Load necessary libraries:

```
library(RColorBrewer)
library(plotrix)

## Warning:  package 'plotrix' was built under R version 4.0.3

##greys <- brewer.pal(8, "Greys")
greys <- grey.colors(60, start=1,end=0, gamma=1) ##0=black, 1=white

reds.func <- colorRampPalette(c("#FFFFFF","#FF0000"))
reds <- reds.func(60)
```

Consider 2×2 region representing the allowable space for $p_{11} \times p_{21}$:

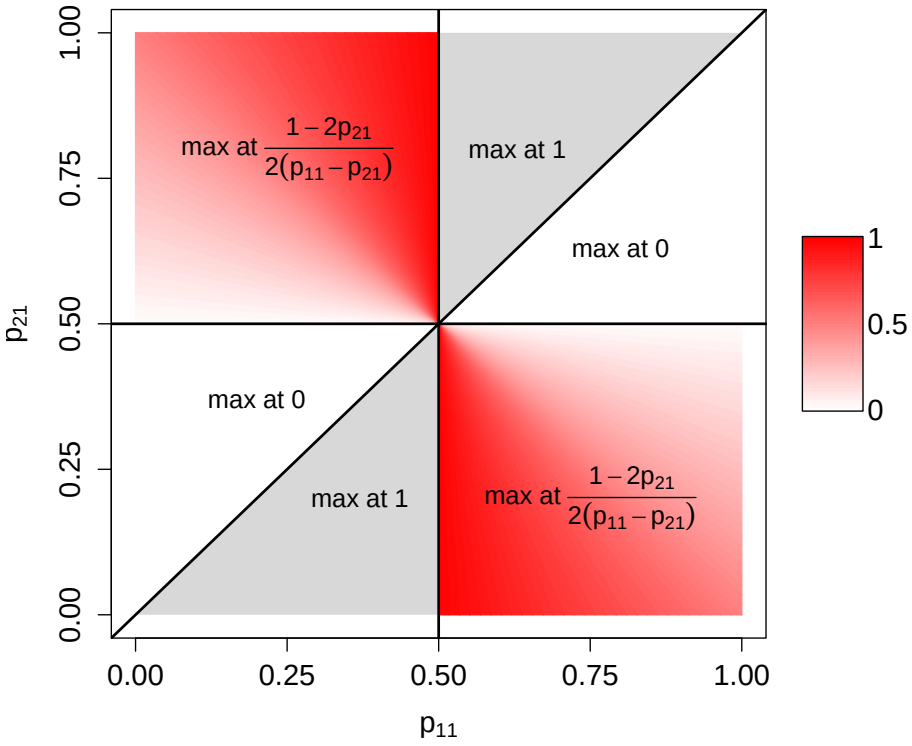
```
##gamma1argMax in terms of p11 and p21
gamma1argMax <- function(p11, p21)
{
  if(((p21 > p11) & (max(p11, p21) <= 1/2)) |
     ((p11 > p21) & (min(p11, p21) >= 1/2)))
  {
    gamma1argMax <- 0
  } else {
    if(((p11 > p21) & (max(p11, p21) <= 1/2)) |
       ((p21 > p21) & (min(p11, p21) >= 1/2)))
    {
      gamma1argMax <- 1
    }
    else {
      gamma1argMax <- (1-2*p21)/(2*(p11-p21))
    }
  }
  gamma1argMax
}

##p21 in terms of p11 and gamma1Star
p21 <- function(p11, gamma1Star)
{
  (2*gamma1Star*p11-1)/(2*(gamma1Star-1))
}
```

Make plot:

```
par(mar=c(7,4,4,6))
plot(1, type="n",
     xlab=expression(p[11]),
```

```
     ylab=expression(p[21]),
     xlim=c(0, 1), ylim=c(0, 1),
     cex.axis=1.3,
     cex.lab=1.3,
     xaxt="n",
     yaxt="n")

axis(1, at=c(0,0.25,0.5,0.75,1),
     cex.axis=1.3)
axis(2, at=c(0,0.25,0.5,0.75,1),
     cex.axis=1.3)

#color in grey the part that corresponds to max = 1
polygon(c(  0,0.5,0.5),
        c(  0,  0,0.5),
        col=greys[10],
        border=NA)
polygon(c(0.5,0.5,  1),
        c(0.5,  1,  1),
        col=greys[10],
        border=NA)

##n = number of shades, excluding white and black (must be even number)
n <- length(reds)-2

for(i in 1:(n/2))
{
  polygon(c(          0,      0,1/2),
          c(1/2+(i-1)/n,1/2+i/n,1/2),
          col=reds[i+1],
          border = reds[i+1])
  polygon(c(          1,      1,1/2),
          c(1/2-(i-1)/n,1/2-i/n,1/2),
          col=reds[i+1],
          border=reds[i+1])
}

for(i in 1:(n/2))
{
  polygon(c((i-1)/n,i/n,1/2),
          c(      1,  1,1/2),
          col=reds[i+(n/2)+1],
          border=reds[i+(n/2)+1])

  polygon(c((n-i)/n,(n+1-i)/n,1/2),
```

```
          c(      0,  0,1/2),
          col=reds[i+(n/2)+1],
          border=reds[i+(n/2)+1])
}

##add some lines
color_lines <- "black"
abline(h=0.5, col=color_lines, lwd=2)
abline(v=0.5, col=color_lines, lwd=2)
abline(a = 0, b=1, col=color_lines, lwd=2)

text(c(0.37, 0.63, 0.8, 0.2, 0.25, 0.75),
     c(0.2, 0.8, 0.63, 0.37, 0.8, 0.2),
     c("max at 1", "max at 1",
       "max at 0", "max at 0",
       expression(paste("max at ", frac(1-2*p[21],2*(p[11]-p[21])))),
       expression(paste("max at ", frac(1-2*p[21],2*(p[11]-p[21]))))),
     ##col=c("black","black","black","black","white","white"),
     cex=1.2)

color.legend(1.1,0.35,1.2,0.65,
             c(0,0.5,1),
             reds,
             align="rb",gradient="y",
             cex=1.3)
```


max at $\frac{1-2p_{21}}{2(p_{11}-p_{21})}$
max at 1
max at 0
max at 0
max at 1
max at $\frac{1-2p_{21}}{2(p_{11}-p_{21})}$
1
0.5
0
0.00
0.25
0.50
0.75
1.00
p_{21}
p_{11}