

# semmcci: Staging

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```
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      0.1629 0.0864 100 -0.0285 0.2966
#> b      0.3933 0.0817 100  0.2291 0.5515
#> a      0.2087 0.0992 100  0.0223 0.4177
#> cond~~cond 1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7920 0.0710 100  0.6237 0.8929
```

```

#> pmi~~pmi          0.9564 0.0465 100  0.8255 0.9995
#> indirect          0.4276 0.0458 100  0.0070 0.1795
#> direct            4.0082 0.0864 100 -0.0285 0.2966
#> total             0.9922 0.0916 100  0.0715 0.4285

# 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          0.1492 0.0943 100 0.0327 0.3560
#> b           0.3681 0.0713 100 0.2348 0.5177
#> a           0.2173 0.0821 100 0.0708 0.3839
#> cond~~cond   1.0000 0.0000 100 1.0000 1.0000
#> reaction~~reaction 0.8184 0.0570 100 0.6844 0.8892
#> pmi~~pmi     0.9528 0.0388 100 0.8525 0.9950
#> indirect     0.0800 0.0357 100 0.0212 0.1557
#> direct       0.1492 0.0943 100 0.0327 0.3560
#> total        0.2291 0.0905 100 0.1090 0.4332

```

## 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/>