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                  0.1396 0.0940 100 -0.0409 0.3364
#> b                   0.4672 0.0689 100  0.3277 0.5884
#> a                   0.1551 0.0837 100 -0.0252 0.3285
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7420 0.0716 100  0.5928 0.8588
```

```
#> pmi~~pmi           0.9759 0.0278 100  0.8921 0.9995
#> indirect           0.2459 0.0418 100 -0.0116 0.1609
#> direct             4.0085 0.0940 100 -0.0409 0.3364
#> total              0.9790 0.0957 100  0.0433 0.3950
```

```r
# 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                 0.1711 0.0956 100 -0.0568 0.2982
#> b                  0.4707 0.0692 100  0.3268 0.5681
#> a                  0.1514 0.0845 100 -0.0087 0.3000
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7248 0.0629 100  0.6292 0.8762
#> pmi~~pmi           0.9771 0.0252 100  0.9100 1.0000
#> indirect           0.0712 0.0402 100 -0.0032 0.1485
#> direct             0.1711 0.0956 100 -0.0568 0.2982
#> total              0.2424 0.1034 100 -0.0024 0.3752
```

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/