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                  0.1301 0.0965 100 -0.0461 0.3140
#> b                   0.3877 0.0871 100  0.2324 0.5348
#> a                   0.1680 0.0863 100  0.0187 0.3368
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8158 0.0746 100  0.6159 0.9112
```

```
#> pmi~~pmi           0.9718 0.0320 100  0.8865 0.9996
#> indirect           0.4865 0.0353 100  0.0072 0.1351
#> direct             4.0542 0.0965 100 -0.0461 0.3140
#> total              0.8988 0.0989 100  0.0206 0.3744


# 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                 0.1320 0.1168 100 -0.1156 0.3597
#> b                  0.4528 0.0697 100  0.2552 0.5258
#> a                  0.1629 0.1059 100 -0.0476 0.3350
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7580 0.0598 100  0.6604 0.8954
#> pmi~~pmi           0.9734 0.0320 100  0.8877 0.9996
#> indirect           0.0738 0.0443 100 -0.0183 0.1360
#> direct             0.1320 0.1168 100 -0.1156 0.3597
#> total              0.2058 0.1053 100 -0.0650 0.3749
```

References

Pesigan, I. J. A., & Cheung, S. F. (2023). Monte Carlo confidence intervals for the indirect effect with missing data. *Behavior Research Methods*. https://doi.org/10.3758/s13428-023-02114-4

R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/