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                  0.0098 0.0843 100 -0.1645 0.1464
#> b                   0.5065 0.0779 100  0.3450 0.6400
#> a                   0.1916 0.1062 100 -0.0220 0.4027
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7414 0.0769 100  0.5638 0.8698
```

```
#> pmi~~pmi           0.9633 0.0407 100  0.8375 0.9994
#> indirect           0.1798 0.0568 100 -0.0101 0.2244
#> direct             3.9366 0.0843 100 -0.1645 0.1464
#> total              0.9629 0.1023 100 -0.0821 0.2730


# 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                 0.0114 0.0949 100 -0.1550 0.2247
#> b                  0.4953 0.0841 100  0.3289 0.6688
#> a                  0.1631 0.0974 100  0.0135 0.3834
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7527 0.0784 100  0.5521 0.8534
#> pmi~~pmi           0.9734 0.0406 100  0.8528 0.9998
#> indirect           0.0808 0.0495 100  0.0073 0.1915
#> direct             0.0114 0.0949 100 -0.1550 0.2247
#> total              0.0922 0.1089 100 -0.0810 0.3100
```

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/