns                       230
##
## Model Test User Model:
##
##   Test statistic                              7469.862
##   Degrees of freedom                              187
##   P-value (Chi-square)                          0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
##   Observed information based on                Hessian
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   pj =~
##     pj1               0.579
##     pj2               0.573
##     pj3               0.533
##   eff =~
##     eff1              1.737
##     eff2              1.821
##     eff3              1.428
##   obey =~
##     obey1             2.156
##     obey2             2.728
##     obey3             2.495
##   moralid =~
##     moralid1          0.727
##     moralid2          0.789
##     moralid3          0.685
##   coop =~
##     coop1             0.482
##     coop2             0.813
##     coop3             0.771
##
## Regressions:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   pj ~
##     age               0.001    0.001    1.047    0.295
##     female            0.016    0.047    0.344    0.731
##     educ2             0.111    0.052    2.128    0.033
##     educ3             0.162    0.070    2.312    0.021
##   dj ~
##     age               0.002    0.001    1.839    0.066
##     female            0.046    0.042    1.100    0.271
##     educ2             0.154    0.046    3.341    0.001
##     educ3             0.122    0.063    1.952    0.051
##   lawf ~
##     age               0.001    0.001    1.072    0.284
##     female            0.030    0.036    0.834    0.404
##     educ2            -0.058    0.040   -1.453    0.146
```

```
##     educ3           -0.104    0.053   -1.962    0.050
##   eff ~
##     age              0.000    0.001    0.080    0.936
##     female          -0.020    0.048   -0.422    0.673
##     educ2           -0.046    0.053   -0.868    0.386
##     educ3           -0.049    0.071   -0.696    0.487
##   foc ~
##     age             -0.005    0.001   -3.284    0.001
##     female          -0.274    0.047   -5.802    0.000
##     educ2           -0.155    0.053   -2.942    0.003
##     educ3           -0.261    0.070   -3.713    0.000
##   obey ~
##     age              0.001    0.001    1.322    0.186
##     female          -0.032    0.033   -0.962    0.336
##     educ2            0.092    0.037    2.453    0.014
##     educ3            0.158    0.050    3.167    0.002
##     pj               0.042    0.020    2.075    0.038
##     dj               0.048    0.019    2.563    0.010
##     lawf            -0.054    0.021   -2.553    0.011
##     eff              0.219    0.020   10.995    0.000
##     foc             -0.021    0.013   -1.558    0.119
##   moralid ~
##     age              0.000    0.001    0.362    0.718
##     female           0.006    0.038    0.154    0.878
##     educ2           -0.073    0.042   -1.740    0.082
##     educ3           -0.093    0.056   -1.642    0.101
##     pj               0.246    0.023   10.808    0.000
##     dj               0.114    0.021    5.533    0.000
##     lawf            -0.007    0.023   -0.295    0.768
##     eff              0.311    0.022   13.971    0.000
##     foc             -0.021    0.015   -1.431    0.153
##   coop ~
##     age              0.005    0.001    3.801    0.000
##     female          -0.125    0.040   -3.124    0.002
##     educ2            0.005    0.045    0.116    0.908
##     educ3            0.126    0.060    2.105    0.035
##     pj               0.226    0.025    9.122    0.000
##     eff              0.051    0.025    2.001    0.045
##     foc             -0.026    0.016   -1.662    0.097
##     obey             0.119    0.024    4.953    0.000
##     moralid         -0.013    0.024   -0.530    0.596
##
## Covariances:
##                   Estimate  Std.Err  z-value  P(>|z|)
##  .pj ~~
##    .dj               0.491    0.027   18.186    0.000
##    .lawf             0.216    0.022    9.642    0.000
##    .eff              0.821    0.033   24.969    0.000
##    .foc              0.294    0.030    9.925    0.000
##  .dj ~~
##    .lawf             0.169    0.020    8.599    0.000
##  .eff ~~
##    .dj               0.515    0.028   18.737    0.000
##  .dj ~~
```

```
##    .foc               0.124    0.026    4.798    0.000
##  .eff ~~
##    .lawf              0.228    0.023    9.915    0.000
##  .lawf ~~
##    .foc               0.124    0.022    5.593    0.000
##  .eff ~~
##    .foc               0.317    0.030   10.486    0.000
##  .obey ~~
##    .moralid           0.020    0.016    1.217    0.224
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               2.766
##    .pj2               2.716
##    .pj3               2.557
##    .eff1              5.130
##    .eff2              4.722
##    .eff3              5.684
##    .obey1             5.702
##    .obey2             6.100
##    .obey3             5.881
##    .moralid1          3.495
##    .moralid2          3.600
##    .moralid3          3.508
##    .coop1             3.407
##    .coop2             3.167
##    .coop3             2.971
##    .pj               -0.521    0.076   -6.898    0.000
##    .dj               -0.088    0.067   -1.310    0.190
##    .lawf             -0.519    0.058   -8.961    0.000
##    .eff               0.031    0.077    0.409    0.683
##    .foc               1.303    0.076   17.101    0.000
##    .obey             -0.540    0.059   -9.191    0.000
##    .moralid          -0.097    0.066   -1.475    0.140
##    .coop             -0.434    0.070   -6.202    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               0.182
##    .pj2               0.146
##    .pj3               0.330
##    .eff1              1.365
##    .eff2              1.655
##    .eff3              3.580
##    .obey1             4.102
##    .obey2             0.689
##    .obey3             1.953
##    .moralid1          0.394
##    .moralid2          0.217
##    .moralid3          0.394
##    .coop1             0.350
##    .coop2             0.045
##    .coop3             0.263
##    .dj                1.137    0.031   36.926    0.000
```

```
##    .lawf              0.787    0.022   35.613    0.000
##    .foc               1.615    0.041   39.169    0.000
##    .pj                1.375    0.041   33.790    0.000
##    .eff               1.448    0.042   34.251    0.000
##    .obey              0.726    0.021   35.252    0.000
##    .moralid           0.804    0.026   30.695    0.000
##    .coop              1.078    0.029   36.676    0.000
```

```
summary(sem.fitted.models.main$SA)
```

```
## lavaan 0.6.10 ended normally after 116 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        74
##
##                                                   Used       Total
##   Number of observations                          2388        2518
##   Number of missing patterns                       193
##
## Model Test User Model:
##
##   Test statistic                              5267.329
##   Degrees of freedom                              164
##   P-value (Chi-square)                          0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
##   Observed information based on                Hessian
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   pj =~
##     pj1               0.579
##     pj2               0.573
##     pj3               0.533
##   eff =~
##     eff1              1.737
##     eff2              1.821
##     eff3              1.428
##   obey =~
##     obey2             2.728
##     obey3             2.495
##   moralid =~
##     moralid1          0.727
##     moralid2          0.789
##     moralid3          0.685
##   coop =~
##     coop1             0.482
##     coop2             0.813
##     coop3             0.771
##
```

```
## Regressions:
##                  Estimate  Std.Err  z-value  P(>|z|)
##   pj ~
##     age             0.006    0.002    3.494    0.000
##     female         -0.076    0.055   -1.390    0.164
##     educ2          -0.058    0.061   -0.957    0.339
##     educ3           0.088    0.088    1.009    0.313
##   dj ~
##     age             0.008    0.001    5.859    0.000
##     female          0.004    0.047    0.086    0.931
##     educ2           0.099    0.052    1.911    0.056
##     educ3           0.217    0.076    2.875    0.004
##   lawf ~
##     age             0.001    0.001    1.038    0.299
##     female         -0.028    0.043   -0.651    0.515
##     educ2          -0.201    0.048   -4.197    0.000
##     educ3          -0.109    0.067   -1.632    0.103
##   eff ~
##     age             0.002    0.002    0.896    0.370
##     female          0.049    0.056    0.871    0.384
##     educ2          -0.181    0.062   -2.907    0.004
##     educ3          -0.075    0.090   -0.839    0.402
##   foc ~
##     age             0.001    0.002    0.579    0.563
##     female          0.035    0.056    0.637    0.524
##     educ2           0.258    0.062    4.161    0.000
##     educ3           0.292    0.089    3.273    0.001
##   obey ~
##     age             0.003    0.001    2.556    0.011
##     female         -0.087    0.037   -2.333    0.020
##     educ2           0.019    0.042    0.460    0.645
##     educ3           0.108    0.060    1.798    0.072
##     pj              0.046    0.021    2.211    0.027
##     dj              0.008    0.021    0.397    0.691
##     lawf           -0.024    0.022   -1.091    0.275
##     eff             0.300    0.019   15.452    0.000
##     foc             0.006    0.014    0.417    0.677
##   moralid ~
##     age             0.000    0.001    0.030    0.976
##     female         -0.074    0.045   -1.648    0.099
##     educ2          -0.096    0.050   -1.906    0.057
##     educ3          -0.199    0.072   -2.762    0.006
##     pj              0.236    0.025    9.563    0.000
##     dj              0.138    0.025    5.532    0.000
##     lawf           -0.029    0.026   -1.103    0.270
##     eff             0.378    0.023   16.243    0.000
##     foc             0.021    0.017    1.254    0.210
##   coop ~
##     age            -0.001    0.001   -0.850    0.395
##     female         -0.088    0.049   -1.790    0.073
##     educ2          -0.006    0.055   -0.105    0.917
##     educ3           0.220    0.079    2.798    0.005
##     pj              0.210    0.027    7.918    0.000
##     eff            -0.046    0.029   -1.573    0.116
```

```
##     foc               0.013    0.019    0.694    0.488
##     obey              0.013    0.031    0.406    0.685
##     moralid           0.100    0.028    3.534    0.000
##
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##  .pj ~~
##    .dj                0.524    0.031   16.705    0.000
##    .lawf              0.325    0.028   11.636    0.000
##    .eff               0.725    0.039   18.732    0.000
##    .foc              -0.221    0.036   -6.156    0.000
##  .dj ~~
##    .lawf              0.213    0.023    9.066    0.000
##  .eff ~~
##    .dj                0.511    0.032   15.933    0.000
##  .dj ~~
##    .foc              -0.064    0.030   -2.138    0.033
##  .eff ~~
##    .lawf              0.262    0.029    9.150    0.000
##  .lawf ~~
##    .foc              -0.078    0.028   -2.800    0.005
##  .eff ~~
##    .foc              -0.339    0.037   -9.158    0.000
##  .obey ~~
##    .moralid           0.035    0.019    1.801    0.072
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               2.766
##    .pj2               2.716
##    .pj3               2.557
##    .eff1              5.130
##    .eff2              4.722
##    .eff3              5.684
##    .obey2             6.100
##    .obey3             5.881
##    .moralid1          3.495
##    .moralid2          3.600
##    .moralid3          3.508
##    .coop1             3.407
##    .coop2             3.167
##    .coop3             2.971
##    .pj               -0.783    0.087   -9.015    0.000
##    .dj               -0.493    0.073   -6.715    0.000
##    .lawf             -0.477    0.068   -7.008    0.000
##    .eff              -0.325    0.089   -3.667    0.000
##    .foc               0.489    0.088    5.571    0.000
##    .obey             -0.416    0.061   -6.872    0.000
##    .moralid          -0.099    0.073   -1.349    0.177
##    .coop             -0.302    0.080   -3.768    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               0.182
```

```
##    .pj2              0.146
##    .pj3              0.330
##    .eff1             1.365
##    .eff2             1.655
##    .eff3             3.580
##    .obey2            0.689
##    .obey3            1.953
##    .moralid1         0.394
##    .moralid2         0.217
##    .moralid3         0.394
##    .coop1            0.350
##    .coop2            0.045
##    .coop3            0.263
##    .dj               1.123    0.034   32.751    0.000
##    .lawf             0.913    0.029   31.971    0.000
##    .foc              1.748    0.051   34.364    0.000
##    .pj               1.458    0.049   29.676    0.000
##    .eff              1.563    0.052   30.235    0.000
##    .obey             0.681    0.023   30.115    0.000
##    .moralid          0.891    0.033   27.075    0.000
##    .coop             1.274    0.039   32.488    0.000
```

```
##
# (2) Measurement models for the additional scales

mod.spec.m <- '
  grthreat =~ grthreat1+grthreat2+grthreat3+grthreat4
'
grthreat.mod <- mod.tmp <- sem(mod.spec.m,data=coopdata.SA2010,std.lv=T,meanstructure=T,missing="fiml")
summary(mod.tmp)
```

```
## lavaan 0.6-19 ended normally after 17 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        12
##
##                                                   Used       Total
##   Number of observations                          3128        3183
##   Number of missing patterns                        15
##
## Model Test User Model:
##
##   Test statistic                               280.363
##   Degrees of freedom                                 2
##   P-value (Chi-square)                           0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
##   Observed information based on                Hessian
##
## Latent Variables:
```

```
##                    Estimate  Std.Err  z-value  P(>|z|)
##   grthreat =~
##     grthreat1         0.775    0.022   34.681    0.000
##     grthreat2         0.777    0.022   34.631    0.000
##     grthreat3         0.716    0.024   29.880    0.000
##     grthreat4         0.610    0.023   26.213    0.000
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .grthreat1         2.497    0.020  123.345    0.000
##    .grthreat2         2.496    0.020  123.117    0.000
##    .grthreat3         2.654    0.021  127.677    0.000
##    .grthreat4         2.480    0.020  124.894    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .grthreat1         0.648    0.027   24.194    0.000
##    .grthreat2         0.655    0.027   24.317    0.000
##    .grthreat3         0.811    0.030   27.274    0.000
##    .grthreat4         0.844    0.028   30.517    0.000
##     grthreat          1.000
```

```
mod.spec.m <- '
  immigr =~ immigr1+immigr2+immigr3+immigr4+immigr5+immigr6+immigr7
'
immigr.mod <- mod.tmp <- sem(mod.spec.m,data=coopdata.SA2010,std.lv=T,meanstructure=T,missing="fiml")
summary(mod.tmp)
```

```
## lavaan 0.6-19 ended normally after 24 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        21
##
##                                                   Used       Total
##   Number of observations                          3147        3183
##   Number of missing patterns                        63
##
## Model Test User Model:
##
##   Test statistic                              1062.834
##   Degrees of freedom                                14
##   P-value (Chi-square)                           0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
##   Observed information based on                Hessian
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   immigr =~
##     immigr1           0.808    0.021   39.176    0.000
```

```
##     immigr2           0.779    0.021   37.481    0.000
##     immigr3           0.807    0.022   36.816    0.000
##     immigr4           0.730    0.022   33.075    0.000
##     immigr5           0.809    0.024   34.244    0.000
##     immigr6           0.717    0.022   32.637    0.000
##     immigr7           0.548    0.021   26.645    0.000
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .immigr1           2.292    0.021  109.466    0.000
##    .immigr2           2.803    0.021  134.581    0.000
##    .immigr3           2.443    0.022  111.172    0.000
##    .immigr4           3.075    0.021  143.817    0.000
##    .immigr5           2.617    0.023  111.623    0.000
##    .immigr6           3.140    0.021  148.502    0.000
##    .immigr7           2.334    0.020  118.861    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .immigr1           0.713    0.024   29.926    0.000
##    .immigr2           0.728    0.024   30.206    0.000
##    .immigr3           0.856    0.027   31.526    0.000
##    .immigr4           0.871    0.027   31.895    0.000
##    .immigr5           1.014    0.031   32.240    0.000
##    .immigr6           0.856    0.027   31.820    0.000
##    .immigr7           0.882    0.025   35.601    0.000
##     immigr            1.000
```

```
mod.spec.m <- '
  trust =~ trust1+trust2+trust3+trust4+trust5
'
trust.mod <- mod.tmp <- sem(mod.spec.m,data=coopdata.SA2010,std.lv=T,meanstructure=T,missing="fiml")
summary(mod.tmp)
```

```
## lavaan 0.6-19 ended normally after 24 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        15
##
##                                                   Used       Total
##   Number of observations                          3169        3183
##   Number of missing patterns                        24
##
## Model Test User Model:
##
##   Test statistic                               916.396
##   Degrees of freedom                                 5
##   P-value (Chi-square)                           0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
```

```
##   Observed information based on                Hessian
##
## Latent Variables:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   trust =~
##     trust1           0.668    0.021   31.788    0.000
##     trust2           0.620    0.021   30.120    0.000
##     trust3           0.662    0.021   31.803    0.000
##     trust4           0.983    0.016   60.041    0.000
##     trust5           0.983    0.017   59.513    0.000
##
## Intercepts:
##                   Estimate  Std.Err  z-value  P(>|z|)
##    .trust1           3.096    0.021  144.756    0.000
##    .trust2           3.153    0.021  151.334    0.000
##    .trust3           2.801    0.021  130.937    0.000
##    .trust4           2.661    0.020  134.443    0.000
##    .trust5           2.550    0.020  128.055    0.000
##
## Variances:
##                   Estimate  Std.Err  z-value  P(>|z|)
##    .trust1           0.994    0.027   36.868    0.000
##    .trust2           0.970    0.026   37.019    0.000
##    .trust3           0.987    0.027   37.001    0.000
##    .trust4           0.262    0.013   20.778    0.000
##    .trust5           0.279    0.013   21.766    0.000
##     trust            1.000
```

```r
mod.spec.m <- '
  services =~ services1+services2+services3+services4
'
services.mod <- mod.tmp <- sem(mod.spec.m,data=coopdata.SA2010,std.lv=T,meanstructure=T,missing="fiml")
summary(mod.tmp)
```

```
## lavaan 0.6-19 ended normally after 22 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                        12
##
##                                                   Used       Total
##   Number of observations                          3174        3183
##   Number of missing patterns                        11
##
## Model Test User Model:
##
##   Test statistic                                16.514
##   Degrees of freedom                                 2
##   P-value (Chi-square)                           0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
```

```
##   Observed information based on                Hessian
##
## Latent Variables:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   services =~
##     services1        1.083    0.024   45.882    0.000
##     services2        0.866    0.022   39.155    0.000
##     services3        0.908    0.023   39.951    0.000
##     services4        0.567    0.024   23.644    0.000
##
## Intercepts:
##                   Estimate  Std.Err  z-value  P(>|z|)
##    .services1        3.313    0.024  138.175    0.000
##    .services2        3.485    0.022  157.795    0.000
##    .services3        3.234    0.023  140.496    0.000
##    .services4        3.170    0.022  141.186    0.000
##
## Variances:
##                   Estimate  Std.Err  z-value  P(>|z|)
##    .services1        0.647    0.032   19.940    0.000
##    .services2        0.793    0.028   28.805    0.000
##    .services3        0.820    0.029   28.474    0.000
##    .services4        1.251    0.034   36.686    0.000
##     services         1.000
```

```
# (3) Extended model, with the new variables added

mod.spec.extended <- '
  pj =~ 0.579*pj1 +0.573*pj2 +0.533*pj3
  pj1 ~ 2.766*1; pj2~2.716*1; pj3~2.557*1
  pj1~~0.182*pj1; pj2~~0.146*pj2; pj3~~0.330*pj3;
#
  eff =~ 1.737*eff1 +1.821*eff2 +1.428*eff3
  eff1 ~ 5.130*1; eff2~4.722*1; eff3~5.684*1
  eff1~~1.365*eff1; eff2~~1.655*eff2; eff3~~3.580*eff3;
#
  obey =~ 2.156*obey1 +2.728*obey2 +2.495*obey3
  obey1 ~ 5.702*1; obey2~6.100*1; obey3~5.881*1
  obey1~~4.102*obey1; obey2~~0.689*obey2; obey3~~1.953*obey3;
#
  moralid =~ 0.727*moralid1 +0.789*moralid2 +0.685*moralid3
  moralid1 ~ 3.495*1; moralid2~3.600*1; moralid3~3.508*1
  moralid1~~0.394*moralid1; moralid2~~0.217*moralid2; moralid3~~0.394*moralid3;
#
  coop =~ 0.482*coop1 +0.813*coop2 +0.771*coop3
  coop1 ~ 3.407*1; coop2~3.167*1; coop3~2.971*1
  coop1~~0.350*coop1; coop2~~0.045*coop2; coop3~~0.263*coop3;
#
  grthreat =~ .775*grthreat1+.777*grthreat2+.716*grthreat3+.610*grthreat4
  grthreat1~2.497*1; grthreat2~2/496*1; grthreat3~2.654*1; grthreat4~2.480*1
  grthreat1~~ .648*grthreat1; grthreat2~~ .655*grthreat2; grthreat3~~ .811*grthreat3; grthreat4~~ .844*
#
  immigr =~ .808*immigr1+.779*immigr2+.807*immigr3+.730*immigr4+.809*immigr5+.717*immigr6+.548*immigr7
  immigr1~2.292*1;immigr2~2.803*1;immigr3~2.443*1;immigr4~3.075*1;immigr5~2.617*1;immigr6~3.140*1;immig
```

```
  immigr1~~ .713*immigr1;immigr2~~ .728*immigr2;immigr3~~ .856*immigr3;immigr4~~ .871*immigr4
  immigr5~~ 1.014*immigr5;immigr6~~ .856*immigr6;immigr7~~ .882*immigr7;
#
  trust =~ .668*trust1+.620*trust2+.662*trust3+.983*trust4+.983*trust5
  trust1~3.096*1;trust2~3.153*1;trust3~2.801*1;trust4~2.661*1;trust5~2.550*1
  trust1~~ .994*trust1;trust2~~ .970*trust2;trust3~~ .987*trust3;trust4~~ .262*trust4;trust5~~ .279*trus
#
  services =~ 1.083*services1+.866*services2+.908*services3+.567*services4
  services1~3.313*1;services2~3.485*1;services3~3.234*1;services4~3.170*1
  services1~~ .647*services1;
  services2~~ .793*services2;
  services3~~ .820*services3;
  services4~~ 1.251*services4
#
  pj~1+age+female+educ2+educ3
  dj~1+age+female+educ2+educ3
  lawf~1+age+female+educ2+educ3
  eff~1+age+female+educ2+educ3
  foc~1+age+female+educ2+educ3
  grthreat~1+age+female+educ2+educ3
  immigr~1+age+female+educ2+educ3
  trust~1+age+female+educ2+educ3
  services~1+age+female+educ2+educ3

  services~~trust+immigr+grthreat+pj+dj+lawf+eff+foc
  trust~~immigr+grthreat+pj+dj+lawf+eff+foc
  immigr~~grthreat+pj+dj+lawf+eff+foc
  grthreat~~pj+dj+lawf+eff+foc
  pj~~dj+lawf+eff+foc
  dj~~lawf+eff+foc
  lawf~~eff+foc
  eff~~foc
#
  obey~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+grthreat+immigr+trust+services
  moralid~1+age+female+educ2+educ3+pj+dj+lawf+eff+foc+grthreat+immigr+trust+services
  obey~~moralid
#
  coop~1+age+female+educ2+educ3+pj+eff+foc+obey+moralid+trust+services
'

sem.fitted.extended.SA2010 <- sem(mod.spec.extended,data=coopdata.SA2010,missing="fiml")
summary(sem.fitted.extended.SA2010)
```

```
## lavaan 0.6-19 ended normally after 140 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of model parameters                       134
##
##                                                   Used       Total
##   Number of observations                          3111        3183
##   Number of missing patterns                       601
##
```

```
## Model Test User Model:
##
##   Test statistic                                30608.669
##   Degrees of freedom                                 797
##   P-value (Chi-square)                             0.000
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Observed
##   Observed information based on                Hessian
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   pj =~
##     pj1               0.579
##     pj2               0.573
##     pj3               0.533
##   eff =~
##     eff1              1.737
##     eff2              1.821
##     eff3              1.428
##   obey =~
##     obey1             2.156
##     obey2             2.728
##     obey3             2.495
##   moralid =~
##     moralid1          0.727
##     moralid2          0.789
##     moralid3          0.685
##   coop =~
##     coop1             0.482
##     coop2             0.813
##     coop3             0.771
##   grthreat =~
##     grthreat1         0.775
##     grthreat2         0.777
##     grthreat3         0.716
##     grthreat4         0.610
##   immigr =~
##     immigr1           0.808
##     immigr2           0.779
##     immigr3           0.807
##     immigr4           0.730
##     immigr5           0.809
##     immigr6           0.717
##     immigr7           0.548
##   trust =~
##     trust1            0.668
##     trust2            0.620
##     trust3            0.662
##     trust4            0.983
##     trust5            0.983
##   services =~
```

```
##     services1         1.083
##     services2         0.866
##     services3         0.908
##     services4         0.567
##
## Regressions:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   pj ~
##     age              0.002    0.001    1.049    0.294
##     female           0.017    0.047    0.359    0.720
##     educ2            0.111    0.052    2.128    0.033
##     educ3            0.162    0.070    2.319    0.020
##   dj ~
##     age              0.002    0.001    1.848    0.065
##     female           0.046    0.042    1.111    0.267
##     educ2            0.152    0.046    3.298    0.001
##     educ3            0.121    0.063    1.930    0.054
##   lawf ~
##     age              0.001    0.001    1.177    0.239
##     female           0.034    0.036    0.959    0.337
##     educ2           -0.058    0.040   -1.451    0.147
##     educ3           -0.108    0.053   -2.030    0.042
##   eff ~
##     age              0.000    0.001    0.047    0.963
##     female          -0.020    0.048   -0.421    0.674
##     educ2           -0.047    0.053   -0.884    0.377
##     educ3           -0.049    0.071   -0.688    0.491
##   foc ~
##     age             -0.005    0.001   -3.290    0.001
##     female          -0.275    0.047   -5.824    0.000
##     educ2           -0.156    0.053   -2.967    0.003
##     educ3           -0.261    0.070   -3.718    0.000
##   grthreat ~
##     age             -0.003    0.001   -2.193    0.028
##     female          -0.010    0.044   -0.220    0.826
##     educ2           -0.039    0.048   -0.814    0.416
##     educ3            0.060    0.065    0.926    0.355
##   immigr ~
##     age             -0.005    0.001   -3.781    0.000
##     female           0.009    0.041    0.232    0.817
##     educ2            0.027    0.045    0.604    0.546
##     educ3            0.193    0.061    3.191    0.001
##   trust ~
##     age             -0.000    0.001   -0.310    0.757
##     female          -0.014    0.039   -0.347    0.729
##     educ2           -0.061    0.043   -1.397    0.162
##     educ3           -0.172    0.058   -2.951    0.003
##   services ~
##     age              0.002    0.001    1.975    0.048
##     female          -0.006    0.041   -0.147    0.883
##     educ2            0.365    0.045    8.061    0.000
##     educ3            0.497    0.061    8.189    0.000
##   obey ~
##     age              0.001    0.001    0.802    0.423
```

```
##     female           -0.031    0.033   -0.940    0.347
##     educ2             0.061    0.038    1.611    0.107
##     educ3             0.128    0.051    2.519    0.012
##     pj                0.038    0.020    1.878    0.060
##     dj                0.045    0.019    2.375    0.018
##     lawf             -0.046    0.022   -2.145    0.032
##     eff               0.221    0.020   10.888    0.000
##     foc              -0.021    0.013   -1.561    0.119
##     grthreat         -0.051    0.020   -2.492    0.013
##     immigr           -0.039    0.019   -2.011    0.044
##     trust             0.001    0.019    0.073    0.942
##     services          0.087    0.019    4.514    0.000
##   moralid ~
##     age               0.000    0.001    0.346    0.729
##     female            0.004    0.037    0.113    0.910
##     educ2            -0.078    0.042   -1.830    0.067
##     educ3            -0.088    0.057   -1.539    0.124
##     pj                0.245    0.023   10.830    0.000
##     dj                0.111    0.020    5.402    0.000
##     lawf             -0.009    0.023   -0.389    0.697
##     eff               0.285    0.023   12.551    0.000
##     foc              -0.031    0.015   -2.058    0.040
##     grthreat         -0.037    0.023   -1.651    0.099
##     immigr            0.026    0.022    1.176    0.239
##     trust             0.120    0.021    5.716    0.000
##     services          0.020    0.022    0.947    0.344
##   coop ~
##     age               0.005    0.001    3.741    0.000
##     female           -0.124    0.040   -3.108    0.002
##     educ2            -0.009    0.045   -0.191    0.849
##     educ3             0.101    0.061    1.663    0.096
##     pj                0.222    0.025    8.969    0.000
##     eff               0.062    0.026    2.399    0.016
##     foc              -0.021    0.016   -1.296    0.195
##     obey              0.116    0.024    4.811    0.000
##     moralid          -0.005    0.025   -0.201    0.841
##     trust            -0.069    0.022   -3.085    0.002
##     services          0.032    0.023    1.379    0.168
##
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##  .trust ~~
##    .services          0.175    0.021    8.262    0.000
##  .immigr ~~
##    .services          0.082    0.022    3.750    0.000
##  .grthreat ~~
##    .services          0.085    0.024    3.613    0.000
##  .pj ~~
##    .services          0.161    0.025    6.332    0.000
##  .services ~~
##    .dj                0.151    0.022    6.702    0.000
##    .lawf              0.071    0.019    3.676    0.000
##  .eff ~~
##    .services          0.148    0.026    5.755    0.000
```

```
##  .services ~~
##    .foc              0.051    0.025    2.001    0.045
##  .immigr ~~
##    .trust            0.136    0.021    6.477    0.000
##  .grthreat ~~
##    .trust            0.083    0.023    3.669    0.000
##  .pj ~~
##    .trust            0.219    0.024    8.965    0.000
##  .trust ~~
##    .dj               0.142    0.021    6.605    0.000
##    .lawf             0.082    0.018    4.451    0.000
##  .eff ~~
##    .trust            0.348    0.025   13.740    0.000
##  .trust ~~
##    .foc              0.198    0.025    8.077    0.000
##  .grthreat ~~
##    .immigr           0.276    0.024   11.525    0.000
##  .pj ~~
##    .immigr           0.087    0.025    3.470    0.001
##  .immigr ~~
##    .dj               0.109    0.022    4.854    0.000
##    .lawf             0.088    0.019    4.578    0.000
##  .eff ~~
##    .immigr           0.149    0.026    5.804    0.000
##  .immigr ~~
##    .foc              0.057    0.025    2.255    0.024
##  .pj ~~
##    .grthreat         0.149    0.027    5.464    0.000
##  .grthreat ~~
##    .dj               0.111    0.024    4.557    0.000
##    .lawf             0.164    0.021    7.871    0.000
##  .eff ~~
##    .grthreat         0.161    0.028    5.851    0.000
##  .grthreat ~~
##    .foc              0.054    0.027    2.009    0.045
##  .pj ~~
##    .dj               0.491    0.027   18.190    0.000
##    .lawf             0.220    0.022    9.800    0.000
##    .eff              0.821    0.033   24.967    0.000
##    .foc              0.294    0.030    9.920    0.000
##  .dj ~~
##    .lawf             0.169    0.020    8.633    0.000
##  .eff ~~
##    .dj               0.514    0.027   18.698    0.000
##  .dj ~~
##    .foc              0.124    0.026    4.803    0.000
##  .eff ~~
##    .lawf             0.229    0.023    9.963    0.000
##  .lawf ~~
##    .foc              0.124    0.022    5.585    0.000
##  .eff ~~
##    .foc              0.316    0.030   10.465    0.000
##  .obey ~~
##    .moralid          0.017    0.016    1.017    0.309
```

```
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               2.766
##    .pj2               2.716
##    .pj3               2.557
##    .eff1              5.130
##    .eff2              4.722
##    .eff3              5.684
##    .obey1             5.702
##    .obey2             6.100
##    .obey3             5.881
##    .moralid1          3.495
##    .moralid2          3.600
##    .moralid3          3.508
##    .coop1             3.407
##    .coop2             3.167
##    .coop3             2.971
##    .grthreat1         2.497
##    .grthreat2         0.004
##    .grthreat3         2.654
##    .grthreat4         2.480
##    .immigr1           2.292
##    .immigr2           2.803
##    .immigr3           2.443
##    .immigr4           3.075
##    .immigr5           2.617
##    .immigr6           3.140
##    .immigr7           2.334
##    .trust1            3.096
##    .trust2            3.153
##    .trust3            2.801
##    .trust4            2.661
##    .trust5            2.550
##    .services1         3.313
##    .services2         3.485
##    .services3         3.234
##    .services4         3.170
##    .pj               -0.522    0.076   -6.906    0.000
##    .dj               -0.086    0.067   -1.281    0.200
##    .lawf             -0.523    0.058   -9.038    0.000
##    .eff               0.033    0.077    0.428    0.669
##    .foc               1.304    0.076   17.127    0.000
##    .grthreat          1.137    0.070   16.200    0.000
##    .immigr            0.151    0.065    2.299    0.022
##    .trust             0.063    0.063    1.003    0.316
##    .services         -0.282    0.066   -4.306    0.000
##    .obey             -0.451    0.064   -7.073    0.000
##    .moralid          -0.050    0.071   -0.699    0.484
##    .coop             -0.430    0.070   -6.137    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .pj1               0.182
```

```
##    .pj2              0.146
##    .pj3              0.330
##    .eff1             1.365
##    .eff2             1.655
##    .eff3             3.580
##    .obey1            4.102
##    .obey2            0.689
##    .obey3            1.953
##    .moralid1         0.394
##    .moralid2         0.217
##    .moralid3         0.394
##    .coop1            0.350
##    .coop2            0.045
##    .coop3            0.263
##    .grthreat1        0.648
##    .grthreat2        0.655
##    .grthreat3        0.811
##    .grthreat4        0.844
##    .immigr1          0.713
##    .immigr2          0.728
##    .immigr3          0.856
##    .immigr4          0.871
##    .immigr5          1.014
##    .immigr6          0.856
##    .immigr7          0.882
##    .trust1           0.994
##    .trust2           0.970
##    .trust3           0.987
##    .trust4           0.262
##    .trust5           0.279
##    .services1        0.647
##    .services2        0.793
##    .services3        0.820
##    .services4        1.251
##    .dj               1.136    0.031   36.945    0.000
##    .lawf             0.788    0.022   35.591    0.000
##    .foc              1.615    0.041   39.175    0.000
##    .pj               1.375    0.041   33.792    0.000
##    .eff              1.447    0.042   34.262    0.000
##    .obey             0.715    0.020   35.058    0.000
##    .moralid          0.789    0.026   30.577    0.000
##    .coop             1.073    0.029   36.644    0.000
##    .grthreat         1.025    0.035   28.910    0.000
##    .immigr           0.987    0.031   32.126    0.000
##    .trust            0.992    0.028   35.017    0.000
##    .services         0.961    0.031   31.195    0.000
```