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                 0.1077 0.1026 100 -0.0896 0.3076
#> b                  0.4193 0.0947 100  0.2173 0.5783
#> a                  0.1836 0.0860 100  0.0161 0.3531
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7960 0.0712 100  0.6476 0.9128
```

```
#> pmi~~pmi           0.9663 0.0322 100  0.8750 0.9991
#> indirect           0.3697 0.0404 100  0.0065 0.1711
#> direct             3.9764 0.1026 100 -0.0896 0.3076
#> total              0.9800 0.1016 100 -0.0111 0.3652


# 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                 0.1240 0.1179 100 -0.1471 0.2975
#> b                  0.3994 0.0878 100  0.2310 0.5789
#> a                  0.2878 0.0970 100  0.0406 0.3808
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7966 0.0660 100  0.6636 0.9079
#> pmi~~pmi           0.9172 0.0422 100  0.8549 0.9983
#> indirect           0.1149 0.0419 100  0.0125 0.1557
#> direct             0.1240 0.1179 100 -0.1471 0.2975
#> total              0.2390 0.1217 100 -0.0530 0.3645
```

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/