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                  0.0995 0.0941 100 -0.0671 0.2849
#> b                   0.4150 0.0839 100  0.2428 0.5533
#> a                   0.1570 0.0991 100 -0.0872 0.3067
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8049 0.0666 100  0.6557 0.8963
```

```
#> pmi~~pmi           0.9754 0.0276 100  0.9059 0.9998
#> indirect           0.4142 0.0403 100 -0.0385 0.1247
#> direct             4.1029 0.0941 100 -0.0671 0.2849
#> total              0.9562 0.1002 100 -0.0348 0.3484


# 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                 0.0878 0.0912 100 -0.0753 0.2499
#> b                  0.4084 0.0961 100  0.2274 0.5988
#> a                  0.1076 0.0882 100 -0.0344 0.3010
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8178 0.0827 100  0.6314 0.9442
#> pmi~~pmi           0.9884 0.0278 100  0.9094 0.9996
#> indirect           0.0439 0.0374 100 -0.0116 0.1404
#> direct             0.0878 0.0912 100 -0.0753 0.2499
#> total              0.1318 0.1066 100 -0.0346 0.3402
```

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/