```
ethans.little.function <- function(G=50000000, gamma= 0, sigma2.theta=1,
 sigma2.epsilon=1, sigma2.xstar=1, sigma2.rw=0) {


   # first level simulation
   thetaL <- rnorm(G, mean=0, sd=sqrt(sigma2.theta))
   thetaR <- rnorm(G, mean=0, sd=sqrt(sigma2.theta))
   epsilonL <- rnorm(G, mean=0, sd=sqrt(sigma2.epsilon))
   epsilonR <- rnorm(G, mean=0, sd=sqrt(sigma2.epsilon))
   eta1 <- rnorm(G, mean=gamma, sd=sqrt(sigma2.xstar))
   lambda1 <- rep(sigma2.theta / (sigma2.theta + sigma2.epsilon), G)
   SL1 <- thetaL + epsilonL
   SR1 <- thetaR + epsilonR
   mL1 <- lambda1 * SL1
   mR1 <- lambda1 * SR1

reelect1 <- sum(mL1 - mR1 >= eta1) / (sum(mL1 - mR1 >= eta1) + sum(mL1 - mR1 < eta1))

   # yank off the first case but have no selection
   thetaL2 <- thetaL
   thetaR2 <- rnorm(length(thetaL2), mean=0, sd=sqrt(sigma2.theta))
   epsilonL2 <- rnorm(length(thetaL2), mean=0, sd=sqrt(sigma2.epsilon))
   epsilonR2 <- rnorm(length(thetaL2), mean=0, sd=sqrt(sigma2.epsilon))
   eta2 <- rnorm(length(thetaL2), mean=gamma, sd=sqrt(sigma2.xstar))
   lambdaL12 <- lambda1
   lambdaL2 <- (lambdaL12 * sigma2.epsilon + sigma2.rw) / (lambdaL12 * sigma2.theta
       + sigma2.rw + sigma2.epsilon)
   lambdaR2 <- rep(sigma2.theta / (sigma2.theta + sigma2.epsilon), length(thetaL2))
   SL2 <- thetaL2 + epsilonL2
   SR2 <- thetaR2 + epsilonR2
   mL2 <- lambdaL2 * SL2 + (1 - lambdaL2) * mL1
   mR2 <- lambdaR2 * SR2



#Probability of left wing guy achieving reelection, conditioning on incumbency

      reelect2 <- sum(mL2 - mR2 >= eta2) / (sum(mL2 - mR2 >= eta2) + sum(mL2 - mR2 < eta2))



#Now calculate the increased probability of winning given incumbency

iaL <- reelect2 - reelect1

#now I need to define the normal vote


sigma <- sqrt(((2*(sigma2.theta^2))/(sigma2.theta + sigma2.epsilon)) + sigma2.xstar)
nv <- 1 - pnorm((gamma / sigma))




   cat("iaL ", iaL, "\n", "nv", nv, "\n", "reelect1", reelect1, "\n", "reelect2", reelect2, "\n")
   return(c(iaL, nv, reelect1, reelect2))
   }



ruler<- seq(-4,4,.25)
storage.matrix <- matrix(NA, length(ruler), 4)

count <- 1
for(i in ruler) {
  storage.matrix[count,1:4] <- ethans.little.function(G=50000, gamma=i)
```

```
  count <- count + 1
}

#create the final incumbency advantage matrix
storage.matrix2 <-matrix(NA, length(seq(ruler)),4)

#now put back in the original stuff
storage.matrix2[,1:2] <- storage.matrix[,1:2]

#now add the right wing incumbency advantage
for(j in seq(1,length(ruler))){storage.matrix2[j,3]<-storage.matrix2[34-j,1]}

#now add the average per district incumbency advantage
for(k in seq(1,length(ruler))){storage.matrix2[k,4]<-
     storage.matrix2[k,2] * storage.matrix2[k,1] + (1-storage.matrix2[k,2]) *
     storage.matrix2[k,3]}



#Now make a matrix with the left-wing component parts

storage.matrix3<-matrix(NA, length(seq(ruler)),5)

# 1. Add in the Probability of winning an open seat

storage.matrix3[,1]<-storage.matrix[,3]

#2.  Add in the probabilty of winning an incumbent seat

storage.matrix3[,2]<- storage.matrix[,4]

#3. Now subtract these two to get the additional probability of winning given that you are an
incumbent

storage.matrix3[,3]<-storage.matrix3[,2]-storage.matrix3[,1]

#4. Add in 1- the normal vote

storage.matrix3[,4]<- 1-storage.matrix[,2]

#5.  Calculate the left wing contribution to the IA
storage.matrix3[,5]<- storage.matrix3[,4] * storage.matrix3[,3]

#Now plot the unconditional probability of winning the open seat and the incumbent seat as a
function of the NV

postscript(file = "c:/latex/incumbency/figuresR/unconditioned_pr_win.eps", horizontal = FALSE,
paper = "letter")
par(cex=2)
plot(storage.matrix3[,4],storage.matrix3[,1],
type="l",xlab="right-wing normal vote", ylab="probability left-wing candidate wins",
     xlim=c(0,1.0) , main=expression(paste({sigma^2} [theta] == 1, ", ",
     {sigma^2} [epsilon] == 1, ", ", {sigma^2} [eta] == 1)))
points(storage.matrix3[,4],storage.matrix3[,1], pch =19)
lines(storage.matrix3[,4],storage.matrix3[,2],type="l")
 points(storage.matrix3[,4],storage.matrix3[,2], pch=23)
legend(.35, 1.0, legend=c("open seat", "left-wing incumbent"),pch=c(19,23),cex=.85)
dev.off()



###Now  plot the unconditioned left-wing incumbency advantage
postscript(file = "c:/latex/incumbency/figuresR/unconditioned_lw_inc_adv.eps", horizontal = FALSE,
paper = "letter")
par(cex=2)
plot(storage.matrix3[,4],storage.matrix3[,3], type="l",xlab="right-wing normal vote",
```

```
ylab="left-wing incumbency advantage without selection",
     xlim=c(0,1.0), ylim=c(-0.05,0.15), main=expression(paste({sigma^2} [theta] == 1, ", ",
     {sigma^2} [epsilon] == 1, ", ", {sigma^2} [eta] == 1)))
dev.off()
```