semmcci: Internal Tests

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Tests

```
#> test-semmcci-mc-func-simple-med
#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-generic-simple-med-defined

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-defined-none

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-std-defined-none

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-std-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-moment
```

```
#> Test passed

#> test-semmcci-mc-simple-med-defined-equality

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-inequality

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-meanstructure

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-mi-amelia

#> Test passed

#> test-semmcci-mc-simple-med-defined-mi-list

#> Test passed

#> test-semmcci-mc-simple-med-defined-mi-mice

#> Test passed

#> test-semmcci-mc-simple-med-defined-none

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-std-defined-meanstructure

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-std-defined-none-random-x
```

```
#> Test passed
#> Test passed
#> Test passed
```

#> test-semmcci-mc-simple-med-std-defined-none

```
#> Test passed
#> Test passed
#> Test passed
```

#> test-semmcci-mc-simple-med-std-defined

```
#> Test passed
#> Test passed
#> Test passed
```

#> test-semmcci-mc-methods

```
#> Monte Carlo Confidence Intervals
#>                     est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual=~x2       0.5535 0.0956 100 0.3053 0.3160 0.3784 0.7576 0.7773 0.7791
#> visual=~x3       0.7294 0.1059 100 0.4818 0.4977 0.5186 0.9238 0.9373 0.9416
#> textual=~x4      1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual=~x5      1.1131 0.0625 100 0.9055 0.9145 0.9558 1.2124 1.2402 1.2625
#> textual=~x6      0.9261 0.0584 100 0.7991 0.8138 0.8348 1.0452 1.0788 1.0972
#> speed=~x7        1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed=~x8        1.1800 0.1689 100 0.7842 0.7914 0.8700 1.5593 1.6323 1.6504
#> speed=~x9        1.0815 0.1491 100 0.7190 0.7261 0.7850 1.3423 1.4525 1.4925
#> x1~~x1           0.5491 0.1161 100 0.2221 0.2442 0.3614 0.8242 0.9092 0.9171
#> x2~~x2           1.1338 0.1085 100 0.8093 0.8656 0.9545 1.3548 1.3899 1.4001
#> x3~~x3           0.8443 0.0927 100 0.6395 0.6418 0.6639 1.0183 1.0317 1.0325
#> x4~~x4           0.3712 0.0462 100 0.2636 0.2703 0.2894 0.4611 0.4744 0.4792
#> x5~~x5           0.4463 0.0676 100 0.2696 0.2905 0.3195 0.5737 0.6150 0.6332
#> x6~~x6           0.3562 0.0415 100 0.2749 0.2751 0.2809 0.4396 0.4534 0.4630
#> x7~~x7           0.7994 0.0718 100 0.6238 0.6333 0.6664 0.9396 0.9512 0.9528
#> x8~~x8           0.4877 0.0757 100 0.3156 0.3238 0.3423 0.6330 0.6615 0.6732
#> x9~~x9           0.5661 0.0636 100 0.3836 0.4100 0.4422 0.6855 0.7262 0.7402
#> visual~~visual   0.8093 0.1266 100 0.4770 0.5004 0.5686 1.0440 1.0974 1.1155
#> textual~~textual 0.9795 0.1187 100 0.6964 0.6981 0.7324 1.1969 1.2778 1.3223
#> speed~~speed     0.3837 0.0847 100 0.1298 0.1468 0.2129 0.5272 0.5481 0.5585
#> visual~~textual  0.4082 0.0669 100 0.2455 0.2542 0.2658 0.5414 0.5536 0.5575
#> visual~~speed    0.2622 0.0506 100 0.1262 0.1309 0.1593 0.3510 0.3740 0.3751
#> textual~~speed   0.1735 0.0480 100 0.0678 0.0726 0.0830 0.2718 0.2826 0.2907
#> Monte Carlo Confidence Intervals (Multiple Imputation Estimates)
#>                     est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual=~x2       0.5535 0.1001 100 0.3246 0.3417 0.3669 0.7558 0.7862 0.8020
```

```
#> visual=~x3       0.7294 0.1249 100 0.3207 0.3411 0.4374 0.9389 0.9755 0.9837
#> textual=~x4      1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual=~x5      1.1131 0.0594 100 0.9655 0.9692 1.0110 1.2398 1.2741 1.2835
#> textual=~x6      0.9261 0.0572 100 0.7988 0.8030 0.8162 1.0351 1.0456 1.0478
#> speed=~x7        1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed=~x8        1.1800 0.1649 100 0.8457 0.8694 0.9106 1.5339 1.6288 1.6621
#> speed=~x9        1.0815 0.1459 100 0.7956 0.8017 0.8261 1.3819 1.4592 1.5178
#> x1~~x1           0.5491 0.1245 100 0.1629 0.1990 0.2834 0.7322 0.7884 0.8222
#> x2~~x2           1.1338 0.1040 100 0.9057 0.9127 0.9279 1.3529 1.3901 1.4152
#> x3~~x3           0.8443 0.0885 100 0.6726 0.6738 0.7003 1.0371 1.0721 1.0864
#> x4~~x4           0.3712 0.0500 100 0.2522 0.2613 0.2761 0.4635 0.5061 0.5300
#> x5~~x5           0.4463 0.0502 100 0.3286 0.3382 0.3568 0.5466 0.5668 0.5745
#> x6~~x6           0.3562 0.0425 100 0.2619 0.2676 0.2772 0.4291 0.4397 0.4485
#> x7~~x7           0.7994 0.0812 100 0.6327 0.6373 0.6616 0.9381 1.0537 1.0721
#> x8~~x8           0.4877 0.0750 100 0.2916 0.3197 0.3533 0.6372 0.6615 0.6781
#> x9~~x9           0.5661 0.0670 100 0.3313 0.3674 0.4334 0.6817 0.7045 0.7111
#> visual~~visual   0.8093 0.1514 100 0.3994 0.4160 0.5598 1.1018 1.1729 1.2049
#> textual~~textual 0.9795 0.1153 100 0.6524 0.6707 0.7473 1.1810 1.2813 1.2924
#> speed~~speed     0.3837 0.0786 100 0.1284 0.1523 0.2266 0.5213 0.5326 0.5375
#> visual~~textual  0.4082 0.0720 100 0.2596 0.2606 0.2818 0.5579 0.6155 0.6324
#> visual~~speed    0.2622 0.0505 100 0.1386 0.1470 0.1652 0.3599 0.3755 0.3776
#> textual~~speed   0.1735 0.0523 100 0.0209 0.0404 0.0815 0.2691 0.2866 0.2876
#> Standardized Monte Carlo Confidence Intervals
#>                     est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       0.7719 0.0532 100 0.6012 0.6252 0.6594 0.8532 0.8974 0.8977
#> visual=~x2       0.4236 0.0627 100 0.2487 0.2591 0.2996 0.5492 0.5819 0.5874
#> visual=~x3       0.5811 0.0574 100 0.4144 0.4235 0.4426 0.6764 0.6965 0.6995
#> textual=~x4      0.8516 0.0229 100 0.8034 0.8034 0.8049 0.8871 0.9026 0.9125
#> textual=~x5      0.8551 0.0262 100 0.7639 0.7799 0.8036 0.8966 0.9075 0.9097
#> textual=~x6      0.8380 0.0237 100 0.7593 0.7689 0.7950 0.8767 0.8832 0.8839
#> speed=~x7        0.5695 0.0558 100 0.3515 0.3731 0.4356 0.6456 0.6541 0.6562
#> speed=~x8        0.7230 0.0493 100 0.5552 0.5678 0.5914 0.7994 0.8068 0.8082
#> speed=~x9        0.6650 0.0500 100 0.5311 0.5359 0.5497 0.7535 0.7600 0.7600
#> x1~~x1           0.4042 0.0808 100 0.1942 0.1947 0.2719 0.5652 0.6084 0.6384
#> x2~~x2           0.8206 0.0532 100 0.6549 0.6614 0.6983 0.9102 0.9327 0.9381
#> x3~~x3           0.6623 0.0649 100 0.5107 0.5149 0.5425 0.8041 0.8205 0.8283
#> x4~~x4           0.2748 0.0389 100 0.1673 0.1852 0.2130 0.3521 0.3545 0.3545
#> x5~~x5           0.2689 0.0444 100 0.1724 0.1764 0.1961 0.3542 0.3914 0.4164
#> x6~~x6           0.2977 0.0395 100 0.2188 0.2200 0.2313 0.3679 0.4086 0.4235
#> x7~~x7           0.6757 0.0603 100 0.5693 0.5721 0.5832 0.8095 0.8602 0.8764
#> x8~~x8           0.4772 0.0689 100 0.3468 0.3491 0.3609 0.6502 0.6774 0.6917
#> x9~~x9           0.5578 0.0652 100 0.4224 0.4224 0.4323 0.6978 0.7128 0.7180
#> visual~~visual   1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual~~textual 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed~~speed     1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual~~textual  0.4585 0.0630 100 0.2932 0.3007 0.3457 0.5826 0.6171 0.6244
```

```
#> visual~~speed    0.4705 0.0780 100 0.2951 0.3014 0.3163 0.6361 0.6839 0.6974
#> textual~~speed   0.2830 0.0633 100 0.1546 0.1562 0.1668 0.3897 0.4073 0.4160
#> Standardized Monte Carlo Confidence Intervals
#>                     est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       0.7719 0.0615 100 0.5920 0.6038 0.6441 0.8867 0.9220 0.9383
#> visual=~x2       0.4236 0.0580 100 0.2713 0.2817 0.3149 0.5479 0.5550 0.5557
#> visual=~x3       0.5811 0.0636 100 0.3180 0.3391 0.4043 0.6647 0.7020 0.7102
#> textual=~x4      0.8516 0.0237 100 0.7789 0.7843 0.7968 0.8885 0.8996 0.9045
#> textual=~x5      0.8551 0.0196 100 0.8030 0.8080 0.8172 0.8877 0.8943 0.8947
#> textual=~x6      0.8380 0.0243 100 0.7770 0.7823 0.7933 0.8851 0.8911 0.8943
#> speed=~x7        0.5695 0.0540 100 0.3483 0.3891 0.4479 0.6513 0.6603 0.6610
#> speed=~x8        0.7230 0.0520 100 0.5931 0.5955 0.6118 0.8143 0.8187 0.8196
#> speed=~x9        0.6650 0.0539 100 0.5261 0.5497 0.5824 0.7648 0.7967 0.8087
#> x1~~x1           0.4042 0.0947 100 0.1195 0.1495 0.2136 0.5849 0.6352 0.6495
#> x2~~x2           0.8206 0.0495 100 0.6912 0.6919 0.6998 0.9008 0.9205 0.9264
#> x3~~x3           0.6623 0.0680 100 0.4956 0.5071 0.5582 0.8365 0.8845 0.8988
#> x4~~x4           0.2748 0.0401 100 0.1819 0.1907 0.2106 0.3650 0.3849 0.3933
#> x5~~x5           0.2689 0.0333 100 0.1995 0.2003 0.2121 0.3321 0.3470 0.3552
#> x6~~x6           0.2977 0.0408 100 0.2003 0.2059 0.2165 0.3706 0.3879 0.3963
#> x7~~x7           0.6757 0.0583 100 0.5631 0.5640 0.5757 0.7994 0.8465 0.8783
#> x8~~x8           0.4772 0.0742 100 0.3283 0.3298 0.3370 0.6257 0.6454 0.6482
#> x9~~x9           0.5578 0.0721 100 0.3459 0.3651 0.4150 0.6608 0.6972 0.7231
#> visual~~visual   1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual~~textual 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed~~speed     1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual~~textual  0.4585 0.0617 100 0.3267 0.3288 0.3413 0.5954 0.6124 0.6134
#> visual~~speed    0.4705 0.0751 100 0.3126 0.3263 0.3585 0.6429 0.6667 0.6695
#> textual~~speed   0.2830 0.0790 100 0.0422 0.0865 0.1560 0.4405 0.4649 0.4761
#> Monte Carlo Confidence Intervals
#> Monte Carlo Confidence Intervals (Multiple Imputation Estimates)
#> Standardized Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals
#> Test passed

#> test-semmcci-npd

#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-zzz-coverage

#> Test passed

#> test-semmcci-zzz-heywood
```

```
#> lavaan 0.6-19 ended normally after 18 iterations
#>
#>   Estimator                                         ML
#>   Optimization method                           NLMINB
#>   Number of model parameters                         8
#>
#>   Number of observations                            50
#>
#> Model Test User Model:
#>
#>   Test statistic                                 0.000
#>   Degrees of freedom                                 2
#>   P-value (Chi-square)                           1.000
#>
#> Parameter Estimates:
#>
#>   Standard errors                             Standard
#>   Information                                 Expected
#>   Information saturated (h1) model          Structured
#>
#> Latent Variables:
#>                    Estimate  Std.Err  z-value  P(>|z|)
#>   eta1 =~
#>     y1                1.000
#>     y2                0.991    0.152    6.524    0.000
#>     y3                0.901    0.138    6.537    0.000
#>     y4                1.399    0.143    9.814    0.000
#>
#> Variances:
#>                    Estimate  Std.Err  z-value  P(>|z|)
#>    .y1                0.000    0.055    0.000    1.000
#>    .y2                0.980    0.203    4.822    0.000
#>    .y3                0.807    0.167    4.820    0.000
#>    .y4                0.696    0.176    3.960    0.000
#>     eta1              0.980    0.204    4.815    0.000
#>
#> Standardized Monte Carlo Confidence Intervals
#>               est se R 0.05% 0.5% 2.5% 97.5% 99.5% 99.95%
#> eta1=~y1   1.0000 NA 0    NA   NA   NA    NA    NA     NA
#> eta1=~y2   0.7039 NA 0    NA   NA   NA    NA    NA     NA
#> eta1=~y3   0.7047 NA 0    NA   NA   NA    NA    NA     NA
#> eta1=~y4   0.8566 NA 0    NA   NA   NA    NA    NA     NA
#> y1~~y1     0.0000 NA 0    NA   NA   NA    NA    NA     NA
#> y2~~y2     0.5045 NA 0    NA   NA   NA    NA    NA     NA
#> y3~~y3     0.5034 NA 0    NA   NA   NA    NA    NA     NA
#> y4~~y4     0.2662 NA 0    NA   NA   NA    NA    NA     NA
```

```
#> eta1~~eta1 1.0000 NA 0    NA   NA   NA    NA    NA     NA
#> Test passed
```

#> test-semmcci

```
#> Test passed
#> [[1]]
#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
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#>
#> [[1]][[2]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[3]]
#> [[1]][[3]]$value
#> [[1]][[3]]$value[[1]]
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#> [[1]][[3]]$visible
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#>
#> [[1]][[4]]
#> [[1]][[4]]$value
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```

```
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#> [[1]][[5]]$visible
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#> [[1]][[6]]$value[[1]]
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#>
#> [[1]][[6]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
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#>
#>
#> [[1]][[7]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[8]]
#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
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#>
#> [[1]][[8]]$visible
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#>
#> [[1]][[9]]
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#> [[1]][[9]]$value[[1]]
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#>
```

```
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#> [[1]][[9]]$visible
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#>
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#> [[1]][[10]]$value[[1]]
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#>
#>
#> [[1]][[10]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[11]]
#> [[1]][[11]]$value
#> [[1]][[11]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[11]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[12]]
#> [[1]][[12]]$value
#> [[1]][[12]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[12]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[13]]
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#> [[1]][[13]]$value[[1]]
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#>
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#> [1] TRUE
#>
#>
#> [[1]][[14]]
```

```
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#>
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#>
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#>
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#> [[1]][[17]]
#> [[1]][[17]]$value
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#> [[1]][[17]]$visible
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#>
#> [[1]][[18]]
#> [[1]][[18]]$value
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#>
```

```
#> [[1]][[18]]$visible
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#>
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#> [[1]][[19]]$value[[1]]
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#>
#> [[1]][[19]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[20]]
#> [[1]][[20]]$value
#> [[1]][[20]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[20]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[21]]
#> [[1]][[21]]$value
#> [[1]][[21]]$value[[1]]
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#>
#>
#> [[1]][[21]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[22]]
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#>
#> [[1]][[23]]
```

```
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#> [[1]][[23]]$value[[1]]
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#>
#>
#> [[1]][[23]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[24]]
#> [[1]][[24]]$value
#> [[1]][[24]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[24]]$visible
#> [1] TRUE
```

Environment

```
ls()

#> [1] "root"
```

Class

```
#> [[1]]
#> [1] "root_criterion"
```

References

Pesigan, I. J. A., & Cheung, S. F. (2023). Monte Carlo confidence intervals for the indirect effect with missing data. *Behavior Research Methods*, *56*(3), 1678–1696. https://doi.org/10.3758/s13428-023-02114-4

R Core Team. (2024). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/