Single-pi-analysis

```r
library(covdepGE)
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.1.1
```

```r
library(latex2exp)
```

```
## Warning: package 'latex2exp' was built under R version 4.1.1
```

```r
library(varbvs)
```

```
## Warning: package 'varbvs' was built under R version 4.1.1
```

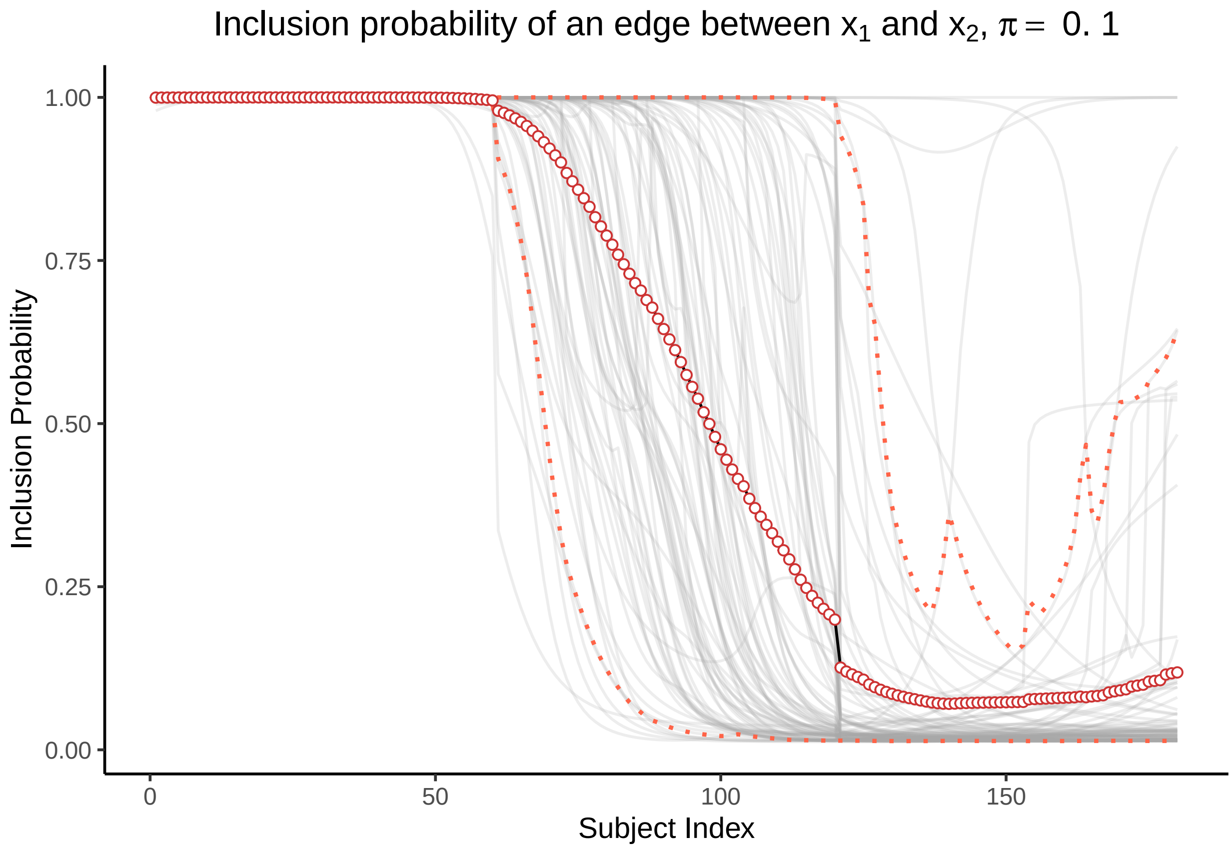
```r
setwd("~/covdepGE")
source("generate_data.R")

# number of trials
trials <- 100

# number of individuals
n <- nrow(generate_continuous()$data)

# matrices for storing inclusion probabilities
prob_mat12 <- matrix(NA, trials, n)
prob_mat13 <- matrix(NA, trials, n)

# values of pi to try
pi_vec <- seq(0.1, 0.9, 0.2)

colors <- c("cadetblue", "aquamarine3", "chartreuse3", "chocolate",
    "coral3", "cornflowerblue", "brown3", "deepskyblue3", "darkorange3",
    "darkcyan", "darkslateblue", "darkslategray")

length(colors)
```

```
## [1] 12
```

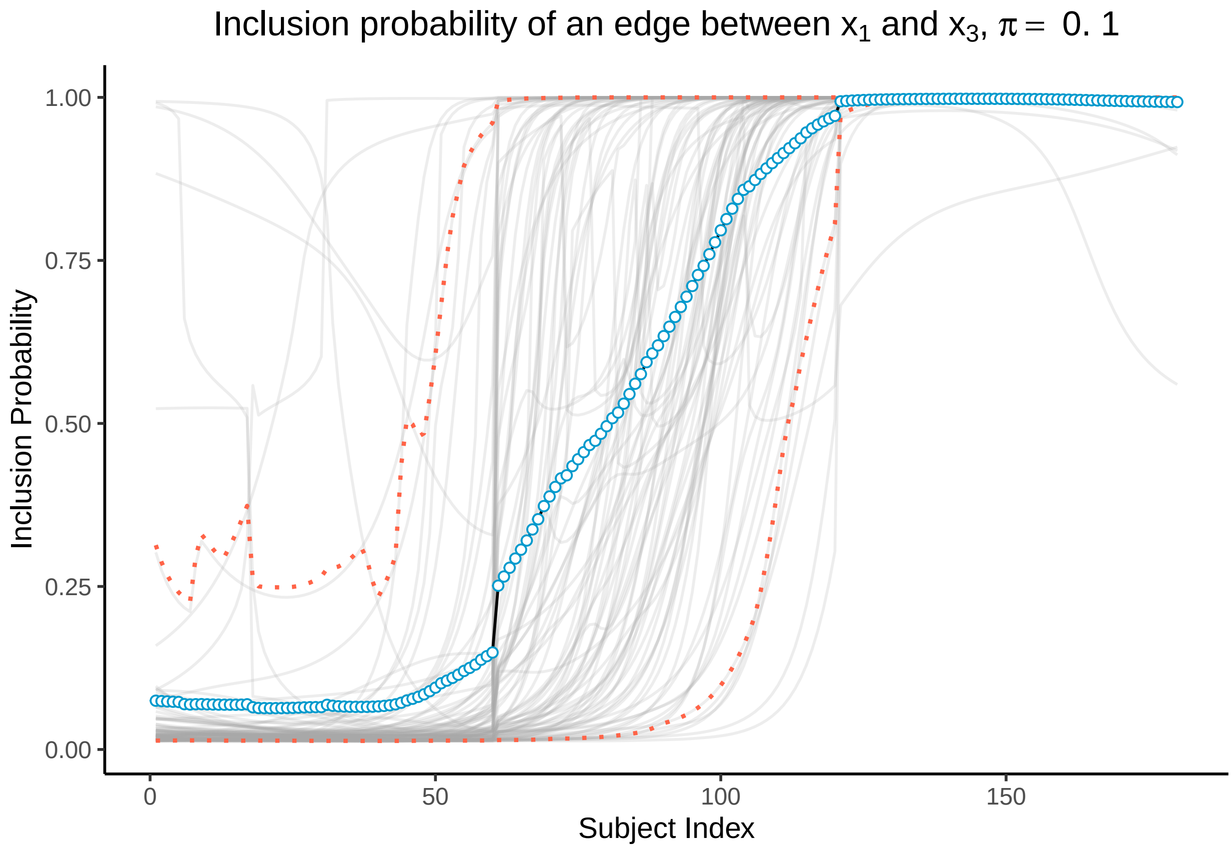
```r
for (pi in pi_vec) {
    for (j in 1:trials) {

        # generate the data
        cont <- generate_continuous(seed = j)
```

```r
    data_mat <- cont$data
    X <- data_mat[, -1]
    y <- data_mat[, 1]
    Z <- cont$covts

    # estimate the graphs
    out <- covdepGE(data_mat = cont$data, Z = cont$covts, tau = 0.56,
        sigmavec = c(0.01, 0.05, 0.1, 0.5, 1, 3, 7, 10), pi_vec = pi)

    # get probabilities of inclusion
    incl.probs <- out$inclusion_probs

    # get continuous probabilities of inclusion for x_1 to
    # x_2 and x_1 to x_3
    probs12 <- as.numeric(lapply(incl.probs, function(x) x[1,
        2]))
    probs13 <- as.numeric(lapply(incl.probs, function(x) x[1,
        3]))

    # add them to the probs matrices
    prob_mat12[j, ] <- probs12
    prob_mat13[j, ] <- probs13

}

# get the mean probabilities for each individual
mean_probs12 <- colMeans(prob_mat12)
mean_probs13 <- colMeans(prob_mat13)

# find the 5% and 95% quantiles
CI12 <- apply(prob_mat12, 2, quantile, c(0.05, 0.95))
CI13 <- apply(prob_mat13, 2, quantile, c(0.05, 0.95))

# visualize them
graphs12 <- ggplot() + theme_classic() + xlab("Subject Index") +
    ylab("Inclusion Probability") + ggtitle(TeX(paste("Inclusion probability of an edge between $x_
    round(pi, 4)))) + theme(plot.title = element_text(hjust = 0.5))

graphs13 <- ggplot() + theme_classic() + xlab("Subject Index") +
    ylab("Inclusion Probability") + ggtitle(TeX(paste("Inclusion probability of an edge between $x_
    round(pi, 4)))) + theme(plot.title = element_text(hjust = 0.5))

# add each of the instances to the plot
for (j in 1:trials) {
    graphs12 <- graphs12 + geom_line(data = data.frame(subj = 1:length(mean_probs12),
        prob = prob_mat12[j, ]), color = "gray66", alpha = 0.2,
        aes(subj, prob))

    graphs13 <- graphs13 + geom_line(data = data.frame(subj = 1:length(mean_probs13),
        prob = prob_mat13[j, ]), color = "gray66", alpha = 0.2,
        aes(subj, prob))
}
```

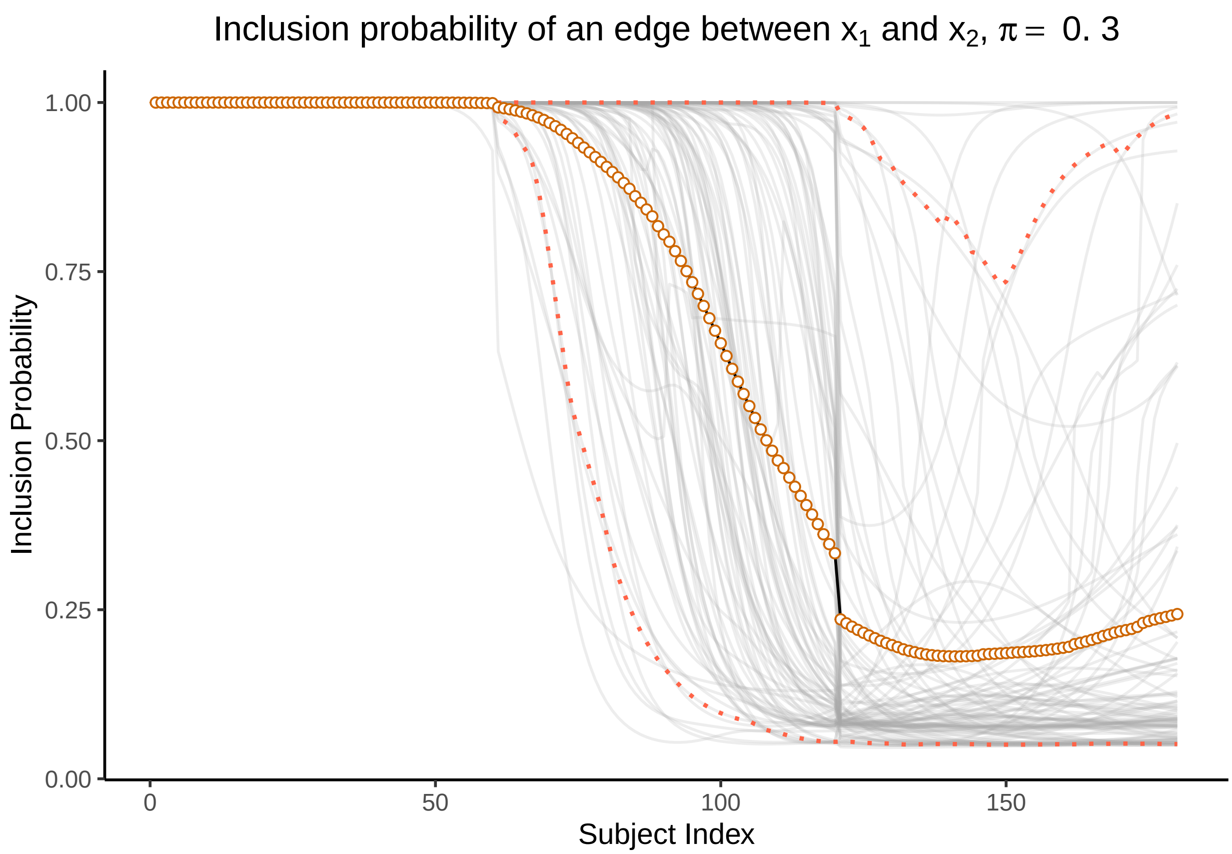
```
    # add error bars to the plot
    for (j in 1:2) {
        graphs12 <- graphs12 + geom_line(data = data.frame(subj = 1:length(mean_probs12),
            prob = CI12[j, ]), color = "tomato", linetype = "dotted",
            size = 0.75, aes(subj, prob))
        graphs13 <- graphs13 + geom_line(data = data.frame(subj = 1:length(mean_probs13),
            prob = CI13[j, ]), color = "tomato", linetype = "dotted",
            size = 0.75, aes(subj, prob))
    }

    # add the mean lines and display

    # select some random colors for plotting
    clr <- sample(colors, 2)
    colors <- colors[-which(colors %in% clr)]

    graphs12 <- graphs12 + geom_line(data = data.frame(subj = 1:length(mean_probs12),
        prob = mean_probs12), aes(subj, prob)) + geom_point(data = data.frame(subj = 1:length(mean_probs
        prob = mean_probs12), color = clr[1], fill = "white", shape = 21,
        aes(subj, prob))

    print(graphs12)

    graphs13 <- graphs13 + geom_line(data = data.frame(subj = 1:length(mean_probs13),
        prob = mean_probs13), aes(subj, prob)) + geom_point(data = data.frame(subj = 1:length(mean_probs
        prob = mean_probs13), color = clr[2], fill = "white", shape = 21,
        aes(subj, prob))

    print(graphs13)
}
```

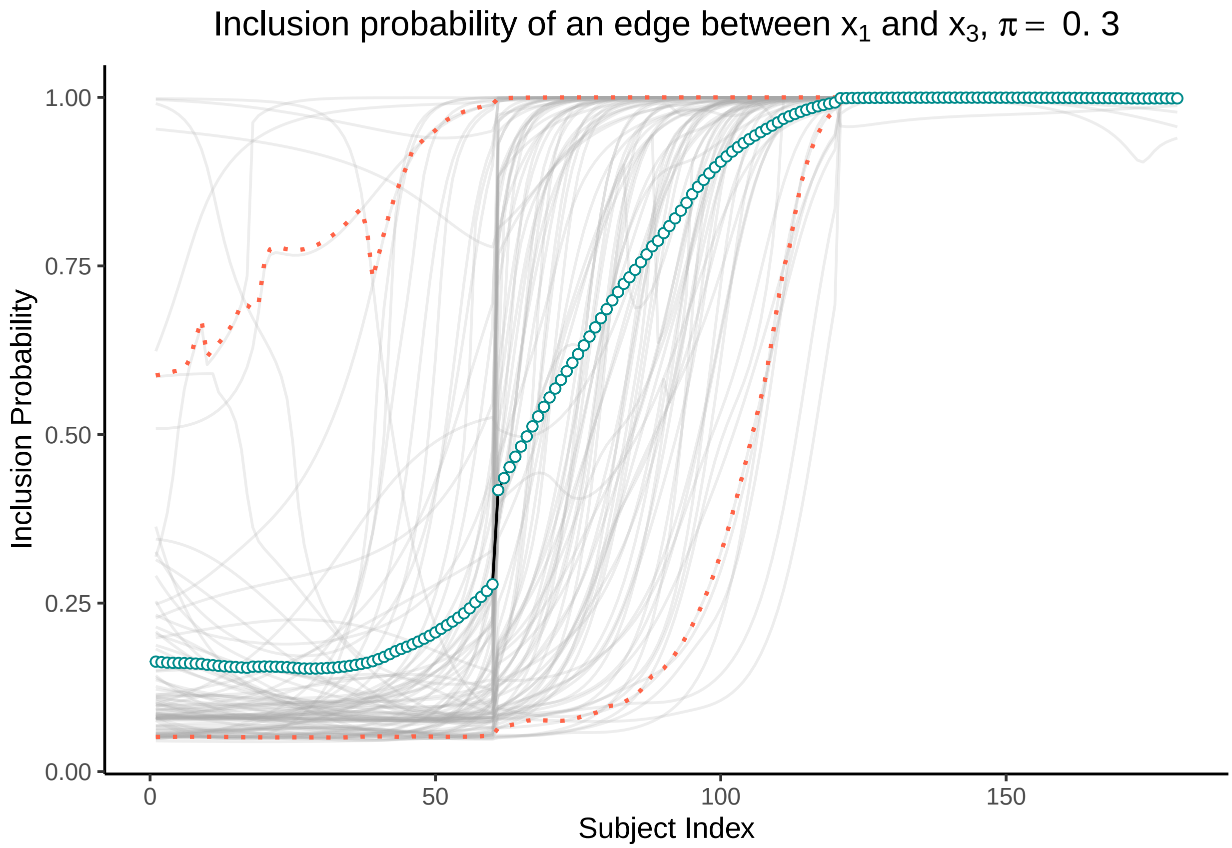


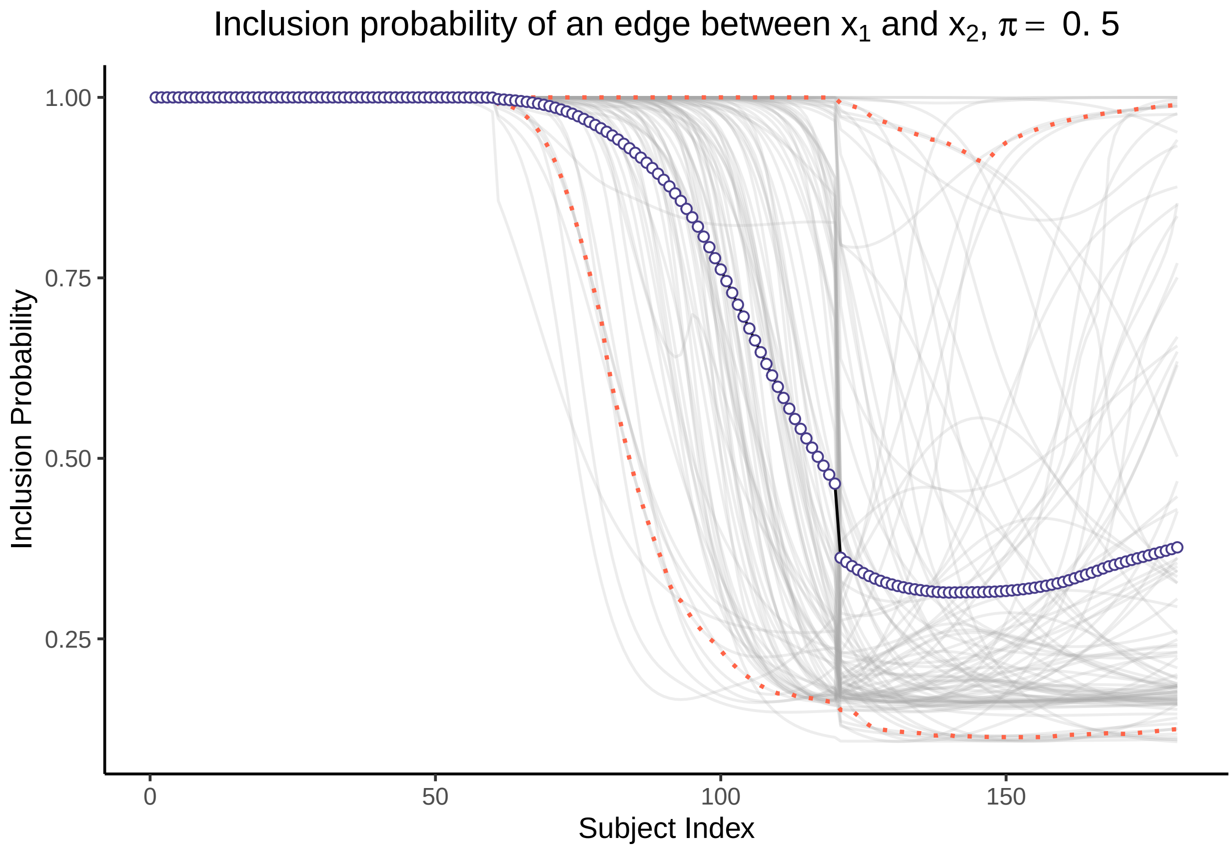
Inclusion probability of an edge between x_1 and x_2, $\pi = 0.1$
Inclusion Probability
1.00
0.75
0.50
0.25
0.00
0
50
100
150
Subject Index



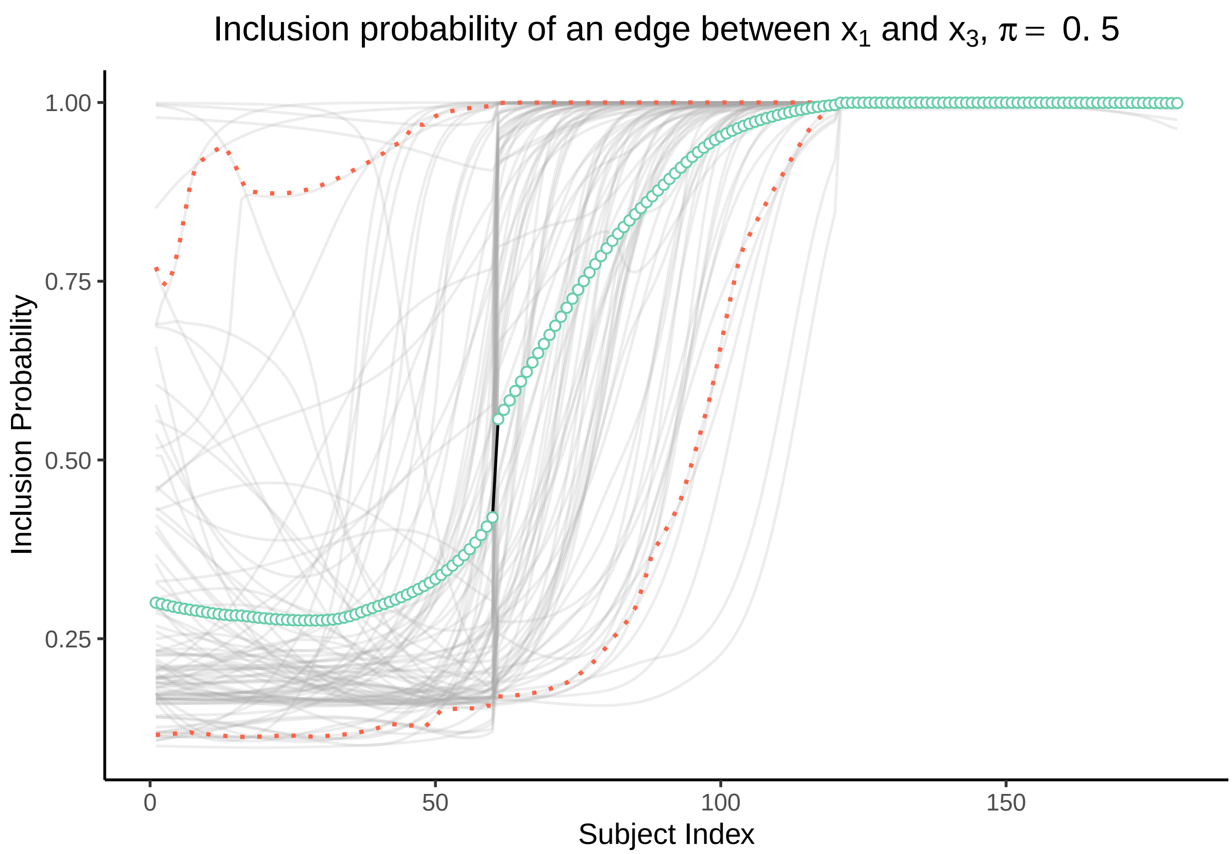
Inclusion probability of an edge between x_1 and x_3, $\pi =$ 0. 1
Inclusion Probability
1.00
0.75
0.50
0.25
0.00
0
50
100
150
Subject Index

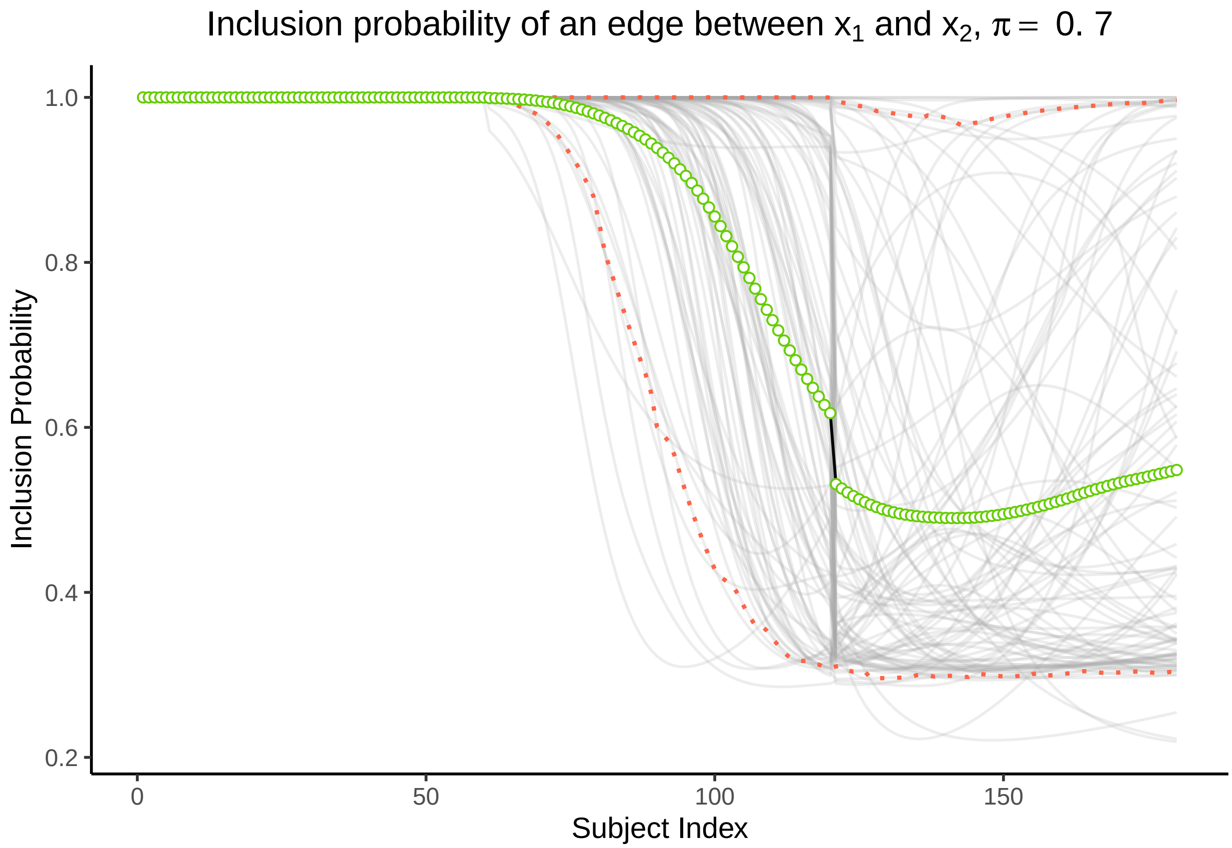

Inclusion probability of an edge between x_1 and x_2, $\pi = 0.3$
Inclusion Probability
1.00
0.75
0.50
0.25
0.00
0
50
100
150
Subject Index


Inclusion probability of an edge between x_1 and x_3, $\pi = 0.3$
Inclusion Probability
1.00
0.75
0.50
0.25
0.00
0
50
100
150
Subject Index

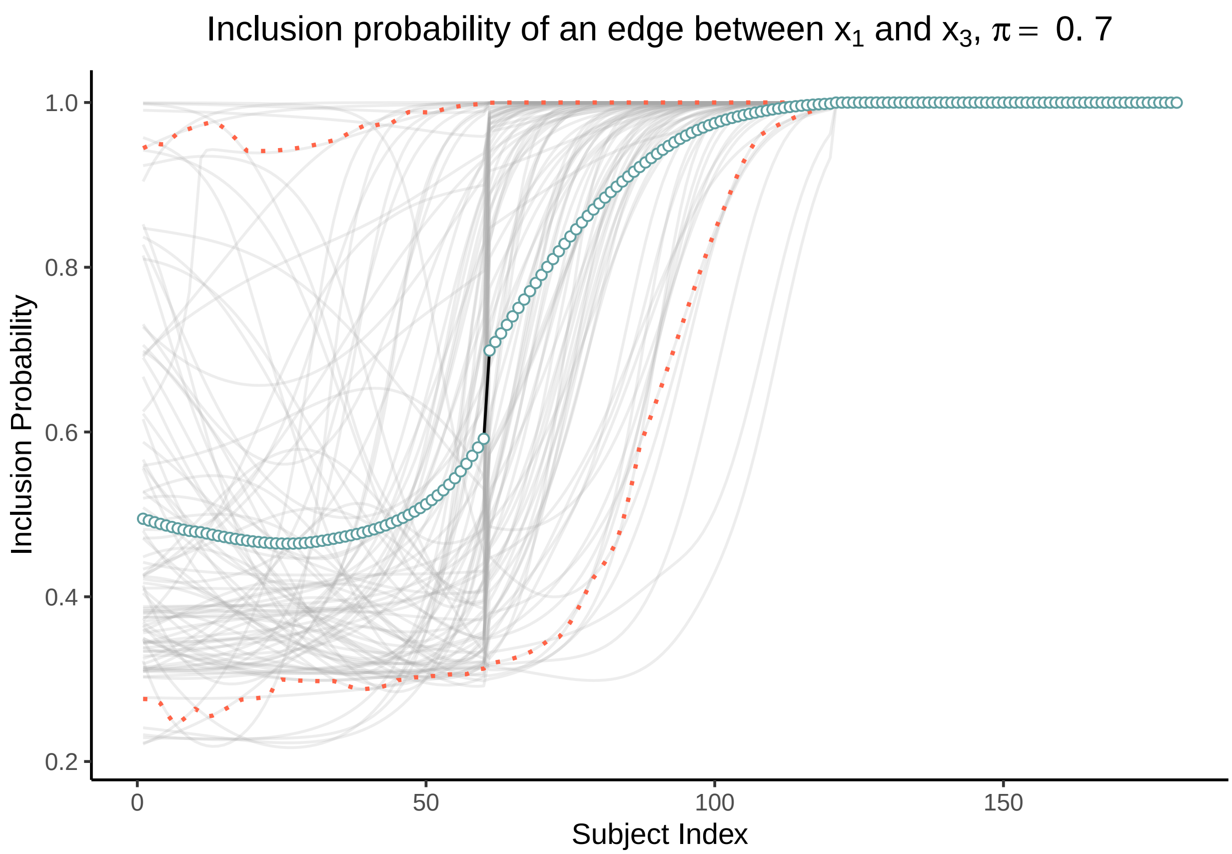


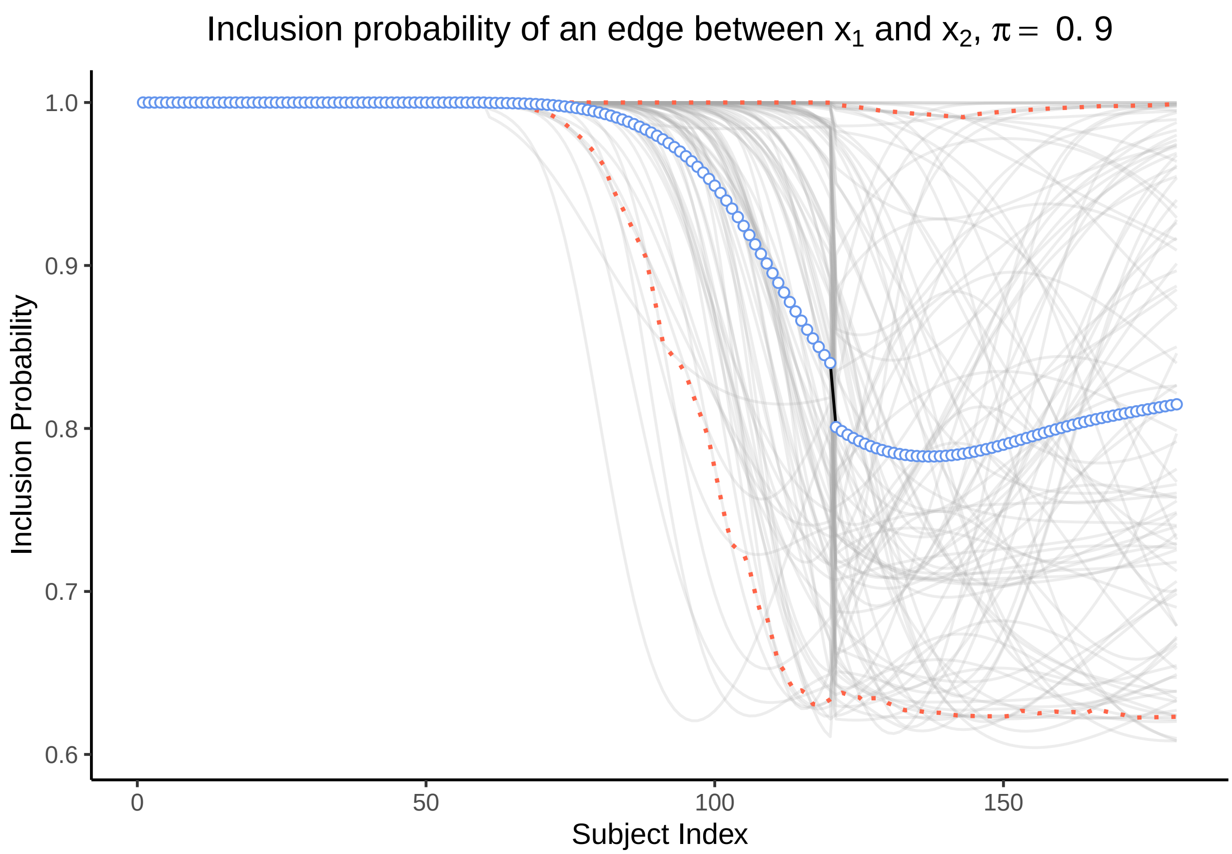
Inclusion probability of an edge between x_1 and x_2, $\pi =$ 0. 5
Inclusion Probability
1.00
0.75
0.50
0.25
0
50
100
150
Subject Index

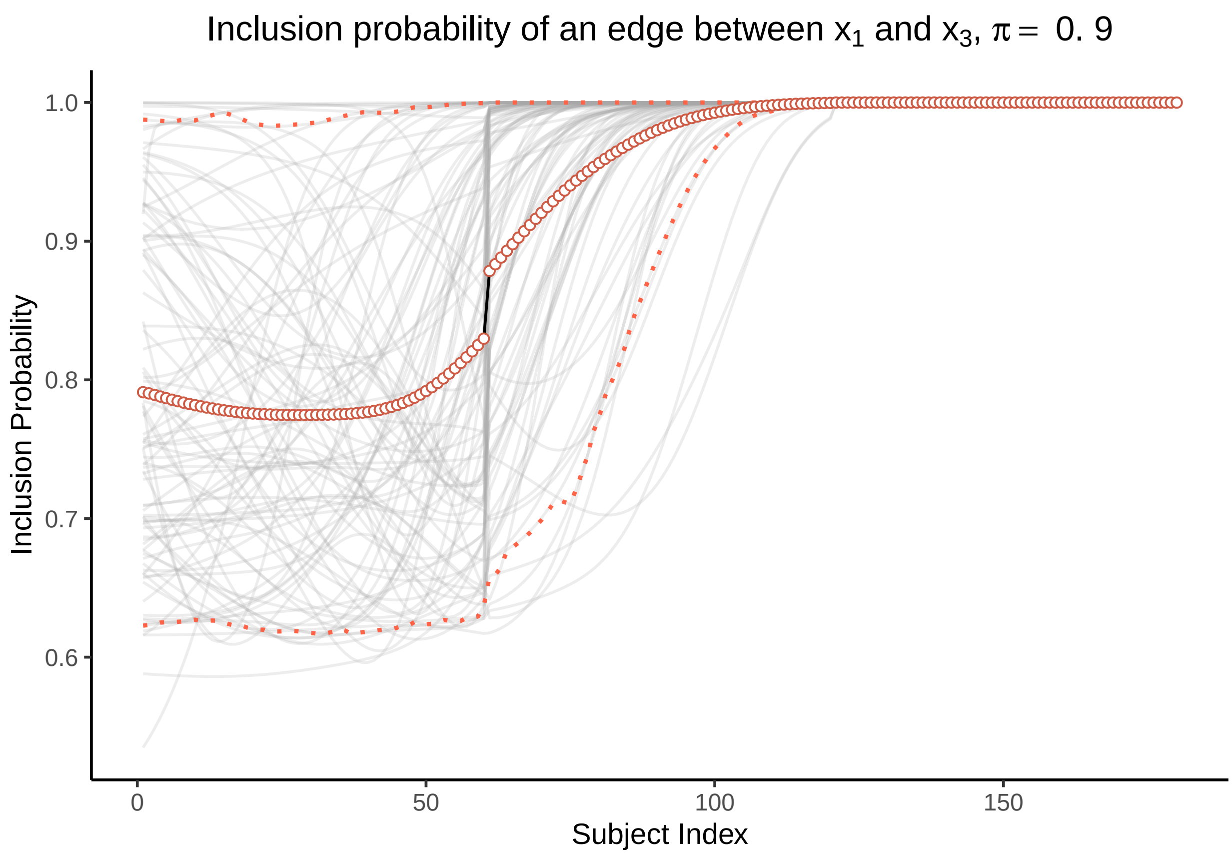

Inclusion probability of an edge between x_1 and x_3, $\pi = 0.5$
1.00
0.75
0.50
0.25
Inclusion Probability
0
50
100
150
Subject Index



Inclusion probability of an edge between x1 and x2, π = 0. 7
Inclusion Probability
Subject Index
1.0
0.8
0.6
0.4
0.2
0
50
100
150


Inclusion probability of an edge between x1 and x3, π = 0. 7
Inclusion Probability
1.0
0.8
0.6
0.4
0.2
0
50
100
150
Subject Index


Inclusion probability of an edge between x_1 and x_2, $\pi = 0.9$
Inclusion Probability
1.0
0.9
0.8
0.7
0.6
0
50
100
150
Subject Index


Inclusion probability of an edge between x_1 and x_3, $\pi = 0.9$
Inclusion Probability
1.0
0.9
0.8
0.7
0.6
0
50
100
150
Subject Index