NA in Indirect Effects for 95% likelihood based CI's metaSEM

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```
library("OpenMx")
```

```
## Loading required package: digest
## Loading required package: MASS
## Loading required package: Matrix
## Loading required package: Rcpp
## Loading required package: parallel
## To take full advantage of multiple cores, use:
##   mxOption(NULL, 'Number of Threads', parallel::detectCores())
##
## Attaching package: 'OpenMx'
## The following objects are masked from 'package:Matrix':
##
##     %&%, expm
```

```
library("metaSEM")
```

```
## "SLSQP" is set as the default optimizer in OpenMx.
## mxOption(NULL, "Gradient algorithm") is set at "central".
## mxOption(NULL, "Optimality tolerance") is set at "6.3e-14".
## mxOption(NULL, "Gradient iterations") is set at "2".
```

```
(x1 <- vec2symMat(c(1,0.67,0.67,0.63,-0.56,1,0.77,0.66,-0.58,1,0.62,-0.58,1,-0.57,1)))
```

```
##       [,1]  [,2]  [,3]  [,4]  [,5]
## [1,]  1.00  0.67  0.67  0.63 -0.56
## [2,]  0.67  1.00  0.77  0.66 -0.58
## [3,]  0.67  0.77  1.00  0.62 -0.58
## [4,]  0.63  0.66  0.62  1.00 -0.57
## [5,] -0.56 -0.58 -0.58 -0.57  1.00
```

```
(x2 <- vec2symMat(c(1,NA,0.522,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.522   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.522   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x3 <- vec2symMat(c(1,0.24,NA,NA,-0.13,1,NA,NA,-0.34,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4]  [,5]
## [1,]  1.00  0.24   NA   NA -0.13
## [2,]  0.24  1.00   NA   NA -0.34
## [3,]    NA    NA    1   NA    NA
## [4,]    NA    NA   NA    1    NA
## [5,] -0.13 -0.34   NA   NA  1.00
```

```
(x4 <- vec2symMat(c(1,0.25,NA,NA,-0.14,1,NA,NA,-0.35,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4]  [,5]
## [1,]  1.00  0.25   NA   NA -0.14
## [2,]  0.25  1.00   NA   NA -0.35
## [3,]    NA    NA    1   NA    NA
## [4,]    NA    NA   NA    1    NA
## [5,] -0.14 -0.35   NA   NA  1.00
```

```
(x5 <- vec2symMat(c(1,NA,0.36,0.34,-0.18,1,NA,NA,NA,1,0.04,-0.1,1,-0.32,1)))
```

```
##       [,1] [,2]  [,3]  [,4]  [,5]
## [1,]  1.00   NA  0.36  0.34 -0.18
## [2,]    NA    1    NA    NA    NA
## [3,]  0.36   NA  1.00  0.04 -0.10
## [4,]  0.34   NA  0.04  1.00 -0.32
## [5,] -0.18   NA -0.10 -0.32  1.00
```

```
(x6 <- vec2symMat(c(1,0.44,0.57,0.47,-0.25,1,0.62,0.53,-0.62,1,0.3,-0.62,1,-0.39,1)))
```

```
##       [,1]  [,2]  [,3]  [,4]  [,5]
## [1,]  1.00  0.44  0.57  0.47 -0.25
## [2,]  0.44  1.00  0.62  0.53 -0.62
## [3,]  0.57  0.62  1.00  0.30 -0.62
## [4,]  0.47  0.53  0.30  1.00 -0.39
## [5,] -0.25 -0.62 -0.62 -0.39  1.00
```

```
(x7 <- vec2symMat(c(1,0.7,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  1.0  0.7   NA   NA   NA
## [2,]  0.7  1.0   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x8 <- vec2symMat(c(1,NA,0.668,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.668   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.668   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x9 <- vec2symMat(c(1,NA,0.43,NA,-0.29,1,NA,NA,NA,1,NA,-0.28,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4]  [,5]
## [1,]  1.00   NA  0.43   NA -0.29
## [2,]    NA    1    NA   NA    NA
## [3,]  0.43   NA  1.00   NA -0.28
```

```
## [4,]    NA   NA    NA    1    NA
## [5,] -0.29   NA -0.28   NA  1.00
```

```
(x10 <- vec2symMat(c(1,NA,NA,0.6,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  1.0   NA   NA  0.6   NA
## [2,]   NA    1   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]  0.6   NA   NA  1.0   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x11 <- vec2symMat(c(1,0.29,0.29,NA,NA,1,0.48,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.29 0.29   NA   NA
## [2,] 0.29 1.00 0.48   NA   NA
## [3,] 0.29 0.48 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x12 <- vec2symMat(c(1,NA,0.54,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA 0.54   NA   NA
## [2,]   NA    1   NA   NA   NA
## [3,] 0.54   NA 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x13 <- vec2symMat(c(1,0.453,0.7,0.72,-0.618,1,0.586,0.536,-0.51,1,0.68,-0.665,1,-0.623,1)))
```

```
##        [,1]   [,2]   [,3]   [,4]   [,5]
## [1,]  1.000  0.453  0.700  0.720 -0.618
## [2,]  0.453  1.000  0.586  0.536 -0.510
## [3,]  0.700  0.586  1.000  0.680 -0.665
## [4,]  0.720  0.536  0.680  1.000 -0.623
## [5,] -0.618 -0.510 -0.665 -0.623  1.000
```

```
(x14 <- vec2symMat(c(1,0.42,NA,0.49,NA,1,NA,0.74,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.42   NA 0.49   NA
## [2,] 0.42 1.00   NA 0.74   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.49 0.74   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x15 <- vec2symMat(c(1,0.218,NA,0.437,-0.171,1,NA,0.376,-0.644,1,NA,NA,1,-0.336,1)))
```

```
##        [,1]   [,2] [,3]   [,4]   [,5]
## [1,]  1.000  0.218   NA  0.437 -0.171
## [2,]  0.218  1.000   NA  0.376 -0.644
## [3,]     NA     NA    1     NA     NA
## [4,]  0.437  0.376   NA  1.000 -0.336
## [5,] -0.171 -0.644   NA -0.336  1.000
```

```
(x16 <- vec2symMat(c(1,0.561,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4] [,5]
## [1,] 1.000 0.561   NA   NA   NA
## [2,] 0.561 1.000   NA   NA   NA
## [3,]    NA    NA    1   NA   NA
## [4,]    NA    NA   NA    1   NA
## [5,]    NA    NA   NA   NA    1
```

```
(x17 <- vec2symMat(c(1,0.564,0.456,0.413,-0.259,1,0.539,0.472,-0.451,1,0.315,-0.274,1,-0.351,1)))
```

```
##        [,1]   [,2]   [,3]   [,4]   [,5]
## [1,]  1.000  0.564  0.456  0.413 -0.259
## [2,]  0.564  1.000  0.539  0.472 -0.451
## [3,]  0.456  0.539  1.000  0.315 -0.274
## [4,]  0.413  0.472  0.315  1.000 -0.351
## [5,] -0.259 -0.451 -0.274 -0.351  1.000
```

```
(x18 <- vec2symMat(c(1,NA,NA,0.369,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2] [,3]  [,4] [,5]
## [1,] 1.000   NA   NA 0.369   NA
## [2,]    NA    1   NA    NA   NA
## [3,]    NA   NA    1    NA   NA
## [4,] 0.369   NA   NA 1.000   NA
## [5,]    NA   NA   NA    NA    1
```

```
(x19 <- vec2symMat(c(1,0.62,NA,NA,-0.64,1,NA,NA,-0.69,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4]  [,5]
## [1,]  1.00  0.62   NA   NA -0.64
## [2,]  0.62  1.00   NA   NA -0.69
## [3,]    NA    NA    1   NA    NA
## [4,]    NA    NA   NA    1    NA
## [5,] -0.64 -0.69   NA   NA  1.00
```

```
(x20 <- vec2symMat(c(1,NA,0.413,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.413   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.413   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x21 <- vec2symMat(c(1,0.18,0.66,NA,-0.18,1,0.38,NA,-0.9,1,NA,-0.43,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4]  [,5]
## [1,]  1.00  0.18  0.66   NA -0.18
## [2,]  0.18  1.00  0.38   NA -0.90
## [3,]  0.66  0.38  1.00   NA -0.43
## [4,]    NA    NA    NA    1    NA
## [5,] -0.18 -0.90 -0.43   NA  1.00
```

```
(x22 <- vec2symMat(c(1,NA,0.529,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.529   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.529   NA 1.000   NA   NA
```

```
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x23 <- vec2symMat(c(1,0.54,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.54   NA   NA   NA
## [2,] 0.54 1.00   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x24 <- vec2symMat(c(1,0.309,0.202,NA,NA,1,0.508,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4] [,5]
## [1,] 1.000 0.309 0.202   NA   NA
## [2,] 0.309 1.000 0.508   NA   NA
## [3,] 0.202 0.508 1.000   NA   NA
## [4,]    NA    NA    NA    1   NA
## [5,]    NA    NA    NA   NA    1
```

```
(x25 <- vec2symMat(c(1,0.31,0.4,NA,NA,1,0.42,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.31 0.40   NA   NA
## [2,] 0.31 1.00 0.42   NA   NA
## [3,] 0.40 0.42 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x26 <- vec2symMat(c(1,0.234,NA,0.289,-0.238,1,NA,0.301,-0.196,1,NA,NA,1,-0.271,1)))
```

```
##        [,1]   [,2] [,3]   [,4]   [,5]
## [1,]  1.000  0.234   NA  0.289 -0.238
## [2,]  0.234  1.000   NA  0.301 -0.196
## [3,]     NA     NA    1     NA     NA
## [4,]  0.289  0.301   NA  1.000 -0.271
## [5,] -0.238 -0.196   NA -0.271  1.000
```

```
(x27 <- vec2symMat(c(1,0.195656566,NA,NA,-0.231157025,1,NA,NA,-0.328838384,1,NA,NA,1,NA,1)))
```

```
##            [,1]       [,2] [,3] [,4]       [,5]
## [1,]  1.0000000  0.1956566   NA   NA -0.2311570
## [2,]  0.1956566  1.0000000   NA   NA -0.3288384
## [3,]         NA         NA    1   NA         NA
## [4,]         NA         NA   NA    1         NA
## [5,] -0.2311570 -0.3288384   NA   NA  1.0000000
```

```
(x28 <- vec2symMat(c(1,0.230833333,NA,NA,-0.173461538,1,NA,NA,-0.524405594,1,NA,NA,1,NA,1)))
```

```
##            [,1]       [,2] [,3] [,4]       [,5]
## [1,]  1.0000000  0.2308333   NA   NA -0.1734615
## [2,]  0.2308333  1.0000000   NA   NA -0.5244056
## [3,]         NA         NA    1   NA         NA
## [4,]         NA         NA   NA    1         NA
## [5,] -0.1734615 -0.5244056   NA   NA  1.0000000
```

```
(x29 <- vec2symMat(c(1,NA,0.28,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA 0.28   NA   NA
## [2,]   NA    1   NA   NA   NA
## [3,] 0.28   NA 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x30 <- vec2symMat(c(1,0.62,0.54,0.33,NA,1,0.54,0.65,NA,1,0.34,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.62 0.54 0.33   NA
## [2,] 0.62 1.00 0.54 0.65   NA
## [3,] 0.54 0.54 1.00 0.34   NA
## [4,] 0.33 0.65 0.34 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x31 <- vec2symMat(c(1,NA,0.454,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.454   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.454   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x32 <- vec2symMat(c(1,NA,0.832,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.832   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.832   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x33 <- vec2symMat(c(1,NA,NA,NA,-0.303,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##        [,1] [,2] [,3] [,4]   [,5]
## [1,]  1.000   NA   NA   NA -0.303
## [2,]     NA    1   NA   NA     NA
## [3,]     NA   NA    1   NA     NA
## [4,]     NA   NA   NA    1     NA
## [5,] -0.303   NA   NA   NA  1.000
```

```
(x34 <- vec2symMat(c(1,0.45,0.77,0.38,-0.51,1,0.49,0.74,-0.72,1,0.52,-0.54,1,-0.81,1)))
```

```
##       [,1]  [,2]  [,3]  [,4]  [,5]
## [1,]  1.00  0.45  0.77  0.38 -0.51
## [2,]  0.45  1.00  0.49  0.74 -0.72
## [3,]  0.77  0.49  1.00  0.52 -0.54
## [4,]  0.38  0.74  0.52  1.00 -0.81
## [5,] -0.51 -0.72 -0.54 -0.81  1.00
```

```
(x35 <- vec2symMat(c(1,0.338,NA,0.396,-0.119,1,NA,0.53,-0.583,1,NA,NA,1,-0.52,1)))
```

```
##        [,1]   [,2] [,3]   [,4]   [,5]
## [1,]  1.000  0.338   NA  0.396 -0.119
## [2,]  0.338  1.000   NA  0.530 -0.583
## [3,]     NA     NA    1     NA     NA
```

```
## [4,]  0.396  0.530   NA  1.000 -0.520
## [5,] -0.119 -0.583   NA -0.520  1.000
```

```
(x36 <- vec2symMat(c(1,NA,0.655,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.655   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.655   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x37 <- vec2symMat(c(1,0.408,0.624,NA,NA,1,0.461,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4] [,5]
## [1,] 1.000 0.408 0.624   NA   NA
## [2,] 0.408 1.000 0.461   NA   NA
## [3,] 0.624 0.461 1.000   NA   NA
## [4,]    NA    NA    NA    1   NA
## [5,]    NA    NA    NA   NA    1
```

```
(x38 <- vec2symMat(c(1,0.092,NA,NA,-0.234,1,NA,NA,-0.415,1,NA,NA,1,NA,1)))
```

```
##        [,1]   [,2] [,3] [,4]   [,5]
## [1,]  1.000  0.092   NA   NA -0.234
## [2,]  0.092  1.000   NA   NA -0.415
## [3,]     NA     NA    1   NA     NA
## [4,]     NA     NA   NA    1     NA
## [5,] -0.234 -0.415   NA   NA  1.000
```

```
(x39 <- vec2symMat(c(1,NA,NA,0.766,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2] [,3]  [,4] [,5]
## [1,] 1.000   NA   NA 0.766   NA
## [2,]    NA    1   NA    NA   NA
## [3,]    NA   NA    1    NA   NA
## [4,] 0.766   NA   NA 1.000   NA
## [5,]    NA   NA   NA    NA    1
```

```
(x40 <- vec2symMat(c(1,NA,0.533,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.533   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.533   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x41 <- vec2symMat(c(1,NA,NA,NA,-0.282,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##        [,1] [,2] [,3] [,4]   [,5]
## [1,]  1.000   NA   NA   NA -0.282
## [2,]     NA    1   NA   NA     NA
## [3,]     NA   NA    1   NA     NA
## [4,]     NA   NA   NA    1     NA
## [5,] -0.282   NA   NA   NA  1.000
```

```
(x42 <- vec2symMat(c(1,NA,NA,0.445,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2] [,3]  [,4] [,5]
## [1,] 1.000   NA   NA 0.445   NA
## [2,]    NA    1   NA    NA   NA
## [3,]    NA   NA    1    NA   NA
## [4,] 0.445   NA   NA 1.000   NA
## [5,]    NA   NA   NA    NA    1
```

```
(x43 <- vec2symMat(c(1,0.613,0.51,NA,NA,1,0.739,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4] [,5]
## [1,] 1.000 0.613 0.510   NA   NA
## [2,] 0.613 1.000 0.739   NA   NA
## [3,] 0.510 0.739 1.000   NA   NA
## [4,]    NA    NA    NA    1   NA
## [5,]    NA    NA    NA   NA    1
```

```
(x44 <- vec2symMat(c(1,NA,NA,0.61,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA   NA 0.61   NA
## [2,]   NA    1   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.61   NA   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x45 <- vec2symMat(c(1,NA,NA,0.77,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA   NA 0.77   NA
## [2,]   NA    1   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.77   NA   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x46 <- vec2symMat(c(1,0.273,0.5148,NA,NA,1,0.4016,NA,NA,1,NA,NA,1,NA,1)))
```

```
##        [,1]   [,2]   [,3] [,4] [,5]
## [1,] 1.0000 0.2730 0.5148   NA   NA
## [2,] 0.2730 1.0000 0.4016   NA   NA
## [3,] 0.5148 0.4016 1.0000   NA   NA
## [4,]     NA     NA     NA    1   NA
## [5,]     NA     NA     NA   NA    1
```

```
(x47 <- vec2symMat(c(1,NA,0.743,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.743   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.743   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x48 <- vec2symMat(c(1,0.304,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4] [,5]
## [1,] 1.000 0.304   NA   NA   NA
## [2,] 0.304 1.000   NA   NA   NA
## [3,]    NA    NA    1   NA   NA
```

```
## [4,]    NA    NA   NA    1   NA
## [5,]    NA    NA   NA   NA    1
```

```
(x49 <- vec2symMat(c(1,0.456,NA,NA,-0.31,1,NA,NA,-0.244,1,NA,NA,1,NA,1)))
```

```
##        [,1]   [,2] [,3] [,4]   [,5]
## [1,]  1.000  0.456   NA   NA -0.310
## [2,]  0.456  1.000   NA   NA -0.244
## [3,]     NA     NA    1   NA     NA
## [4,]     NA     NA   NA    1     NA
## [5,] -0.310 -0.244   NA   NA  1.000
```

```
(x50 <- vec2symMat(c(1,0.537,NA,NA,-0.398,1,NA,NA,-0.36,1,NA,NA,1,NA,1)))
```

```
##        [,1]   [,2] [,3] [,4]   [,5]
## [1,]  1.000  0.537   NA   NA -0.398
## [2,]  0.537  1.000   NA   NA -0.360
## [3,]     NA     NA    1   NA     NA
## [4,]     NA     NA   NA    1     NA
## [5,] -0.398 -0.360   NA   NA  1.000
```

```
(x51 <- vec2symMat(c(1,0.376,0.502,0.633,-0.363,1,0.51,0.434,-0.447,1,0.559,-0.592,1,-0.535,1)))
```

```
##        [,1]   [,2]   [,3]   [,4]   [,5]
## [1,]  1.000  0.376  0.502  0.633 -0.363
## [2,]  0.376  1.000  0.510  0.434 -0.447
## [3,]  0.502  0.510  1.000  0.559 -0.592
## [4,]  0.633  0.434  0.559  1.000 -0.535
## [5,] -0.363 -0.447 -0.592 -0.535  1.000
```

```
(x52 <- vec2symMat(c(1,0.47,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.47   NA   NA   NA
## [2,] 0.47 1.00   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x53 <- vec2symMat(c(1,NA,NA,0.619,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2] [,3]  [,4] [,5]
## [1,] 1.000   NA   NA 0.619   NA
## [2,]    NA    1   NA    NA   NA
## [3,]    NA   NA    1    NA   NA
## [4,] 0.619   NA   NA 1.000   NA
## [5,]    NA   NA   NA    NA    1
```

```
(x54 <- vec2symMat(c(1,0.15,NA,0.17,NA,1,NA,0.13,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.15   NA 0.17   NA
## [2,] 0.15 1.00   NA 0.13   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.17 0.13   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x55 <- vec2symMat(c(1,0.15,NA,0.28,NA,1,NA,0.23,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.15   NA 0.28   NA
## [2,] 0.15 1.00   NA 0.23   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.28 0.23   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x56 <- vec2symMat(c(1,0.57,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.57   NA   NA   NA
## [2,] 0.57 1.00   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x57 <- vec2symMat(c(1,NA,NA,NA,-0.18,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2] [,3] [,4]  [,5]
## [1,]  1.00   NA   NA   NA -0.18
## [2,]    NA    1   NA   NA    NA
## [3,]    NA   NA    1   NA    NA
## [4,]    NA   NA   NA    1    NA
## [5,] -0.18   NA   NA   NA  1.00
```

```
(x58 <- vec2symMat(c(1,0.4,0.34,NA,NA,1,0.55,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.40 0.34   NA   NA
## [2,] 0.40 1.00 0.55   NA   NA
## [3,] 0.34 0.55 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x59 <- vec2symMat(c(1,0.386,0.63,0.384,NA,1,0.531,0.549,NA,1,0.367,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3]  [,4] [,5]
## [1,] 1.000 0.386 0.630 0.384   NA
## [2,] 0.386 1.000 0.531 0.549   NA
## [3,] 0.630 0.531 1.000 0.367   NA
## [4,] 0.384 0.549 0.367 1.000   NA
## [5,]    NA    NA    NA    NA    1
```

```
(x60 <- vec2symMat(c(1,NA,NA,0.43,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA   NA 0.43   NA
## [2,]   NA    1   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.43   NA   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x61 <- vec2symMat(c(1,0.51,0.66,NA,-0.61,1,0.76,NA,-0.57,1,NA,-0.66,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4]  [,5]
## [1,]  1.00  0.51  0.66   NA -0.61
## [2,]  0.51  1.00  0.76   NA -0.57
## [3,]  0.66  0.76  1.00   NA -0.66
```

```
## [4,]    NA    NA    NA    1    NA
## [5,] -0.61 -0.57 -0.66   NA  1.00
```

```
(x62 <- vec2symMat(c(1,0.499,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4] [,5]
## [1,] 1.000 0.499   NA   NA   NA
## [2,] 0.499 1.000   NA   NA   NA
## [3,]    NA    NA    1   NA   NA
## [4,]    NA    NA   NA    1   NA
## [5,]    NA    NA   NA   NA    1
```

```
(x63 <- vec2symMat(c(1,0.602,0.716,NA,NA,1,0.622,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4] [,5]
## [1,] 1.000 0.602 0.716   NA   NA
## [2,] 0.602 1.000 0.622   NA   NA
## [3,] 0.716 0.622 1.000   NA   NA
## [4,]    NA    NA    NA    1   NA
## [5,]    NA    NA    NA   NA    1
```

```
(x64 <- vec2symMat(c(1,NA,NA,0.18,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA   NA 0.18   NA
## [2,]   NA    1   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,] 0.18   NA   NA 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x65 <- vec2symMat(c(1,NA,0.6414,0.0027,-0.1386,1,NA,NA,NA,1,0.0459,-0.1925,1,-0.629,1)))
```

```
##         [,1] [,2]    [,3]    [,4]    [,5]
## [1,]  1.0000   NA  0.6414  0.0027 -0.1386
## [2,]      NA    1      NA      NA      NA
## [3,]  0.6414   NA  1.0000  0.0459 -0.1925
## [4,]  0.0027   NA  0.0459  1.0000 -0.6290
## [5,] -0.1386   NA -0.1925 -0.6290  1.0000
```

```
(x66 <- vec2symMat(c(1,NA,NA,0.353,-0.385,1,NA,NA,NA,1,NA,NA,1,-0.478,1)))
```

```
##        [,1] [,2] [,3]   [,4]   [,5]
## [1,]  1.000   NA   NA  0.353 -0.385
## [2,]     NA    1   NA     NA     NA
## [3,]     NA   NA    1     NA     NA
## [4,]  0.353   NA   NA  1.000 -0.478
## [5,] -0.385   NA   NA -0.478  1.000
```

```
(x67 <- vec2symMat(c(1,0.51,0.68,0.35,NA,1,0.47,0.5,NA,1,0.48,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.51 0.68 0.35   NA
## [2,] 0.51 1.00 0.47 0.50   NA
## [3,] 0.68 0.47 1.00 0.48   NA
## [4,] 0.35 0.50 0.48 1.00   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x68 <- vec2symMat(c(1,0.62,0.77,NA,NA,1,0.63,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.62 0.77   NA   NA
## [2,] 0.62 1.00 0.63   NA   NA
## [3,] 0.77 0.63 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x69 <- vec2symMat(c(1,NA,0.53,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA 0.53   NA   NA
## [2,]   NA    1   NA   NA   NA
## [3,] 0.53   NA 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x70 <- vec2symMat(c(1,0.28,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.28   NA   NA   NA
## [2,] 0.28 1.00   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x71 <- vec2symMat(c(1,0.57,NA,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.57   NA   NA   NA
## [2,] 0.57 1.00   NA   NA   NA
## [3,]   NA   NA    1   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x72 <- vec2symMat(c(1,0.32,0.561,NA,NA,1,0.505,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2]  [,3] [,4] [,5]
## [1,] 1.000 0.320 0.561   NA   NA
## [2,] 0.320 1.000 0.505   NA   NA
## [3,] 0.561 0.505 1.000   NA   NA
## [4,]    NA    NA    NA    1   NA
## [5,]    NA    NA    NA   NA    1
```

```
(x73 <- vec2symMat(c(1,0.795,0.761,NA,-0.671,1,0.719,NA,-0.688,1,NA,-0.633,1,NA,1)))
```

```
##        [,1]   [,2]   [,3] [,4]   [,5]
## [1,]  1.000  0.795  0.761   NA -0.671
## [2,]  0.795  1.000  0.719   NA -0.688
## [3,]  0.761  0.719  1.000   NA -0.633
## [4,]     NA     NA     NA    1     NA
## [5,] -0.671 -0.688 -0.633   NA  1.000
```

```
(x74 <- vec2symMat(c(1,NA,0.532,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.532   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.532   NA 1.000   NA   NA
```

```
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x75 <- vec2symMat(c(1,NA,0.522,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1] [,2]  [,3] [,4] [,5]
## [1,] 1.000   NA 0.522   NA   NA
## [2,]    NA    1    NA   NA   NA
## [3,] 0.522   NA 1.000   NA   NA
## [4,]    NA   NA    NA    1   NA
## [5,]    NA   NA    NA   NA    1
```

```
(x76 <- vec2symMat(c(1,0.493,NA,NA,NA,1,NA,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##       [,1]  [,2] [,3] [,4] [,5]
## [1,] 1.000 0.493   NA   NA   NA
## [2,] 0.493 1.000   NA   NA   NA
## [3,]    NA    NA    1   NA   NA
## [4,]    NA    NA   NA    1   NA
## [5,]    NA    NA   NA   NA    1
```

```
(x77 <- vec2symMat(c(1,NA,0.31,NA,NA,1,NA,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00   NA 0.31   NA   NA
## [2,]   NA    1   NA   NA   NA
## [3,] 0.31   NA 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
(x78 <- vec2symMat(c(1,0.45,0.71,NA,NA,1,0.66,NA,NA,1,NA,NA,1,NA,1)))
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,] 1.00 0.45 0.71   NA   NA
## [2,] 0.45 1.00 0.66   NA   NA
## [3,] 0.71 0.66 1.00   NA   NA
## [4,]   NA   NA   NA    1   NA
## [5,]   NA   NA   NA   NA    1
```

```
my.df6 <- list(x1, x2, x3,x4,x5,x6,x7,x8,x9,x10,x11,x12,x13,x14,x15,x16,x17,x18,x19,
               x20,x21,x22,x23,x24,x25,x26,x27,x28,x29,x30,x31,x32,x33,x34,x35,x36,
               x37,x38,x39,x40,x41,x42,x43,x44,x45,x46,x47,x48,x49,x50,x51,x52,x53,
               x54,x55,x56,x57,x58,x59,x60,x61,x62,x63,x64,x65,x66,x67,x68,x69,x70,
               x71,x72,x73,x74,x75,x76,x77,x78)

my.df6 <- lapply(my.df6, function(x)
{dimnames(x) <- list(c("S","P","J","T","E"),
                     c("S","P","J","T","E"))
  x})

my.df6
```

```
## [[1]]
##       S     P     J     T     E
## S  1.00  0.67  0.67  0.63 -0.56
## P  0.67  1.00  0.77  0.66 -0.58
## J  0.67  0.77  1.00  0.62 -0.58
## T  0.63  0.66  0.62  1.00 -0.57
```

```
## E -0.56 -0.58 -0.58 -0.57  1.00
##
## [[2]]
##       S  P     J  T  E
## S 1.000 NA 0.522 NA NA
## P    NA  1    NA NA NA
## J 0.522 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[3]]
##       S     P  J  T     E
## S  1.00  0.24 NA NA -0.13
## P  0.24  1.00 NA NA -0.34
## J    NA    NA  1 NA    NA
## T    NA    NA NA  1    NA
## E -0.13 -0.34 NA NA  1.00
##
## [[4]]
##       S     P  J  T     E
## S  1.00  0.25 NA NA -0.14
## P  0.25  1.00 NA NA -0.35
## J    NA    NA  1 NA    NA
## T    NA    NA NA  1    NA
## E -0.14 -0.35 NA NA  1.00
##
## [[5]]
##       S  P     J     T     E
## S  1.00 NA  0.36  0.34 -0.18
## P    NA  1    NA    NA    NA
## J  0.36 NA  1.00  0.04 -0.10
## T  0.34 NA  0.04  1.00 -0.32
## E -0.18 NA -0.10 -0.32  1.00
##
## [[6]]
##       S     P     J     T     E
## S  1.00  0.44  0.57  0.47 -0.25
## P  0.44  1.00  0.62  0.53 -0.62
## J  0.57  0.62  1.00  0.30 -0.62
## T  0.47  0.53  0.30  1.00 -0.39
## E -0.25 -0.62 -0.62 -0.39  1.00
##
## [[7]]
##     S   P  J  T  E
## S 1.0 0.7 NA NA NA
## P 0.7 1.0 NA NA NA
## J  NA  NA  1 NA NA
## T  NA  NA NA  1 NA
## E  NA  NA NA NA  1
##
## [[8]]
##       S  P     J  T  E
## S 1.000 NA 0.668 NA NA
## P    NA  1    NA NA NA
```

```
## J 0.668 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[9]]
##       S  P     J  T     E
## S  1.00 NA  0.43 NA -0.29
## P    NA  1    NA NA    NA
## J  0.43 NA  1.00 NA -0.28
## T    NA NA    NA  1    NA
## E -0.29 NA -0.28 NA  1.00
##
## [[10]]
##     S  P  J   T  E
## S 1.0 NA NA 0.6 NA
## P  NA  1 NA  NA NA
## J  NA NA  1  NA NA
## T 0.6 NA NA 1.0 NA
## E  NA NA NA  NA  1
##
## [[11]]
##      S    P    J  T  E
## S 1.00 0.29 0.29 NA NA
## P 0.29 1.00 0.48 NA NA
## J 0.29 0.48 1.00 NA NA
## T   NA   NA   NA  1 NA
## E   NA   NA   NA NA  1
##
## [[12]]
##      S  P    J  T  E
## S 1.00 NA 0.54 NA NA
## P   NA  1   NA NA NA
## J 0.54 NA 1.00 NA NA
## T   NA NA   NA  1 NA
## E   NA NA   NA NA  1
##
## [[13]]
##        S      P      J      T      E
## S  1.000  0.453  0.700  0.720 -0.618
## P  0.453  1.000  0.586  0.536 -0.510
## J  0.700  0.586  1.000  0.680 -0.665
## T  0.720  0.536  0.680  1.000 -0.623
## E -0.618 -0.510 -0.665 -0.623  1.000
##
## [[14]]
##      S    P  J    T  E
## S 1.00 0.42 NA 0.49 NA
## P 0.42 1.00 NA 0.74 NA
## J   NA   NA  1   NA NA
## T 0.49 0.74 NA 1.00 NA
## E   NA   NA NA   NA  1
##
## [[15]]
##        S      P  J      T      E
```

```
## S  1.000  0.218 NA  0.437 -0.171
## P  0.218  1.000 NA  0.376 -0.644
## J     NA     NA  1     NA     NA
## T  0.437  0.376 NA  1.000 -0.336
## E -0.171 -0.644 NA -0.336  1.000
##
## [[16]]
##       S     P  J  T  E
## S 1.000 0.561 NA NA NA
## P 0.561 1.000 NA NA NA
## J    NA    NA  1 NA NA
## T    NA    NA NA  1 NA
## E    NA    NA NA NA  1
##
## [[17]]
##        S      P      J      T      E
## S  1.000  0.564  0.456  0.413 -0.259
## P  0.564  1.000  0.539  0.472 -0.451
## J  0.456  0.539  1.000  0.315 -0.274
## T  0.413  0.472  0.315  1.000 -0.351
## E -0.259 -0.451 -0.274 -0.351  1.000
##
## [[18]]
##       S  P  J     T  E
## S 1.000 NA NA 0.369 NA
## P    NA  1 NA    NA NA
## J    NA NA  1    NA NA
## T 0.369 NA NA 1.000 NA
## E    NA NA NA    NA  1
##
## [[19]]
##       S     P  J  T     E
## S  1.00  0.62 NA NA -0.64
## P  0.62  1.00 NA NA -0.69
## J    NA    NA  1 NA    NA
## T    NA    NA NA  1    NA
## E -0.64 -0.69 NA NA  1.00
##
## [[20]]
##       S  P     J  T  E
## S 1.000 NA 0.413 NA NA
## P    NA  1    NA NA NA
## J 0.413 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[21]]
##       S     P     J  T     E
## S  1.00  0.18  0.66 NA -0.18
## P  0.18  1.00  0.38 NA -0.90
## J  0.66  0.38  1.00 NA -0.43
## T    NA    NA    NA  1    NA
## E -0.18 -0.90 -0.43 NA  1.00
##
```

```
## [[22]]
##       S  P     J  T  E
## S 1.000 NA 0.529 NA NA
## P    NA  1    NA NA NA
## J 0.529 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[23]]
##      S    P  J  T  E
## S 1.00 0.54 NA NA NA
## P 0.54 1.00 NA NA NA
## J   NA   NA  1 NA NA
## T   NA   NA NA  1 NA
## E   NA   NA NA NA  1
##
## [[24]]
##       S     P     J  T  E
## S 1.000 0.309 0.202 NA NA
## P 0.309 1.000 0.508 NA NA
## J 0.202 0.508 1.000 NA NA
## T    NA    NA    NA  1 NA
## E    NA    NA    NA NA  1
##
## [[25]]
##      S    P    J  T  E
## S 1.00 0.31 0.40 NA NA
## P 0.31 1.00 0.42 NA NA
## J 0.40 0.42 1.00 NA NA
## T   NA   NA   NA  1 NA
## E   NA   NA   NA NA  1
##
## [[26]]
##        S      P  J      T      E
## S  1.000  0.234 NA  0.289 -0.238
## P  0.234  1.000 NA  0.301 -0.196
## J     NA     NA  1     NA     NA
## T  0.289  0.301 NA  1.000 -0.271
## E -0.238 -0.196 NA -0.271  1.000
##
## [[27]]
##            S          P  J  T          E
## S  1.0000000  0.1956566 NA NA -0.2311570
## P  0.1956566  1.0000000 NA NA -0.3288384
## J         NA         NA  1 NA         NA
## T         NA         NA NA  1         NA
## E -0.2311570 -0.3288384 NA NA  1.0000000
##
## [[28]]
##            S          P  J  T          E
## S  1.0000000  0.2308333 NA NA -0.1734615
## P  0.2308333  1.0000000 NA NA -0.5244056
## J         NA         NA  1 NA         NA
## T         NA         NA NA  1         NA
```

```
## E -0.1734615 -0.5244056 NA NA  1.0000000
##
## [[29]]
##      S  P    J  T  E
## S 1.00 NA 0.28 NA NA
## P   NA  1   NA NA NA
## J 0.28 NA 1.00 NA NA
## T   NA NA   NA  1 NA
## E   NA NA   NA NA  1
##
## [[30]]
##      S    P    J    T  E
## S 1.00 0.62 0.54 0.33 NA
## P 0.62 1.00 0.54 0.65 NA
## J 0.54 0.54 1.00 0.34 NA
## T 0.33 0.65 0.34 1.00 NA
## E   NA   NA   NA   NA  1
##
## [[31]]
##       S  P     J  T  E
## S 1.000 NA 0.454 NA NA
## P    NA  1    NA NA NA
## J 0.454 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[32]]
##       S  P     J  T  E
## S 1.000 NA 0.832 NA NA
## P    NA  1    NA NA NA
## J 0.832 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[33]]
##        S  P  J  T      E
## S  1.000 NA NA NA -0.303
## P     NA  1 NA NA     NA
## J     NA NA  1 NA     NA
## T     NA NA NA  1     NA
## E -0.303 NA NA NA  1.000
##
## [[34]]
##       S     P     J     T     E
## S  1.00  0.45  0.77  0.38 -0.51
## P  0.45  1.00  0.49  0.74 -0.72
## J  0.77  0.49  1.00  0.52 -0.54
## T  0.38  0.74  0.52  1.00 -0.81
## E -0.51 -0.72 -0.54 -0.81  1.00
##
## [[35]]
##        S      P  J      T      E
## S  1.000  0.338 NA  0.396 -0.119
## P  0.338  1.000 NA  0.530 -0.583
```

```
## J     NA     NA  1     NA     NA
## T  0.396  0.530 NA  1.000 -0.520
## E -0.119 -0.583 NA -0.520  1.000
##
## [[36]]
##       S  P     J  T  E
## S 1.000 NA 0.655 NA NA
## P    NA  1    NA NA NA
## J 0.655 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[37]]
##       S     P     J  T  E
## S 1.000 0.408 0.624 NA NA
## P 0.408 1.000 0.461 NA NA
## J 0.624 0.461 1.000 NA NA
## T    NA    NA    NA  1 NA
## E    NA    NA    NA NA  1
##
## [[38]]
##        S      P  J  T      E
## S  1.000  0.092 NA NA -0.234
## P  0.092  1.000 NA NA -0.415
## J     NA     NA  1 NA     NA
## T     NA     NA NA  1     NA
## E -0.234 -0.415 NA NA  1.000
##
## [[39]]
##       S  P  J     T  E
## S 1.000 NA NA 0.766 NA
## P    NA  1 NA    NA NA
## J    NA NA  1    NA NA
## T 0.766 NA NA 1.000 NA
## E    NA NA NA    NA  1
##
## [[40]]
##       S  P     J  T  E
## S 1.000 NA 0.533 NA NA
## P    NA  1    NA NA NA
## J 0.533 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[41]]
##        S  P  J  T      E
## S  1.000 NA NA NA -0.282
## P     NA  1 NA NA     NA
## J     NA NA  1 NA     NA
## T     NA NA NA  1     NA
## E -0.282 NA NA NA  1.000
##
## [[42]]
##       S  P  J     T  E
```

```
## S 1.000 NA NA 0.445 NA
## P    NA  1 NA    NA NA
## J    NA NA  1    NA NA
## T 0.445 NA NA 1.000 NA
## E    NA NA NA    NA  1
##
## [[43]]
##       S     P     J  T  E
## S 1.000 0.613 0.510 NA NA
## P 0.613 1.000 0.739 NA NA
## J 0.510 0.739 1.000 NA NA
## T    NA    NA    NA  1 NA
## E    NA    NA    NA NA  1
##
## [[44]]
##      S  P  J    T  E
## S 1.00 NA NA 0.61 NA
## P   NA  1 NA   NA NA
## J   NA NA  1   NA NA
## T 0.61 NA NA 1.00 NA
## E   NA NA NA   NA  1
##
## [[45]]
##      S  P  J    T  E
## S 1.00 NA NA 0.77 NA
## P   NA  1 NA   NA NA
## J   NA NA  1   NA NA
## T 0.77 NA NA 1.00 NA
## E   NA NA NA   NA  1
##
## [[46]]
##        S      P      J  T  E
## S 1.0000 0.2730 0.5148 NA NA
## P 0.2730 1.0000 0.4016 NA NA
## J 0.5148 0.4016 1.0000 NA NA
## T     NA     NA     NA  1 NA
## E     NA     NA     NA NA  1
##
## [[47]]
##       S  P     J  T  E
## S 1.000 NA 0.743 NA NA
## P    NA  1    NA NA NA
## J 0.743 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[48]]
##       S     P  J  T  E
## S 1.000 0.304 NA NA NA
## P 0.304 1.000 NA NA NA
## J    NA    NA  1 NA NA
## T    NA    NA NA  1 NA
## E    NA    NA NA NA  1
##
```

```
## [[49]]
##        S      P  J  T      E
## S  1.000  0.456 NA NA -0.310
## P  0.456  1.000 NA NA -0.244
## J     NA     NA  1 NA     NA
## T     NA     NA NA  1     NA
## E -0.310 -0.244 NA NA  1.000
##
## [[50]]
##        S      P  J  T      E
## S  1.000  0.537 NA NA -0.398
## P  0.537  1.000 NA NA -0.360
## J     NA     NA  1 NA     NA
## T     NA     NA NA  1     NA
## E -0.398 -0.360 NA NA  1.000
##
## [[51]]
##        S      P      J      T      E
## S  1.000  0.376  0.502  0.633 -0.363
## P  0.376  1.000  0.510  0.434 -0.447
## J  0.502  0.510  1.000  0.559 -0.592
## T  0.633  0.434  0.559  1.000 -0.535
## E -0.363 -0.447 -0.592 -0.535  1.000
##
## [[52]]
##      S    P  J  T  E
## S 1.00 0.47 NA NA NA
## P 0.47 1.00 NA NA NA
## J   NA   NA  1 NA NA
## T   NA   NA NA  1 NA
## E   NA   NA NA NA  1
##
## [[53]]
##       S  P  J     T  E
## S 1.000 NA NA 0.619 NA
## P    NA  1 NA    NA NA
## J    NA NA  1    NA NA
## T 0.619 NA NA 1.000 NA
## E    NA NA NA    NA  1
##
## [[54]]
##      S    P  J    T  E
## S 1.00 0.15 NA 0.17 NA
## P 0.15 1.00 NA 0.13 NA
## J   NA   NA  1   NA NA
## T 0.17 0.13 NA 1.00 NA
## E   NA   NA NA   NA  1
##
## [[55]]
##      S    P  J    T  E
## S 1.00 0.15 NA 0.28 NA
## P 0.15 1.00 NA 0.23 NA
## J   NA   NA  1   NA NA
## T 0.28 0.23 NA 1.00 NA
```

```
## E   NA   NA NA   NA  1
##
## [[56]]
##      S    P  J  T  E
## S 1.00 0.57 NA NA NA
## P 0.57 1.00 NA NA NA
## J   NA   NA  1 NA NA
## T   NA   NA NA  1 NA
## E   NA   NA NA NA  1
##
## [[57]]
##       S  P  J  T     E
## S  1.00 NA NA NA -0.18
## P    NA  1 NA NA    NA
## J    NA NA  1 NA    NA
## T    NA NA NA  1    NA
## E -0.18 NA NA NA  1.00
##
## [[58]]
##      S    P    J  T  E
## S 1.00 0.40 0.34 NA NA
## P 0.40 1.00 0.55 NA NA
## J 0.34 0.55 1.00 NA NA
## T   NA   NA   NA  1 NA
## E   NA   NA   NA NA  1
##
## [[59]]
##       S     P     J     T  E
## S 1.000 0.386 0.630 0.384 NA
## P 0.386 1.000 0.531 0.549 NA
## J 0.630 0.531 1.000 0.367 NA
## T 0.384 0.549 0.367 1.000 NA
## E    NA    NA    NA    NA  1
##
## [[60]]
##      S  P  J    T  E
## S 1.00 NA NA 0.43 NA
## P   NA  1 NA   NA NA
## J   NA NA  1   NA NA
## T 0.43 NA NA 1.00 NA
## E   NA NA NA   NA  1
##
## [[61]]
##       S     P     J  T     E
## S  1.00  0.51  0.66 NA -0.61
## P  0.51  1.00  0.76 NA -0.57
## J  0.66  0.76  1.00 NA -0.66
## T    NA    NA    NA  1    NA
## E -0.61 -0.57 -0.66 NA  1.00
##
## [[62]]
##       S     P  J  T  E
## S 1.000 0.499 NA NA NA
## P 0.499 1.000 NA NA NA
```

```
## J    NA    NA  1 NA NA
## T    NA    NA NA  1 NA
## E    NA    NA NA NA  1
##
## [[63]]
##       S     P     J  T  E
## S 1.000 0.602 0.716 NA NA
## P 0.602 1.000 0.622 NA NA
## J 0.716 0.622 1.000 NA NA
## T    NA    NA    NA  1 NA
## E    NA    NA    NA NA  1
##
## [[64]]
##      S  P  J    T  E
## S 1.00 NA NA 0.18 NA
## P   NA  1 NA   NA NA
## J   NA NA  1   NA NA
## T 0.18 NA NA 1.00 NA
## E   NA NA NA   NA  1
##
## [[65]]
##         S  P       J       T       E
## S  1.0000 NA  0.6414  0.0027 -0.1386
## P      NA  1      NA      NA      NA
## J  0.6414 NA  1.0000  0.0459 -0.1925
## T  0.0027 NA  0.0459  1.0000 -0.6290
## E -0.1386 NA -0.1925 -0.6290  1.0000
##
## [[66]]
##        S  P  J      T      E
## S  1.000 NA NA  0.353 -0.385
## P     NA  1 NA     NA     NA
## J     NA NA  1     NA     NA
## T  0.353 NA NA  1.000 -0.478
## E -0.385 NA NA -0.478  1.000
##
## [[67]]
##      S    P    J    T  E
## S 1.00 0.51 0.68 0.35 NA
## P 0.51 1.00 0.47 0.50 NA
## J 0.68 0.47 1.00 0.48 NA
## T 0.35 0.50 0.48 1.00 NA
## E   NA   NA   NA   NA  1
##
## [[68]]
##      S    P    J  T  E
## S 1.00 0.62 0.77 NA NA
## P 0.62 1.00 0.63 NA NA
## J 0.77 0.63 1.00 NA NA
## T   NA   NA   NA  1 NA
## E   NA   NA   NA NA  1
##
## [[69]]
##      S  P    J  T  E
```

```
## S 1.00 NA 0.53 NA NA
## P   NA  1   NA NA NA
## J 0.53 NA 1.00 NA NA
## T   NA NA   NA  1 NA
## E   NA NA   NA NA  1
##
## [[70]]
##      S    P  J  T  E
## S 1.00 0.28 NA NA NA
## P 0.28 1.00 NA NA NA
## J   NA   NA  1 NA NA
## T   NA   NA NA  1 NA
## E   NA   NA NA NA  1
##
## [[71]]
##      S    P  J  T  E
## S 1.00 0.57 NA NA NA
## P 0.57 1.00 NA NA NA
## J   NA   NA  1 NA NA
## T   NA   NA NA  1 NA
## E   NA   NA NA NA  1
##
## [[72]]
##       S     P     J  T  E
## S 1.000 0.320 0.561 NA NA
## P 0.320 1.000 0.505 NA NA
## J 0.561 0.505 1.000 NA NA
## T    NA    NA    NA  1 NA
## E    NA    NA    NA NA  1
##
## [[73]]
##        S      P      J  T      E
## S  1.000  0.795  0.761 NA -0.671
## P  0.795  1.000  0.719 NA -0.688
## J  0.761  0.719  1.000 NA -0.633
## T     NA     NA     NA  1     NA
## E -0.671 -0.688 -0.633 NA  1.000
##
## [[74]]
##       S  P     J  T  E
## S 1.000 NA 0.532 NA NA
## P    NA  1    NA NA NA
## J 0.532 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
## [[75]]
##       S  P     J  T  E
## S 1.000 NA 0.522 NA NA
## P    NA  1    NA NA NA
## J 0.522 NA 1.000 NA NA
## T    NA NA    NA  1 NA
## E    NA NA    NA NA  1
##
```

```
## [[76]]
##       S     P  J  T  E
## S 1.000 0.493 NA NA NA
## P 0.493 1.000 NA NA NA
## J    NA    NA  1 NA NA
## T    NA    NA NA  1 NA
## E    NA    NA NA NA  1
##
## [[77]]
##      S  P    J  T  E
## S 1.00 NA 0.31 NA NA
## P   NA  1   NA NA NA
## J 0.31 NA 1.00 NA NA
## T   NA NA   NA  1 NA
## E   NA NA   NA NA  1
##
## [[78]]
##      S    P    J  T  E
## S 1.00 0.45 0.71 NA NA
## P 0.45 1.00 0.66 NA NA
## J 0.71 0.66 1.00 NA NA
## T   NA   NA   NA  1 NA
## E   NA   NA   NA NA  1
```

```
A3 <- create.mxMatrix(c(0, 0, 0, 0,0, 0, 0, "0.2*J2P", "0.2*T2P",
                        "0.2*E2P", "0.2*S2J", 0, 0, 0, 0, "0.2*S2T",
                        0, 0, 0, 0, 0, 0, "0.2*J2E", "0.2*T2E", 0),
                      type="Full", nrow=5, ncol=5, byrow=TRUE, name="A3")
A3
```

```
## FullMatrix 'A3'
##
## $labels
##      [,1]  [,2] [,3]  [,4]  [,5]
## [1,] NA    NA   NA    NA    NA
## [2,] NA    NA   "J2P" "T2P" "E2P"
## [3,] "S2J" NA   NA    NA    NA
## [4,] "S2T" NA   NA    NA    NA
## [5,] NA    NA   "J2E" "T2E" NA
##
## $values
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  0.0    0  0.0  0.0  0.0
## [2,]  0.0    0  0.2  0.2  0.2
## [3,]  0.2    0  0.0  0.0  0.0
## [4,]  0.2    0  0.0  0.0  0.0
## [5,]  0.0    0  0.2  0.2  0.0
##
## $free
##       [,1]  [,2]  [,3]  [,4]  [,5]
## [1,] FALSE FALSE FALSE FALSE FALSE
## [2,] FALSE FALSE  TRUE  TRUE  TRUE
## [3,]  TRUE FALSE FALSE FALSE FALSE
## [4,]  TRUE FALSE FALSE FALSE FALSE
## [5,] FALSE FALSE  TRUE  TRUE FALSE
```

```
##
## $lbound: No lower bounds assigned.
##
## $ubound: No upper bounds assigned.
```

```
S3 <- create.mxMatrix(c(1, 0, "0.1*ErrVarP", 0 , 0,
                        "0.1*ErrVarJ", 0, 0, "0.1*CorJT",
                        "0.1*ErrVarT", 0, 0, 0,0, "0.1*ErrVarE"),
                      type="Symm", byrow=TRUE, name="S3")
S3
```

```
## SymmMatrix 'S3'
##
## $labels
##      [,1] [,2]      [,3]      [,4]      [,5]
## [1,] NA   NA        NA        NA        NA
## [2,] NA   "ErrVarP" NA        NA        NA
## [3,] NA   NA        "ErrVarJ" "CorJT"   NA
## [4,] NA   NA        "CorJT"   "ErrVarT" NA
## [5,] NA   NA        NA        NA        "ErrVarE"
##
## $values
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    1  0.0  0.0  0.0  0.0
## [2,]    0  0.1  0.0  0.0  0.0
## [3,]    0  0.0  0.1  0.1  0.0
## [4,]    0  0.0  0.1  0.1  0.0
## [5,]    0  0.0  0.0  0.0  0.1
##
## $free
##       [,1]  [,2]  [,3]  [,4]  [,5]
## [1,] FALSE FALSE FALSE FALSE FALSE
## [2,] FALSE  TRUE FALSE FALSE FALSE
## [3,] FALSE FALSE  TRUE  TRUE FALSE
## [4,] FALSE FALSE  TRUE  TRUE FALSE
## [5,] FALSE FALSE FALSE FALSE  TRUE
##
## $lbound: No lower bounds assigned.
##
## $ubound: No upper bounds assigned.
```

```
my.n6 <- c(181,354,349,447,178,197,305,151,222,253,182,189,185,486,161,798,
           78,550,224,274,514,214,345,914,221,250,211,173,100,407,32,32,153,
           212,224,322,356,206,368,160,167,546,844,2111,532,188,157,176,239,
           275,80,1126,338,268,253,108,130,217,168,180,230,430,207,989,56,
           193,43,247,39,160,148,216,729,563,446,621,232,128)
my.n6
```

```
##  [1]  181  354  349  447  178  197  305  151  222  253  182  189  185  486
## [15]  161  798   78  550  224  274  514  214  345  914  221  250  211  173
## [29]  100  407   32   32  153  212  224  322  356  206  368  160  167  546
## [43]  844 2111  532  188  157  176  239  275   80 1126  338  268  253  108
## [57]  130  217  168  180  230  430  207  989   56  193   43  247   39  160
## [71]  148  216  729  563  446  621  232  128
```

```r
random1 <- tssem1(my.df6, my.n6, method="REM", RE.type="Diag")
summary(random1)
```

```
##
## Call:
## meta(y = ES, v = acovR, RE.constraints = Diag(x = paste(RE.startvalues,
##     "*Tau2_", 1:no.es, "_", 1:no.es, sep = "")), RE.lbound = RE.lbound,
##     I2 = I2, model.name = model.name, suppressWarnings = TRUE,
##     silent = silent, run = run)
##
## 95% confidence intervals: z statistic approximation
## Coefficients:
##                Estimate   Std.Error      lbound      ubound  z value
## Intercept1   4.2750e-01  2.3261e-02  3.8191e-01  4.7309e-01  18.3783
## Intercept2   5.6102e-01  2.2879e-02  5.1618e-01  6.0586e-01  24.5211
## Intercept3   4.5265e-01  3.2731e-02  3.8850e-01  5.1680e-01  13.8296
## Intercept4  -3.3643e-01  3.1563e-02 -3.9829e-01 -2.7457e-01 -10.6589
## Intercept5   5.6678e-01  2.3383e-02  5.2095e-01  6.1261e-01  24.2385
## Intercept6   5.0324e-01  4.3229e-02  4.1851e-01  5.8796e-01  11.6412
## Intercept7  -5.1291e-01  3.8493e-02 -5.8835e-01 -4.3746e-01 -13.3245
## Intercept8   4.1592e-01  4.9984e-02  3.1795e-01  5.1389e-01   8.3211
## Intercept9  -4.8805e-01  4.5055e-02 -5.7635e-01 -3.9974e-01 -10.8322
## Intercept10 -4.9467e-01  4.2895e-02 -5.7875e-01 -4.1060e-01 -11.5321
## Tau2_1_1     2.2453e-02  5.1326e-03  1.2393e-02  3.2512e-02   4.3745
## Tau2_2_2     1.8575e-02  4.6627e-03  9.4361e-03  2.7713e-02   3.9837
## Tau2_3_3     2.5688e-02  7.6240e-03  1.0746e-02  4.0631e-02   3.3694
## Tau2_4_4     2.2758e-02  6.8236e-03  9.3835e-03  3.6132e-02   3.3351
## Tau2_5_5     1.0195e-02  3.4463e-03  3.4408e-03  1.6950e-02   2.9584
## Tau2_6_6     2.4629e-02  9.8938e-03  5.2370e-03  4.4020e-02   2.4893
## Tau2_7_7     2.7002e-02  9.0965e-03  9.1735e-03  4.4831e-02   2.9684
## Tau2_8_8     2.2400e-02  1.1433e-02 -7.9571e-06  4.4808e-02   1.9593
## Tau2_9_9     2.0593e-02  1.0180e-02  6.3923e-04  4.0546e-02   2.0228
## Tau2_10_10   1.8302e-02  8.4510e-03  1.7379e-03  3.4865e-02   2.1656
##               Pr(>|z|)
## Intercept1  < 2.2e-16 ***
## Intercept2  < 2.2e-16 ***
## Intercept3  < 2.2e-16 ***
## Intercept4  < 2.2e-16 ***
## Intercept5  < 2.2e-16 ***
## Intercept6  < 2.2e-16 ***
## Intercept7  < 2.2e-16 ***
## Intercept8  < 2.2e-16 ***
## Intercept9  < 2.2e-16 ***
## Intercept10 < 2.2e-16 ***
## Tau2_1_1    1.217e-05 ***
## Tau2_2_2    6.784e-05 ***
## Tau2_3_3    0.0007532 ***
## Tau2_4_4    0.0008527 ***
## Tau2_5_5    0.0030927 **
## Tau2_6_6    0.0128002 *
## Tau2_7_7    0.0029932 **
## Tau2_8_8    0.0500814 .
## Tau2_9_9    0.0430985 *
## Tau2_10_10  0.0303414 *
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Q statistic on the homogeneity of effect sizes: 4264.415
## Degrees of freedom of the Q statistic: 225
## P value of the Q statistic: 0
##
## Heterogeneity indices (based on the estimated Tau2):
##                                Estimate
## Intercept1: I2 (Q statistic)    0.9172
## Intercept2: I2 (Q statistic)    0.9071
## Intercept3: I2 (Q statistic)    0.9209
## Intercept4: I2 (Q statistic)    0.8920
## Intercept5: I2 (Q statistic)    0.8252
## Intercept6: I2 (Q statistic)    0.9030
## Intercept7: I2 (Q statistic)    0.9320
## Intercept8: I2 (Q statistic)    0.8818
## Intercept9: I2 (Q statistic)    0.8808
## Intercept10: I2 (Q statistic)   0.8657
##
## Number of studies (or clusters): 78
## Number of observed statistics: 235
## Number of estimated parameters: 20
## Degrees of freedom: 215
## -2 log likelihood: -202.1545
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values may indicate problems.)
```

```
# trying with diag.constraints=TRUE option
random2a <- tssem2(random1, Amatrix=A3, Smatrix=S3, diag.constraints=TRUE,
                   intervals="LB",
                   mx.algebras=list(Ind1 =mxAlgebra(S2J*J2P,name="Ind1"),
                                    Ind2 =mxAlgebra(S2T*T2E,name="Ind2"),
                                    Ind3=mxAlgebra(S2T*T2E*E2P,name="Ind3") ,
                                    Ind4 =mxAlgebra(S2J*J2E*E2P,name="Ind4"),
                                    Ind5 =mxAlgebra(S2T*T2P,name="Ind5") ))
summary(random2a)
```

```
##
## Call:
## wls(Cov = pooledS, asyCov = asyCov, n = tssem1.obj$total.n, Amatrix = Amatrix,
##     Smatrix = Smatrix, Fmatrix = Fmatrix, diag.constraints = diag.constraints,
##     cor.analysis = cor.analysis, intervals.type = intervals.type,
##     mx.algebras = mx.algebras, model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: Likelihood-based statistic
## Coefficients:
##          Estimate Std.Error    lbound    ubound z value Pr(>|z|)
## J2P      0.368435        NA  0.284622  0.445795      NA       NA
## T2P      0.275685        NA  0.150775  0.394408      NA       NA
## E2P     -0.204136        NA -0.327307 -0.071721      NA       NA
## S2J      0.566861        NA  0.523988  0.609705      NA       NA
## S2T      0.460664        NA  0.401183  0.520397      NA       NA
## J2E     -0.332025        NA -0.436499 -0.224521      NA       NA
```

```
## T2E     -0.354279        NA -0.461948 -0.242601      NA       NA
## ErrVarP  0.539151        NA  0.475028  0.596376      NA       NA
## ErrVarJ  0.678669        NA  0.628260  0.725442      NA       NA
## CorJT    0.139172        NA  0.053792  0.226388      NA       NA
## ErrVarT  0.787788        NA  0.729187  0.839052      NA       NA
## ErrVarE  0.670071        NA  0.593946  0.737461      NA       NA
##
## mxAlgebras objects (and their 95% likelihood-based CIs):
##                lbound    Estimate      ubound
## Ind1[1,1]  0.16007010  0.20885133  0.25587502
## Ind2[1,1] -0.21818189 -0.16320351 -0.11091891
## Ind3[1,1]  0.01167458  0.03331569  0.06025579
## Ind4[1,1]  0.01380093  0.03842084  0.06631491
## Ind5[1,1]  0.06931433  0.12699808          NA
##
## Goodness-of-fit indices:
##                                                Value
## Sample size                                24958.0000
## Chi-square of target model                     1.7545
## DF of target model                             2.0000
## p value of target model                        0.4159
## Number of constraints imposed on "Smatrix"     4.0000
## DF manually adjusted                           0.0000
## Chi-square of independence model            2132.2072
## DF of independence model                      10.0000
## RMSEA                                          0.0000
## RMSEA lower 95% CI                             0.0000
## RMSEA upper 95% CI                             0.0121
## SRMR                                           0.0129
## TLI                                            1.0006
## CFI                                            1.0000
## AIC                                           -2.2455
## BIC                                          -18.4954
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
#rerunning the model due to NA in indirect effects
random2a <- rerun(random2a)
```

```
## Warning in mxTryHard(object$mx.fit, greenOK = TRUE, paste = FALSE,
## bestInitsOutput = FALSE, : argument 'checkHess' coerced to FALSE due to
## presence of MxConstraints
```

```
##
## Begin fit attempt 1 of at maximum 11 tries
```

```
##
##  Lowest minimum so far:  1.75452308942147
```

```
##
## Solution found
```

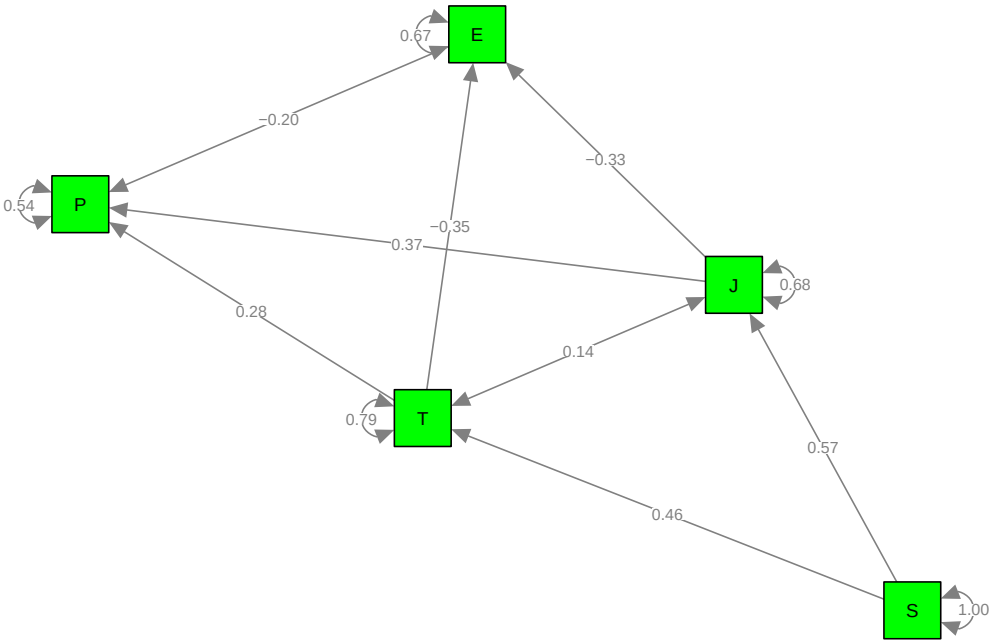
```
## Running final fit, for Hessian and/or standard errors and/or confidence intervals
```

```
summary(random2a)
```

```
##
## Call:
```

```
## wls(Cov = pooledS, asyCov = asyCov, n = tssem1.obj$total.n, Amatrix = Amatrix,
##     Smatrix = Smatrix, Fmatrix = Fmatrix, diag.constraints = diag.constraints,
##     cor.analysis = cor.analysis, intervals.type = intervals.type,
##     mx.algebras = mx.algebras, model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: Likelihood-based statistic
## Coefficients:
##          Estimate Std.Error    lbound    ubound z value Pr(>|z|)
## J2P      0.368435        NA  0.284622  0.445795      NA       NA
## T2P      0.275685        NA  0.150775  0.394408      NA       NA
## E2P     -0.204136        NA -0.327307 -0.071721      NA       NA
## S2J      0.566861        NA  0.523988  0.609705      NA       NA
## S2T      0.460664        NA  0.401183  0.520397      NA       NA
## J2E     -0.332025        NA -0.436499 -0.224521      NA       NA
## T2E     -0.354279        NA -0.461948 -0.242601      NA       NA
## ErrVarP  0.539151        NA  0.475028  0.596376      NA       NA
## ErrVarJ  0.678669        NA  0.628260  0.725442      NA       NA
## CorJT    0.139172        NA  0.053792  0.226388      NA       NA
## ErrVarT  0.787788        NA  0.729187  0.839052      NA       NA
## ErrVarE  0.670071        NA  0.593946  0.737461      NA       NA
##
## mxAlgebras objects (and their 95% likelihood-based CIs):
##                lbound    Estimate      ubound
## Ind1[1,1]  0.16007010  0.20885133  0.25587502
## Ind2[1,1] -0.21818189 -0.16320351 -0.11091891
## Ind3[1,1]  0.01167458  0.03331569  0.06025579
## Ind4[1,1]  0.01380093  0.03842084  0.06631491
## Ind5[1,1]  0.06931432  0.12699808  0.18351828
##
## Goodness-of-fit indices:
##                                                Value
## Sample size                                24958.0000
## Chi-square of target model                     1.7545
## DF of target model                             2.0000
## p value of target model                        0.4159
## Number of constraints imposed on "Smatrix"     4.0000
## DF manually adjusted                           0.0000
## Chi-square of independence model            2132.2072
## DF of independence model                      10.0000
## RMSEA                                          0.0000
## RMSEA lower 95% CI                             0.0000
## RMSEA upper 95% CI                             0.0121
## SRMR                                           0.0129
## TLI                                            1.0006
## CFI                                            1.0000
## AIC                                           -2.2455
## BIC                                          -18.4954
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
library(semPlot)
my.plot <- meta2semPlot(random2a)
semPaths(my.plot, whatLabels="est", color="green", layout="spring")
```




```
#  trying with diag.constraints=FALSE option
random2b <- tssem2(random1, Amatrix=A3, Smatrix=S3,
                   diag.constraints=FALSE, intervals="LB",
                  mx.algebras=list(Ind1 =mxAlgebra(S2J*J2P,name="Ind1"),
                                   Ind2 =mxAlgebra(S2T*T2E,name="Ind2"),
                                   Ind3 =mxAlgebra(S2T*T2E*E2P,name="Ind3") ,
                                   Ind4 =mxAlgebra(S2J*J2E*E2P,name="Ind4"),
                                   Ind5 =mxAlgebra(S2T*T2P,name="Ind5") ))
summary(random2b)
```

```
##
## Call:
## wls(Cov = pooledS, asyCov = asyCov, n = tssem1.obj$total.n, Amatrix = Amatrix,
##     Smatrix = Smatrix, Fmatrix = Fmatrix, diag.constraints = diag.constraints,
##     cor.analysis = cor.analysis, intervals.type = intervals.type,
##     mx.algebras = mx.algebras, model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: Likelihood-based statistic
## Coefficients:
##        Estimate Std.Error    lbound    ubound z value Pr(>|z|)
## J2P    0.368435        NA  0.284623  0.445794      NA       NA
## T2P    0.275685        NA  0.150777  0.394406      NA       NA
## E2P   -0.204136        NA -0.327306 -0.071722      NA       NA
## S2J    0.566861        NA  0.523988  0.609705      NA       NA
## S2T    0.460664        NA  0.401184  0.520397      NA       NA
## J2E   -0.332025        NA -0.436499 -0.224523      NA       NA
## T2E   -0.354279        NA -0.461947 -0.242602      NA       NA
## CorJT  0.139172        NA  0.053793  0.226388      NA       NA
##
## mxAlgebras objects (and their 95% likelihood-based CIs):
##                lbound    Estimate     ubound
## Ind1[1,1]  0.16006742  0.20885133  0.2558774
## Ind2[1,1] -0.21817587 -0.16320352 -0.1109176
```

```
## Ind3[1,1]  0.01167535  0.03331569  0.0602567
## Ind4[1,1]  0.01379976  0.03842084         NA
## Ind5[1,1]          NA  0.12699808         NA
##
## Goodness-of-fit indices:
##                                                Value
## Sample size                                24958.0000
## Chi-square of target model                     1.7545
## DF of target model                             2.0000
## p value of target model                        0.4159
## Number of constraints imposed on "Smatrix"     0.0000
## DF manually adjusted                           0.0000
## Chi-square of independence model            2132.2072
## DF of independence model                      10.0000
## RMSEA                                          0.0000
## RMSEA lower 95% CI                             0.0000
## RMSEA upper 95% CI                             0.0121
## SRMR                                           0.0129
## TLI                                            1.0006
## CFI                                            1.0000
## AIC                                           -2.2455
## BIC                                          -18.4954
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
#rerunning the model due to NA in indirect effects
random2b <- rerun(random2b)
```

```
##
## Begin fit attempt 1 of at maximum 11 tries
```

```
##
##  Lowest minimum so far:  1.75452308942147
```

```
##
## Solution found
```

```
## Running final fit, for Hessian and/or standard errors and/or confidence intervals
```

```
summary(random2b)
```

```
##
## Call:
## wls(Cov = pooledS, asyCov = asyCov, n = tssem1.obj$total.n, Amatrix = Amatrix,
##     Smatrix = Smatrix, Fmatrix = Fmatrix, diag.constraints = diag.constraints,
##     cor.analysis = cor.analysis, intervals.type = intervals.type,
##     mx.algebras = mx.algebras, model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: Likelihood-based statistic
## Coefficients:
##        Estimate Std.Error    lbound    ubound z value Pr(>|z|)
## J2P    0.368435        NA  0.284623  0.445794      NA       NA
## T2P    0.275685        NA  0.150777  0.394406      NA       NA
## E2P   -0.204136        NA -0.327306 -0.071722      NA       NA
## S2J    0.566861        NA  0.523988  0.609705      NA       NA
## S2T    0.460664        NA  0.401184  0.520397      NA       NA
```

```
## J2E   -0.332025        NA -0.436499 -0.224523      NA       NA
## T2E   -0.354279        NA -0.461947 -0.242602      NA       NA
## CorJT  0.139172        NA  0.053793  0.226388      NA       NA
##
## mxAlgebras objects (and their 95% likelihood-based CIs):
##                lbound    Estimate      ubound
## Ind1[1,1]  0.16006742  0.20885133  0.25587741
## Ind2[1,1] -0.21817587 -0.16320352 -0.11091756
## Ind3[1,1]  0.01167535  0.03331569  0.06025670
## Ind4[1,1]  0.01379975  0.03842084  0.06631451
## Ind5[1,1]  0.06931443  0.12699808  0.18351984
##
## Goodness-of-fit indices:
##                                                 Value
## Sample size                                 24958.0000
## Chi-square of target model                      1.7545
## DF of target model                              2.0000
## p value of target model                         0.4159
## Number of constraints imposed on "Smatrix"      0.0000
## DF manually adjusted                            0.0000
## Chi-square of independence model             2132.2072
## DF of independence model                       10.0000
## RMSEA                                           0.0000
## RMSEA lower 95% CI                              0.0000
## RMSEA upper 95% CI                              0.0121
## SRMR                                            0.0129
## TLI                                             1.0006
## CFI                                             1.0000
## AIC                                            -2.2455
## BIC                                           -18.4954
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
# intervals using SE
random2c <- tssem2(random1, Amatrix=A3, Smatrix=S3, diag.constraints=FALSE,
                   intervals="z",
                   mx.algebras=list(Ind1 =mxAlgebra(S2J*J2P,name="Ind1"),
                                    Ind2 =mxAlgebra(S2T*T2E,name="Ind2"),
                                    Ind3 =mxAlgebra(S2T*T2E*E2P,name="Ind3") ,
                                    Ind4 =mxAlgebra(S2J*J2E*E2P,name="Ind4"),
                                    Ind5 =mxAlgebra(S2T*T2P,name="Ind5") ))
summary(random2c)
```

```
##
## Call:
## wls(Cov = pooledS, asyCov = asyCov, n = tssem1.obj$total.n, Amatrix = Amatrix,
##     Smatrix = Smatrix, Fmatrix = Fmatrix, diag.constraints = diag.constraints,
##     cor.analysis = cor.analysis, intervals.type = intervals.type,
##     mx.algebras = mx.algebras, model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: z statistic approximation
## Coefficients:
##        Estimate Std.Error    lbound    ubound z value  Pr(>|z|)
## J2P    0.368435  0.040585  0.288890  0.447980  9.0781 < 2.2e-16 ***
```

```
## T2P    0.275685  0.061460  0.155224  0.396145  4.4856 7.272e-06 ***
## E2P   -0.204136  0.064609 -0.330767 -0.077505 -3.1596  0.001580 **
## S2J    0.566861  0.021866  0.524005  0.609717 25.9247 < 2.2e-16 ***
## S2T    0.460664  0.030402  0.401078  0.520251 15.1526 < 2.2e-16 ***
## J2E   -0.332025  0.053647 -0.437170 -0.226880 -6.1891 6.050e-10 ***
## T2E   -0.354279  0.055549 -0.463153 -0.245404 -6.3777 1.797e-10 ***
## CorJT  0.139172  0.044017  0.052901  0.225443  3.1618  0.001568 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## mxAlgebras objects:
##        Ind1        Ind2        Ind3        Ind4        Ind5
##  0.20885133 -0.16320352  0.03331569  0.03842084  0.12699808
##
## Goodness-of-fit indices:
##                                                Value
## Sample size                                24958.0000
## Chi-square of target model                     1.7545
## DF of target model                             2.0000
## p value of target model                        0.4159
## Number of constraints imposed on "Smatrix"     0.0000
## DF manually adjusted                           0.0000
## Chi-square of independence model            2132.2072
## DF of independence model                      10.0000
## RMSEA                                          0.0000
## RMSEA lower 95% CI                             0.0000
## RMSEA upper 95% CI                             0.0121
## SRMR                                           0.0129
## TLI                                            1.0006
## CFI                                            1.0000
## AIC                                           -2.2455
## BIC                                          -18.4954
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
# Wald CI of Ind1
mxEval(Ind1, random2c$mx.fit) + c(-1, 1)*mxSE(Ind1, random2c$mx.fit)
```

```
## Treating first argument as an expression
```

```
## [1] 0.1847071 0.2329955
```

```
sessionInfo()
```

```
## R version 3.3.3 (2017-03-06)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Linux Mint 18.1
##
## locale:
##  [1] LC_CTYPE=en_SG.UTF-8       LC_NUMERIC=C
##  [3] LC_TIME=en_SG.UTF-8        LC_COLLATE=en_SG.UTF-8
##  [5] LC_MONETARY=en_SG.UTF-8    LC_MESSAGES=en_SG.UTF-8
##  [7] LC_PAPER=en_SG.UTF-8       LC_NAME=C
##  [9] LC_ADDRESS=C               LC_TELEPHONE=C
## [11] LC_MEASUREMENT=en_SG.UTF-8 LC_IDENTIFICATION=C
##
```

```
## attached base packages:
## [1] parallel  stats     graphics  grDevices utils     datasets  methods
## [8] base
##
## other attached packages:
## [1] semPlot_1.0.1  metaSEM_0.9.12 OpenMx_2.7.4   Rcpp_0.12.9
## [5] Matrix_1.2-8   MASS_7.3-45    digest_0.6.12
##
## loaded via a namespace (and not attached):
##  [1] splines_3.3.3        ellipse_0.3-8        gtools_3.5.0
##  [4] network_1.13.0       Formula_1.2-1        assertthat_0.1
##  [7] stats4_3.3.3         latticeExtra_0.6-28  d3Network_0.5.2.1
## [10] yaml_2.1.14          lisrelToR_0.1.4      pbivnorm_0.6.0
## [13] numDeriv_2016.8-1    backports_1.0.5      lattice_0.20-34
## [16] quantreg_5.29        quadprog_1.5-5       RColorBrewer_1.1-2
## [19] checkmate_1.8.2      ggm_2.3              minqa_1.2.4
## [22] colorspace_1.3-2     htmltools_0.3.5      plyr_1.8.4
## [25] psych_1.6.12         XML_3.98-1.5         SparseM_1.74
## [28] corpcor_1.6.8        scales_0.4.1         whisker_0.3-2
## [31] glasso_1.8           sna_2.4              jpeg_0.1-8
## [34] fdrtool_1.2.15       lme4_1.1-12          MatrixModels_0.4-1
## [37] huge_1.2.7           arm_1.9-3            tibble_1.2
## [40] htmlTable_1.9        rockchalk_1.8.101    mgcv_1.8-17
## [43] car_2.1-4            ggplot2_2.2.1        nnet_7.3-12
## [46] lazyeval_0.2.0       pbkrtest_0.4-6       mnormt_1.5-5
## [49] statnet.common_3.3.0 survival_2.40-1      magrittr_1.5
## [52] evaluate_0.10        nlme_3.1-131         foreign_0.8-67
## [55] tools_3.3.3          data.table_1.10.4    stringr_1.2.0
## [58] munsell_0.4.3        cluster_2.0.5        sem_3.1-8
## [61] grid_3.3.3           nloptr_1.0.4         rjson_0.2.15
## [64] htmlwidgets_0.8      igraph_1.0.1         lavaan_0.5-22
## [67] base64enc_0.1-3      rmarkdown_1.3        boot_1.3-18
## [70] mi_1.0               gtable_0.2.0         abind_1.4-5
## [73] reshape2_1.4.2       qgraph_1.4.2         gridExtra_2.2.1
## [76] knitr_1.15.1         Hmisc_4.0-2          rprojroot_1.2
## [79] stringi_1.1.2        matrixcalc_1.0-3     rpart_4.1-10
## [82] acepack_1.4.1        png_0.1-7            coda_0.19-1
```