

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	0.0955	100	0.3770	0.3788	0.3975	0.7612	0.7980	0.8012
#> visual=~x3	0.7294	0.1054	100	0.4576	0.4700	0.4960	0.9058	0.9645	0.9747
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0603	100	0.9948	0.9975	1.0161	1.2432	1.2556	1.2587
#> textual=~x6	0.9261	0.0582	100	0.7912	0.7929	0.8031	1.0477	1.0630	1.0719
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1587	100	0.7754	0.7835	0.8658	1.4859	1.5356	1.5728
#> speed=~x9	1.0815	0.1467	100	0.6596	0.6996	0.8340	1.3303	1.3758	1.4121
#> x1~~x1	0.5491	0.1272	100	0.2718	0.2790	0.3086	0.7933	0.8593	0.8933
#> x2~~x2	1.1338	0.1025	100	0.8880	0.8991	0.9378	1.3305	1.3915	1.3975
#> x3~~x3	0.8443	0.0791	100	0.6997	0.7026	0.7121	1.0030	1.0367	1.0526
#> x4~~x4	0.3712	0.0465	100	0.2477	0.2604	0.2819	0.4477	0.4648	0.4758
#> x5~~x5	0.4463	0.0597	100	0.3265	0.3272	0.3373	0.5603	0.5811	0.5849
#> x6~~x6	0.3562	0.0445	100	0.2525	0.2543	0.2691	0.4504	0.4679	0.4731
#> x7~~x7	0.7994	0.0750	100	0.5687	0.5993	0.6496	0.9387	0.9679	0.9895
#> x8~~x8	0.4877	0.0869	100	0.2584	0.2862	0.3363	0.6520	0.6998	0.7156
#> x9~~x9	0.5661	0.0713	100	0.3401	0.3870	0.4430	0.7012	0.7366	0.7558
#> visual~~visual	0.8093	0.1607	100	0.4750	0.4963	0.5479	1.1343	1.2477	1.2979
#> textual~~textual	0.9795	0.1008	100	0.7750	0.7840	0.8064	1.1764	1.2318	1.2377
#> speed~~speed	0.3837	0.0822	100	0.2031	0.2114	0.2318	0.5175	0.5623	0.5914
#> visual~~textual	0.4082	0.0757	100	0.2343	0.2439	0.2757	0.6010	0.6156	0.6214
#> visual~~speed	0.2622	0.0564	100	0.1369	0.1453	0.1581	0.3700	0.3946	0.4061
#> textual~~speed	0.1735	0.0471	100	0.0622	0.0741	0.0915	0.2529	0.2859	0.3088

```
#> 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	0.0991	100	0.2941	0.3166	0.3659	0.7713	0.8098	0.8255
#> visual=~x3	0.7294	0.1166	100	0.3745	0.4084	0.4889	0.9741	1.0059	1.0100
#> textual=~x4	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> textual=~x5	1.1131	0.0620	100	0.9620	0.9668	1.0068	1.2258	1.2394	1.2454
#> textual=~x6	0.9261	0.0539	100	0.7787	0.7862	0.8248	1.0310	1.0389	1.0425
#> speed=~x7	1.0000	0.0000	100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
#> speed=~x8	1.1800	0.1711	100	0.7707	0.8153	0.8939	1.4795	1.6074	1.6423
#> speed=~x9	1.0815	0.1455	100	0.7322	0.7595	0.8280	1.3822	1.4827	1.5066
#> x1~~x1	0.5491	0.1129	100	0.1845	0.2205	0.3235	0.7752	0.8752	0.8948
#> x2~~x2	1.1338	0.0886	100	0.9367	0.9450	0.9671	1.3151	1.3345	1.3388
#> x3~~x3	0.8443	0.0952	100	0.6219	0.6258	0.6525	1.0168	1.0677	1.0899
#> x4~~x4	0.3712	0.0483	100	0.2322	0.2518	0.2830	0.4587	0.4811	0.4953
#> x5~~x5	0.4463	0.0572	100	0.3024	0.3035	0.3486	0.5529	0.5832	0.5847
#> x6~~x6	0.3562	0.0412	100	0.2677	0.2704	0.2799	0.4435	0.4467	0.4469
#> x7~~x7	0.7994	0.0715	100	0.6558	0.6593	0.6703	0.9181	0.9353	0.9394

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#> x8~~x8          0.4877 0.0813 100 0.2814 0.3021 0.3477 0.6412 0.6437 0.6438
#> x9~~x9          0.5661 0.0652 100 0.4309 0.4368 0.4551 0.6945 0.7263 0.7420
#> visual~~visual  0.8093 0.1624 100 0.4028 0.4264 0.5080 1.1487 1.3525 1.4214
#> textual~~textual 0.9795 0.1181 100 0.7232 0.7332 0.7563 1.2327 1.2964 1.3069
#> speed~~speed    0.3837 0.0876 100 0.1871 0.1917 0.2136 0.5526 0.5751 0.5781
#> visual~~textual 0.4082 0.0844 100 0.1166 0.1750 0.2715 0.5763 0.5960 0.6041
#> visual~~speed    0.2622 0.0550 100 0.1534 0.1563 0.1639 0.3624 0.4169 0.4426
#> textual~~speed   0.1735 0.0436 100 0.0957 0.0969 0.0990 0.2809 0.3006 0.3019
#> Standardized Monte Carlo Confidence Intervals
#>           est      se    R 0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0601 100 0.6256 0.6344 0.6467 0.8667 0.8892 0.8913
#> visual=~x2      0.4236 0.0540 100 0.3029 0.3038 0.3166 0.5263 0.5549 0.5765
#> visual=~x3      0.5811 0.0540 100 0.4193 0.4329 0.4647 0.6661 0.6790 0.6889
#> textual=~x4      0.8516 0.0217 100 0.7878 0.7988 0.8139 0.8916 0.8988 0.9019
#> textual=~x5      0.8551 0.0211 100 0.7934 0.7959 0.8158 0.8940 0.9029 0.9039
#> textual=~x6      0.8380 0.0243 100 0.7580 0.7625 0.7739 0.8747 0.8813 0.8835
#> speed=~x7       0.5695 0.0509 100 0.4243 0.4385 0.4615 0.6494 0.6620 0.6676
#> speed=~x8       0.7230 0.0594 100 0.5504 0.5722 0.6070 0.8092 0.8330 0.8348
#> speed=~x9       0.6650 0.0502 100 0.4898 0.4904 0.5581 0.7394 0.7622 0.7817
#> x1~~x1          0.4042 0.0916 100 0.2056 0.2094 0.2488 0.5818 0.5975 0.6086
#> x2~~x2          0.8206 0.0466 100 0.6676 0.6915 0.7230 0.8998 0.9077 0.9083
#> x3~~x3          0.6623 0.0609 100 0.5254 0.5389 0.5563 0.7840 0.8124 0.8242
#> x4~~x4          0.2748 0.0368 100 0.1865 0.1922 0.2051 0.3376 0.3617 0.3793
#> x5~~x5          0.2689 0.0361 100 0.1830 0.1847 0.2007 0.3345 0.3666 0.3705
#> x6~~x6          0.2977 0.0403 100 0.2194 0.2232 0.2350 0.4011 0.4185 0.4254
#> x7~~x7          0.6757 0.0566 100 0.5543 0.5617 0.5782 0.7870 0.8075 0.8199
#> x8~~x8          0.4772 0.0841 100 0.3031 0.3061 0.3451 0.6315 0.6719 0.6969
#> x9~~x9          0.5578 0.0648 100 0.3888 0.4185 0.4533 0.6885 0.7595 0.7601
#> 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 0.0667 100 0.3039 0.3066 0.3327 0.5979 0.6210 0.6392
#> visual~~speed    0.4705 0.0695 100 0.2662 0.2767 0.3617 0.6112 0.6220 0.6228
#> textual~~speed   0.2830 0.0723 100 0.1275 0.1398 0.1558 0.4075 0.4847 0.5476
#> Standardized Monte Carlo Confidence Intervals
#>           est      se    R 0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x1      0.7719 0.0596 100 0.5578 0.5790 0.6285 0.8720 0.9278 0.9351
#> visual=~x2      0.4236 0.0523 100 0.2890 0.2916 0.3188 0.5300 0.5504 0.5570
#> visual=~x3      0.5811 0.0561 100 0.4408 0.4472 0.4695 0.6819 0.7009 0.7136
#> textual=~x4      0.8516 0.0238 100 0.7855 0.7858 0.7995 0.8955 0.9060 0.9082
#> textual=~x5      0.8551 0.0229 100 0.7910 0.7952 0.8013 0.8942 0.8998 0.9037
#> textual=~x6      0.8380 0.0242 100 0.7776 0.7783 0.7928 0.8804 0.8923 0.8927
#> speed=~x7       0.5695 0.0526 100 0.4278 0.4302 0.4392 0.6470 0.6541 0.6555
#> speed=~x8       0.7230 0.0593 100 0.5666 0.5764 0.6030 0.8186 0.8416 0.8518
#> speed=~x9       0.6650 0.0475 100 0.5383 0.5408 0.5522 0.7392 0.7473 0.7512
#> x1~~x1          0.4042 0.0902 100 0.1256 0.1392 0.2392 0.6044 0.6642 0.6888

```

```

#> x2~~x2      0.8206 0.0446 100 0.6898 0.6970 0.7191 0.8984 0.9150 0.9165
#> x3~~x3      0.6623 0.0649 100 0.4907 0.5085 0.5351 0.7795 0.8000 0.8056
#> x4~~x4      0.2748 0.0403 100 0.1753 0.1791 0.1981 0.3608 0.3825 0.3830
#> x5~~x5      0.2689 0.0389 100 0.1832 0.1904 0.2003 0.3579 0.3677 0.3742
#> x6~~x6      0.2977 0.0404 100 0.2030 0.2037 0.2248 0.3715 0.3942 0.3953
#> x7~~x7      0.6757 0.0583 100 0.5703 0.5722 0.5813 0.8071 0.8149 0.8170
#> x8~~x8      0.4772 0.0845 100 0.2744 0.2916 0.3298 0.6364 0.6677 0.6790
#> x9~~x9      0.5578 0.0617 100 0.4356 0.4416 0.4535 0.6951 0.7075 0.7102
#> 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 0.0822 100 0.1570 0.2393 0.3486 0.6342 0.6715 0.6800
#> visual~~speed   0.4705 0.0727 100 0.3241 0.3291 0.3435 0.6212 0.7293 0.7383
#> textual~~speed   0.2830 0.0647 100 0.1657 0.1733 0.1891 0.4245 0.4638 0.4906
#> Monte Carlo Confidence Intervals
#> Monte Carlo Confidence Intervals (Multiple Imputation Estimates)
#> Standardized Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals

#> test-semmcci-npd

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

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

#> lavaan 0.6.15 ended normally after 18 iterations
#>
#> Estimator ML
#> Optimization method NLMINB
#> Number of model parameters 8
#>
#> Number of observations 50
#>
#> Model Test User Model:
#>
#> Test statistic 0.000
#> Degrees of freedom 2
#> P-value (Chi-square) 1.000
#>
#> Parameter Estimates:
#>
#> Standard errors Standard
#> Information Expected

```

```

#> Information saturated (h1) model          Structured
#>
#> Latent Variables:
#>           Estimate Std.Err  z-value  P(>|z|)
#>   eta1 =~
#>     y1           1.000
#>     y2           0.991    0.152    6.524    0.000
#>     y3           0.901    0.138    6.537    0.000
#>     y4           1.399    0.143    9.814    0.000
#>
#> Variances:
#>           Estimate Std.Err  z-value  P(>|z|)
#>   .y1           0.000    0.055    0.000    1.000
#>   .y2           0.980    0.203    4.822    0.000
#>   .y3           0.807    0.167    4.820    0.000
#>   .y4           0.696    0.176    3.960    0.000
#>   eta1          0.980    0.204    4.815    0.000
#>
#> Standardized Monte Carlo Confidence Intervals
#>           est se R 0.05% 0.5% 2.5% 97.5% 99.5% 99.95%
#> eta1=~y1  1.0000 NA 0    NA    NA    NA    NA    NA    NA
#> eta1=~y2  0.7039 NA 0    NA    NA    NA    NA    NA    NA
#> eta1=~y3  0.7047 NA 0    NA    NA    NA    NA    NA    NA
#> eta1=~y4  0.8566 NA 0    NA    NA    NA    NA    NA    NA
#> y1~~y1    0.0000 NA 0    NA    NA    NA    NA    NA    NA
#> y2~~y2    0.5045 NA 0    NA    NA    NA    NA    NA    NA
#> y3~~y3    0.5034 NA 0    NA    NA    NA    NA    NA    NA
#> y4~~y4    0.2662 NA 0    NA    NA    NA    NA    NA    NA
#> eta1~~eta1 1.0000 NA 0    NA    NA    NA    NA    NA    NA
#> [[1]]
#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
#> [1] TRUE
#>

```

```

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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  0.4237 20000      3.8443      4.1239      4.3848
#> alien67=~anomia67    1.0000  0.0000 20000      1.0000      1.0000      1.0000
#> alien67=~powerless67 0.9787  0.0615 20000      0.7782      0.8215      0.8568
#> alien71=~anomia71    1.0000  0.0000 20000      1.0000      1.0000      1.0000
#> alien71=~powerless71 0.9221  0.0593 20000      0.7260      0.7711      0.8058
#> alien71~alien67      0.6070  0.0515 20000      0.4405      0.4736      0.5067
#> alien71~ses          -0.2268  0.0525 20000     -0.4041     -0.3614     -0.3313
#> alien67~ses          -0.5750  0.0564 20000     -0.7459     -0.7165     -0.6845
#> anomia67~~anomia71    1.6229  0.3125 20000      0.6115      0.8068      1.0035
#> powerless67~~powerless71 0.3387  0.2599 20000     -0.5112     -0.3395     -0.1680
#> education~~education  2.8013  0.5068 20000      1.1872      1.4975      1.8086
#> sei~~sei            264.5971 18.1403 20000    200.2411    217.3737    229.0072
#> anomia67~~anomia67    4.7307  0.4562 20000      3.2568      3.5430      3.8296
#> powerless67~~powerless67 2.5634  0.4032 20000      1.2475      1.5072      1.7833
#> anomia71~~anomia71    4.3992  0.5128 20000      2.6196      3.0766      3.3894

```

```

#> powerless71~~powerless71 3.0699 0.4315 20000 1.7034 1.9539 2.2284
#> ses~~ses 6.7983 0.6522 20000 4.6081 5.1289 5.5302
#> alien67~~alien67 4.8415 0.4666 20000 3.2681 3.6572 3.9360
#> alien71~~alien71 4.0832 0.4033 20000 2.7589 3.0567 3.2948
#> 97.5% 99.5% 99.95%
#> ses=~education 1.0000 1.0000 1.0000
#> ses=~sei 6.0462 6.3004 6.5915
#> alien67=~anomia67 1.0000 1.0000 1.0000
#> alien67=~powerless67 1.0973 1.1362 1.1863
#> alien71=~anomia71 1.0000 1.0000 1.0000
#> alien71=~powerless71 1.0387 1.0744 1.1132
#> alien71~alien67 0.7073 0.7397 0.7743
#> alien71~ses -0.1236 -0.0934 -0.0494
#> alien67~ses -0.4650 -0.4304 -0.3922
#> anomia67~~anomia71 2.2334 2.4229 2.6373
#> powerless67~~powerless71 0.8446 1.0020 1.2013
#> education~~education 3.8020 4.0817 4.5841
#> sei~~sei 299.9948 311.9461 322.1450
#> anomia67~~anomia67 5.6278 5.9086 6.2052
#> powerless67~~powerless67 3.3611 3.6070 3.8852
#> anomia71~~anomia71 5.3982 5.7092 6.0941
#> powerless71~~powerless71 3.9164 4.1660 4.5068
#> ses~~ses 8.0736 8.4710 8.9196
#> alien67~~alien67 5.7599 6.0328 6.3030
#> alien71~~alien71 4.8792 5.1182 5.3809
#>
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#> [[1]][[5]]$visible
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#>
#> [[1]][[6]]
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#> [[1]][[6]]$visible
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#>
#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>

```



```

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

```

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#> [[1]][[12]]$value
#> [[1]][[12]]$value[[1]]
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#>
#>
#> [[1]][[12]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[13]]
#> [[1]][[13]]$value
#> [[1]][[13]]$value[[1]]
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#>
#>
#> [[1]][[13]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[14]]
#> [[1]][[14]]$value
#> [[1]][[14]]$value[[1]]
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#>
#>
#> [[1]][[14]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[15]]
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#> [[1]][[15]]$value[[1]]
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#>
#>
#> [[1]][[15]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[16]]
#> [[1]][[16]]$value
#> [[1]][[16]]$value[[1]]
#> [1] TRUE
#>
#>
```

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#> [[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      0.6284518 0.8719996
#> visual=~x2      0.3187598 0.5299712
#> visual=~x3      0.4695335 0.6818539
#> textual=~x4     0.7994936 0.8954722
#> textual=~x5     0.8013221 0.8942393
#> textual=~x6     0.7928033 0.8804228
#> speed=~x7       0.4392058 0.6470353
#> speed=~x8       0.6029784 0.8186042
#> speed=~x9       0.5521924 0.7392254
#> x1~~x1          0.2392017 0.6043587
#> x2~~x2          0.7191295 0.8983602
#> x3~~x3          0.5350743 0.7795350
#> x4~~x4          0.1980755 0.3607908
#> x5~~x5          0.2003357 0.3578827
#> x6~~x6          0.2248227 0.3714629
#> x7~~x7          0.5813419 0.8070792
#> x8~~x8          0.3297664 0.6364039
#> x9~~x9          0.4535339 0.6950790
#> visual~~visual  1.0000000 1.0000000
#> textual~~textual 1.0000000 1.0000000
#> speed~~speed    1.0000000 1.0000000
#> visual~~textual  0.3485785 0.6342343
#> visual~~speed    0.3434979 0.6211927
#> textual~~speed   0.1890880 0.4244871
#>
#>
#> [[1]][[18]]$visible
```

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#> [1] TRUE
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#>
#> [[1]][[19]]
#> [[1]][[19]]$value
#> [[1]][[19]]$value[[1]]
#> [[1]][[19]]$value[[1]]$thetahatstar
#>           y1           y2           y3
#> [1,] -1.109231285 -2.576734103 -2.8131683327
#> [2,] -0.363991791  0.306967956 -0.2835359765
#> [3,]  1.279457815  2.095078372  2.7581385788
#> [4,] -0.662502205  0.299618489 -0.6598510193
#> [5,] -0.690091610 -1.476570777 -1.6799651228
#> [6,] -1.288664817 -1.001285449 -2.1626102447
#> [7,] -0.780637267 -2.495071149 -2.3580987746
#> [8,] -1.860405653 -3.316135707 -4.1602043810
#> [9,] -1.501799969 -1.291750234 -2.5895812273
#> [10,]  0.448069045  0.377981200  0.7684967002
#> [11,] -1.791689930 -3.017090077 -3.9085594730
#> [12,] -0.198362476  0.228389772 -0.1206072003
#> [13,]  0.612659650  0.509170597  1.0465424507
#> [14,] -0.836202784 -1.966578164 -2.1340963605
#> [15,] -2.192640688 -2.695418217 -4.2300224755
#> [16,]  0.340063192  1.236871299  1.1104636500
#> [17,] -1.546215598 -3.303895198 -3.7616228218
#> [18,]  0.565656824  1.480360408  1.5269005697
#> [19,] -0.108913243  0.616303541  0.2062100689
#> [20,] -0.349297243 -0.313568867 -0.6095841302
#> [21,] -0.900249116 -1.128248074 -1.7487227293
#> [22,] -0.612809140 -0.739510340 -1.1745577753
#> [23,]  2.141504965  3.682447311  4.7140170939
#> [24,] -0.770382358 -0.183089927 -1.0622583308
#> [25,] -0.868271058 -1.383339161 -1.8504116170
#> [26,]  0.396600669 -0.935730749 -0.0247384433
#> [27,] -0.598906935  0.112183158 -0.6845677762
#> [28,]  0.570089050  0.976906072  1.2530313869
#> [29,] -1.383113014 -2.170253078 -2.9291133123
#> [30,] -0.069801545 -0.502566495 -0.3659444665
#> [31,]  0.511906013  0.295214868  0.8021682488
#> [32,] -0.720333305 -2.194616941 -2.1161614572
#> [33,] -0.800660459 -2.770563412 -2.5359539575
#> [34,] -0.249257036 -0.362082451 -0.5117590412
#> [35,]  0.710199029 -0.145141982  0.8050559802
#> [36,]  0.129928993  0.490112047  0.4340104707
#> [37,]  0.340004224 -0.801309002 -0.0207146146

```

```

#> [38,] 1.415961562 2.067360200 2.9129735419
#> [39,] 0.662782755 2.147777278 2.0184030430
#> [40,] 1.066326613 1.404824007 2.1093060438
#> [41,] 1.328479674 1.730495886 2.6169398213
#> [42,] 0.545670087 0.085609171 0.7279489745
#> [43,] -1.033348936 -0.269819204 -1.4383034087
#> [44,] -0.149482082 -0.139192296 -0.2636470044
#> [45,] -1.705614075 -2.665856277 -3.6063045829
#> [46,] -0.371890697 -1.685667357 -1.3992149216
#> [47,] 0.378198460 0.600339598 0.8047691073
#> [48,] 0.281010015 1.768524780 1.3318709653
#> [49,] -1.853360268 -2.578703942 -3.7421751752
#> [50,] -0.092531036 -0.515104307 -0.4012456389
#> [51,] -0.410954723 0.483039941 -0.2443852144
#> [52,] -0.095221819 -0.231287944 -0.2470947920
#> [53,] 0.314866841 2.530630999 1.7970267809
#> [54,] -0.202041020 -1.615835681 -1.1486621827
#> [55,] -1.138396198 -0.776147893 -1.8502864247
#> [56,] -0.180020907 0.612324931 0.1153323008
#> [57,] 1.051447747 2.705486629 2.8125657008
#> [58,] 1.870179615 3.371807766 4.2032879744
#> [59,] -1.392369921 -2.518210915 -3.1337585184
#> [60,] -0.634640372 -0.892977341 -1.2869486360
#> [61,] 0.350564713 1.391965631 1.2096296930
#> [62,] 1.568959225 1.633344990 2.8628982376
#> [63,] 0.335498280 -0.539988175 0.1186886831
#> [64,] -0.102991582 -0.190304381 -0.2340393655
#> [65,] -1.169439557 -1.459744723 -2.2683644804
#> [66,] 0.027456666 -0.120458317 -0.0326114202
#> [67,] 1.235073967 3.458594248 3.4594870499
#> [68,] 0.347027724 0.271761647 0.5835528300
#> [69,] 0.428336210 1.005025613 1.0918736540
#> [70,] -0.546471010 -0.297129708 -0.8463327514
#> [71,] 1.400741617 2.145524047 2.9373722440
#> [72,] -0.888995293 -1.016183847 -1.6724984876
#> [73,] 1.545927999 2.676185294 3.4129114756
#> [74,] -0.354007994 -0.653245758 -0.8039647939
#> [75,] 0.561881533 0.096664418 0.7542995166
#> [76,] 0.464358140 1.210291591 1.2507062897
#> [77,] 1.643055260 4.040588583 4.2912138891
#> [78,] 0.130017658 0.147699754 0.2440965464
#> [79,] -1.544886247 -1.387599579 -2.6965013100
#> [80,] -0.333937408 -1.114094843 -1.0346891296
#> [81,] 0.153429715 -0.032813899 0.1731133844
#> [82,] 1.357220916 1.924484723 2.7604352465

```

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#> [83,] 1.490071479 2.234616582 3.0982073873
#> [84,] -0.505621423 0.160503556 -0.5414268483
#> [85,] -1.451633157 -2.867391630 -3.4014392420
#> [86,] 1.753209486 3.030474549 3.8680029655
#> [87,] 0.709131810 1.608904432 1.7771475019
#> [88,] 1.168415229 2.402819644 2.7904542602
#> [89,] -0.240678480 -0.727046923 -0.7036017580
#> [90,] -1.347077181 -2.945444451 -3.3143761202
#> [91,] 2.124075391 4.056592296 4.8999175726
#> [92,] -0.224539038 0.272936723 -0.1285271468
#> [93,] 0.994165827 1.982918881 2.3401414677
#> [94,] -0.341898329 0.298167854 -0.2608695673
#> [95,] -0.793789509 -1.822585369 -2.0012978997
#> [96,] -1.695985845 -2.399033234 -3.4462227596
#> [97,] 0.736113550 1.295516147 1.6368758041
#> [98,] 1.046976642 1.588121773 2.1868996110
#> [99,] -0.665659944 -1.463792662 -1.6424080150
#> [100,] 0.719104447 2.156832674 2.0936604105
#> [101,] -0.970488391 -1.324162121 -1.9450337664
#> [102,] -0.547004692 -0.860328517 -1.1595500007
#> [103,] -0.130141526 0.967675540 0.3747355815
#> [104,] 0.234466402 0.236718903 0.4237439011
#> [105,] -0.425364597 -1.678230012 -1.4617683692
#> [106,] -0.748636076 -0.842754309 -1.4012272751
#> [107,] -0.758484412 -2.980294562 -2.5997532954
#> [108,] 2.496594700 4.273591327 5.4848669301
#> [109,] -0.593946277 -1.708563513 -1.6888201087
#> [110,] 0.176372215 0.441334146 0.4648545286
#> [111,] 1.145129756 2.070730164 2.5771219930
#> [112,] -0.315400556 -1.490500052 -1.2204631846
#> [113,] 0.736787885 0.584002788 1.2428565614
#> [114,] 0.590520374 -0.255994853 0.5943004363
#> [115,] 0.393979939 1.539263472 1.3455117300
#> [116,] -1.042432779 -1.550198498 -2.1601876760
#> [117,] 2.158996954 3.437628620 4.5999651240
#> [118,] 0.369620384 0.687791403 0.8426045127
#> [119,] 0.858809823 0.701040577 1.4599665022
#> [120,] -2.143334401 -2.883281990 -4.2727950695
#> [121,] -1.965587249 -3.354823985 -4.3128340612
#> [122,] 0.511005788 2.098455133 1.8017685360
#> [123,] -1.631603411 -2.778397516 -3.5764704713
#> [124,] -0.004303273 0.549183539 0.2994077778
#> [125,] 0.324264125 0.725120961 0.8067625238
#> [126,] -0.652347298 -2.950784989 -2.4510259008
#> [127,] 0.530981826 0.802137374 1.1072761654

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#> [128,] -0.735060592 -2.669711061 -2.3981834292
#> [129,]  2.288974720  4.084909712  5.1212586529
#> [130,] -0.170769916  1.154291826  0.4276370333
#> [131,] -2.005943743 -3.056174356 -4.1974197459
#> [132,] -1.792935397 -3.152151228 -3.9850658276
#> [133,]  0.898958855  0.958352095  1.6528286451
#> [134,]  2.149635250  2.388153985  4.0058767867
#> [135,] -0.119603429  1.000191882  0.4059215820
#> [136,] -1.625524341 -3.337544475 -3.8791931461
#> [137,]  0.730416403  0.738374047  1.3205810387
#> [138,]  1.021296582  1.822148818  2.2847523123
#> [139,]  0.947975344  1.229144993  1.8642299280
#> [140,]  1.274089357  1.871074214  2.6271312921
#> [141,]  0.996276247  1.240494419  1.9307586253
#> [142,]  2.370141204  4.088427220  5.2244236725
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#> [145,] -0.790664655 -0.988493165 -1.5345150188
#> [146,]  0.403600803  1.417211395  1.2897749580
#> [147,] -1.095574597 -1.678184302 -2.2974812030
#> [148,] -1.851880931 -4.866340946 -5.0098732316
#> [149,] -3.427076019 -5.576551876 -7.3682467091
#> [150,]  1.689477498  3.614251979  4.1125025086
#> [151,]  1.993589211  3.912098273  4.6570158344
#> [152,] -0.537324083 -0.611446683 -1.0093594808
#> [153,] -0.409860106 -0.739365933 -0.9214043301
#> [154,]  0.477581129  0.127602527  0.6663479871
#> [155,] -1.977709070 -3.370611092 -4.3367109076
#> [156,] -0.077311428  0.665118940  0.2727073911
#> [157,] -0.723795855 -1.740504728 -1.8684659212
#> [158,]  0.398015044  0.575030121  0.8154342832
#> [159,] -0.559883825 -0.811502992 -1.1485138947
#> [160,] -2.221669938 -4.176232673 -5.0880113823
#> [161,]  0.593134484  0.203383999  0.8524962082
#> [162,]  1.751660649  1.870028037  3.2220723679
#> [163,]  0.900907610  1.466714061  1.9373783106
#> [164,] -1.359804490 -2.245416459 -2.9417605883
#> [165,]  1.066228417  3.835864836  3.4583094727
#> [166,] -0.162813360  0.742140135  0.2088317638
#> [167,] -2.133443418 -2.241905818 -3.9045242932
#> [168,] -1.020601389 -1.121282272 -1.8949338305
#> [169,]  0.407892706  0.250286257  0.6475322787
#> [170,] -1.228730658 -1.791410727 -2.5263600201
#> [171,]  0.430905594  0.701232389  0.9264851037
#> [172,]  0.234492486 -0.089379832  0.2428052830

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#> [173,] -0.540151452 -1.540905746 -1.5286960183
#> [174,]  0.898705680  1.842454810  2.1431529326
#> [175,] -0.785676576 -1.667322720 -1.9050169684
#> [176,]  1.580849983  2.739898882  3.4918168512
#> [177,]  1.587320823  1.211508239  2.6516930402
#> [178,]  0.469021465  0.070164232  0.6237984111
#> [179,] -0.401275845 -1.429891911 -1.2939129378
#> [180,] -0.461956883  0.010210508 -0.5703844070
#> [181,] -0.400836163 -0.429453289 -0.7381631147
#> [182,] -1.794378133 -2.233665902 -3.4771439899
#> [183,]  0.373997466  0.848509223  0.9372543060
#> [184,]  0.123189184  0.558730652  0.4636865180
#> [185,] -0.265576965 -0.118285501 -0.3968125596
#> [186,] -1.990981182 -3.062778175 -4.1824265808
#> [187,]  0.043041331 -0.381873724 -0.1582522669
#> [188,]  0.198612050 -0.131192484  0.1748588395
#> [189,]  1.443164630  2.538806845  3.2085283628
#> [190,] -0.737642159 -1.138974873 -1.5519080946
#> [191,] -0.884254127 -1.947573598 -2.1834686671
#> [192,] -1.242623894 -1.194720294 -2.2125463935
#> [193,] -1.244852308 -1.596984510 -2.4385649780
#> [194,]  0.058614999  0.331314995  0.2569576591
#> [195,] -0.507726069 -1.418007003 -1.4200585695
#> [196,] -1.734322377 -3.293129373 -3.9902135560
#> [197,]  1.398271138  2.453418124  3.1051599291
#> [198,]  0.106098136  0.433550830  0.3729047709
#> [199,] -0.826805895 -0.926408561 -1.5451280517
#> [200,]  1.152579186  1.039730511  2.0142496383
#> [201,]  0.413381805 -0.575648811  0.1960176899
#> [202,] -1.333023451 -1.290112408 -2.3782114272
#> [203,]  1.209535697  1.854905378  2.5376611681
#> [204,] -0.050296797  1.156077561  0.5788555639
#> [205,] -1.505582803 -2.874594612 -3.4727107027
#> [206,] -1.679950476 -1.949368326 -3.1766817832
#> [207,]  0.267388804  0.948899066  0.8600276382
#> [208,]  1.389985194  0.968913846  2.2709898041
#> [209,]  0.581993074  2.412210917  2.0644095582
#> [210,] -1.258850504 -2.847728969 -3.1501312513
#> [211,]  0.443874535  1.065200387  1.1446441082
#> [212,]  0.213955080  0.692093817  0.6508807127
#> [213,] -0.343446760 -0.916328475 -0.9367950435
#> [214,] -0.019097455  0.958793457  0.5082760898
#> [215,]  0.381601895  0.228267230  0.6025285351
#> [216,] -0.180262773 -0.244485521 -0.3604632295
#> [217,] -0.252585161 -0.827501166 -0.7741970452

```



```

#> [218,] 1.314589884 2.164548975 2.8405008288
#> [219,] -0.329077617 -0.498328377 -0.6869044621
#> [220,] 0.432979192 0.147262769 0.6216408930
#> [221,] 0.112301505 0.146335152 0.2212475693
#> [222,] -0.412302380 -0.771294770 -0.9421689627
#> [223,] 2.001169570 4.660146743 5.0816039693
#> [224,] 1.669128667 2.957977899 3.7229232932
#> [225,] 2.378782174 3.327945446 4.8131632418
#> [226,] 0.358433381 -0.253799265 0.3061111488
#> [227,] -0.262608483 0.435703228 -0.0856703727
#> [228,] 0.877943889 2.356724097 2.4026613255
#> [229,] 0.010490223 -0.742241520 -0.3988318738
#> [230,] 0.617791644 1.040786412 1.3479664621
#> [231,] -1.727312565 -3.379751815 -4.0295442924
#> [232,] -0.151398515 -1.069417683 -0.7822728999
#> [233,] -0.370000863 0.102206081 -0.4046634342
#> [234,] 0.992649104 2.625573450 2.6948965235
#> [235,] -0.868958119 -0.458154682 -1.3378297180
#> [236,] 1.333944787 0.774829538 2.0933998956
#> [237,] -0.985937788 -0.806167693 -1.6768336288
#> [238,] -1.561963827 -1.711255484 -2.8974121805
#> [239,] 0.198248531 1.304793473 0.9713176226
#> [240,] -0.039487294 -0.866754603 -0.5302523653
#> [241,] 0.803378027 2.209605625 2.2280346243
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#> [1702,] -2.598727567 -4.426850296 -5.6972768428

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#> [1947,] -1.401550467 -2.201787032 -2.9696044649
#> [1948,] 1.334746448 1.470451978 2.4804408805
#> [1949,] 0.843442421 1.260133251 1.7510766907
#> [1950,] -1.684474899 -2.670344305 -3.5824351295
#> [1951,] 1.794908137 3.944133785 4.4270429559
#> [1952,] 0.016831556 -0.226031881 -0.1044496237
#> [1953,] 1.753353018 3.812045126 4.3019208936
#> [1954,] 1.400884454 2.030610730 2.8737782795
#> [1955,] -0.058084737 -0.575610642 -0.3918702888
#> [1956,] 0.640736128 0.899144476 1.2979724215
#> [1957,] 0.158983784 0.647244766 0.5574432824
#> [1958,] 0.174859843 0.475789888 0.4820901249
#> [1959,] -0.667659848 0.027384845 -0.8173607700
#> [1960,] -1.428855401 -1.608041687 -2.6741493528
#> [1961,] 0.065807856 -1.132710746 -0.5465459854
#> [1962,] 1.940519167 3.428451505 4.3224348650
#> [1963,] -0.599750826 -1.806882217 -1.7506210276
#> [1964,] -0.488782716 -0.116182806 -0.6739786701
#> [1965,] 0.107701581 0.527844799 0.4272334386
#> [1966,] 0.711211978 1.386842025 1.6565060899
#> [1967,] -1.176555346 -1.510309517 -2.3052990672
#> [1968,] -0.215987558 0.576161744 0.0504135655
#> [1969,] 1.211020890 1.757361623 2.4853804731
#> [1970,] 1.578893872 1.961748081 3.0575365054
#> [1971,] -0.236228568 -0.035268234 -0.3141445991
#> [1972,] 0.003063544 -0.162504267 -0.0863628876

```

```

#> [1973,] -0.692272520 -1.783009194 -1.8527451650
#> [1974,]  0.705674752  0.823051469  1.3367211292
#> [1975,]  1.330925678  2.342572349  2.9596667496
#> [1976,] -0.191321895 -0.299639176 -0.4048616989
#> [1977,] -0.583408054 -0.453770144 -0.9793213756
#> [1978,]  1.290436849  1.302693545  2.3320888066
#> [1979,]  1.236999406  1.932921139  2.6152033332
#> [1980,] -0.106982218 -0.980211655 -0.6773810730
#> [1981,]  0.361890829  1.235723468  1.1370452701
#> [1982,]  1.102067587  0.500705643  1.6521264708
#> [1983,] -0.472681438  0.930225312 -0.0731880106
#> [1984,]  0.812619227  1.291471478  1.7300322008
#> [1985,] -0.840161492 -2.684960158 -2.5377047182
#> [1986,] -2.131485058 -3.022547457 -4.3353056832
#> [1987,] -0.559077031 -1.655764536 -1.6160376485
#> [1988,]  1.407506691  0.987029239  2.3028920387
#> [1989,]  0.884352846  1.429271861  1.8959560035
#> [1990,] -0.431525207 -0.447662940 -0.7865373207
#> [1991,] -2.083046633 -4.025534712 -4.8315198896
#> [1992,]  1.552269432  2.694711725  3.4311005072
#> [1993,]  0.981789496  1.700996884  2.1682535296
#> [1994,] -0.285006156  0.141618569 -0.2768044870
#> [1995,] -0.743773474 -1.693189707 -1.8671197494
#> [1996,]  2.153788866  3.194875683  4.4587530276
#> [1997,]  0.812929954  0.411207465  1.2419099986
#> [1998,]  0.476441427  0.735141656  1.0020855813
#> [1999,]  0.952042770  1.408535281  1.9688560241
#> [2000,]  0.465284329  0.847058772  1.0502822216
#>
#> [[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/>