

# semmcci: Internal Tests

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## Tests

```
#> 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	0.0945	100	0.2789	0.2991	0.3399	0.7173	0.7515	0.7519
#> visual=~x3	0.7294	0.1121	100	0.3745	0.3889	0.4928	0.9308	0.9849	0.9953
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0727	100	0.9452	0.9516	0.9801	1.2347	1.3193	1.3373
#> textual=~x6	0.9261	0.0531	100	0.8048	0.8049	0.8284	1.0429	1.0695	1.0789
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1768	100	0.7530	0.7568	0.8009	1.4860	1.5730	1.5922
#> speed=~x9	1.0815	0.1471	100	0.6427	0.7150	0.8163	1.3517	1.5010	1.5114
#> x1~~x1	0.5491	0.1281	100	0.2367	0.2527	0.2794	0.7664	0.8131	0.8426
#> x2~~x2	1.1338	0.0951	100	0.8740	0.8945	0.9595	1.3126	1.3480	1.3538
#> x3~~x3	0.8443	0.0934	100	0.5898	0.6119	0.6661	1.0340	1.0658	1.0753
#> x4~~x4	0.3712	0.0518	100	0.2542	0.2557	0.2744	0.4685	0.4968	0.5045
#> x5~~x5	0.4463	0.0618	100	0.3287	0.3333	0.3484	0.5655	0.6057	0.6156
#> x6~~x6	0.3562	0.0465	100	0.2720	0.2721	0.2782	0.4533	0.5007	0.5109
#> x7~~x7	0.7994	0.0872	100	0.5557	0.5719	0.6067	0.9474	0.9627	0.9631
#> x8~~x8	0.4877	0.0679	100	0.2773	0.3026	0.3576	0.6205	0.6526	0.6538
#> x9~~x9	0.5661	0.0672	100	0.4165	0.4265	0.4586	0.7017	0.7214	0.7255
#> visual~~visual	0.8093	0.1615	100	0.5056	0.5202	0.5673	1.1456	1.3022	1.3656
#> textual~~textual	0.9795	0.1118	100	0.7018	0.7308	0.7783	1.1823	1.2743	1.3384
#> speed~~speed	0.3837	0.0878	100	0.1560	0.1759	0.2221	0.5700	0.5904	0.6045
#> visual~~textual	0.4082	0.0689	100	0.2508	0.2590	0.2763	0.5441	0.5732	0.5928
#> visual~~speed	0.2622	0.0635	100	0.0794	0.1128	0.1643	0.3911	0.4387	0.4454
#> textual~~speed	0.1735	0.0501	100	0.0521	0.0557	0.0805	0.2606	0.2737	0.2747

```
#> 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	0.0914	100	0.3388	0.3492	0.3901	0.7393	0.7737	0.7964
#> visual=~x3	0.7294	0.1147	100	0.4426	0.4550	0.4842	0.9752	0.9879	0.9893
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0760	100	0.8370	0.8780	0.9545	1.2522	1.2960	1.3038
#> textual=~x6	0.9261	0.0565	100	0.8073	0.8079	0.8229	1.0380	1.0588	1.0592
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1808	100	0.6660	0.7318	0.8665	1.5210	1.6042	1.6395
#> speed=~x9	1.0815	0.1509	100	0.7801	0.7957	0.8172	1.3729	1.4439	1.4553
#> x1~~x1	0.5491	0.1245	100	0.2600	0.2952	0.3484	0.7670	0.8020	0.8167
#> x2~~x2	1.1338	0.1092	100	0.8681	0.8721	0.9187	1.3430	1.4082	1.4283
#> x3~~x3	0.8443	0.0929	100	0.6159	0.6261	0.6684	1.0105	1.0585	1.0920
#> x4~~x4	0.3712	0.0473	100	0.2605	0.2656	0.2806	0.4556	0.4705	0.4790
#> x5~~x5	0.4463	0.0671	100	0.2705	0.2885	0.3303	0.5978	0.6192	0.6302
#> x6~~x6	0.3562	0.0376	100	0.2760	0.2833	0.2922	0.4342	0.4473	0.4539
#> x7~~x7	0.7994	0.0789	100	0.6273	0.6293	0.6522	0.9501	1.0329	1.0399

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#> x8~~x8          0.4877 0.0748 100 0.2707 0.2955 0.3296 0.6183 0.6844 0.6968
#> x9~~x9          0.5661 0.0651 100 0.4101 0.4128 0.4305 0.6965 0.7381 0.7545
#> visual~~visual  0.8093 0.1571 100 0.2687 0.2812 0.5065 1.0611 1.1121 1.1246
#> textual~~textual 0.9795 0.1147 100 0.6849 0.6971 0.7512 1.1866 1.3463 1.3782
#> speed~~speed    0.3837 0.0913 100 0.1443 0.1504 0.2044 0.5624 0.5740 0.5775
#> visual~~textual  0.4082 0.0620 100 0.2568 0.2598 0.2784 0.5189 0.5258 0.5261
#> visual~~speed    0.2622 0.0691 100 0.0661 0.0869 0.1419 0.3842 0.4176 0.4214
#> textual~~speed   0.1735 0.0556 100 0.0418 0.0427 0.0756 0.2819 0.3087 0.3173
#> Standardized Monte Carlo Confidence Intervals
#>           est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0617 100 0.6276 0.6368 0.6603 0.8893 0.9148 0.9231
#> visual=~x2      0.4236 0.0532 100 0.2429 0.2585 0.3081 0.5099 0.5393 0.5546
#> visual=~x3      0.5811 0.0570 100 0.4071 0.4082 0.4497 0.6725 0.6971 0.7035
#> textual=~x4      0.8516 0.0248 100 0.7757 0.7760 0.7914 0.8977 0.9109 0.9166
#> textual=~x5      0.8551 0.0233 100 0.8018 0.8029 0.8065 0.8920 0.8986 0.9022
#> textual=~x6      0.8380 0.0234 100 0.7742 0.7771 0.7915 0.8713 0.8736 0.8739
#> speed=~x7        0.5695 0.0549 100 0.3914 0.4203 0.4651 0.6708 0.6934 0.7014
#> speed=~x8        0.7230 0.0532 100 0.5826 0.5924 0.6051 0.8082 0.8402 0.8569
#> speed=~x9        0.6650 0.0520 100 0.5261 0.5280 0.5317 0.7352 0.7636 0.7813
#> x1~~x1           0.4042 0.0961 100 0.1479 0.1631 0.2091 0.5640 0.5944 0.6061
#> x2~~x2           0.8206 0.0437 100 0.6924 0.7089 0.7400 0.9042 0.9328 0.9409
#> x3~~x3           0.6623 0.0640 100 0.5050 0.5141 0.5477 0.7977 0.8334 0.8342
#> x4~~x4           0.2748 0.0419 100 0.1599 0.1701 0.1942 0.3737 0.3978 0.3982
#> x5~~x5           0.2689 0.0396 100 0.1860 0.1925 0.2044 0.3496 0.3554 0.3571
#> x6~~x6           0.2977 0.0390 100 0.2363 0.2369 0.2408 0.3734 0.3961 0.4006
#> x7~~x7           0.6757 0.0622 100 0.5080 0.5191 0.5500 0.7837 0.8223 0.8466
#> x8~~x8           0.4772 0.0759 100 0.2656 0.2937 0.3468 0.6339 0.6490 0.6606
#> x9~~x9           0.5578 0.0669 100 0.3896 0.4165 0.4595 0.7173 0.7212 0.7232
#> 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 0.0627 100 0.3225 0.3245 0.3389 0.5743 0.6279 0.6586
#> visual~~speed     0.4705 0.0797 100 0.2174 0.2688 0.3499 0.6360 0.6728 0.6779
#> textual~~speed    0.2830 0.0741 100 0.1016 0.1040 0.1243 0.4063 0.4540 0.4806
#> Standardized Monte Carlo Confidence Intervals
#>           est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0669 100 0.5055 0.5099 0.6425 0.8701 0.8856 0.8940
#> visual=~x2      0.4236 0.0524 100 0.2645 0.2756 0.3174 0.5180 0.5387 0.5410
#> visual=~x3      0.5811 0.0584 100 0.3881 0.4064 0.4521 0.6879 0.6950 0.6977
#> textual=~x4      0.8516 0.0237 100 0.7857 0.7900 0.7990 0.8972 0.9020 0.9025
#> textual=~x5      0.8551 0.0261 100 0.7786 0.7831 0.7953 0.8960 0.9017 0.9053
#> textual=~x6      0.8380 0.0218 100 0.7857 0.7863 0.7916 0.8708 0.8835 0.8887
#> speed=~x7        0.5695 0.0578 100 0.3893 0.3967 0.4379 0.6686 0.6802 0.6809
#> speed=~x8        0.7230 0.0560 100 0.5511 0.5743 0.6126 0.8337 0.8600 0.8609
#> speed=~x9        0.6650 0.0476 100 0.5524 0.5537 0.5633 0.7507 0.7654 0.7673
#> x1~~x1           0.4042 0.0979 100 0.2007 0.2155 0.2429 0.5870 0.7399 0.7445

```

```

#> x2~~x2      0.8206 0.0439 100 0.7073 0.7098 0.7317 0.8993 0.9239 0.9300
#> x3~~x3      0.6623 0.0659 100 0.5131 0.5169 0.5268 0.7956 0.8344 0.8493
#> x4~~x4      0.2748 0.0402 100 0.1855 0.1863 0.1950 0.3616 0.3760 0.3827
#> x5~~x5      0.2689 0.0441 100 0.1804 0.1869 0.1972 0.3676 0.3868 0.3938
#> x6~~x6      0.2977 0.0363 100 0.2103 0.2194 0.2418 0.3733 0.3818 0.3827
#> x7~~x7      0.6757 0.0635 100 0.5363 0.5373 0.5530 0.8081 0.8426 0.8484
#> x8~~x8      0.4772 0.0802 100 0.2588 0.2603 0.3047 0.6247 0.6695 0.6962
#> x9~~x9      0.5578 0.0630 100 0.4112 0.4141 0.4365 0.6827 0.6934 0.6948
#> 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 0.0635 100 0.3176 0.3196 0.3391 0.5739 0.6882 0.7230
#> visual~~speed   0.4705 0.0832 100 0.2385 0.2632 0.3293 0.6502 0.6786 0.6794
#> textual~~speed   0.2830 0.0774 100 0.0740 0.0789 0.1320 0.4415 0.4712 0.4718
#> Monte Carlo Confidence Intervals
#> Monte Carlo Confidence Intervals (Multiple Imputation Estimates)
#> Standardized Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals

#> test-semmcci-npd

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

#> test-semmcci-zzz-coverage
#> test-semmcci-zzz-heywood

#> lavaan 0.6.15 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
#> [[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]]
#> [1] TRUE
#>

```

```

#>
#> [[1]][[2]]$visible
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#>
#>
#> [[1]][[3]]
#> [[1]][[3]]$value
#> [[1]][[3]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[3]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[4]]
#> [[1]][[4]]$value
#> [[1]][[4]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[4]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[5]]
#> [[1]][[5]]$value
#> [[1]][[5]]$value[[1]]
#> Monte Carlo Confidence Intervals
#>
#>          est      se      R    0.05%    0.5%    2.5%
#> ses=~education      1.0000  0.0000 20000    1.0000    1.0000    1.0000
#> ses=~sei           5.2195  0.4212 20000    3.7735    4.1390    4.3972
#> alien67=~anomia67    1.0000  0.0000 20000    1.0000    1.0000    1.0000
#> alien67=~powerless67 0.9787  0.0616 20000    0.7701    0.8179    0.8576
#> alien71=~anomia71    1.0000  0.0000 20000    1.0000    1.0000    1.0000
#> alien71=~powerless71 0.9221  0.0602 20000    0.7261    0.7658    0.8018
#> alien71~alien67      0.6070  0.0510 20000    0.4353    0.4755    0.5070
#> alien71~ses         -0.2268  0.0524 20000   -0.4076   -0.3621   -0.3305
#> alien67~ses         -0.5750  0.0566 20000   -0.7656   -0.7222   -0.6861
#> anomia67~~anomia71    1.6229  0.3132 20000    0.5655    0.7985    1.0130
#> powerless67~~powerless71 0.3387  0.2616 20000   -0.5128   -0.3335   -0.1795
#> education~~education  2.8013  0.5068 20000    1.0301    1.4891    1.8147
#> sei~~sei            264.5971 18.0852 20000  205.5939 217.7230 229.2902
#> anomia67~~anomia67    4.7307  0.4545 20000    3.2212    3.5401    3.8392
#> powerless67~~powerless67 2.5634  0.4000 20000    1.2226    1.5258    1.7701
#> anomia71~~anomia71    4.3992  0.5185 20000    2.7221    3.0520    3.3751

```

```

#> powerless71~~powerless71 3.0699 0.4385 20000 1.6698 1.9366 2.2220
#> ses~~ses 6.7983 0.6499 20000 4.5544 5.1033 5.5250
#> alien67~~alien67 4.8415 0.4670 20000 3.3657 3.6551 3.9187
#> alien71~~alien71 4.0832 0.4057 20000 2.7185 3.0473 3.2974
#> 97.5% 99.5% 99.95%
#> ses=~education 1.0000 1.0000 1.0000
#> ses=~sei 6.0540 6.3084 6.5384
#> alien67=~anomia67 1.0000 1.0000 1.0000
#> alien67=~powerless67 1.0976 1.1387 1.1867
#> alien71=~anomia71 1.0000 1.0000 1.0000
#> alien71=~powerless71 1.0387 1.0741 1.1146
#> alien71~alien67 0.7057 0.7381 0.7720
#> alien71~ses -0.1249 -0.0937 -0.0504
#> alien67~ses -0.4660 -0.4327 -0.3825
#> anomia67~~anomia71 2.2416 2.4332 2.6440
#> powerless67~~powerless71 0.8484 1.0072 1.1802
#> education~~education 3.7984 4.1124 4.5083
#> sei~~sei 300.1846 311.5893 325.5133
#> anomia67~~anomia67 5.6174 5.9006 6.2276
#> powerless67~~powerless67 3.3482 3.6101 3.8937
#> anomia71~~anomia71 5.4117 5.7193 6.0645
#> powerless71~~powerless71 3.9386 4.1964 4.5589
#> ses~~ses 8.0731 8.4757 8.9601
#> alien67~~alien67 5.7662 6.0445 6.4014
#> alien71~~alien71 4.8878 5.1436 5.4230
#>
#>
#> [[1]][[5]]$visible
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#>
#> [[1]][[6]]
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#> [[1]][[6]]$visible
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#>
#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>

```



```

#>
#> [[1]][[7]]$visible
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#>
#>
#> [[1]][[8]]
#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[8]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[9]]
#> [[1]][[9]]$value
#> [[1]][[9]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[9]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[10]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[11]]
#> [[1]][[11]]$value
#> [[1]][[11]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[11]]$visible
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#>
#> [[1]][[12]]

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#> [1] TRUE
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#>
#> [[1]][[19]]
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#> [[1]][[19]]$value[[1]]$thetahatstar
#>
#>           y1           y2           y3
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#> [2,]  2.093398569  5.1971062091  5.494601672
#> [3,]  0.015152882 -1.0244993272 -0.549658899
#> [4,]  0.267760159 -0.8171874364 -0.119613356
#> [5,]  1.206108748  1.5139089248  2.344149078
#> [6,] -0.068503286  0.1837809703  0.016568543
#> [7,]  0.217076116 -0.5612636388 -0.040788331
#> [8,]  0.311054650 -0.4549597779  0.135395176
#> [9,]  0.639064054 -0.1902083004  0.691342198
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#> [11,] 0.909499540  1.2063650079  1.803609448
#> [12,] -0.220059505  0.3200705947 -0.096783934
#> [13,] 0.680520455  0.0539262816  0.878521956
#> [14,] 0.833499404  0.5186600245  1.327191355
#> [15,] 0.805462211  1.6359103680  1.912256711
#> [16,] 1.271700102  2.5771594046  3.015999658
#> [17,] -0.677574635 -0.8350367804 -1.308332202
#> [18,] -1.416642607 -1.3520288179 -2.516843825
#> [19,]  1.383477908  3.2965469697  3.554614282
#> [20,] -0.195388654 -0.4001996957 -0.465739742
#> [21,] -0.034544847  1.2880822206  0.671754983
#> [22,] 0.288221096  1.0037193560  0.916428047
#> [23,] 1.563186881  2.8446979418  3.527950414
#> [24,] 0.113455760  0.1726079722  0.237267217
#> [25,] 0.069752642  0.1465148732  0.168289742
#> [26,] 1.025087529  0.6530317777  1.640668536
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#> [37,] -0.944142032 -2.1215243401 -2.354683041

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#> [40,] -0.202830210 -0.4919477651 -0.525935548
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#> [82,] 0.306630143 -0.0279409979 0.366855450

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#> [127,] 0.449925354 1.2653828408 1.263282237

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#> [218,] -0.823107887 -1.4195377275 -1.814182752
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#> [1419,] -1.630915809 -2.3141387783 -3.317968883
#> [1420,] -0.403306093 -0.7253147455 -0.905433789
#> [1421,] -0.349153095 -0.6554108416 -0.799112364
#> [1422,]  0.935728864  1.6277974707  2.070194252
#> [1423,]  0.380709937  0.7054551732  0.866235611
#> [1424,] -1.796564817 -4.0797691754 -4.504380765
#> [1425,] -2.136224100 -3.1532238154 -4.413735080
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#> [1427,] -2.108555285 -4.1016154370 -4.905550275
#> [1428,] -0.088850132 -1.7195669384 -1.065081959
#> [1429,] -0.883830730 -0.5314186757 -1.397034010
#> [1430,]  0.996768451  1.7861328495  2.234178877
#> [1431,]  1.477808224  3.1705585112  3.602323943
#> [1432,]  0.133371430  0.1252257419  0.235806497

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#> [1433,] -1.713534066 -2.0125266087 -3.253610038
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#> [1435,] -1.454071287 -2.1796897246 -3.022833775
#> [1436,]  0.990085548 -1.0714322682  0.640016434
#> [1437,]  0.318491574  1.0289397007  0.968170951
#> [1438,]  0.377573870  0.1010424376  0.526901237
#> [1439,]  2.356317603  3.7011090692  4.992240566
#> [1440,]  1.952750565  3.5291847578  4.393589907
#> [1441,] -0.362343703 -0.6719616183 -0.824745772
#> [1442,]  0.208393187  1.1911058395  0.920875925
#> [1443,] -0.614671265 -1.3664227383 -1.524789941
#> [1444,] -0.788437066 -1.7515070181 -1.955178003
#> [1445,]  1.685418825  3.3501681686  3.960885967
#> [1446,]  0.701161528  2.0787204429  2.027936939
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#> [1448,]  0.835428379  1.9792589981  2.140168026
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#> [1456,]  1.942187392  3.4896354528  4.358469638
#> [1457,]  0.215069265  1.7081984486  1.216165607
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#> [1461,] -0.372579772 -1.0122988410 -1.026382850
#> [1462,]  0.252838189 -0.6213524443 -0.029540527
#> [1463,] -1.130122764 -1.7229063607 -2.365380932
#> [1464,]  0.782666528  2.7756200890  2.516322137
#> [1465,] -2.278003044 -3.2799397344 -4.660852561
#> [1466,] -1.408188617 -2.4434847765 -3.112014231
#> [1467,]  0.656747295  1.3177766633  1.550261357
#> [1468,]  0.066708528 -0.4202970152 -0.150063072
#> [1469,] -0.824042169 -0.6431951442 -1.384510153
#> [1470,]  1.885186682  2.8197154101  3.915613339
#> [1471,] -0.268666523  0.1388414491 -0.257970483
#> [1472,] -0.063436228  0.2949482240  0.084580233
#> [1473,] -0.756494560 -3.0885677159 -2.657359057
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#> [1475,]  1.476059715  1.9256360443  2.909263741
#> [1476,]  1.046054601  1.9339250356  2.377656177
#> [1477,]  2.202217075  3.2194666857  4.532788994

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#> [1478,] 1.026271855 2.1063669003 2.448685511
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#> [1480,] 1.121852012 3.2271239202 3.189845240
#> [1481,] 0.934194195 1.1383019850 1.796631051
#> [1482,] -0.772420853 -0.1031537661 -1.020439070
#> [1483,] 1.246909184 3.0071740692 3.223726024
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#> [1493,] 0.952792943 2.1103759260 2.359283648
#> [1494,] -1.8711155613 -2.8013441842 -3.887921621
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#> [1518,] 1.293452173 2.1681063191 2.816116711
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#> [1521,] 1.915023700 4.0365681823 4.628121833
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#> [1523,] -0.938520134 -1.3117724927 -1.898294277
#> [1524,] -0.443792667 -0.5080418953 -0.835342385
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#> [1568,] -0.394238545 -0.2739893565 -0.643660046
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#> [1570,] -1.828460083 -2.4194688865 -3.622756363
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#> [1572,] -0.379056714 -1.0541573918 -1.057689209
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#> [1576,] -2.125324029 -4.1750002385 -4.967186049
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#> [1579,]  0.851273207  2.2556607052  2.313317578
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#> [1581,] -0.727407204 -1.9103240507 -1.967211814
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#> [1587,] -0.579633379  0.1666641334 -0.630299385
#> [1588,] -1.016027922 -1.4058384696 -2.047147587
#> [1589,]  1.690027094  2.5601548053  3.528208045
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#> [1591,] -0.838961159 -1.8366809096 -2.065448460
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#> [1599,] -0.519433451 -1.0650787247 -1.238797019
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#> [1612,]  0.501850248  1.2443226672  1.316344006

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#> [1613,] -0.496815940 -0.1873320171 -0.723480770
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#> [1615,] -1.229004532 -1.0937940840 -2.139553506
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#> [1632,] -0.977816710 -1.5135896816 -2.059296396
#> [1633,]  1.123052510  3.0894082334  3.114915796
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#> [1640,]  0.031970078 -0.3098950300 -0.132112732
#> [1641,]  1.289133466  2.9345567765  3.236079286
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#> [1643,] -1.162180591 -1.7372152730 -2.413297235
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#> [1658,] -0.849984877 -1.1534874736 -1.700051058
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#> [1671,] -2.193380838 -3.6081262518 -4.737460173
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#> [1702,] -0.856807143 -1.9990964247 -2.177835850

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#> [1969,] 0.381647841 0.5078536177 0.757744569
#> [1970,] -0.456716493 0.2966295975 -0.404899144
#> [1971,] 1.502459556 1.0608167765 2.462245318
#> [1972,] -0.507789824 0.3839739508 -0.420114086

```

```

#> [1973,] -0.107016418 -0.3119078649 -0.306543097
#> [1974,]  1.606172878  3.1412173783  3.746108947
#> [1975,] -2.492248191 -1.9364563056 -4.182434836
#> [1976,]  0.263361728  0.0228126760  0.341066784
#> [1977,]  1.721667310  2.5314251689  3.551719003
#> [1978,] -0.407429764 -0.6842120229 -0.887765631
#> [1979,] -1.929716120 -2.3901471576 -3.732748244
#> [1980,]  1.094906717  2.8229929716  2.931969250
#> [1981,] -0.696581801 -1.8282158574 -1.883206555
#> [1982,]  1.085177534  1.3477392617  2.101133114
#> [1983,]  0.358424213  0.0075063451  0.451113390
#> [1984,] -1.272259292 -3.6027919901 -3.585880101
#> [1985,] -0.521091669  0.0306926439 -0.632757551
#> [1986,] -0.353946268 -0.6392198798 -0.796104048
#> [1987,]  3.107723934  6.0105783522  7.210887695
#> [1988,] -1.123858379 -2.1606723513 -2.600511169
#> [1989,]  0.196672036  0.4849787629  0.514388926
#> [1990,] -0.303699933 -1.3887180867 -1.149388017
#> [1991,] -0.284185928 -0.4747287387 -0.617828630
#> [1992,] -0.066049475 -0.3527615039 -0.278130213
#> [1993,] -1.906605812 -3.1206638449 -4.109336339
#> [1994,]  0.800956347  1.1536017873  1.638976921
#> [1995,] -0.626816263 -1.5128887927 -1.621217033
#> [1996,]  0.768294228  0.2642144324  1.104675180
#> [1997,]  0.760711269  1.0954995947  1.556547845
#> [1998,] -0.750869129 -0.3018882647 -1.103853837
#> [1999,]  1.161626258  3.1634661736  3.204115530
#> [2000,] -0.236712777 -0.6181945833 -0.638248117
#>
#> [[1]][[19]]$value[[1]]$decomposition
#> [1] "eigen"
#>
#>
#>
#> [[1]][[19]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[20]]
#> [[1]][[20]]$value
#> [[1]][[20]]$value[[1]]
#> [[1]][[20]]$value[[1]]$M
#> [1] 2
#>
#> [[1]][[20]]$value[[1]]$est

```



```

#> [1] 0 0 0
#>
#> [[1]][[20]]$value[[1]]$within
#>      [,1] [,2] [,3]
#> [1,]    1    0    0
#> [2,]    0    1    0
#> [3,]    0    0    1
#>
#> [[1]][[20]]$value[[1]]$between
#>      [,1] [,2] [,3]
#> [1,]    0    0    0
#> [2,]    0    0    0
#> [3,]    0    0    0
#>
#> [[1]][[20]]$value[[1]]$total
#>      [,1] [,2] [,3]
#> [1,]    1    0    0
#> [2,]    0    1    0
#> [3,]    0    0    1
#>
#> [[1]][[20]]$value[[1]]$ariv
#> [1] NA
#>
#> [[1]][[20]]$value[[1]]$total_adj
#> [1] NA
#>
#>
#>
#> [[1]][[20]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[21]]
#> [[1]][[21]]$value
#> [[1]][[21]]$value[[1]]
#>
#>      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

```

```
#>  
#>  
#> [[1]][[21]]$visible  
#> [1] TRUE
```

## Environment

```
ls()  
#> [1] "i"      "root"   "tex_file"
```

## Class

```
#> [[1]]  
#> [1] "character"  
#>  
#> [[2]]  
#> [1] "root_criterion"  
#>  
#> [[3]]  
#> [1] "character"
```

## 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/>