

WEB-APPENDIX 1: R CODE FOR THE EXAMPLE

```
# -----
# load libraries: bayesmeta, metafor
# -----
library(bayesmeta)
library(metafor)

# -----
# define data
# -----
all.dat <- data.frame(
  "study" = c("D1050049", "D1050196", "D1050229", "D1050233"),
  "y"     = c(-0.09, -0.41, -0.40, -0.60),
  "se"    = c(0.15, 0.15, 0.10, 0.14),
  "nt"    = c(71, 90, 121, 125),
  "nc"    = c(72, 90, 127, 120),
  "hist"  = c(TRUE, TRUE, TRUE, FALSE),
  stringsAsFactors = FALSE
)

hist.dat <- all.dat[all.dat$hist == TRUE,]

# -----
# conduct meta-analysis of historical studies
# using tau ~ HN(0.25); mu is improper(1) by default
# hist_ma$summary contains posterior for tau, mu
# and the predicted effect
# -----
hist_ma <- bayesmeta(
  y = hist.dat$y,
  sigma = hist.dat$se,
  tau.prior = function(x){dhalfnormal(x, scale=0.25)}
)

print(round(t(hist_ma$summary), 3))

# -----
# simple size calculation for new study,
# calculation of ESS
# -----
sigma <- sqrt(0.1^2/((1/121) + (1/127)))
d <- -0.32
alpha <- 0.025
power <- 0.9
n.per.arm <- ceiling(((qnorm(alpha) + qnorm(1-
power))^2/(d)^2)*2*sigma^2)
```

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overall.n <- sum(hist.dat$nt) + sum(hist.dat$nc)
var <- rma(yi = hist.dat$y, sei = hist.dat$se, method = "FE")$se^2

ess <- overall.n*var/hist_ma$summary["sd","theta"]^2

# -----
# conduct meta-analysis of all studies
# shrinkage estimates can be obtained by command
# all_ma$theta
# -----
all_ma <- bayesmeta(
  y = all.dat$y,
  sigma = all.dat$se,
  tau.prior = function(x){dhalfnormal(x,scale=0.25)}
)

print(round(t(all_ma$theta), 3))

```