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                 0.1021 0.0928 100 -0.1045 0.2669
#> b                  0.4331 0.0768 100  0.2985 0.5854
#> a                  0.1391 0.0955 100 -0.0224 0.3297
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7897 0.0736 100  0.6357 0.8975
```

```
#> pmi~~pmi           0.9807 0.0296 100  0.8913 0.9999
#> indirect           0.3317 0.0427 100 -0.0119 0.1559
#> direct             4.0647 0.0928 100 -0.1045 0.2669
#> total              0.9155 0.0970 100 -0.0394 0.3155


# 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                 0.1044 0.0898 100 -0.0684 0.2741
#> b                  0.4114 0.0835 100  0.2734 0.5753
#> a                  0.1264 0.1020 100 -0.1132 0.3050
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8090 0.0693 100  0.6434 0.9083
#> pmi~~pmi           0.9840 0.0245 100  0.9069 0.9999
#> indirect           0.0520 0.0455 100 -0.0426 0.1387
#> direct             0.1044 0.0898 100 -0.0684 0.2741
#> total              0.1564 0.0893 100 -0.0194 0.3136
```

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/