

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
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#> 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-semccci-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	0.0952	100	0.3395	0.3600	0.3992	0.7485	0.7545	0.7563
#> visual=~x3	0.7294	0.1149	100	0.5030	0.5122	0.5428	0.9458	1.0266	1.0878
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0677	100	0.9827	0.9853	0.9979	1.2475	1.2758	1.2838
#> textual=~x6	0.9261	0.0603	100	0.7810	0.7900	0.8137	1.0504	1.1187	1.1562
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1486	100	0.7600	0.7801	0.8672	1.4505	1.4987	1.5029
#> speed=~x9	1.0815	0.1612	100	0.6983	0.7173	0.7641	1.3309	1.4330	1.4984
#> x1~~x1	0.5491	0.1159	100	0.2861	0.2914	0.3128	0.7755	0.7868	0.7873
#> x2~~x2	1.1338	0.1023	100	0.8574	0.8707	0.9534	1.3352	1.3592	1.3673
#> x3~~x3	0.8443	0.0953	100	0.5780	0.5879	0.6137	1.0222	1.0542	1.0711
#> x4~~x4	0.3712	0.0501	100	0.2476	0.2482	0.2739	0.4561	0.4678	0.4706
#> x5~~x5	0.4463	0.0559	100	0.3135	0.3204	0.3364	0.5380	0.5585	0.5673
#> x6~~x6	0.3562	0.0457	100	0.2418	0.2551	0.2715	0.4391	0.4817	0.4990
#> x7~~x7	0.7994	0.0780	100	0.6040	0.6250	0.6643	0.9409	0.9821	1.0050
#> x8~~x8	0.4877	0.0832	100	0.2875	0.3038	0.3306	0.6242	0.6780	0.7033
#> x9~~x9	0.5661	0.0732	100	0.4085	0.4129	0.4273	0.7297	0.7409	0.7432
#> visual~~visual	0.8093	0.1357	100	0.5515	0.5670	0.5887	1.0673	1.1431	1.1545
#> textual~~textual	0.9795	0.1219	100	0.5932	0.6469	0.7176	1.1971	1.2816	1.2831
#> speed~~speed	0.3837	0.0874	100	0.1875	0.1909	0.2082	0.5621	0.6107	0.6361
#> visual~~textual	0.4082	0.0585	100	0.2677	0.2725	0.3074	0.5228	0.5418	0.5454
#> visual~~speed	0.2622	0.0540	100	0.1312	0.1386	0.1610	0.3485	0.3791	0.3998
#> textual~~speed	0.1735	0.0477	100	0.0624	0.0698	0.1003	0.2718	0.2908	0.3017

```
#> 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	0.0979	100	0.3486	0.3509	0.3871	0.7656	0.7918	0.7936
#> visual=~x3	0.7294	0.1019	100	0.4473	0.4560	0.4833	0.8791	0.9789	0.9915
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0596	100	0.9950	0.9986	1.0113	1.2315	1.2489	1.2577
#> textual=~x6	0.9261	0.0500	100	0.7931	0.8087	0.8300	1.0099	1.0335	1.0400
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1548	100	0.8518	0.8609	0.8797	1.4903	1.6008	1.6298
#> speed=~x9	1.0815	0.1504	100	0.7659	0.7742	0.8203	1.3611	1.4165	1.4386
#> x1~~x1	0.5491	0.1222	100	0.2151	0.2381	0.3210	0.7916	0.8396	0.8552
#> x2~~x2	1.1338	0.0976	100	0.9188	0.9281	0.9422	1.3314	1.4114	1.4424
#> x3~~x3	0.8443	0.0846	100	0.6625	0.6689	0.6898	1.0215	1.0664	1.0700
#> x4~~x4	0.3712	0.0520	100	0.2246	0.2286	0.2491	0.4674	0.4813	0.4850
#> x5~~x5	0.4463	0.0540	100	0.3160	0.3233	0.3451	0.5778	0.6046	0.6115
#> x6~~x6	0.3562	0.0412	100	0.2461	0.2624	0.2821	0.4391	0.4537	0.4598
#> x7~~x7	0.7994	0.0770	100	0.6165	0.6244	0.6583	0.9326	0.9737	0.9954

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#> x8~~x8          0.4877 0.0747 100 0.3415 0.3472 0.3577 0.6449 0.6654 0.6688
#> x9~~x9          0.5661 0.0679 100 0.4455 0.4531 0.4634 0.7093 0.7365 0.7477
#> visual~~visual  0.8093 0.1254 100 0.5670 0.5735 0.5962 1.0712 1.0973 1.1158
#> textual~~textual 0.9795 0.1054 100 0.7596 0.7663 0.8045 1.1861 1.2061 1.2177
#> speed~~speed    0.3837 0.0802 100 0.1467 0.1486 0.2269 0.5102 0.5677 0.5783
#> visual~~textual  0.4082 0.0736 100 0.2207 0.2351 0.2587 0.5526 0.5943 0.5959
#> visual~~speed    0.2622 0.0462 100 0.1556 0.1578 0.1651 0.3434 0.3842 0.4026
#> textual~~speed   0.1735 0.0466 100 0.0681 0.0699 0.0800 0.2532 0.2950 0.3267
#> Standardized Monte Carlo Confidence Intervals
#>               est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0542 100 0.6608 0.6631 0.6726 0.8676 0.8862 0.8886
#> visual=~x2      0.4236 0.0537 100 0.3010 0.3032 0.3212 0.5131 0.5281 0.5391
#> visual=~x3      0.5811 0.0619 100 0.4220 0.4242 0.4558 0.7016 0.7154 0.7225
#> textual=~x4     0.8516 0.0253 100 0.7691 0.7739 0.8062 0.8944 0.8986 0.8996
#> textual=~x5     0.8551 0.0226 100 0.7848 0.7912 0.8108 0.8909 0.9028 0.9063
#> textual=~x6     0.8380 0.0241 100 0.7783 0.7813 0.7865 0.8829 0.8934 0.8967
#> speed=~x7       0.5695 0.0542 100 0.4251 0.4341 0.4545 0.6661 0.6854 0.6981
#> speed=~x8       0.7230 0.0567 100 0.5701 0.5778 0.6024 0.8072 0.8356 0.8576
#> speed=~x9       0.6650 0.0565 100 0.5008 0.5124 0.5338 0.7555 0.7616 0.7618
#> x1~~x1          0.4042 0.0836 100 0.2104 0.2146 0.2473 0.5476 0.5602 0.5634
#> x2~~x2          0.8206 0.0452 100 0.7093 0.7210 0.7368 0.8968 0.9080 0.9094
#> x3~~x3          0.6623 0.0715 100 0.4780 0.4881 0.5078 0.7920 0.8201 0.8219
#> x4~~x4          0.2748 0.0428 100 0.1908 0.1925 0.2000 0.3499 0.4011 0.4085
#> x5~~x5          0.2689 0.0384 100 0.1786 0.1850 0.2064 0.3427 0.3739 0.3841
#> x6~~x6          0.2977 0.0403 100 0.1959 0.2018 0.2204 0.3815 0.3896 0.3942
#> x7~~x7          0.6757 0.0609 100 0.5127 0.5300 0.5563 0.7934 0.8115 0.8193
#> x8~~x8          0.4772 0.0805 100 0.2643 0.3011 0.3484 0.6371 0.6661 0.6750
#> x9~~x9          0.5578 0.0732 100 0.4196 0.4200 0.4292 0.7151 0.7373 0.7491
#> 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 0.0523 100 0.3451 0.3544 0.3716 0.5633 0.5832 0.5925
#> visual~~speed    0.4705 0.0853 100 0.2648 0.2865 0.3262 0.6525 0.7240 0.7389
#> textual~~speed   0.2830 0.0659 100 0.1260 0.1272 0.1732 0.4115 0.4468 0.4605
#> Standardized Monte Carlo Confidence Intervals
#>               est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0537 100 0.6460 0.6496 0.6729 0.8795 0.9010 0.9062
#> visual=~x2      0.4236 0.0594 100 0.2722 0.2811 0.3214 0.5308 0.5691 0.5741
#> visual=~x3      0.5811 0.0522 100 0.4050 0.4128 0.4474 0.6419 0.6910 0.7205
#> textual=~x4     0.8516 0.0227 100 0.8007 0.8019 0.8058 0.9044 0.9118 0.9120
#> textual=~x5     0.8551 0.0213 100 0.7954 0.7994 0.8108 0.8886 0.8960 0.8992
#> textual=~x6     0.8380 0.0245 100 0.7497 0.7690 0.7946 0.8768 0.8864 0.8875
#> speed=~x7       0.5695 0.0541 100 0.3816 0.3844 0.4449 0.6431 0.6714 0.6836
#> speed=~x8       0.7230 0.0529 100 0.5823 0.5840 0.6206 0.8007 0.8232 0.8343
#> speed=~x9       0.6650 0.0509 100 0.5370 0.5389 0.5591 0.7510 0.7558 0.7562
#> x1~~x1          0.4042 0.0834 100 0.1788 0.1881 0.2265 0.5472 0.5780 0.5826

```

```

#> x2~~x2      0.8206 0.0508 100 0.6704 0.6761 0.7183 0.8967 0.9209 0.9259
#> x3~~x3      0.6623 0.0572 100 0.4807 0.5215 0.5879 0.7998 0.8295 0.8359
#> x4~~x4      0.2748 0.0387 100 0.1683 0.1686 0.1821 0.3507 0.3570 0.3588
#> x5~~x5      0.2689 0.0362 100 0.1915 0.1972 0.2104 0.3426 0.3609 0.3673
#> x6~~x6      0.2977 0.0408 100 0.2123 0.2143 0.2312 0.3687 0.4081 0.4379
#> x7~~x7      0.6757 0.0590 100 0.5326 0.5491 0.5864 0.8018 0.8522 0.8544
#> x8~~x8      0.4772 0.0752 100 0.3038 0.3222 0.3589 0.6149 0.6589 0.6609
#> x9~~x9      0.5578 0.0663 100 0.4281 0.4288 0.4360 0.6874 0.7096 0.7117
#> 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 0.0661 100 0.2898 0.2915 0.3333 0.5754 0.6337 0.6389
#> visual~~speed   0.4705 0.0697 100 0.2598 0.3027 0.3586 0.6149 0.6429 0.6470
#> textual~~speed   0.2830 0.0676 100 0.1318 0.1352 0.1535 0.4337 0.4444 0.4447
#> 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]]
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#> [[1]][[1]]$value
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#> [1] TRUE
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
#> [1] TRUE
#>

```

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#> [[1]][[3]]
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#> [[1]][[3]]$value[[1]]
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#>
#>
#> [[1]][[3]]$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  0.4188 20000      3.8841      4.1509      4.4133
#> alien67=~anomia67    1.0000  0.0000 20000      1.0000      1.0000      1.0000
#> alien67=~powerless67 0.9787  0.0610 20000      0.7790      0.8216      0.8596
#> alien71=~anomia71    1.0000  0.0000 20000      1.0000      1.0000      1.0000
#> alien71=~powerless71 0.9221  0.0595 20000      0.7252      0.7692      0.8055
#> alien71~alien67      0.6070  0.0510 20000      0.4476      0.4765      0.5082
#> alien71~ses          -0.2268  0.0522 20000     -0.3993     -0.3631     -0.3290
#> alien67~ses          -0.5750  0.0564 20000     -0.7680     -0.7189     -0.6865
#> anomia67~~anomia71    1.6229  0.3132 20000      0.5497      0.8109      1.0111
#> powerless67~~powerless71 0.3387  0.2596 20000     -0.4996     -0.3246     -0.1728
#> education~~education  2.8013  0.5061 20000      1.1739      1.5160      1.8137
#> sei~~sei            264.5971 18.0098 20000    203.6902    217.9012    228.9218
#> anomia67~~anomia67    4.7307  0.4508 20000      3.2547      3.5653      3.8374
#> powerless67~~powerless67 2.5634  0.3994 20000      1.2627      1.5447      1.7861
#> anomia71~~anomia71    4.3992  0.5139 20000      2.7609      3.0660      3.3818

```

```

#> powerless71~~powerless71 3.0699 0.4324 20000 1.7255 1.9710 2.2197
#> ses~~ses 6.7983 0.6497 20000 4.6857 5.1017 5.5217
#> alien67~~alien67 4.8415 0.4677 20000 3.3539 3.6386 3.9370
#> alien71~~alien71 4.0832 0.4048 20000 2.7609 3.0112 3.2843
#> 97.5% 99.5% 99.95%
#> ses=~education 1.0000 1.0000 1.0000
#> ses=~sei 6.0497 6.3030 6.6544
#> alien67=~anomia67 1.0000 1.0000 1.0000
#> alien67=~powerless67 1.0986 1.1368 1.1784
#> alien71=~anomia71 1.0000 1.0000 1.0000
#> alien71=~powerless71 1.0400 1.0739 1.1152
#> alien71~alien67 0.7064 0.7380 0.7736
#> alien71~ses -0.1253 -0.0929 -0.0592
#> alien67~ses -0.4656 -0.4306 -0.3885
#> anomia67~~anomia71 2.2389 2.4335 2.6113
#> powerless67~~powerless71 0.8468 0.9964 1.1796
#> education~~education 3.8017 4.0865 4.5256
#> sei~~sei 299.6870 311.1771 324.1098
#> anomia67~~anomia67 5.6049 5.8802 6.2973
#> powerless67~~powerless67 3.3500 3.6177 3.8876
#> anomia71~~anomia71 5.4150 5.6973 5.9816
#> powerless71~~powerless71 3.9200 4.1752 4.4687
#> ses~~ses 8.0618 8.4525 8.9458
#> alien67~~alien67 5.7709 6.0626 6.3753
#> alien71~~alien71 4.8796 5.1366 5.3921
#>
#>
#> [[1]][[5]]$visible
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#> [[1]][[6]]$visible
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#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>

```



```

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#> [[1]][[7]]$visible
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#>
#> [[1]][[8]]
#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
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#>
#>
#> [[1]][[8]]$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]][[13]]
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#>
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#> [1] TRUE
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#>
#> [[1]][[19]]
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#>
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#> [1,] 0.6759024062 2.2194363424 2.0745307615
#> [2,] 0.2147570948 0.9544718206 0.7974896157
#> [3,] 2.0453920120 3.0156569043 4.2241254432
#> [4,] 1.1452419143 1.1469193500 2.0645855286
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#> [10,] 1.1964387577 1.6561956392 2.4110539662
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#> [16,] -2.2785034593 -3.9316412191 -5.0231436077
#> [17,] -0.5855622563 -0.6892148407 -1.1126695709
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#> [24,] -2.3570220317 -5.1358722143 -5.7893524497
#> [25,] 1.0075081862 1.7376071451 2.2206413744
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#> [32,] -0.3151641399 0.8123243826 0.0578027677
#> [33,] 0.9230787525 0.7629610804 1.5744718330
#> [34,] 0.2333441479 1.0388790183 0.8675097526
#> [35,] 2.7935439454 3.5270715383 5.4408693546
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#> [37,] -0.4210174793 0.0783006363 -0.4815466347

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#> [1923,] -1.2287871433 -2.1892583446 -2.7472192266
#> [1924,] 2.4085266732 4.2109724561 5.3402970450
#> [1925,] -0.3540841525 -0.9878684852 -0.9897613654
#> [1926,] -0.9111745801 -1.7849712258 -2.1268004141
#> [1927,] -1.9727229352 -2.7354137468 -3.9779853675

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#> [1928,] 0.6104547741 0.7059294688 1.1529859517
#> [1929,] 0.4044827048 2.2554584449 1.7560666885
#> [1930,] 2.4586958095 4.3921331146 5.5033935154
#> [1931,] -1.5837207381 -1.5727651171 -2.8476862500
#> [1932,] 1.0741795141 2.6260297033 2.7968164838
#> [1933,] -1.3458413735 -2.0787389044 -2.8318498020
#> [1934,] 0.8046825329 2.4446848917 2.3601204670
#> [1935,] -0.0738293259 1.0116509641 0.4693602658
#> [1936,] 1.2161524819 0.8167279320 1.9697671475
#> [1937,] -0.4371204814 -1.1475102302 -1.1819004586
#> [1938,] 0.3438689827 1.1149204800 1.0475317948
#> [1939,] -1.2017224554 -2.1671196456 -2.7011840617
#> [1940,] -0.4191866116 -0.6366432580 -0.8760275081
#> [1941,] 0.7532928025 1.3259376085 1.6751806188
#> [1942,] -2.0985904723 -3.9479625679 -4.8078534477
#> [1943,] 0.5892830697 0.7859815904 1.1710108440
#> [1944,] 0.5571516298 1.8108756547 1.6997168893
#> [1945,] -0.8643578842 -0.6398246209 -1.4329125284
#> [1946,] -1.6702434294 -1.8867132310 -3.1298063402
#> [1947,] 0.7106451192 1.7352915312 1.8491741159
#> [1948,] 1.4535413937 1.9027503897 2.8684832732
#> [1949,] -1.0206820148 -0.7861715117 -1.7090619281
#> [1950,] 0.3865654759 0.7915430107 0.9213124947
#> [1951,] 1.5930196330 2.5165030486 3.3830168219
#> [1952,] -0.7000461972 -0.4309250610 -1.1120886965
#> [1953,] -0.8731380829 -0.7151177271 -1.4856457786
#> [1954,] -0.1866670644 0.3750197838 -0.0246497433
#> [1955,] -0.7439541389 -1.3626984273 -1.6839362111
#> [1956,] 0.3562158214 -0.3994840623 0.2224969348
#> [1957,] 0.6259414200 -0.2805455467 0.6248451513
#> [1958,] 1.1442426001 2.6622144252 2.9042647286
#> [1959,] -1.9149085854 -2.7508957533 -3.9144839178
#> [1960,] -0.2730930984 -0.3261577930 -0.5215454432
#> [1961,] 2.2593163281 3.3884857720 4.6977891141
#> [1962,] 0.3994275781 0.3066892717 0.6682777484
#> [1963,] 1.0557605807 0.3718202596 1.5228565873
#> [1964,] -0.0133920395 -0.4141013667 -0.2465085210
#> [1965,] -0.5574846740 -1.3466456889 -1.4425039940
#> [1966,] 0.5916757503 1.1080598385 1.3527344108
#> [1967,] -0.5163826516 -1.3181230831 -1.3754217583
#> [1968,] -0.2302644252 0.4073740555 -0.0610594968
#> [1969,] -0.3952796005 -0.4023323074 -0.7161831854
#> [1970,] -0.7801013532 -0.5636916136 -1.2855957212
#> [1971,] 1.5740237915 2.2897067777 3.2334669601
#> [1972,] -0.2071949023 0.5734679730 0.0598828980

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#> [1973,] -0.2000526573 -0.1402446438 -0.3272914889
#> [1974,] -0.1230769629 -0.5512940153 -0.4594195594
#> [1975,] -2.7342625156 -5.3985595952 -6.4055441371
#> [1976,] 1.3054451110 2.8102562332 3.1874379771
#> [1977,] 0.5718938904 1.4751814826 1.5318039769
#> [1978,] 0.7124251772 2.0249344077 2.0121334817
#> [1979,] 0.3237800414 -0.0133405840 0.3963436421
#> [1980,] 0.9504073715 1.6746780036 2.1145147842
#> [1981,] 1.0252645565 1.5306811646 2.1279479503
#> [1982,] 1.5952695746 2.4621650408 3.3556671339
#> [1983,] 0.1377041966 0.6962335610 0.5580948010
#> [1984,] -0.1630100676 0.1300355337 -0.1311059526
#> [1985,] 0.9139414790 1.1295667983 1.7665286637
#> [1986,] 0.8462369609 1.7318005339 2.0163170196
#> [1987,] 1.6833018678 3.2124202272 3.8818018248
#> [1988,] 1.0813189291 2.1480731289 2.5404733009
#> [1989,] -0.0814127016 -0.3757469880 -0.3100438249
#> [1990,] -1.0661837760 -1.6687042889 -2.2555704376
#> [1991,] -1.4209890174 -2.0228403438 -2.8945360205
#> [1992,] 2.6104037979 4.2252655061 5.5999657463
#> [1993,] -1.5294646204 -2.8347004652 -3.4803512615
#> [1994,] -0.9032403343 0.8076639203 -0.6781026136
#> [1995,] -0.1792170739 0.2831066331 -0.0663677075
#> [1996,] -1.9186252844 -1.9793771159 -3.4909580238
#> [1997,] 0.4124084515 0.8615054105 0.9923643608
#> [1998,] -1.2988872495 -2.9420946909 -3.2524252818
#> [1999,] 1.1287131889 1.6453042194 2.3205572813
#> [2000,] -0.7366490709 -2.5886917291 -2.3552018931
#>
#> [[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/>