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-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 0.1049 100 0.2518 0.2725 0.3246 0.7376 0.8073 0.8412
#> visual=~x3       0.7294 0.1092 100 0.4473 0.4580 0.4864 0.8984 0.9240 0.9242
#> textual=~x4      1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual=~x5      1.1131 0.0650 100 0.9452 0.9671 0.9950 1.2456 1.2634 1.2717
#> textual=~x6      0.9261 0.0573 100 0.8093 0.8116 0.8226 1.0327 1.0748 1.0956
#> speed=~x7        1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed=~x8        1.1800 0.1633 100 0.7469 0.7474 0.8824 1.5025 1.5438 1.5470
#> speed=~x9        1.0815 0.1491 100 0.8029 0.8044 0.8569 1.4119 1.5045 1.5498
#> x1~~x1           0.5491 0.1328 100 0.2231 0.2487 0.3175 0.7975 0.9201 0.9331
#> x2~~x2           1.1338 0.1161 100 0.8359 0.8618 0.9340 1.3424 1.4360 1.4767
#> x3~~x3           0.8443 0.0881 100 0.6358 0.6374 0.6637 0.9955 1.0713 1.1084
#> x4~~x4           0.3712 0.0470 100 0.2878 0.2916 0.2974 0.4754 0.4893 0.4909
#> x5~~x5           0.4463 0.0581 100 0.2831 0.3032 0.3354 0.5500 0.5573 0.5603
#> x6~~x6           0.3562 0.0422 100 0.2651 0.2675 0.2726 0.4489 0.4593 0.4601
#> x7~~x7           0.7994 0.0817 100 0.6269 0.6304 0.6506 0.9468 0.9516 0.9524
#> x8~~x8           0.4877 0.0736 100 0.3363 0.3438 0.3568 0.6367 0.6821 0.6890
#> x9~~x9           0.5661 0.0809 100 0.3734 0.3888 0.4163 0.7131 0.7376 0.7392
#> visual~~visual   0.8093 0.1594 100 0.4408 0.4445 0.4762 1.0702 1.2180 1.2209
#> textual~~textual 0.9795 0.1130 100 0.6616 0.6859 0.7961 1.1764 1.2198 1.2400
#> speed~~speed     0.3837 0.0797 100 0.1414 0.1514 0.1897 0.5405 0.5738 0.5760
#> visual~~textual  0.4082 0.0814 100 0.1759 0.1885 0.2645 0.5736 0.5989 0.6087
#> visual~~speed    0.2622 0.0525 100 0.1194 0.1208 0.1833 0.3675 0.4130 0.4449
#> textual~~speed   0.1735 0.0495 100 0.0550 0.0646 0.0778 0.2659 0.2791 0.2886
#> 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 0.1005 100 0.3227 0.3422 0.3850 0.7539 0.8711 0.8890
#> visual=~x3       0.7294 0.1198 100 0.4758 0.4799 0.4997 0.9227 0.9415 0.9422
#> textual=~x4      1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual=~x5      1.1131 0.0614 100 0.9659 0.9776 1.0081 1.2235 1.2578 1.2757
#> textual=~x6      0.9261 0.0519 100 0.8338 0.8342 0.8484 1.0326 1.0660 1.0900
#> speed=~x7        1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed=~x8        1.1800 0.1537 100 0.8802 0.8992 0.9357 1.4857 1.5773 1.6038
#> speed=~x9        1.0815 0.1487 100 0.6432 0.6864 0.7791 1.3209 1.4876 1.5013
#> x1~~x1           0.5491 0.1118 100 0.2666 0.2724 0.3486 0.7922 0.8465 0.8809
#> x2~~x2           1.1338 0.1172 100 0.8383 0.8543 0.8893 1.3365 1.3715 1.3975
#> x3~~x3           0.8443 0.0919 100 0.6077 0.6346 0.6928 1.0114 1.0670 1.0731
#> x4~~x4           0.3712 0.0523 100 0.2560 0.2564 0.2684 0.4851 0.5037 0.5147
#> x5~~x5           0.4463 0.0558 100 0.3101 0.3210 0.3385 0.5485 0.5764 0.5772
#> x6~~x6           0.3562 0.0420 100 0.2709 0.2758 0.2871 0.4324 0.4620 0.4793
#> x7~~x7           0.7994 0.0750 100 0.6376 0.6450 0.6677 0.9488 0.9587 0.9594
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#> x8~~x8          0.4877 0.0706 100 0.3169 0.3293 0.3535 0.6005 0.6346 0.6615
#> x9~~x9          0.5661 0.0700 100 0.4201 0.4208 0.4308 0.7027 0.7281 0.7289
#> visual~~visual  0.8093 0.1530 100 0.5126 0.5143 0.5373 1.1372 1.1651 1.1677
#> textual~~textual 0.9795 0.1017 100 0.7217 0.7346 0.7522 1.1377 1.1825 1.2069
#> speed~~speed    0.3837 0.0848 100 0.1404 0.1465 0.2124 0.5188 0.5349 0.5420
#> visual~~textual 0.4082 0.0650 100 0.2497 0.2524 0.2765 0.5421 0.5610 0.5750
#> visual~~speed   0.2622 0.0609 100 0.1289 0.1336 0.1406 0.3733 0.3786 0.3795
#> textual~~speed  0.1735 0.0570 100 0.0050 0.0148 0.0481 0.2695 0.2900 0.2964
#> Standardized Monte Carlo Confidence Intervals
#>                    est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       0.7719 0.0652 100 0.5780 0.5987 0.6289 0.8761 0.9009 0.9185
#> visual=~x2       0.4236 0.0647 100 0.2287 0.2355 0.2760 0.5249 0.5842 0.5944
#> visual=~x3       0.5811 0.0550 100 0.4323 0.4398 0.4498 0.6784 0.6927 0.6984
#> textual=~x4      0.8516 0.0232 100 0.7762 0.7764 0.7941 0.8827 0.8892 0.8900
#> textual=~x5      0.8551 0.0245 100 0.7858 0.7881 0.8069 0.8983 0.9074 0.9127
#> textual=~x6      0.8380 0.0223 100 0.7822 0.7858 0.7961 0.8823 0.8897 0.8904
#> speed=~x7        0.5695 0.0535 100 0.3678 0.3824 0.4183 0.6445 0.6726 0.6869
#> speed=~x8        0.7230 0.0579 100 0.5163 0.5500 0.6025 0.8046 0.8453 0.8512
#> speed=~x9        0.6650 0.0558 100 0.5378 0.5451 0.5599 0.7723 0.7850 0.7886
#> x1~~x1           0.4042 0.0989 100 0.1563 0.1880 0.2325 0.6045 0.6410 0.6659
#> x2~~x2           0.8206 0.0527 100 0.6467 0.6585 0.7243 0.9238 0.9445 0.9477
#> x3~~x3           0.6623 0.0621 100 0.5123 0.5202 0.5398 0.7976 0.8065 0.8131
#> x4~~x4           0.2748 0.0388 100 0.2080 0.2094 0.2208 0.3694 0.3973 0.3975
#> x5~~x5           0.2689 0.0417 100 0.1670 0.1766 0.1930 0.3489 0.3789 0.3826
#> x6~~x6           0.2977 0.0372 100 0.2072 0.2084 0.2216 0.3663 0.3824 0.3882
#> x7~~x7           0.6757 0.0578 100 0.5282 0.5473 0.5846 0.8250 0.8535 0.8647
#> x8~~x8           0.4772 0.0813 100 0.2754 0.2854 0.3525 0.6370 0.6960 0.7332
#> x9~~x9           0.5578 0.0743 100 0.3781 0.3838 0.4035 0.6866 0.7027 0.7108
#> 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 0.0685 100 0.2518 0.2581 0.3332 0.5797 0.6080 0.6132
#> visual~~speed    0.4705 0.0792 100 0.2587 0.2969 0.3520 0.6846 0.7104 0.7124
#> textual~~speed   0.2830 0.0731 100 0.1124 0.1271 0.1556 0.4270 0.4394 0.4399
#> Standardized Monte Carlo Confidence Intervals
#>                    est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1       0.7719 0.0553 100 0.6249 0.6285 0.6572 0.8670 0.8837 0.8924
#> visual=~x2       0.4236 0.0522 100 0.2922 0.3036 0.3223 0.5017 0.5439 0.5689
#> visual=~x3       0.5811 0.0586 100 0.4547 0.4561 0.4589 0.6637 0.6760 0.6813
#> textual=~x4      0.8516 0.0236 100 0.7720 0.7809 0.7942 0.8951 0.9027 0.9046
#> textual=~x5      0.8551 0.0221 100 0.7840 0.7955 0.8114 0.8957 0.9018 0.9034
#> textual=~x6      0.8380 0.0221 100 0.7696 0.7746 0.7857 0.8791 0.8830 0.8848
#> speed=~x7        0.5695 0.0570 100 0.3646 0.3746 0.4385 0.6450 0.6594 0.6663
#> speed=~x8        0.7230 0.0496 100 0.6000 0.6017 0.6215 0.8018 0.8235 0.8310
#> speed=~x9        0.6650 0.0500 100 0.5330 0.5412 0.5553 0.7400 0.7678 0.7746
#> x1~~x1           0.4042 0.0845 100 0.2036 0.2189 0.2483 0.5677 0.6049 0.6095
```

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#> x2~~x2          0.8206 0.0438 100 0.6762 0.7034 0.7483 0.8961 0.9077 0.9146
#> x3~~x3          0.6623 0.0658 100 0.5358 0.5430 0.5595 0.7894 0.7919 0.7933
#> x4~~x4          0.2748 0.0398 100 0.1818 0.1851 0.1987 0.3692 0.3901 0.4040
#> x5~~x5          0.2689 0.0377 100 0.1839 0.1868 0.1977 0.3416 0.3669 0.3853
#> x6~~x6          0.2977 0.0367 100 0.2172 0.2204 0.2271 0.3827 0.4000 0.4077
#> x7~~x7          0.6757 0.0617 100 0.5561 0.5651 0.5840 0.8076 0.8595 0.8670
#> x8~~x8          0.4772 0.0711 100 0.3094 0.3217 0.3570 0.6137 0.6379 0.6401
#> x9~~x9          0.5578 0.0651 100 0.4000 0.4104 0.4524 0.6916 0.7070 0.7159
#> 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 0.0601 100 0.3028 0.3043 0.3361 0.5780 0.6305 0.6351
#> visual~~speed   0.4705 0.0743 100 0.2808 0.2817 0.3134 0.5984 0.6304 0.6452
#> textual~~speed  0.2830 0.0829 100 0.0094 0.0314 0.0953 0.4322 0.4436 0.4473
#> 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

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#> 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  0.4277 20000    3.7987   4.1166   4.3876
#> alien67=~anomia67            1.0000  0.0000 20000    1.0000   1.0000   1.0000
#> alien67=~powerless67         0.9787  0.0618 20000    0.7702   0.8219   0.8564
#> alien71=~anomia71            1.0000  0.0000 20000    1.0000   1.0000   1.0000
#> alien71=~powerless71         0.9221  0.0589 20000    0.7255   0.7711   0.8052
#> alien71~alien67              0.6070  0.0509 20000    0.4426   0.4746   0.5078
#> alien71~ses                 -0.2268  0.0523 20000   -0.4038  -0.3643  -0.3299
#> alien67~ses                 -0.5750  0.0568 20000   -0.7668  -0.7211  -0.6863
#> anomia67~~anomia71           1.6229  0.3153 20000    0.6387   0.8193   1.0009
#> powerless67~~powerless71     0.3387  0.2627 20000   -0.5530  -0.3352  -0.1769
#> education~~education         2.8013  0.5130 20000    1.1701   1.4899   1.7991
#> sei~~sei                   264.5971 18.1923 20000  203.5699 217.1416 228.9588
#> anomia67~~anomia67           4.7307  0.4553 20000    3.1739   3.5272   3.8418
#> powerless67~~powerless67     2.5634  0.4064 20000    1.2349   1.5226   1.7655
#> anomia71~~anomia71           4.3992  0.5171 20000    2.6974   3.0856   3.3721
#> powerless71~~powerless71     3.0699  0.4342 20000    1.6605   1.9581   2.2189
#> ses~~ses                     6.7983  0.6554 20000    4.6254   5.0919   5.4898
#> alien67~~alien67             4.8415  0.4640 20000    3.3300   3.6515   3.9386
```

```
#> alien71~~alien71          4.0832  0.4026 20000   2.7871   3.0520   3.3162
#>                             97.5%   99.5%  99.95%
#> ses=~education            1.0000   1.0000  1.0000
#> ses=~sei                  6.0567   6.3171  6.7534
#> alien67=~anomia67         1.0000   1.0000  1.0000
#> alien67=~powerless67      1.0997   1.1364  1.1723
#> alien71=~anomia71         1.0000   1.0000  1.0000
#> alien71=~powerless71      1.0375   1.0718  1.1185
#> alien71~alien67           0.7063   0.7372  0.7741
#> alien71~ses              -0.1251  -0.0923 -0.0597
#> alien67~ses              -0.4644  -0.4291 -0.3922
#> anomia67~~anomia71        2.2453   2.4313  2.6423
#> powerless67~~powerless71  0.8502   1.0177  1.2115
#> education~~education      3.8212   4.1314  4.4781
#> sei~~sei                299.9368 311.2459 323.6323
#> anomia67~~anomia67        5.6206   5.8863  6.1974
#> powerless67~~powerless67  3.3571   3.6058  3.8455
#> anomia71~~anomia71        5.4163   5.7043  6.0190
#> powerless71~~powerless71  3.9256   4.1722  4.4791
#> ses~~ses                  8.0900   8.4876  8.8585
#> alien67~~alien67          5.7508   6.0312  6.3204
#> alien71~~alien71          4.8766   5.1231  5.4207
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#>                           2.5%      97.5%
#> visual=~x1          0.65720928 0.8669741
#> visual=~x2          0.32228127 0.5017210
#> visual=~x3          0.45887303 0.6636643
#> textual=~x4         0.79422706 0.8951483
#> textual=~x5         0.81140568 0.8957381
#> textual=~x6         0.78568208 0.8791343
#> speed=~x7           0.43854545 0.6449868
#> speed=~x8           0.62152214 0.8018376
#> speed=~x9           0.55531888 0.7400030
#> x1~~x1              0.24834523 0.5676668
#> x2~~x2              0.74827149 0.8961291
#> x3~~x3              0.55954893 0.7894350
#> x4~~x4              0.19870547 0.3691919
#> x5~~x5              0.19765328 0.3416124
#> x6~~x6              0.22712279 0.3826741
#> x7~~x7              0.58399131 0.8075752
#> x8~~x8              0.35703048 0.6136591
#> x9~~x9              0.45239506 0.6916209
#> visual~~visual    1.00000000 1.0000000
#> textual~~textual 1.00000000 1.0000000
#> speed~~speed      1.00000000 1.0000000
#> visual~~textual   0.33611728 0.5779883
#> visual~~speed     0.31343632 0.5984295
#> textual~~speed    0.09528988 0.4322300
#>
#>
#> [[1]][[18]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[19]]
```

10

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#> [[1]][[19]]$value
#> [[1]][[19]]$value[[1]]
#> [[1]][[19]]$value[[1]]$thetahatstar
#>                   y1             y2             y3
#>    [1,] -2.844103e-01 -2.284515978 -1.6224645814
#>    [2,] -3.039683e-01  0.457940553 -0.1249044974
#>    [3,]  3.154111e-01  0.379675720  0.6040153973
#>    [4,] -1.381335e+00 -2.504394053 -3.1123309422
#>    [5,]  1.670023e+00  3.641111422  4.1031495906
#>    [6,] -2.388066e-01  0.144443175 -0.2176269910
#>    [7,]  4.872812e-01 -0.227155337  0.4815679854
#>    [8,]  7.349807e-01  1.930855194  1.9880497339
#>    [9,] -6.332553e-01 -0.813635253 -1.2411899130
#>   [10,] -5.880571e-01 -1.699976475 -1.6767109171
#>   [11,]  7.916623e-01  1.885821013  2.0337384747
#>   [12,]  1.016613e+00  1.835889636  2.2865369701
#>   [13,] -4.515523e-01 -0.268539398 -0.7121046120
#>   [14,] -1.364341e+00 -2.732892672 -3.2179459567
#>   [15,]  1.998015e+00  3.178709089  4.2555342143
#>   [16,]  1.712171e+00  1.856813019  3.1654954086
#>   [17,] -2.241172e+00 -3.867186048 -4.9408225536
#>   [18,]  5.022386e-01  0.348626106  0.8197541464
#>   [19,] -4.053145e-01 -0.380948936 -0.7168296315
#>   [20,]  1.636475e+00  3.488272546  3.9764957348
#>   [21,]  7.095395e-03  1.490690054  0.8361183807
#>   [22,] -5.384952e-01 -2.248593057 -1.9193674753
#>   [23,]  2.497656e+00  3.667144945  5.1496381405
#>   [24,] -2.153768e-01 -0.694085636 -0.6537588870
#>   [25,] -7.546227e-01 -1.592236541 -1.8246236818
#>   [26,]  1.399765e+00  2.875530889  3.3412770594
#>   [27,] -2.460292e-01 -1.496520478 -1.1372995936
#>   [28,] -6.951842e-01 -1.002475476 -1.4232124354
#>   [29,] -7.340251e-01 -0.688976770 -1.2976675812
#>   [30,] -3.708179e-01 -1.210995580 -1.1344542262
#>   [31,] -1.078917e+00 -2.266331796 -2.6031067680
#>   [32,]  1.816813e+00  3.261547583  4.0755516517
#>   [33,]  2.081103e-01  0.425866466  0.4958473214
#>   [34,]  1.296372e+00  2.391384810  2.9436678557
#>   [35,] -7.332687e-03  0.068072324  0.0286335784
#>   [36,] -1.251240e+00 -1.109642673 -2.1760757289
#>   [37,] -1.515627e-01  0.756837197  0.2310173849
#>   [38,]  3.987603e-01  1.206110920  1.1665870834
#>   [39,] -1.140303e+00 -2.526052565 -2.8237877871
#>   [40,]  9.123112e-01  2.179191405  2.3469934169
#>   [41,]  1.888626e+00  4.075931514  4.6170499598
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#>     [42,] -4.291369e-01 -0.875755052 -1.0211323498
#>     [43,] -5.305140e-01 -0.686381582 -1.0424531907
#>     [44,]  2.787570e-01  0.149504214  0.4305728520
#>     [45,]  7.413313e-01  2.399756104  2.2561891457
#>     [46,] -6.469559e-01 -0.308644005 -0.9780252751
#>     [47,] -1.285769e+00 -0.331728699 -1.7874235149
#>     [48,]  5.103929e-01  0.636616250  0.9897449278
#>     [49,]  1.234073e+00  1.249600280  2.2323398746
#>     [50,]  2.181038e-01  1.369128704  1.0317800557
#>     [51,]  8.346029e-01  1.693166820  1.9803694741
#>     [52,] -8.748240e-01 -1.521729848 -1.9353840019
#>     [53,]  1.988827e+00  4.665694879  5.0692923192
#>     [54,] -1.457622e+00 -2.958886066 -3.4596822615
#>     [55,]  1.940399e+00  2.448580273  3.7784975742
#>     [56,] -2.279374e-01 -1.049731343 -0.8667901803
#>     [57,]  1.100905e+00  1.765304798  2.3524768191
#>     [58,] -1.400898e+00 -2.136147612 -2.9323631333
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#>     [61,]  7.784382e-03 -0.570047858 -0.3066457287
#>     [62,]  6.329626e-01  1.664054542  1.7127720463
#>     [63,]  6.391655e-01  0.630392895  1.1468680358
#>     [64,] -5.085728e-01  0.304304460 -0.4653036140
#>     [65,] -5.352570e-01 -1.116621495 -1.2871326916
#>     [66,]  5.081859e-01  0.408716598  0.8605180645
#>     [67,] -5.621978e-01 -2.156913540 -1.8980459167
#>     [68,] -1.966485e+00 -2.308297929 -3.7331758676
#>     [69,] -3.227881e-01 -0.700281749 -0.7911371696
#>     [70,] -7.544544e-01 -1.397763723 -1.7164895906
#>     [71,]  2.176153e-01  0.036118482  0.2914061279
#>     [72,]  5.455974e-01  1.593164122  1.5644882050
#>     [73,] -1.576071e+00 -2.752299682 -3.4927397756
#>     [74,]  2.883010e+00  3.974060243  5.8004921224
#>     [75,]  1.304626e+00  1.931263066  2.6986122920
#>     [76,]  1.318933e+00  1.235133923  2.3301303594
#>     [77,]  1.061501e+00  0.682244658  1.7022869091
#>     [78,] -5.424185e-01 -0.959573599 -1.2089079177
#>     [79,]  2.876140e-01 -0.606402300  0.0221209546
#>     [80,] -1.908105e+00 -3.340098590 -4.2329829536
#>     [81,] -1.585869e+00 -3.451837708 -3.8931722533
#>     [82,]  1.686376e+00  3.492370193  4.0409950988
#>     [83,] -7.138352e-01 -0.893052548 -1.3857446970
#>     [84,] -7.659672e-01 -3.433057005 -2.8603484333
#>     [85,] -3.037585e-01  0.725654644  0.0239273240
#>     [86,]  1.283918e+00  2.187683512  2.8150926671
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#>   [88,]  1.709183e+00  2.390750480  3.4580829127
#>   [89,]  1.365927e+00  2.664565874  3.1820053007
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#>   [91,] -1.207587e+00 -1.204828464 -2.1744661002
#>   [92,]  8.066197e-01  1.197680101  1.6705005775
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#>   [94,] -1.452514e+00 -1.573500863 -2.6844825568
#>   [95,] -2.014654e-01  0.609372543  0.0869530360
#>   [96,] -2.282544e+00 -3.810267176 -4.9608240640
#>   [97,]  1.441579e+00  2.850428462  3.3794885616
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#>   [99,] -4.923019e-01 -0.958171359 -1.1456354273
#>  [100,] -1.589719e+00 -2.236179558 -3.2233334897
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#>  [102,] -1.806006e-01  0.128366366 -0.1539673526
#>  [103,] -2.279471e-01 -0.207217016 -0.3992421789
#>  [104,]  1.351353e+00  1.561702151  2.5517885995
#>  [105,]  1.066750e+00  1.499818915  2.1625524199
#>  [106,] -2.055086e+00 -2.699288159 -4.0606427145
#>  [107,]  1.357839e+00  2.913670993  3.3101632968
#>  [108,] -9.375866e-01 -1.287382423 -1.8835947028
#>  [109,]  9.626962e-01  1.843254546  2.2233915978
#>  [110,] -1.938865e-01 -0.034317626 -0.2608173237
#>  [111,]  7.807148e-01  1.639500242  1.8833894005
#>  [112,]  2.468249e-01  0.630347777  0.6576022562
#>  [113,] -1.408558e+00 -2.626913097 -3.2142700542
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#>  [124,] -6.389918e-01 -0.164461038 -0.8880787889
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#>  [130,]  7.068020e-01  0.355116776  1.0784426287
#>  [131,] -3.193006e-01 -0.963416224 -0.9328170018
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#>   [134,]   5.938482e-02   0.222860216   0.1977297542
#>   [135,]  -3.182524e-01  -1.295339933  -1.1157136967
#>   [136,]   1.211127e+00   2.993717968   3.1716384230
#>   [137,]  -2.497597e+00  -4.605967785  -5.6705713572
#>   [138,]  -1.748918e+00  -2.241148502  -3.4246092055
#>   [139,]   8.940681e-01   1.800242802   2.1139440203
#>   [140,]  -2.597133e-01  -0.371521726  -0.5300362063
#>   [141,]   1.699363e+00   2.492011004   3.5020323084
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#>   [143,]  -1.990048e-01  -0.889824447  -0.7419702406
#>   [144,]  -1.601321e+00  -3.226002458  -3.7871113220
#>   [145,]   4.775118e-02   0.878158097   0.5468857300
#>   [146,]   1.532124e+00   0.784631035   2.3459649344
#>   [147,]  -2.346197e+00  -4.668067436  -5.5162423414
#>   [148,]  -4.228660e-02  -0.043673581  -0.0769675367
#>   [149,]   1.235370e+00   2.217783911   2.7712580627
#>   [150,]  -2.108311e+00  -3.179140659  -4.3933104879
#>   [151,]   3.045639e-01   0.408314307   0.6063823165
#>   [152,]  -8.402229e-01  -1.492132602  -1.8758118981
#>   [153,]  -1.282570e+00  -2.869080091  -3.1915575579
#>   [154,]  -5.729687e-01  -0.307022702  -0.8848649677
#>   [155,]  -4.160765e-02   1.288307658   0.6630729145
#>   [156,]  -9.885669e-01  -2.477605827  -2.6076902508
#>   [157,]  -1.692224e-02   0.601355340   0.3126253537
#>   [158,]  -1.108914e+00  -2.006755906  -2.4964584278
#>   [159,]   1.443882e+00   2.150490549   2.9939238231
#>   [160,]   4.190183e-01   1.034204586   1.0964474934
#>   [161,]  -2.085975e-02  -0.469446168  -0.2865346489
#>   [162,]   1.723509e+00   3.242613271   3.9486955568
#>   [163,]  -8.622080e-01  -3.387108361  -2.9548591055
#>   [164,]   5.867128e-01   1.901992520   1.7871450891
#>   [165,]  -1.284985e+00  -2.464772176  -2.9701959281
#>   [166,]   5.652140e-01   0.958616872   1.2368025382
#>   [167,]   8.548214e-01   1.264737905   1.7678214939
#>   [168,]  -1.210564e+00  -2.550108631  -2.9247521785
#>   [169,]   8.489019e-01   1.231634263   1.7420688275
#>   [170,]  -5.786598e-01   0.473114401  -0.4590182287
#>   [171,]   8.296588e-01   1.107115585   1.6489704262
#>   [172,]   1.402818e+00   2.097221255   2.9131553631
#>   [173,]   1.630008e+00   2.397964620   3.3633564276
#>   [174,]   1.338530e-01   0.306452448   0.3369802563
#>   [175,]   6.997766e-01   1.467500534   1.6870085415
#>   [176,]  -1.769932e+00  -2.810913332  -3.7670086772
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#>   [177,] -6.715972e-01 -1.003510887 -1.3943745288
#>   [178,]  1.331755e+00  1.562100782  2.5275721158
#>   [179,]  6.386076e-01  1.693088318  1.7359237430
#>   [180,] -4.371703e-01 -0.244172284 -0.6806477954
#>   [181,] -1.834290e-01 -0.758945715 -0.6499152890
#>   [182,]  1.478525e+00  2.774531841  3.3834392669
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#>   [184,] -3.486445e-01 -0.838519555 -0.9000958775
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#>   [186,]  1.378242e+00  1.463385067  2.5307570054
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#>   [195,] -1.148299e-01  0.313639049  0.0308659690
#>   [196,] -4.074357e-01  0.397339323 -0.2875573591
#>   [197,]  1.097083e+00  1.618043414  2.2659866795
#>   [198,] -3.915173e-01 -0.855154093 -0.9627887929
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#>   [201,] -3.106819e-01 -0.674157331 -0.7615431348
#>   [202,] -2.551936e-01 -0.810981259 -0.7682818161
#>   [203,]  8.530844e-01  2.729112165  2.5783218214
#>   [204,]  1.175699e-01  0.940974431  0.6688086317
#>   [205,] -5.534004e-01 -1.356345425 -1.4427938728
#>   [206,]  2.156983e+00  3.106953789  4.4139431978
#>   [207,]  1.255455e+00  0.693864679  1.9505920902
#>   [208,] -1.610394e+00 -3.968941386 -4.2107246878
#>   [209,] -1.971765e+00 -2.974226874 -4.1093222026
#>   [210,] -1.447101e+00 -1.450128067 -2.6092661743
#>   [211,] -6.630923e-02 -0.306232382 -0.2526324136
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#>   [217,]  8.146883e-01  1.955973525  2.1013831305
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#>   [219,] -1.372473e-01 -0.266248022 -0.3189010767
#>   [220,] -6.074088e-01 -0.702753088 -1.1474249285
#>   [221,]  1.099799e-01  0.370360413  0.3426772109
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#>  [222,]  1.863467e+00  3.470111331  4.2494722917
#>  [223,]  1.406639e+00  2.471798505  3.1257947440
#>  [224,]  7.326192e-01 -0.469514967  0.6530000588
#>  [225,]  2.683900e-02 -1.121132004 -0.5887136401
#>  [226,] -9.579589e-01 -3.912862849 -3.3660302537
#>  [227,] -3.411729e-01 -1.855907760 -1.4553867820
#>  [228,]  9.986183e-01  1.331250872  1.9840451389
#>  [229,]  5.787026e-01  0.082987083  0.7676846449
#>  [230,]  9.152794e-01  1.293150013  1.8589788602
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#>  [232,]  2.024766e-01  0.851703524  0.7251440370
#>  [233,]  2.386065e-01  1.380786763  1.0638162772
#>  [234,] -8.128404e-01 -2.253848604 -2.2643869839
#>  [235,]  1.141194e-01 -0.611716707 -0.1971726426
#>  [236,] -1.882133e+00 -2.595184696 -3.7872003667
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#>  [240,] -1.390200e-02 -0.864538553 -0.4971182105
#>  [241,]  9.809791e-01  2.658350742  2.6985343387
#>  [242,]  2.611387e-01 -0.052401208  0.2965540970
#>  [243,] -5.695981e-01 -1.633071984 -1.6165638458
#>  [244,] -1.335556e+00 -2.413504200 -3.0048053681
#>  [245,] -1.109282e+00 -2.861604256 -2.9713223613
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#> [1014,] -3.870238e-01 -1.312644536 -1.2110735163
#> [1015,] -7.991827e-01 -0.573655608 -1.3149193205
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#> [1260,]  4.257999e-01 -0.478232130  0.2655650109
#> [1261,] -2.070545e+00 -3.783596017 -4.6816642057
#> [1262,]  1.000065e+00  3.456615955  3.1653373681
#> [1263,] -3.455430e-02 -0.650335499 -0.4039974787
#> [1264,] -1.069927e+00 -1.333712023 -2.0743315143
#> [1265,]  2.787486e-01 -0.153490260  0.2624131244
#> [1266,] -2.308822e-01 -0.937934716 -0.8084199518
#> [1267,]  2.123486e-01  1.200913313  0.9312509808
#> [1268,]  1.569869e+00  2.866828743  3.5485643569
#> [1269,]  1.131930e+00  1.076523318  2.0089191654
#> [1270,]  3.192060e-01  0.963419630  0.9327009245
#> [1271,]  1.715301e+00  2.262154527  3.3943464249
#> [1272,] -6.165772e-01 -0.793101538 -1.2089973209
#> [1273,] -1.536743e+00 -2.653947358 -3.3891169033
#> [1274,]  3.273021e-02  0.875383418  0.5266150502
#> [1275,]  1.321601e+00  1.453701267  2.4547531651
#> [1276,]  6.842983e-01  0.934883487  1.3721271546
#> [1277,]  2.245631e-01  0.821012911  0.7356533390
#> [1278,]  2.464348e-01  0.490110933  0.5792902019
#> [1279,] -1.438102e+00 -1.874198170 -2.8333858268
#> [1280,] -5.574692e-01 -1.926597115 -1.7643334353
#> [1281,]  1.511515e+00  3.351794748  3.7449336781
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#> [1288,] -9.966709e-01 -2.016962981 -2.3621583473
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#> [1301,] -1.146758e+00 -0.563955355 -1.7429549112
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#> [1310,] -6.039221e-01 -0.363724461 -0.9549304045
#> [1311,] -5.092487e-01 -0.466389331 -0.8938493430
#> [1312,] -1.472122e+00 -1.998868881 -2.9449948858
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#> [1314,] -7.312250e-01 -0.904161590 -1.4135945389
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#> [1367,]  -5.617079e-02  -0.429561331  -0.3084323864
#> [1368,]  -1.583147e+00  -2.404245222  -3.3084069176
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#> [1371,]   4.679178e-01   0.715489437   0.9805505871
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#> [1414,]  -1.756917e+00  -3.165887031  -3.9477748337
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#> [1416,]  -7.760011e-01  -2.437691301  -2.3204741788
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#> [1419,]   2.512901e+00   4.786861764   5.7900443282
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#> [1421,]   1.564246e+00   2.691328107   3.4441570994
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#> [1457,] -1.234664e+00 -1.642622762 -2.4511878641
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#> [1461,]  1.002020e+00  2.788256037  2.7968640653
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#> [1480,]  9.163056e-02  1.203373658  0.7820834366
#> [1481,]  1.117537e+00  1.805250918  2.3953840118
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#> [1484,]   2.445495e+00   3.935178589   5.2333422901
#> [1485,]  -2.232237e-01  -0.421338844  -0.5121808569
#> [1486,]  -1.184207e+00  -2.228276473  -2.7132823522
#> [1487,]   5.816930e-01   0.733147990   1.1322257179
#> [1488,]   6.458806e-01   1.576280424   1.6801695413
#> [1489,]   8.362599e-02  -0.041299379   0.0813604824
#> [1490,]   5.575586e-01   0.577273088   1.0156265774
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#> [1507,]   1.911319e-01  -0.042176676   0.2149312319
#> [1508,]  -3.175026e-01  -0.455937280  -0.6489454295
#> [1509,]  -1.576096e+00  -1.546770604  -2.8237528476
#> [1510,]   9.100744e-01   2.880863621   2.7336028970
#> [1511,]  -1.380976e+00  -1.700795903  -2.6659190192
#> [1512,]   1.913494e-01   1.264064897   0.9401119523
#> [1513,]  -9.482099e-01  -1.223013887  -1.8611199061
#> [1514,]  -1.093040e+00  -2.847707409  -2.9433572354
#> [1515,]   2.502808e-01   0.747187341   0.7267527936
#> [1516,]   1.785265e+00   2.358996359   3.5353329373
#> [1517,]   2.006154e+00   3.462442437   4.4231433969
#> [1518,]  -1.182632e+00  -2.544241112  -2.8866647325
#> [1519,]  -1.627265e+00  -2.639199543  -3.4938116081
#> [1520,]   1.034668e+00   2.403498970   2.6240511963
#> [1521,]  -2.761616e-01  -0.282128668  -0.5009375310
#> [1522,]  -4.698622e-01   0.385817150  -0.3717961666
#> [1523,]   5.273256e-02  -0.316923186  -0.1101226757
#> [1524,]  -1.252762e+00  -2.119659627  -2.7384915380
#> [1525,]   1.203896e+00   2.009944081   2.6166690291
#> [1526,]  -6.720533e-02  -1.242331554  -0.7732456800
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#> [1529,] -8.156515e-02  0.215372066  0.0178124065
#> [1530,]  1.924764e+00  2.961949869  4.0438991427
#> [1531,] -1.051039e+00 -1.269713353 -2.0152613437
#> [1532,] -3.383169e-01 -0.832929905 -0.8841154840
#> [1533,] -2.773862e+00 -5.041005742 -6.2564964624
#> [1534,] -1.225723e+00 -2.772076709 -3.0668384515
#> [1535,]  2.187764e-01  1.615239326  1.1691999509
#> [1536,]  9.377297e-02  0.091169416  0.1675281911
#> [1537,]  1.032548e+00  1.704449058  2.2334647733
#> [1538,]  8.031067e-01  0.833716625  1.4641355219
#> [1539,] -5.337035e-01  0.552320214 -0.3590027916
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#> [1575,]  -5.766055e-02  0.363639691  0.1299032761
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#> [1581,]   2.032487e+00  3.784110266  4.6344926442
#> [1582,]  -9.501841e-01 -2.260661540 -2.4394326880
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#> [1639,]   1.928276e+00   2.752021300   3.9317775404
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#> [1661,]   7.526178e-01   1.424735658   1.7291677375
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#> [1674,] -3.587970e-01  0.416270355 -0.2163999401
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#> [1682,]  1.424918e+00  3.053327933  3.4713128336
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#> [1692,] -1.598369e+00 -4.145903958 -4.2939366643
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#> [1730,]   1.489997e-01   0.686520876   0.5667899917
#> [1731,]   5.802623e-01   1.001376800   1.2792974749
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#> [1737,]   1.227646e-01   0.575334600   0.4723715087
#> [1738,]   1.728980e+00   3.339896909   4.0095062901
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#> [1757,]   2.946262e-01   1.751906029   1.3396273430
#> [1758,]  -1.255833e+00  -2.250966165  -2.8151896860
#> [1759,]   2.654907e+00   4.061353910   5.5644959430
#> [1760,]  -2.076550e+00  -3.183794937  -4.3562883347
#> [1761,]   3.438208e-01   1.508207299   1.2657294272
#> [1762,]  -1.397006e+00  -2.106739662  -2.9111907509
#> [1763,]   4.196912e-01   0.840629466   0.9898604689
#> [1764,]  -7.869392e-02  -0.006782903  -0.1018939429
#> [1765,]  -1.486707e+00  -2.453573733  -3.2155237711
#> [1766,]  -1.218343e+00  -2.628039756  -2.9777009616
#> [1767,]  -8.183074e-01  -0.937811228  -1.5408585919
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#> [1769,]  -2.452705e+00  -4.074197201  -5.3194821579
#> [1770,]  -3.516624e-01  -0.752720647  -0.8562442578
#> [1771,]   5.639468e-01   0.297758883   0.8684738354
#> [1772,]   1.266529e+00   2.065712053   2.7257189253
#> [1773,]   1.373286e+00   2.193914030   2.9299896371
#> [1774,]  -1.822018e-01   0.026412974  -0.2125438133
#> [1775,]  -1.821414e-01  -0.193926397  -0.3347476488
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#> [1777,]   1.309042e-02   0.434581493   0.2574980164
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```
#> [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
```

Environment

```r
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/