semmcci: Internal Tests

Ivan Jacob Agaloos Pesigan

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
\textit{\#> test-semmcci-mc-simple-med-defined-inequality}
#> Test passed
#> Test passed
#> Test passed
```

```
\#> test-semmcci-mc-simple-med-defined-mean structure
#> 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-mean structure
#> Test passed
#> Test passed
#> Test passed
\textit{\#> 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
\textit{\#> 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 #> visual=~x2 0.5535 0.0973 100 0.3178 0.3230 0.3566 0.7203 0.7952 0.8296 0.7294 0.1095 100 0.4361 0.4561 0.5451 0.9560 1.0412 1.0416 #> visual=~x3 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 #> textual=~x4 #> textual=~x5 1.1131 0.0540 100 0.9709 0.9788 0.9972 1.2071 1.2337 1.2370 #> textual=~x6 0.9261 0.0559 100 0.7780 0.7950 0.8400 1.0431 1.0916 1.1180 #> speed=~x7 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 #> speed=~x8 1.1800 0.1508 100 0.7845 0.7982 0.8794 1.4643 1.4771 1.4777 #> speed=~x9 1.0815 0.1650 100 0.7367 0.7583 0.7865 1.4200 1.4886 1.5074 #> x1~~x1 0.5491 0.1024 100 0.2890 0.3185 0.3611 0.7484 0.7724 0.7824 #> x2~~x2 1.1338 0.1109 100 0.8520 0.8807 0.9499 1.3319 1.3641 1.3722 #> x3~~x3 0.8443 0.0943 100 0.6870 0.6899 0.7154 1.0764 1.1177 1.1185 #> x4~~x4 0.3712 0.0481 100 0.2795 0.2816 0.2867 0.4701 0.4943 0.4960 #> x5~~x5 0.4463 0.0604 100 0.2509 0.2727 0.3286 0.5683 0.5890 0.5903 #> x6~~x6 0.3562 0.0459 100 0.2454 0.2524 0.2697 0.4208 0.4697 0.4807 #> x7~~x7 0.7994 0.0763 100 0.6350 0.6366 0.6466 0.9517 0.9563 0.9597 #> x8~~x8 0.4877 0.0718 100 0.3412 0.3519 0.3695 0.6255 0.6777 0.6853 #> x9~~x9 0.5661 0.0724 100 0.3764 0.3983 0.4324 0.7013 0.7180 0.7189 #> visual~~visual 0.8093 0.1416 100 0.4626 0.4736 0.5013 1.0419 1.1411 1.1689 #> textual~~textual 0.9795 0.1186 100 0.6991 0.7206 0.7673 1.2058 1.2788 1.2963 #> speed~~speed 0.3837 0.0880 100 0.1588 0.1651 0.1822 0.5439 0.5688 0.5767 #> visual~~textual 0.4082 0.0767 100 0.1576 0.1594 0.2257 0.5639 0.5772 0.5820 #> visual~~speed 0.2622 0.0557 100 0.0902 0.1155 0.1562 0.3654 0.4020 0.4027 0.1735 0.0430 100 0.0408 0.0553 0.0911 0.2523 0.2901 0.3038 #> textual~~speed #> Monte Carlo Confidence Intervals (Multiple Imputation Estimates) se R 0.05% 0.5% 2.5% 97.5% 99.5% 99.95% est #> visual=~x1 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 #> visual=~x2 0.5535 0.1022 100 0.1847 0.2648 0.3737 0.7451 0.7536 0.7564 #> visual=~x3 0.7294 0.1124 100 0.4261 0.4402 0.5099 0.9173 1.0068 1.0492 #> textual=~x4 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.1131 0.0691 100 0.9355 0.9423 0.9661 1.2354 1.2662 1.2769 #> textual=~x5 0.9261 0.0607 100 0.7745 0.7776 0.7943 1.0268 1.0433 1.0506 #> textual=~x6 #> speed=~x7 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.1800 0.1501 100 0.8082 0.8419 0.9293 1.5239 1.5609 1.5760 #> speed=~x8 #> speed=~x9 1.0815 0.1362 100 0.6502 0.6734 0.8603 1.3590 1.4368 1.4733 #> x1~~x1 0.5491 0.1067 100 0.1789 0.2272 0.3808 0.7901 0.8397 0.8628 #> x2~~x2 1.1338 0.0999 100 0.8986 0.9140 0.9474 1.3019 1.3412 1.3555 #> x3~~x3 0.8443 0.0936 100 0.6335 0.6376 0.6741 1.0162 1.0517 1.0757 #> x4~~x4 0.3712 0.0475 100 0.2268 0.2395 0.2669 0.4454 0.4600 0.4674 0.4463 0.0564 100 0.3104 0.3128 0.3248 0.5478 0.5645 0.5784 #> x5~~x5 #> x6~~x6 0.3562 0.0419 100 0.2451 0.2538 0.2762 0.4460 0.4726 0.4726 #> x7~~x7 0.7994 0.0811 100 0.5975 0.6151 0.6461 0.9433 0.9568 0.9638

```
#> x8~~x8
                  0.4877 0.0701 100 0.3152 0.3169 0.3302 0.6237 0.6493 0.6631
                  0.5661 0.0656 100 0.4493 0.4537 0.4679 0.6999 0.7303 0.7517
#> x9~~x9
#> visual~~visual 0.8093 0.1470 100 0.4303 0.4314 0.5227 1.1130 1.1964 1.2017
#> textual~~textual 0.9795 0.1093 100 0.7356 0.7551 0.8072 1.2074 1.2693 1.2987
#> speed~~speed 0.3837 0.0786 100 0.1279 0.1422 0.2017 0.5071 0.5854 0.5968
#> visual~~textual 0.4082 0.0770 100 0.2405 0.2479 0.2686 0.5634 0.6058 0.6221
#> visual~~speed
                  0.2622 0.0589 100 0.0995 0.1090 0.1541 0.3530 0.4046 0.4284
#> textual~~speed
                 0.1735 0.0445 100 0.0601 0.0679 0.0853 0.2662 0.2697 0.2713
#> Standardized Monte Carlo Confidence Intervals
                     est
                            se R 0.05% 0.5%
                                                 2.5% 97.5% 99.5% 99.95%
#> visual=~x1
                  0.7719 0.0524 100 0.6278 0.6298 0.6465 0.8540 0.8747 0.8853
#> visual=~x2
                  0.4236 0.0635 100 0.2564 0.2671 0.3067 0.5498 0.5609 0.5636
#> visual=~x3
                  0.5811 0.0541 100 0.4320 0.4378 0.4826 0.6687 0.7143 0.7235
                 0.8516 0.0235 100 0.7863 0.7888 0.8000 0.8898 0.8985 0.8990
#> textual=~x4
                 0.8551 0.0220 100 0.7894 0.7946 0.8122 0.8990 0.9117 0.9210
#> textual=~x5
#> textual=~x6
                  0.8380 0.0233 100 0.7674 0.7759 0.7875 0.8750 0.8792 0.8813
#> speed=~x7
                  0.5695 0.0585 100 0.3836 0.3934 0.4088 0.6593 0.6750 0.6827
#> speed=~x8
                 0.7230 0.0514 100 0.5540 0.5652 0.5968 0.8051 0.8129 0.8150
#> speed=~x9
                 0.6650 0.0542 100 0.5381 0.5434 0.5524 0.7541 0.7753 0.7880
#> x1~~x1
                 0.4042 0.0792 100 0.2162 0.2347 0.2707 0.5820 0.6034 0.6059
#> x2~~x2
                 0.8206 0.0543 100 0.6824 0.6854 0.6977 0.9059 0.9285 0.9342
#> x3~~x3
                 0.6623 0.0624 100 0.4765 0.4896 0.5528 0.7670 0.8083 0.8134
#> x4~~x4
                 0.2748 0.0398 100 0.1919 0.1926 0.2081 0.3601 0.3777 0.3817
#> x5~~x5
                 0.2689 0.0375 100 0.1518 0.1687 0.1919 0.3403 0.3686 0.3769
                 0.2977 0.0388 100 0.2233 0.2271 0.2344 0.3798 0.3979 0.4111
#> x6~~x6
#> x7~~x7
                 0.6757 0.0633 100 0.5339 0.5443 0.5653 0.8329 0.8451 0.8528
#> x8~~x8
                 0.4772 0.0723 100 0.3358 0.3392 0.3517 0.6438 0.6804 0.6930
#> x9~~x9
                 0.5578 0.0710 100 0.3791 0.3987 0.4313 0.6949 0.7047 0.7104
#> 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
#> visual~~textual 0.4585 0.0677 100 0.2314 0.2377 0.3143 0.5651 0.6240 0.6467
                  0.4705 0.0707 100 0.2389 0.2759 0.3286 0.6091 0.6393 0.6533
#> visual~~speed
#> Standardized Monte Carlo Confidence Intervals
                     est
                            se R 0.05% 0.5%
                                                2.5% 97.5% 99.5% 99.95%
#> visual=~x1
                  0.7719 0.0551 100 0.5899 0.5965 0.6351 0.8582 0.9153 0.9323
#> visual=~x2
                  0.4236 0.0617 100 0.1689 0.2264 0.3157 0.5320 0.5497 0.5537
#> visual=~x3
                  0.5811 0.0611 100 0.4106 0.4200 0.4397 0.6754 0.6954 0.7034
                  0.8516 0.0213 100 0.7923 0.7955 0.8115 0.8980 0.9068 0.9070
#> textual=~x4
#> textual=~x5
                  0.8551 0.0220 100 0.8007 0.8065 0.8181 0.8993 0.9127 0.9175
                 0.8380 0.0237 100 0.7720 0.7766 0.7839 0.8837 0.8954 0.9006
#> textual=~x6
#> speed=~x7
                  0.5695 0.0548 100 0.3543 0.3673 0.4226 0.6450 0.6943 0.6995
                 0.7230 0.0461 100 0.5937 0.5998 0.6368 0.8182 0.8343 0.8380
#> speed=~x8
#> speed=~x9
                  0.6650 0.0509 100 0.5190 0.5198 0.5503 0.7477 0.7575 0.7583
                0.4042 0.0831 100 0.1307 0.1619 0.2635 0.5960 0.6441 0.6520
#> x1~~x1
```

```
#> x2~~x2
               0.8206 0.0500 100 0.6934 0.6978 0.7169 0.9002 0.9446 0.9707
                  0.6623 0.0688 100 0.5052 0.5163 0.5438 0.8067 0.8235 0.8314
#> x3~~x3
                 0.2748 0.0363 100 0.1773 0.1778 0.1936 0.3415 0.3672 0.3722
#> x4~~x4
#> x5~~x5
                 0.2689 0.0377 100 0.1582 0.1670 0.1912 0.3307 0.3495 0.3589
#> x6~~x6
                  0.2977 0.0396 100 0.1889 0.1982 0.2191 0.3855 0.3969 0.4040
#> x7~~x7
                 0.6757 0.0591 100 0.5106 0.5179 0.5839 0.8207 0.8649 0.8744
#> x8~~x8
                 0.4772 0.0666 100 0.2977 0.3040 0.3305 0.5945 0.6402 0.6475
#> x9~~x9
                  0.5578 0.0659 100 0.4249 0.4262 0.4409 0.6971 0.7298 0.7307
#> textual~~textual 1.0000 0.0000 100 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
#> visual~~textual 0.4585 0.0616 100 0.3206 0.3220 0.3251 0.5531 0.5915 0.5927
#> visual~~speed 0.4705 0.0841 100 0.2779 0.2887 0.3301 0.6325 0.6636 0.6856
#> textual~~speed 0.2830 0.0601 100 0.1054 0.1247 0.1557 0.3980 0.4065 0.4101
#> 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:
#>
                                                 0.000
#>
    Test statistic
    Degrees of freedom
#>
#>
    P-value (Chi-square)
                                                 1.000
#>
#> Parameter Estimates:
#>
#>
    Standard errors
                                              Standard
#> Information
                                              Expected
```

```
#>
#> Latent Variables:
               Estimate Std.Err z-value P(>|z|)
#>
#>
   eta1 =~
#>
                1.000
  y1
                0.991 0.152 6.524 0.000
#>
    y2
                0.901 0.138 6.537 0.000
   уЗ
#>
#>
   y4
                1.399 0.143 9.814 0.000
#>
#> Variances:
              Estimate Std.Err z-value P(>|z|)
#>
               0.000 0.055 0.000 1.000
#>
  .y1
                0.980 0.203 4.822 0.000
#> .y2
#>
    .уЗ
               0.807 0.167 4.820 0.000
                     0.176 3.960 0.000
#>
   .y4
               0.696
               0.980 0.204 4.815 0.000
#>
   eta1
#>
#> 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
#> eta1=~y2 0.7039 NA 0 NA NA NA NA
                                       NA
#> eta1=~y3 0.7047 NA 0 NA NA NA NA
                                       NA
#> eta1=~y4 0.8566 NA 0 NA NA NA NA NA
NA
#> eta1~~eta1 1.0000 NA 0 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
#>
```

```
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#> [[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
                                   se R 0.05% 0.5%
                                                               2.5%
                            est
                         1.0000 0.0000 20000 1.0000 1.0000
#> ses=~education
                                                             1.0000
#> ses=~sei
                         5.2195 0.4232 20000 3.8828 4.1184 4.3741
#> alien67=~anomia67
                         1.0000 0.0000 20000 1.0000 1.0000 1.0000
                         0.9787 0.0612 20000 0.7699 0.8226 0.8595
#> alien67=~powerless67
                         1.0000 0.0000 20000 1.0000 1.0000
                                                             1.0000
#> alien71=~anomia71
#> alien71=~powerless71
                         0.9221 0.0594 20000 0.7296 0.7644 0.8055
#> alien71~alien67
                         0.6070 0.0510 20000 0.4394 0.4740 0.5068
#> alien71~ses
                         #> alien67~ses
                         -0.5750 0.0567 20000 -0.7560 -0.7198 -0.6863
#> anomia67~~anomia71
                         1.6229 0.3127 20000 0.6033 0.8064
                                                             1.0090
#> powerless67~~powerless71 0.3387 0.2617 20000 -0.5115 -0.3273 -0.1725
#> education~~education
                        2.8013 0.5068 20000 1.1849 1.4774
                                                             1.8123
#> sei~~sei
                        264.5971 18.1160 20000 206.1547 218.5036 228.8329
                      4.7307 0.4520 20000 3.1829 3.5861 3.8506
#> anomia67~~anomia67
#> powerless67~~powerless67 2.5634 0.4036 20000 1.2203 1.5411 1.7731
#> anomia71~~anomia71 4.3992 0.5157 20000 2.7146 3.0598 3.3779
```

```
#> powerless71~~powerless71 3.0699 0.4317 20000 1.5903 1.9643 2.2321
           6.7983 0.6516 20000 4.6039 5.1251 5.5390
#> ses~~ses
#> alien67~~alien67
                        4.8415 0.4641 20000 3.3676 3.6626 3.9277
#> alien71~~alien71
                        4.0832 0.4024 20000 2.7322 3.0197 3.2953
#>
                          97.5% 99.5% 99.95%
#> ses=~education
                        1.0000 1.0000 1.0000
#> ses=~sei
                        6.0434 6.2930 6.5633
#> alien67=~anomia67
                        1.0000 1.0000 1.0000
#> alien67=~powerless67
                        1.0989 1.1343
                                        1.1748
#> alien71=~anomia71
                        1.0000 1.0000 1.0000
                       1.0382 1.0744 1.1123
#> alien71=~powerless71
#> alien71~alien67
                         0.7055 0.7365 0.7755
                         -0.1254 -0.0916 -0.0525
#> alien71~ses
                        -0.4644 -0.4281 -0.3826
#> alien67~ses
                     2.2347 2.4094 2.6354
#> anomia67~~anomia71
#> powerless67~~powerless71     0.8546     1.0078
                                        1.1826
#> education 3.7745 4.0930 4.4314
#> sei~~sei
                       300.0111 311.2744 319.9201
#> anomia67~~anomia67 5.6109 5.8839 6.1559
#> powerless67~~powerless67 3.3519 3.5803
                                        3.8756
#> anomia71~~anomia71 5.4108 5.7206 5.9856
#> powerless71~~powerless71 3.9155 4.1995 4.4629
                    8.0985 8.4878 8.8915
#> ses~~ses
                        5.7609 6.0407
#> alien67~~alien67
                                        6.3632
#> alien71~~alien71
                         4.8799 5.1285 5.3654
#>
#>
#> [[1]][[5]]$visible
#> [1] TRUE
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#>
#> [[1]][[6]]
#> [[1]][[6]]$value
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#>
#>
#> [[1]][[6]]$visible
#> [1] TRUE
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#>
#> [[1]][[7]]
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#> [1] TRUE
#>
```

```
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#>
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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
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#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#> [1] TRUE
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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]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[13]]
#> [[1]][[13]]$value
#> [[1]][[13]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[13]]$visible
#> [1] TRUE
#>
#> [[1]][[14]]
#> [[1]][[14]]$value
#> [[1]][[14]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[14]]$visible
#> [1] TRUE
#>
#> [[1]][[15]]
#> [[1]][[15]]$value
#> [[1]][[15]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[15]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[16]]
#> [[1]][[16]]$value
#> [[1]][[16]]$value[[1]]
#> [1] TRUE
#>
#>
```

```
#> [[1]][[16]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[17]]
#> [[1]][[17]]$value
#> [[1]][[17]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[17]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[18]]
#> [[1]][[18]]$value
#> [[1]][[18]]$value[[1]]
                    2.5 % 97.5 %
#> textual=~x4
                0.8114752 0.8980010
#> x2~~x2
                0.7169092 0.9002432
#> x3~~x3
                0.5438408 0.8066502
#> x4~~x4
               0.1935651 0.3415028
0.1912168 0.3307279
0.2190790 0.3855087
#> x5~~x5
#> x6~~x6
                0.5838719 0.8206556
#> x7~~x7
#> visual~~visual 1.0000000 1.0000000
#> textual~~textual 1.0000000 1.0000000
#> speed~~speed 1.0000000 1.0000000
#> visual~~textual 0.3251455 0.5530869
#> visual~~speed     0.3301399 0.6324861
#> textual~~speed 0.1557491 0.3980156
#>
#>
#> [[1]][[18]]$visible
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#>
#>
#> [[1]][[19]]
#> [[1]][[19]]$value
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#> [[1]][[19]]$value[[1]]$thetahatstar
#>
                     y1
                                   y2
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#> [1981,] 0.5474098377 0.7368576832 1.091534066
#> [1982,] 1.3408120588 2.5147184254 3.067528730
#> [1983,] 0.8606111656 2.3239325773 2.362849852
#> [1984,] -0.3952879871 -0.0302444861 -0.509700481
#> [1985,] -0.8256779076 -2.1590779139 -2.227801356
#> [1986,] -0.3982895496 -0.2204104298 -0.618977505
#> [1987,] 0.0160825894 0.3140852364 0.194358817
#> [1988,] 0.9811442288 2.1096334225 2.394225065
#> [1989,] -1.4529874687 -2.6125761912 -3.261716141
#> [1990,] -0.3411170980 -2.3818582814 -1.747197686
#> [1991,] -0.5932736422 -1.5140663921 -1.580043588
#> [1992,] 1.4150083673 0.0819251688 1.809951612
#> [1993,] -2.9310194622 -5.1484271779 -6.512083017
#> [1994,] 0.0647917609 -0.0994841263 0.025584479
#> [1996,] -0.3103117538 -1.0497282133 -0.969507636
#> [1997,] 0.0547716814 0.5502168808 0.373646502
#> [2000,] 0.9827909947 0.6984867718 1.613151239
#> [[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
             0
      0 0
#> [2,]
#> [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_adi
#> [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
#> eta1=~y2 0.7039 NA 0
                   NA NA NA NA
                                        NA
#> eta1=~y3 0.7047 NA 0
                   NA NA NA NA
                                        NA
#> eta1=~y4 0.8566 NA 0 NA NA NA NA
                                        NA
NA NA NA NA
                                        NA
                   NA NA
                           NA NA NA
                                        NA
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/