

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	0.1045	100	0.2902	0.3238	0.3906	0.7858	0.8596	0.8612
#> visual=~x3	0.7294	0.1035	100	0.4198	0.4229	0.5385	0.9278	0.9560	0.9738
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0640	100	0.8797	0.9091	1.0016	1.2373	1.2844	1.2924
#> textual=~x6	0.9261	0.0504	100	0.8129	0.8130	0.8267	1.0212	1.0535	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	0.1588	100	0.7713	0.7779	0.8302	1.4491	1.5374	1.6099
#> speed=~x9	1.0815	0.1686	100	0.6557	0.6764	0.7164	1.4039	1.5304	1.5398
#> x1~~x1	0.5491	0.1239	100	0.1943	0.2037	0.2929	0.7921	0.8872	0.8938
#> x2~~x2	1.1338	0.0984	100	0.9459	0.9473	0.9547	1.3229	1.3640	1.3896
#> x3~~x3	0.8443	0.0888	100	0.5779	0.6078	0.6667	1.0105	1.0611	1.0720
#> x4~~x4	0.3712	0.0418	100	0.2682	0.2808	0.3052	0.4604	0.4711	0.4728
#> x5~~x5	0.4463	0.0578	100	0.2648	0.2938	0.3403	0.5686	0.5731	0.5732
#> x6~~x6	0.3562	0.0386	100	0.2651	0.2683	0.2832	0.4358	0.4455	0.4499
#> x7~~x7	0.7994	0.0782	100	0.5747	0.5949	0.6395	0.9436	0.9849	0.9969
#> x8~~x8	0.4877	0.0745	100	0.3201	0.3314	0.3530	0.6649	0.6901	0.7039
#> x9~~x9	0.5661	0.0721	100	0.3976	0.4019	0.4155	0.6731	0.6862	0.6867
#> visual~~visual	0.8093	0.1573	100	0.4230	0.4489	0.5554	1.1599	1.2119	1.2284
#> textual~~textual	0.9795	0.1101	100	0.6957	0.7069	0.7592	1.1628	1.2671	1.2747
#> speed~~speed	0.3837	0.0843	100	0.1609	0.1805	0.2176	0.5487	0.5779	0.5788
#> visual~~textual	0.4082	0.0835	100	0.2432	0.2441	0.2554	0.5697	0.6117	0.6268
#> visual~~speed	0.2622	0.0614	100	0.0469	0.0669	0.1502	0.3828	0.3913	0.3937
#> textual~~speed	0.1735	0.0473	100	0.0583	0.0640	0.0815	0.2647	0.2822	0.2907

```
#> Monte Carlo Confidence Intervals (Multiple Imputation Estimates)
```

#>	est	se	R	0.05%	0.5%	2.5%	97.5%	99.5%	99.95%
#> visual=~x1	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> visual=~x2	0.5535	0.0937	100	0.3413	0.3529	0.3922	0.7280	0.7788	0.7990
#> visual=~x3	0.7294	0.1071	100	0.4691	0.5134	0.5652	0.9199	0.9923	1.0363
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0657	100	0.9722	0.9791	0.9925	1.2400	1.2504	1.2559
#> textual=~x6	0.9261	0.0582	100	0.8111	0.8190	0.8315	1.0419	1.0508	1.0567
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1519	100	0.8216	0.8253	0.8856	1.4308	1.5444	1.5895
#> speed=~x9	1.0815	0.1457	100	0.7357	0.7582	0.8181	1.3691	1.4299	1.4553
#> x1~~x1	0.5491	0.1088	100	0.2687	0.3074	0.3602	0.7700	0.8224	0.8542
#> x2~~x2	1.1338	0.1027	100	0.8575	0.8628	0.9229	1.3294	1.3870	1.4200
#> x3~~x3	0.8443	0.0872	100	0.6369	0.6616	0.6950	1.0145	1.0764	1.1098
#> x4~~x4	0.3712	0.0518	100	0.2489	0.2512	0.2683	0.4796	0.4858	0.4868
#> x5~~x5	0.4463	0.0513	100	0.3232	0.3335	0.3525	0.5430	0.5524	0.5540
#> x6~~x6	0.3562	0.0438	100	0.2519	0.2613	0.2861	0.4567	0.4804	0.4836
#> x7~~x7	0.7994	0.0704	100	0.6351	0.6483	0.6671	0.9413	0.9568	0.9638

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#> x8~~x8          0.4877 0.0746 100 0.3579 0.3605 0.3770 0.6387 0.6657 0.6724
#> x9~~x9          0.5661 0.0637 100 0.3967 0.3980 0.4151 0.6638 0.7222 0.7305
#> visual~~visual  0.8093 0.1487 100 0.4412 0.4505 0.5355 1.0647 1.1426 1.1862
#> textual~~textual 0.9795 0.1143 100 0.6743 0.6859 0.7224 1.1564 1.1923 1.2136
#> speed~~speed    0.3837 0.0876 100 0.1757 0.1959 0.2203 0.5699 0.6093 0.6308
#> visual~~textual  0.4082 0.0658 100 0.2388 0.2418 0.2772 0.5476 0.5539 0.5552
#> visual~~speed    0.2622 0.0537 100 0.1298 0.1396 0.1554 0.3518 0.4100 0.4124
#> textual~~speed   0.1735 0.0494 100 0.0194 0.0441 0.0798 0.2594 0.3138 0.3153
#> Standardized Monte Carlo Confidence Intervals
#>               est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0602 100 0.5948 0.6070 0.6411 0.8820 0.9193 0.9260
#> visual=~x2      0.4236 0.0590 100 0.2493 0.2799 0.3184 0.5357 0.5616 0.5645
#> visual=~x3      0.5811 0.0502 100 0.4203 0.4261 0.4630 0.6644 0.7030 0.7149
#> textual=~x4      0.8516 0.0222 100 0.7867 0.7890 0.7950 0.8883 0.8949 0.8949
#> textual=~x5      0.8551 0.0225 100 0.7969 0.7979 0.8048 0.8841 0.8975 0.9043
#> textual=~x6      0.8380 0.0203 100 0.7749 0.7832 0.7932 0.8747 0.8793 0.8793
#> speed=~x7        0.5695 0.0533 100 0.4148 0.4317 0.4575 0.6635 0.6866 0.7014
#> speed=~x8        0.7230 0.0567 100 0.6027 0.6043 0.6079 0.8030 0.8392 0.8529
#> speed=~x9        0.6650 0.0592 100 0.4994 0.5105 0.5289 0.7624 0.7932 0.8164
#> x1~~x1           0.4042 0.0919 100 0.1425 0.1548 0.2215 0.5885 0.6313 0.6462
#> x2~~x2           0.8206 0.0500 100 0.6813 0.6846 0.7126 0.8986 0.9205 0.9376
#> x3~~x3           0.6623 0.0571 100 0.4889 0.5056 0.5586 0.7849 0.8184 0.8233
#> x4~~x4           0.2748 0.0374 100 0.1991 0.1992 0.2109 0.3679 0.3775 0.3811
#> x5~~x5           0.2689 0.0381 100 0.1823 0.1944 0.2184 0.3523 0.3633 0.3650
#> x6~~x6           0.2977 0.0338 100 0.2269 0.2269 0.2350 0.3708 0.3865 0.3995
#> x7~~x7           0.6757 0.0598 100 0.5081 0.5284 0.5597 0.7907 0.8132 0.8279
#> x8~~x8           0.4772 0.0802 100 0.2725 0.2954 0.3552 0.6305 0.6349 0.6368
#> x9~~x9           0.5578 0.0771 100 0.3334 0.3701 0.4187 0.7203 0.7393 0.7506
#> 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 0.0769 100 0.2852 0.2923 0.3083 0.5968 0.6018 0.6049
#> visual~~speed    0.4705 0.0749 100 0.1255 0.1752 0.3522 0.5969 0.6299 0.6435
#> textual~~speed   0.2830 0.0685 100 0.1174 0.1293 0.1437 0.4222 0.4422 0.4561
#> Standardized Monte Carlo Confidence Intervals
#>               est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0566 100 0.6066 0.6158 0.6389 0.8541 0.8849 0.9027
#> visual=~x2      0.4236 0.0572 100 0.2760 0.2858 0.3005 0.5170 0.5245 0.5251
#> visual=~x3      0.5811 0.0516 100 0.4436 0.4589 0.4770 0.6690 0.7060 0.7177
#> textual=~x4      0.8516 0.0259 100 0.7793 0.7864 0.7949 0.8936 0.8959 0.8968
#> textual=~x5      0.8551 0.0191 100 0.8144 0.8171 0.8210 0.8931 0.9011 0.9035
#> textual=~x6      0.8380 0.0243 100 0.7490 0.7630 0.7897 0.8796 0.8852 0.8891
#> speed=~x7        0.5695 0.0514 100 0.4146 0.4285 0.4564 0.6504 0.6852 0.6920
#> speed=~x8        0.7230 0.0489 100 0.5891 0.5892 0.5995 0.7847 0.8006 0.8031
#> speed=~x9        0.6650 0.0471 100 0.5508 0.5508 0.5695 0.7677 0.7730 0.7762
#> x1~~x1           0.4042 0.0855 100 0.1851 0.2165 0.2706 0.5916 0.6207 0.6320

```

```

#> x2~~x2      0.8206 0.0474 100 0.7243 0.7249 0.7327 0.9097 0.9182 0.9238
#> x3~~x3      0.6623 0.0597 100 0.4848 0.5015 0.5524 0.7725 0.7892 0.8031
#> x4~~x4      0.2748 0.0437 100 0.1957 0.1974 0.2015 0.3681 0.3816 0.3927
#> x5~~x5      0.2689 0.0327 100 0.1837 0.1881 0.2024 0.3260 0.3323 0.3367
#> x6~~x6      0.2977 0.0404 100 0.2096 0.2164 0.2263 0.3763 0.4176 0.4389
#> x7~~x7      0.6757 0.0573 100 0.5211 0.5305 0.5770 0.7917 0.8161 0.8280
#> x8~~x8      0.4772 0.0683 100 0.3551 0.3590 0.3843 0.6405 0.6529 0.6529
#> x9~~x9      0.5578 0.0631 100 0.3976 0.4025 0.4106 0.6753 0.6966 0.6966
#> 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 0.0577 100 0.3015 0.3034 0.3715 0.5743 0.6094 0.6233
#> visual~~speed   0.4705 0.0757 100 0.2719 0.2958 0.3388 0.6318 0.6791 0.7071
#> textual~~speed   0.2830 0.0680 100 0.0342 0.0804 0.1615 0.3969 0.4396 0.4501
#> 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]]$value
#> [[1]][[1]]$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  0.4209 20000    3.8781    4.1459    4.3950
#> alien67=~anomia67    1.0000  0.0000 20000    1.0000    1.0000    1.0000
#> alien67=~powerless67 0.9787  0.0614 20000    0.7815    0.8205    0.8613
#> alien71=~anomia71    1.0000  0.0000 20000    1.0000    1.0000    1.0000
#> alien71=~powerless71 0.9221  0.0593 20000    0.7377    0.7713    0.8049
#> alien71~alien67      0.6070  0.0507 20000    0.4446    0.4781    0.5084
#> alien71~ses         -0.2268  0.0526 20000   -0.4021   -0.3611   -0.3303
#> alien67~ses         -0.5750  0.0569 20000   -0.7616   -0.7217   -0.6864
#> anomia67~~anomia71    1.6229  0.3144 20000    0.5874    0.8174    1.0091
#> powerless67~~powerless71 0.3387  0.2603 20000   -0.5423   -0.3398   -0.1787
#> education~~education  2.8013  0.5045 20000    1.2006    1.5123    1.8157
#> sei~~sei           264.5971 18.0783 20000  203.8638  217.1390  229.3908
#> anomia67~~anomia67    4.7307  0.4517 20000    3.2315    3.5709    3.8419
#> powerless67~~powerless67 2.5634  0.4031 20000    1.2111    1.5370    1.7720
#> anomia71~~anomia71    4.3992  0.5144 20000    2.6942    3.0700    3.3980

```

```

#> powerless71~~powerless71 3.0699 0.4337 20000 1.6569 1.9608 2.2176
#> ses~~ses 6.7983 0.6497 20000 4.7420 5.1131 5.5268
#> alien67~~alien67 4.8415 0.4667 20000 3.3190 3.6349 3.9132
#> alien71~~alien71 4.0832 0.4020 20000 2.7908 3.0404 3.3019
#> 97.5% 99.5% 99.95%
#> ses=~education 1.0000 1.0000 1.0000
#> ses=~sei 6.0428 6.3160 6.6293
#> alien67=~anomia67 1.0000 1.0000 1.0000
#> alien67=~powerless67 1.1007 1.1390 1.1883
#> alien71=~anomia71 1.0000 1.0000 1.0000
#> alien71=~powerless71 1.0393 1.0760 1.1165
#> alien71~alien67 0.7079 0.7390 0.7756
#> alien71~ses -0.1228 -0.0931 -0.0435
#> alien67~ses -0.4640 -0.4304 -0.3856
#> anomia67~~anomia71 2.2475 2.4351 2.7083
#> powerless67~~powerless71 0.8413 0.9963 1.2075
#> education~~education 3.7771 4.0946 4.4022
#> sei~~sei 299.8108 310.8807 320.5326
#> anomia67~~anomia67 5.6235 5.9163 6.3399
#> powerless67~~powerless67 3.3410 3.6037 3.8633
#> anomia71~~anomia71 5.4037 5.7301 6.0431
#> powerless71~~powerless71 3.9249 4.1536 4.5062
#> ses~~ses 8.0789 8.4813 8.9430
#> alien67~~alien67 5.7486 6.0247 6.4317
#> alien71~~alien71 4.8647 5.1212 5.4324
#>
#>
#> [[1]][[5]]$visible
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#>
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#>
#> [[1]][[7]]
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#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>

```



```

#>
#> [[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]]
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#>
#>
#> [[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 %
#> visual=~x1 0.6389310 0.8540569
#> visual=~x2 0.3005430 0.5169790
#> visual=~x3 0.4769650 0.6690120
#> textual=~x4 0.7948998 0.8935924
#> textual=~x5 0.8210035 0.8930875
#> textual=~x6 0.7897320 0.8795763
#> speed=~x7 0.4563813 0.6503621
#> speed=~x8 0.5995203 0.7846735
#> speed=~x9 0.5695295 0.7677231
#> x1~~x1 0.2705867 0.5916261
#> x2~~x2 0.7327210 0.9096628
#> x3~~x3 0.5524174 0.7725041
#> x4~~x4 0.2014925 0.3681342
#> x5~~x5 0.2023928 0.3259531
#> x6~~x6 0.2263452 0.3763186
#> x7~~x7 0.5770083 0.7916583
#> x8~~x8 0.3842820 0.6405246
#> x9~~x9 0.4106009 0.6753417
#> visual~~visual 1.0000000 1.0000000
#> textual~~textual 1.0000000 1.0000000
#> speed~~speed 1.0000000 1.0000000
#> visual~~textual 0.3715096 0.5742903
#> visual~~speed 0.3387899 0.6317906
#> textual~~speed 0.1615065 0.3968878
#>
#>
#> [[1]][[18]]$visible
```

```

#> [1] TRUE
#>
#>
#> [[1]][[19]]
#> [[1]][[19]]$value
#> [[1]][[19]]$value[[1]]
#> [[1]][[19]]$value[[1]]$thetahatstar
#>
#>          y1          y2          y3
#> [1,] -0.6680090976 -0.781245109 -1.266552046
#> [2,] -1.6848844938 -2.260239131 -3.355354685
#> [3,] -0.5460741989 -1.608709284 -1.573709687
#> [4,] -1.0539008064 -1.872216724 -2.353194706
#> [5,] -2.3622144273 -4.191897349 -5.271960733
#> [6,]  2.0367721063  2.965048316  4.185290949
#> [7,] -0.4836924689 -1.445830930 -1.405530275
#> [8,]  1.4095709393  2.663192766  3.235666694
#> [9,] -0.6904787026 -1.717625120 -1.814222887
#> [10,] -0.8467161624 -1.792532907 -2.050618499
#> [11,]  0.0812739111 -0.013575396  0.093813133
#> [12,] -0.8491817869 -1.627646311 -1.962187924
#> [13,]  1.8075729053  3.705619954  4.310470473
#> [14,] -0.3512998915 -0.173168022 -0.534164801
#> [15,]  0.4491330712  0.550090225  0.865336823
#> [16,]  1.2352479754  1.034160493  2.114244806
#> [17,]  0.2022129493  1.375285635  1.015381371
#> [18,] -1.0305254978 -1.752957780 -2.257862452
#> [19,]  0.9034654278  0.851373448  1.599079579
#> [20,]  0.7416885177  1.175844098  1.577414698
#> [21,]  0.5728882293  0.839502333  1.180268584
#> [22,] -0.0123594358 -1.005167079 -0.573237609
#> [23,] -2.2330588049 -3.373917663 -4.656961828
#> [24,] -0.0962223809 -0.896596185 -0.617560690
#> [25,]  0.7969191089  1.682335161  1.927367453
#> [26,] -0.4992927982 -0.568744955 -0.938237573
#> [27,] -0.3113624296  0.717851290  0.010114812
#> [28,] -1.2029676334 -2.744297186 -3.023046143
#> [29,] -0.8892732394 -1.487058801 -1.934160966
#> [30,] -0.6187316031 -2.047156970 -1.907632097
#> [31,]  2.3114717411  4.052329576  5.131231368
#> [32,] -0.1851046774  0.012273329 -0.224010573
#> [33,]  0.1803841433 -1.158498066 -0.417982575
#> [34,] -0.9488356185 -0.985496731 -1.730088088
#> [35,] -1.7269235222 -3.283537891 -3.975664464
#> [36,] -0.1964466491 -1.402971112 -1.023555192
#> [37,] -0.1105124379 -0.488989263 -0.409175324

```

```

#> [38,] -1.9720420051 -2.506781767 -3.850255085
#> [39,]  0.1456558093 -0.033658243  0.162950908
#> [40,] -3.0292165762 -5.023290716 -6.565087319
#> [41,]  1.9769042945  3.020192753  4.141239862
#> [42,] -0.1919741471 -0.969054794 -0.777172684
#> [43,]  0.0772497042  0.102199519  0.153045259
#> [44,]  0.6099226545  2.544035539  2.172394321
#> [45,]  0.4623224288  1.689578728  1.514152094
#> [46,] -0.1876861349  0.458167679  0.020223097
#> [47,] -0.4078549275 -1.651983774 -1.425368605
#> [48,]  0.5522304600  1.679865334  1.620875048
#> [49,]  0.9744068609  1.176538091  1.867994862
#> [50,] -0.1845011915 -0.262212751 -0.375586321
#> [51,]  2.0614558113  3.740990242  4.646686308
#> [52,] -0.2007989091 -0.793947376 -0.690999697
#> [53,] -0.7688530464 -2.080138140 -2.113133644
#> [54,] -0.3213736732 -1.062884196 -0.990602644
#> [55,] -0.0667334956 -0.241005361 -0.216963193
#> [56,] -1.0666295596 -1.586430479 -2.210467801
#> [57,] -0.5849178269 -0.678435016 -1.105883629
#> [58,]  1.5690372169  2.861047564  3.544319019
#> [59,]  0.3505345971  0.490664982  0.709408015
#> [60,] -0.2465954166 -0.091725804 -0.358403436
#> [61,] -0.8856062311 -1.136981936 -1.735310278
#> [62,] -1.8545273620 -2.312129471 -3.595692847
#> [63,] -0.7474738666 -1.443807716 -1.733337499
#> [64,]  0.4366916864  0.404733761  0.769155918
#> [65,]  1.1199588265  1.032779835  1.969715382
#> [66,] -0.7261502416 -0.529499867 -1.199344798
#> [67,] -0.6277645963 -1.504828146 -1.617926264
#> [68,]  0.0781198979  0.719560274  0.496739745
#> [69,] -2.0998756800 -3.372432328 -4.490060889
#> [70,] -2.7220746567 -3.619699990 -5.403153522
#> [71,]  2.6657197754  4.318890224  5.720901441
#> [72,]  0.0711623400 -0.444267492 -0.157811871
#> [73,]  0.8573864160  1.636557840  1.977364455
#> [74,]  0.7745832284  0.758559997  1.386858527
#> [75,] -0.2897274842 -0.583233281 -0.684954316
#> [76,]  0.2289456918 -1.026105974 -0.283955246
#> [77,] -0.1084353747  0.542362553  0.165771809
#> [78,] -0.0344211223  0.726014866  0.359985416
#> [79,] -0.8271033888 -0.533021474 -1.327185657
#> [80,]  0.4755878190 -0.008216030  0.588488758
#> [81,] -1.2289184886 -2.253005898 -2.782760235
#> [82,] -0.8204353362 -1.911299925 -2.083757567

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#> [83,] -0.5170353090 -1.233253073 -1.329136306
#> [84,] -1.5246480388 -2.644134029 -3.368588689
#> [85,] 1.8646189357 2.173528918 3.531359330
#> [86,] 0.7950433798 1.168180189 1.639693975
#> [87,] -0.5204582180 -0.131681697 -0.722078611
#> [88,] -0.6972843435 -0.379150677 -1.079912106
#> [89,] 0.2915177135 -0.550237896 0.058157648
#> [90,] -0.4991492745 -0.211125001 -0.739594500
#> [91,] 0.8969435568 -0.327118348 0.936933333
#> [92,] 0.7822190523 1.619829136 1.874348555
#> [93,] 1.9080289088 3.105734881 4.102825961
#> [94,] 0.3950325929 0.218170995 0.613673354
#> [95,] -0.6296014190 -1.619489866 -1.683849199
#> [96,] 0.6544403397 0.888630720 1.309226600
#> [97,] -2.0861922881 -3.267474321 -4.414750678
#> [98,] -2.1897910337 -4.665306071 -5.319674298
#> [99,] 0.0283117018 0.944737994 0.559594147
#> [100,] -1.2578275571 -1.713611623 -2.519468014
#> [101,] -0.6328870751 -0.572423049 -1.106868100
#> [102,] -0.9143823959 -2.419755585 -2.483079237
#> [103,] -1.4787833429 -2.208905967 -3.069862996
#> [104,] -1.8481849531 -3.574933008 -4.288587085
#> [105,] 1.4428746738 3.221758129 3.587176162
#> [106,] 1.4392776070 1.724839233 2.751963379
#> [107,] 1.2512739138 1.254733965 2.256637867
#> [108,] -0.9656040417 -2.064314294 -2.349696550
#> [109,] -0.4218731288 -2.807866955 -2.084315788
#> [110,] 0.5012332263 -0.501493337 0.346719805
#> [111,] 0.0068319283 0.241218590 0.142385494
#> [112,] -0.1488527854 -0.938661756 -0.706534362
#> [113,] -0.3396768864 -0.888809518 -0.916822219
#> [114,] -0.1943860470 2.025733055 0.881801596
#> [115,] -2.1253092072 -3.597456454 -4.646654947
#> [116,] 0.4589023314 0.070965642 0.611624808
#> [117,] -0.3858295363 -0.475731000 -0.745132350
#> [118,] -0.7194865858 -2.079865932 -2.051423610
#> [119,] -1.0943044386 -2.192213836 -2.581162211
#> [120,] 0.2888931934 -0.047939864 0.333639303
#> [121,] -2.9357138409 -4.533632585 -6.176751553
#> [122,] 0.8836272782 1.053472797 1.686498489
#> [123,] 0.8129267463 1.579268093 1.890130743
#> [124,] -1.3468985707 -4.012781846 -3.906480963
#> [125,] -2.0151966903 -3.985328274 -4.724599505
#> [126,] 0.4662441179 0.892668358 1.076790470
#> [127,] 1.0577279429 3.005637159 2.986967954

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#> [128,] -0.4082765708 -2.486670620 -1.889110639
#> [129,]  0.6433259660 -0.018346192  0.792032990
#> [130,]  1.8810219263  2.975524281  3.996887373
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#> [132,] -1.1096945636 -1.850066452 -2.410475910
#> [133,]  0.2675707073  0.260947453  0.478470125
#> [134,] -0.6507494714 -1.040993263 -1.389178994
#> [135,]  0.2327361018  0.360209843  0.490118554
#> [136,] -0.9625350116 -2.359711611 -2.509802675
#> [137,]  0.1655447893  0.126374431  0.276563494
#> [138,] -0.1051692186 -0.427511936 -0.368395096
#> [139,]  0.3412472459  1.007032356  0.984389151
#> [140,] -0.8125011273 -0.217328711 -1.133780669
#> [141,]  0.3138130270  0.230634213  0.519310776
#> [142,]  1.2194096218  1.061559690  2.109700110
#> [143,] -2.8478096771 -5.964606846 -6.861267656
#> [144,]  1.6386583288  2.690714137  3.536607205
#> [145,]  0.4571442531  0.170709768  0.664786334
#> [146,]  1.2000368858  2.636135121  2.959366143
#> [147,] -1.3379943802 -1.906752184 -2.726619332
#> [148,] -1.2631597496 -1.207930440 -2.245485265
#> [149,] -2.1393715970 -3.946277605 -4.857771595
#> [150,]  0.1633570417  0.636459682  0.556911375
#> [151,]  0.6430532755  0.626898166  1.149776554
#> [152,]  1.1397535493  1.315690663  2.151402662
#> [153,]  0.6007767690  1.628372802  1.652835106
#> [154,]  0.3581312197  2.034279432  1.575522240
#> [155,] -0.7952009898 -2.509266350 -2.384137182
#> [156,]  0.3299594392  0.433057233  0.651781324
#> [157,]  0.4848649380  0.442730035  0.850313322
#> [158,]  0.4441174612 -0.215086870  0.434441208
#> [159,] -0.2625957464 -0.265558339 -0.474825299
#> [160,]  0.4347822639  1.525744497  1.388888931
#> [161,]  0.0603389290  0.780473162  0.508371342
#> [162,]  0.5022936622  1.701777194  1.570765044
#> [163,]  0.5660654989  0.813665419  1.157422372
#> [164,] -1.4387741403 -2.229354443 -3.031320385
#> [165,]  1.0457495839  1.500489718  2.136737373
#> [166,]  0.5042871989  1.071010492  1.223201834
#> [167,] -0.3519452879 -0.704135712 -0.829634435
#> [168,] -0.6480255720 -0.880639217 -1.296792566
#> [169,] -0.2667982585  0.848550701  0.138218125
#> [170,]  1.1199702515  1.570193822  2.267971891
#> [171,]  2.1282563544  3.057766523  4.350824663
#> [172,]  0.2329088531 -0.105887757  0.231669317

```

```

#> [173,] 1.4595439494 1.611993188 2.714610264
#> [174,] -1.7994010814 -5.137302845 -5.094804438
#> [175,] 0.5936022886 0.104888464 0.798418653
#> [176,] 0.1961912218 -1.208932193 -0.426260300
#> [177,] -0.6632218399 -0.314183137 -1.001382594
#> [178,] -0.5196861585 -0.386793677 -0.862692336
#> [179,] 1.3097521846 3.091180386 3.348709953
#> [180,] -2.0649637428 -3.418065734 -4.471851045
#> [181,] 0.0340629133 -0.292049791 -0.119599648
#> [182,] 1.0224740147 1.747171513 2.244611281
#> [183,] 1.7471038082 3.290516943 4.004701951
#> [184,] -0.5357778897 0.239465940 -0.535210530
#> [185,] 0.5049878566 0.453245420 0.881241789
#> [186,] -0.0522667288 0.841852377 0.402017278
#> [187,] 0.6612876749 0.521766940 1.114171049
#> [188,] 0.1873810295 -1.924922505 -0.834591076
#> [189,] -1.8949481452 -3.112620993 -4.090336019
#> [190,] -1.4924120373 -2.459309232 -3.225821028
#> [191,] 1.2804707361 1.280033993 2.307086165
#> [192,] -1.0302866771 -1.721754480 -2.240248122
#> [193,] 0.0984699454 0.990225655 0.672323793
#> [194,] 3.0650794712 5.491308629 6.869537964
#> [195,] -0.1169916574 -0.566128132 -0.460063621
#> [196,] 1.6718461363 2.304398778 3.363602874
#> [197,] -0.8308734679 -0.765736430 -1.461033927
#> [198,] -1.1636061481 -2.661532011 -2.928031967
#> [199,] 0.5236534330 0.821277808 1.108759949
#> [200,] 0.3941657599 0.505568831 0.772086197
#> [201,] 0.1810874544 -0.850237043 -0.246033599
#> [202,] 1.4887546476 2.613295880 3.306716481
#> [203,] 1.1681055987 1.268283348 2.160448014
#> [204,] 0.7534467926 1.375657568 1.702965137
#> [205,] 0.3196409485 0.836998737 0.863084999
#> [206,] -1.6571769328 -2.286872731 -3.335584454
#> [207,] 2.7444470769 5.338916360 6.385144579
#> [208,] 1.2729265261 1.232349991 2.271216064
#> [209,] 1.6348911904 3.669695947 4.075203577
#> [210,] -1.1438969449 -1.281069990 -2.137356368
#> [211,] 1.3904763701 1.859692408 2.765947098
#> [212,] -0.5785457528 -0.055279931 -0.752112801
#> [213,] -1.0671103468 -1.552870545 -2.192442974
#> [214,] -3.1098407360 -5.798049845 -7.095582881
#> [215,] 0.5214713229 2.177934909 1.858926793
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#> [217,] -0.5071362650 -1.196139308 -1.296195815

```



```

#> [218,] -0.8235528997 -1.024375717 -1.595439303
#> [219,] -1.0529704944 -0.368866141 -1.517737995
#> [220,] -1.2533150531 -1.655800128 -2.481758055
#> [221,] -1.3426873998 -1.240431245 -2.362691209
#> [222,] 0.7676045140 2.195946863 2.175845742
#> [223,] 0.1905289472 0.421581011 0.471545522
#> [224,] -0.8402277105 -1.500286432 -1.880342973
#> [225,] -0.8641996038 -1.656474283 -1.996913154
#> [226,] -0.7189162125 -0.315023826 -1.071298888
#> [227,] -2.1616386566 -3.473932233 -4.623406258
#> [228,] 0.9009868940 1.170341177 1.773002633
#> [229,] 0.8603604120 1.399637317 1.849591997
#> [230,] -0.3076844007 -1.233076806 -1.067982173
#> [231,] -2.1019710878 -4.600277768 -5.174076631
#> [232,] -0.3062584188 -2.556967465 -1.800907890
#> [233,] -0.9787352827 -1.459283055 -2.030303934
#> [234,] -0.0257875278 0.094491704 0.020282418
#> [235,] 1.8670900132 4.334427885 4.733649167
#> [236,] 1.4489562331 2.393401896 3.135056715
#> [237,] 1.5875786377 2.791170735 3.528661078
#> [238,] 0.6185840276 0.779838438 1.204139349
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#> [240,] 0.5440282389 -0.176954874 0.580189572
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#> [244,] 0.3150306036 -0.349391683 0.198938981
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#> [1112,] 1.4489487210 1.839287665 2.827537149
#> [1113,] 0.3994876488 0.923871200 1.010862785
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#> [1116,] 1.1537389545 1.742332566 2.405610571
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#> [1668,] 0.4475359235 2.104901718 1.726200494
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#> [1701,] -0.4626642448 -1.023517305 -1.144942128
#> [1702,] 0.7415736295 1.893135013 1.975337861

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#> [1747,]  0.4513625605  0.853157919  1.036306832

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#> [1848,] -2.9995539520 -4.357678981 -6.158711986
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#> [1941,]  0.5695410212  0.877492653  1.197177721
#> [1942,] -0.8015928523 -1.022013245 -1.566744499
#> [1943,]  1.0261694692 -0.194360612  1.171750396
#> [1944,] -0.9325743141 -1.826365731 -2.176457663
#> [1945,]  0.1930542302  0.646021435  0.599249537
#> [1946,]  1.9375828107  3.459522285  4.336016271
#> [1947,]  1.1230401512  0.973385334  1.940596269
#> [1948,]  0.4458762815  0.237332488  0.687708223
#> [1949,] -0.5269160186 -0.957892280 -1.188643639
#> [1950,] -0.4521010913 -0.737088331 -0.972814003
#> [1951,] -1.4043503846 -1.493694415 -2.580134149
#> [1952,] -0.1720400467  0.476927726  0.050144491
#> [1953,] -1.8158862674 -3.117162391 -3.994267756
#> [1954,] -1.2966426458 -2.890493220 -3.220989651
#> [1955,] -1.3153608699 -0.984633135 -2.186658342
#> [1956,] -0.3309627193 -0.075577681 -0.454646209
#> [1957,] -0.0102426512  0.110404764  0.048497645
#> [1958,] -0.4350702564 -0.439110110 -0.786211462
#> [1959,]  0.9763072694  0.297008211  1.382262374
#> [1960,] -0.1659820059 -0.715912298 -0.604277528
#> [1961,] -0.7756188372 -0.234362080 -1.097242012
#> [1962,]  0.1861092946  0.508932128  0.514510518
#> [1963,] -0.5511674898 -0.137510823 -0.763607367
#> [1964,] -0.6454077268 -1.804842026 -1.806422031
#> [1965,]  0.0411287754  0.211988044  0.168931233
#> [1966,]  0.7657477045  1.324785141  1.690072056
#> [1967,] -0.0819524438 -0.163773897 -0.193080682
#> [1968,] -1.5207328098 -3.316168008 -3.736657200
#> [1969,] -1.2794144076 -1.507594287 -2.432055380
#> [1970,] -0.9758661735 -2.039800775 -2.348889242
#> [1971,]  0.4863298906  1.025241507  1.175409566
#> [1972,]  0.2367418171  1.299385318  1.016316666

```

```

#> [1973,] -0.0806787644  0.103514351 -0.043158643
#> [1974,] -0.0296663620 -0.322918650 -0.216199679
#> [1975,]  0.2185925725 -1.354830652 -0.479293809
#> [1976,]  1.2461664376  2.269162999  2.813234590
#> [1977,] -1.4383651990 -2.597518379 -3.235126014
#> [1978,]  0.9737118468  1.251450452  1.908701418
#> [1979,]  0.6524504993  2.454658940  2.175825405
#> [1980,]  0.1471394463 -0.011456558  0.177121978
#> [1981,] -0.8851429619 -2.073318509 -2.254360187
#> [1982,]  0.5007801543  1.805070505  1.626201194
#> [1983,] -0.9466354581 -1.394872876 -1.954531154
#> [1984,]  0.6751346733  1.466091140  1.655498368
#> [1985,]  0.5966446831  0.359182462  0.943334979
#> [1986,] -1.2667070856 -3.169061734 -3.338254480
#> [1987,] -0.5837985744 -1.321520071 -1.461373225
#> [1988,] -0.6008632781 -0.618535527 -1.092525573
#> [1989,] -0.6248245078 -1.060948688 -1.367925519
#> [1990,] -0.0095064553 -0.629296120 -0.361087355
#> [1991,]  1.8335858027  4.613680501  4.846843610
#> [1992,]  0.6090759759 -0.200035449  0.648494020
#> [1993,]  1.4709390887  1.523041840  2.679455496
#> [1994,]  0.6357721723  1.267978118  1.496469700
#> [1995,]  0.3499912711  1.329557737  1.174280854
#> [1996,]  1.6856118675  1.613184007  2.997173202
#> [1997,] -0.6830698966 -0.393193596 -1.069980213
#> [1998,]  0.8107830603  1.012460273  1.572903001
#> [1999,] -2.1273379095 -3.033623999 -4.336281291
#> [2000,]  1.3916188627  1.952440601  2.818843127
#>
#> [[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/>