semmcci: Staging

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```r
library(semmcci)
library(lavaan)

# Data ------------------------------------------------------------------------
data("Tal.Or", package = "psych")
df <- mice::ampute(Tal.Or)$amp

# Monte Carlo -----------------------------------------------------------------
## Fit Model in lavaan --------------------------------------------------------
model <- "
  reaction ~ cp * cond + b * pmi
  pmi ~ a * cond
  cond ~~ cond
  indirect := a * b
  direct := cp
  total := cp + (a * b)
"
fit <- sem(data = df, model = model, missing = "fiml")

## MC() ------------------------------------------------------------------------
unstd <- MC(
  fit,
  R = 100L, # use a large value e.g., 20000L for actual research
  alpha = 0.05
)

## Standardized Monte Carlo ----------------------------------------------------
MCStd(unstd, alpha = 0.05)
```

```
#> Standardized Monte Carlo Confidence Intervals
#>                         est     se   R    2.5%  97.5%
#> cp                  -0.0112 0.0937 100 -0.1888 0.1495
#> b                    0.5002 0.0803 100  0.3408 0.6260
#> a                    0.1356 0.1040 100 -0.0460 0.3233
#> cond~~cond           1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction   0.7512 0.0783 100  0.5831 0.8782
```

```
#> pmi~~pmi            0.9816 0.0330 100  0.8955 1.0000
#> indirect            0.1617 0.0545 100 -0.0209 0.1854
#> direct              4.0571 0.0937 100 -0.1888 0.1495
#> total               0.9379 0.1102 100 -0.1682 0.2689


# Monte Carlo (Multiple Imputation) ----------------------------------------
## Multiple Imputation ------------------------------------------------------
mi <- mice::mice(
  data = df,
  print = FALSE,
  m = 5L, # use a large value e.g., 100L for actual research,
  seed = 42
)

## Fit Model in lavaan ------------------------------------------------------
fit <- sem(data = df, model = model) # use default listwise deletion

## MCMI() -------------------------------------------------------------------
unstd <- MCMI(
  fit,
  mi = mi,
  R = 100L, # use a large value e.g., 20000L for actual research
  alpha = 0.05
)

## Standardized Monte Carlo -------------------------------------------------
MCStd(unstd, alpha = 0.05)

#> Standardized Monte Carlo Confidence Intervals
#>                         est     se   R    2.5%  97.5%
#> cp                  -0.0242 0.0865 100 -0.1667 0.1489
#> b                    0.5162 0.0733 100  0.3302 0.6161
#> a                    0.0873 0.0891 100 -0.0989 0.2502
#> cond~~cond           1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction   0.7351 0.0703 100  0.6183 0.8819
#> pmi~~pmi             0.9924 0.0218 100  0.9373 1.0000
#> indirect             0.0451 0.0448 100 -0.0419 0.1380
#> direct              -0.0242 0.0865 100 -0.1667 0.1489
#> total                0.0209 0.0853 100 -0.1493 0.1976
```

References

R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/