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                0.0661 0.0984 100 -0.1110 0.2467
#> b                 0.4426 0.0764 100  0.2919 0.5625
#> a                 0.1680 0.0818 100 -0.0211 0.3016
#> cond~~cond        1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7899 0.0685 100  0.6515 0.8967
```

```
#> pmi~~pmi         0.9718 0.0240 100  0.9089 0.9999
#> indirect         0.3228 0.0389 100 -0.0103 0.1303
#> direct           4.0372 0.0984 100 -0.1110 0.2467
#> total            0.9719 0.0990 100 -0.0392 0.3293


# 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                0.1091 0.0726 100 -0.1011 0.1623
#> b                 0.4452 0.0701 100  0.3211 0.5842
#> a                 0.1732 0.0912 100  0.0401 0.3582
#> cond~~cond        1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7730 0.0596 100  0.6568 0.8846
#> pmi~~pmi          0.9700 0.0367 100  0.8716 0.9983
#> indirect          0.0771 0.0445 100  0.0157 0.1691
#> direct            0.1091 0.0726 100 -0.1011 0.1623
#> total             0.1862 0.0809 100 -0.0438 0.2666
```

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/