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                  0.0669 0.0703 100 -0.0501 0.2436
#> b                   0.4283 0.0767 100  0.2833 0.5671
#> a                   0.2085 0.0831 100  0.0271 0.3527
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8002 0.0636 100  0.6649 0.8961
```

```
#> pmi~~pmi           0.9565 0.0341 100  0.8756 0.9990
#> indirect           0.4312 0.0357 100  0.0121 0.1536
#> direct             3.8941 0.0703 100 -0.0501 0.2436
#> total              0.9786 0.0676 100  0.0463 0.3016


# 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                 0.0784 0.0851 100 -0.0662 0.2334
#> b                  0.4272 0.0764 100  0.2958 0.5955
#> a                  0.2086 0.0855 100  0.0628 0.3690
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7974 0.0697 100  0.6269 0.8880
#> pmi~~pmi           0.9565 0.0363 100  0.8638 0.9960
#> indirect           0.0891 0.0436 100  0.0250 0.1914
#> direct             0.0784 0.0851 100 -0.0662 0.2334
#> total              0.1675 0.0866 100  0.0140 0.3390
```

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/