**A test of meta-heuristic algorithms for parameter extraction of next-generation solar cells with S-shaped current-voltage curves**

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| Fig.S1. Convergence curve of DE, MABC, ADELI, STLBO, IJAYA (a), GOTLBO, NDE, ISCA, TLBO, PSO (b), EBLSHADE, NNA, CWOA, and WW (c) for single-*IV* case. Solid and dotted lines correspond to square error fitting function and absolute error fitting function using, respectively. | |

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| Fig.S2. Lines represent the fitting results, while symbols represent the simulated current-voltage characteristic. The values *I*01= 1.6⋅10-6 mA, *n*1= 1.92, *R*p1 = 190 Ω, *I*02 = 0.16 mA, *n*2= 1.92, *R*p2 =190 Ω, *R*s = 45 Ω, *I*ph = 8 mA and Eqs. (1)-(2) were assumed under simulation. | | |

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| Fig.S3. The results of algorithm comparison in *I*01 (a), *n*1 (b), *R*p1 (c), *I*02 (d), *n*2 (e), *R*p2 (f), *R*s (g), *I*ph (h) evaluation, RMSPE (i), and Comp (j) parameters by Friedman, Friedman Aligned, and Quade tests in the single-IV case. The colored hexagon indicates that the adjusted *p*-value, which tests the hypothesis that an algorithm in a row outperforms an algorithm in a column, is not greater than *plim* = 0.1. The solid fill signifies that every post-hoc procedure resulted in *p* < *plim*; the patterned fill indicates that only specific post-hoc procedures achieved this outcome. The correspondence between the color and position of the hexagon to a test as well as the fill pattern to procedures are shown in a legend at the bottom of the figure. | |

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| Fig.S4. The results of multiple comparisons in *I*01 (a), *n*1 (b), *R*p1 (c), *I*02 (d), *n*2 (e), *R*p2 (f), *R*s (g), *I*ph (h) evaluation, RMSPE (i), and Comp (j) parameters among all algorithms in the single--IV case. The colored cylinder indicates that the adjusted *p*-value, which tests the control algorithm outperforms the comparison algorithm, is not greater than *p*lim =0.1. The correspondence between the color of the cylinder to a post-hoc procedure is shown in the figure legend. | |

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| Fig.S5. Lines represent the fitting results, while symbols represent the simulated current-voltage characteristic. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S6. Comparison of *I*01 value estimation by different algorithms on the IV curve set. Circles represent the *I*01 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S7. Comparison of *n*1 value estimation by different algorithms on the IV curve set. Circles represent the *n*1 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S8. Comparison of *R*p1 value estimation by different algorithms on the IV curve set. Circles represent the *R*p1 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S9. Comparison of *I*02 value estimation by different algorithms on the IV curve set. Circles represent the *I*02 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S10. Comparison of *n*2 value estimation by different algorithms on the IV curve set. Circles represent the *n*2 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S11. Comparison of *R*p2 value estimation by different algorithms on the IV curve set. Circles represent the *R*p2 values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S12. Comparison of *R*s value estimation by different algorithms on the IV curve set. Circles represent the *R*s values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S13. Comparison of *I*ph value estimation by different algorithms on the IV curve set. Circles represent the *I*ph values, which have been used in IV curve simulations, squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S14. Comparison of RMSPE value for different algorithms, applied to the IV curve set. Squares represent the median values, and stars represent the mean values. The colored regions correspond to the IQR. The lines only serve as guide to the eye. | | |

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| Fig.S15. Scatter plots for *n*1 determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S16. Scatter plots for *n*2 determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S17. Scatter plots for *R*S determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S18. Scatter plots for *I*ph determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S19. Scatter plots for *І*02 determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S20. Scatter plots for *R*p2 determination results. Blue squares represent the mean values, and red circles represent the median values. The black line is the identity line. The parameters values from Sec.2.2.2 were assumed under simulation. | | |

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| Fig.S21. Scatter plots for *I*01 determination results in the *IV*-set case. Blue squares represent the mean values, and red circles represent the median values. The black vertical line corresponds to the true *I*01 value. The lines correspond to normal distributions calculated based on the results of *I*01 determination from curves simulated for various temperatures. The values of the probability density function, corresponding to the parameter values obtained as a fitting result, are plotted on the ordinate axis. | | |

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| Fig.S22. Scatter plots for *R*p1 determination results in the *IV*-set case. Blue squares represent the mean values, and red circles represent the median values. The black vertical line corresponds to the true *R*p1 value. The lines correspond to normal distributions calculated based on the results of *R*p1 determination from curves simulated for various temperatures. The values of the probability density function, corresponding to the parameter values obtained as a fitting result, are plotted on the ordinate axis. | | |

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| Fig.S23. The accuracy (absolute percentage error for the median value) of the *I*01 (a), *n*1 (b), *R*p1 (c), *I*02 (d), *n*2 (e), *R*p2 (f), *R*s (g), *I*ph (h) evaluations from noisy IV curves versus voltage and current standard deviations. IV curves were simulated using parameters from the *IV*-set case at *T* = 300 K. The STLBO algorithm was used for parameter extraction. The APE values were averaged over 100 *IV* curves, which were simulated with equal values of SD*V* and SD*I*. | |

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| **Table S1.** The results of the compared algorithms in the single-IV case. | | | | | | | | | | |
|  |  | Parameter | | | | | | | | |
|  |  | *I*01 (A) | *n*1 | *R*p1 (Ω) | *I*02 (A) | *n*2 | *R*p2 (Ω) | *R*s (Ω) | *I*ph (A) | RMSPE |
|  | true value | 1.6e-9 | 1.92 | 190 | 1.6e-4 | 1.92 | 190 | 45 | 8e-3 |  |
| DE | MEAN | 4.30612E-7 | 2.29342 | 273.866 | 8.17387E-4 | 8.08356 | 217.375 | 23.6714 | 0.00793327 | 0.202896 |
| MEDIAN | 6.31239E-9 | 2.09479 | 200.493 | 3.843E-4 | 4.91355 | 106.342 | 14.1994 | 0.00776123 | 0.177838 |
| STD | 9.79424E-7 | 0.819543 | 327.208 | 0.00101283 | 8.7304 | 448.313 | 22.4509 | 8.7897E-4 | 0.0818108 |
| IQR | 2.47897E-7 | 1.18701 | 73.9815 | 0.00118424 | 6.42196 | 73.1935 | 36.6225 | 0.00105832 | 0.12722 |
| EBLSHADE | MEAN | 4.89016E-8 | 1.99143 | 191.859 | 1.90839E-4 | 2.09441 | 257.032 | 42.8834 | 0.00795469 | 0.112344 |
| MEDIAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| STD | 2.94351E-7 | 0.302862 | 7.06297 | 1.42778E-4 | 0.749826 | 408.471 | 8.42013 | 1.76013E-4 | 0.00378624 |
| IQR | 2.45E-17 | 2E-9 | 1E-7 | 4E-13 | 2.5E-9 | 2.5E-7 | 5E-8 | 2E-12 | 0 |
| ADELI | MEAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| MEDIAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| STD | 2.24774E-17 | 1.8407E-9 | 8.14411E-8 | 2.26085E-12 | 1.09586E-8 | 1.29649E-6 | 8.3637E-8 | 1.67527E-12 | 5.60747E-17 |
| IQR | 2.5E-17 | 2E-9 | 1E-7 | 8E-13 | 6E-9 | 3.5E-7 | 6.5E-8 | 2E-12 | 0 |
| NDE | MEAN | 2.96195E-7 | 2.42087 | 217.047 | 4.32932E-4 | 4.1948 | 572.088 | 31.1402 | 0.00768983 | 0.150002 |
| MEDIAN | 1.97951E-8 | 2.31401 | 205.507 | 2.7074E-4 | 2.82514 | 247.163 | 33.9332 | 0.00765711 | 0.111897 |
| STD | 1.06531E-6 | 0.585381 | 81.8273 | 3.94921E-4 | 6.46811 | 902.42 | 16.9948 | 3.9184E-4 | 0.149461 |
| IQR | 1.28566E-7 | 0.782389 | 32.2484 | 5.10535E-4 | 2.85309 | 341.063 | 30.0524 | 6.3894E-4 | 2.59792E-4 |
| MABC | MEAN | 1.87007E-6 | 3.23398 | 517.263 | 0.00116959 | 14.9942 | 881.309 | 25.5168 | 0.0101761 | 0.404887 |
| MEDIAN | 3.78613E-8 | 3.00104 | 141.578 | 2.22821E-4 | 6.65565 | 82.0348 | 12.4381 | 0.00855776 | 0.169928 |
| STD | 3.35158E-6 | 3.38085 | 2492.2 | 0.00255612 | 17.4695 | 2269.68 | 27.1128 | 0.00447919 | 0.313895 |
| IQR | 1.56208E-6 | 2.81682 | 158.743 | 7.57854E-4 | 23.8231 | 151.829 | 47.2398 | 0.00357495 | 0.608581 |
| TLBO | MEAN | 4.76305E-9 | 1.91592 | 189.79 | 2.17925E-4 | 2.14102 | 494.417 | 44.2879 | 0.00801613 | 0.111834 |
| MEDIAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| STD | 1.1263E-8 | 0.237052 | 9.96477 | 2.26679E-4 | 1.05125 | 1239.57 | 9.34268 | 2.38013E-4 | 9.91547E-5 |
| IQR | 3.78381E-11 | 0.00312336 | 0.131118 | 2.10985E-8 | 0.00210025 | 0.0325284 | 0.0313024 | 1.92458E-6 | 2.0801E-6 |
| **Table S1** (*continued*) | | | | | | | | | | |
|  |  | *I*01 (A) | *n*1 | *R*p1 (Ω) | *I*02 (A) | *n*2 | *R*p2 (Ω) | *R*s (Ω) | *I*ph (A) | RMSPE |

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|  | true value | 1.6e-9 | 1.92 | 190 | 1.6e-4 | 1.92 | 190 | 45 | 8e-3 |  |
| GOTLBO | MEAN | 1.71767E-6 | 9.57122 | 11628.3 | 7.92397E-4 | 20.2703 | 128.312 | 24.659 | 0.0228366 | 0.639726 |
| MEDIAN | 1.03447E-8 | 3.41832 | 69.094 | 7.71914E-7 | 14.2566 | 74.3327 | 8.80183 | 0.0142995 | 0.81521 |
| STD | 3.34406E-6 | 11.018 | 44234.6 | 0.00216328 | 14.115 | 417.298 | 29.8185 | 0.0197114 | 0.282839 |
| IQR | 1.36228E-6 | 15.8671 | 216.793 | 2.4192E-4 | 23.5098 | 64.4833 | 43.6466 | 0.0237021 | 0.493468 |
| STLBO | MEAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| MEDIAN | 1.59673E-9 | 1.91973 | 189.998 | 1.59904E-4 | 1.91936 | 189.951 | 45.0092 | 0.00800011 | 0.111803 |
| STD | 3.10035E-17 | 2.53498E-9 | 1.09935E-7 | 7.54905E-13 | 5.08363E-9 | 3.95897E-7 | 7.27714E-8 | 2.265E-12 | 5.60747E-17 |
| IQR | 3.6E-17 | 2.5E-9 | 1E-7 | 1.15E-12 | 7.5E-9 | 6E-7 | 1E-7 | 3E-12 | 0 |
| PSO | MEAN | 3.14227E-6 | 16.6587 | 180118 | 0.00271538 | 36.2226 | 1271.15 | 41.1715 | 0.0386418 | 0.554837 |
| MEDIAN | 1E-16 | 3.52665 | 106.144 | 1E-10 | 50 | 22.0427 | 0.409733 | 0.00899564 | 0.836124 |
| STD | 4.55814E-6 | 22.0702 | 388032 | 0.00438738 | 21.3176 | 3258.81 | 45.3494 | 0.0350568 | 0.350233 |
| IQR | 1E-5 | 49.083 | 163.924 | 0.00643173 | 40.2401 | 100.011 | 92.3135 | 0.0667872 | 0.724107 |
| IJAYA | MEAN | 4.22388E-7 | 2.24164 | 311.312 | 6.00966E-4 | 6.98969 | 296.131 | 13.8104 | 0.00757605 | 0.137686 |
| MEDIAN | 9.73093E-9 | 2.19089 | 210.625 | 4.10043E-4 | 5.6748 | 159.549 | 3.75794 | 0.00761625 | 0.123026 |
| STD | 1.1024E-6 | 0.833675 | 469.522 | 9.60642E-4 | 5.94046 | 532.266 | 18.5512 | 6.09311E-4 | 0.0351445 |
| IQR | 1.12926E-7 | 1.11574 | 61.1361 | 5.19021E-4 | 3.36356 | 169.582 | 18.6422 | 8.92576E-4 | 0.0320204 |
| ISCA | MEAN | 1.15274E-6 | 10.4396 | 22799 | 5.06103E-4 | 15.9083 | 152.337 | 12.3251 | 0.0178729 | 0.740415 |
| MEDIAN | 2.08898E-8 | 3.5363 | 102.061 | 6.45362E-7 | 12.4266 | 76.6075 | 2.41391 | 0.0104324 | 0.830527 |
| STD | 2.29412E-6 | 12.3668 | 98896.9 | 0.00127207 | 11.5125 | 585.368 | 23.4796 | 0.0187227 | 0.239125 |
| IQR | 1.16327E-6 | 11.1835 | 413.555 | 9.58418E-5 | 16.2615 | 68.6495 | 7.87543 | 0.0101581 | 0.282537 |
| NNA | MEAN | 4.86072E-7 | 17.7241 | 7704.75 | 7.60416E-4 | 26.175 | 181.643 | 7.19023 | 0.0194113 | 0.776483 |
| MEDIAN | 4.09834E-12 | 13.7798 | 75.4677 | 6.53373E-6 | 24.3121 | 74.7187 | 1.47635 | 0.0127364 | 0.833512 |
| STD | 1.37597E-6 | 15.7707 | 23975 | 0.00178214 | 12.9398 | 643.998 | 14.9043 | 0.01764 | 0.233516 |
| IQR | 2.55487E-8 | 28.9827 | 126.308 | 4.49047E-4 | 21.3311 | 63.1188 | 3.89105 | 0.0132889 | 0.0740081 |
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| **Table S1** (*continued*) | | | | | | | | | | |
|  |  | *I*01 (A) | *n*1 | *R*p1 (Ω) | *I*02 (A) | *n*2 | *R*p2 (Ω) | *R*s (Ω) | *I*ph (A) | RMSPE |
|  | true value | 1.6e-9 | 1.92 | 190 | 1.6e-4 | 1.92 | 190 | 45 | 8e-3 |  |
| CWOA | MEAN | 1.91016E-6 | 19.7767 | 27364.9 | 0.00115056 | 30.3776 | 400.515 | 27.5457 | 0.026159 | 0.746787 |
| MEDIAN | 5.94422E-10 | 17.2753 | 56.5524 | 6.44204E-9 | 34.0434 | 52.5507 | 9.03927 | 0.0141445 | 0.854377 |
| STD | 3.8446E-6 | 17.5006 | 145161 | 0.00303351 | 17.6242 | 1479.81 | 32.8588 | 0.0257545 | 0.300868 |
| IQR | 5.44157E-7 | 30.0379 | 70.4671 | 9.36563E-5 | 32.9741 | 74.873 | 53.057 | 0.0233644 | 0.0649151 |
| WW | MEAN | 2.25657E-6 | 6.01898 | 1815.69 | 3.60402E-4 | 45.528 | 79.1659 | 16.1267 | 0.0242362 | 0.802633 |
| MEDIAN | 4.28549E-7 | 4.43733 | 94.2486 | 1E-10 | 50 | 31.019 | 1.15863 | 0.00961191 | 0.853405 |
| STD | 3.10815E-6 | 7.02418 | 7319.67 | 0.00147962 | 11.7448 | 227.327 | 25.8349 | 0.0246133 | 0.124962 |
| IQR | 3.2253E-6 | 3.28317 | 58.5468 | 5.44421E-5 | 0 | 61.1333 | 15.4329 | 0.0241842 | 0.0583219 |

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| **Table S2.** The statistical significance of the null hypothesis in Friedman, Friedman Aligned, and Quade tests and the Iman–Davenport extension | | | | | | | | | | | |
| Test | *p*-value | | | | | | | | | | |
| Single IV case | | | | | | | | | | IV-set case |
| *I*01 | *n*1 | *R*p1 | *I*02 | *n*2 | *R*p2 | *R*s | *I*ph | RMSPE | Comp |  |
| Friedman | 4.9664E-07 | 0.0000E+00 | 0.0000E+00 | 3.0381E-07 | 0.0000E+00 | 6.8597E-07 | 2.3210E-06 | 0.0000E+00 | 0.0000E+00 | 0.0000E+00 | 2.2964E-06 |
| Iman- Davenport | 0.0000E+00 | 1.4774E-09 | 1.4310E-09 | 0.0000E+00 | 1.3797E-09 | 0.0000E+00 | 1.5223E-09 | 1.4438E-09 | 1.2472E-09 | 0.0000E+00 | 0.0000E+00 |
| Friedman Aligned | 4.0411E-07 | 5.9524E-07 | 2.7010E-05 | 1.4847E-06 | 0.0000E+00 | 4.9647E-06 | 0.0000E+00 | 5.0555E-07 | 0.0000E+00 | 4.3982E-04 | 0.0000E+00 |
| Quade | 1.1191E-09 | 0.0000E+00 | 0.0000E+00 | 1.1432E-09 | 0.0000E+00 | 1.0869E-09 | 0.0000E+00 | 0.0000E+00 | 0.0000E+00 | 8.3247E-06 | 0.0000E+00 |

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| **Table S3.** Ranking of the algorithms according to Friedman, Friedman Aligned, and Quade tests. | | | | | | | | | | | | | | | |
| Test | DE | EBLSHADE | ADELI | NDE | MABC | TLBO | GOTLBO | STLBO | PSO | IJAYA | ISCA | NNA | CWOA | WW |
| ***Single-IV case*** | | | | | | | | | | | | | | | |
| *I*01 | | | | | | | | | | | | | | | |
| Friedman | 8.88 | 2.69 | **2.24** | 8.76 | 9.98 | 4.02 | 9.02 | 2.45 | 10.59 | 8.62 | 9.56 | 8.07 | 8.98 | 11.14 |
| Friedman Aligned | 6.695 | 5.448 | 5.210 | 6.149 | 8.248 | 5.261 | 8.254 | **5.209** | 9.168 | 6.618 | 7.847 | 6.668 | 7.814 | 9.552 |
| Quade | 8.332 | 2.921 | **2.091** | 8.318 | 9.632 | 4.337 | 9.587 | 2.568 | 11 | 8.464 | 9.183 | 8.156 | 9.323 | 11.09 |
| *n*1 | | | | | | | | | | | | | | | |
| Friedman | 7.16 | 2.61 | **2.22** | 6.42 | 9.32 | 3.53 | 9.66 | 2.4 | 10.99 | 7.18 | 9.98 | 11.1 | 11.67 | 10.76 |
| Friedman Aligned | 5.581 | 4.653 | **4.570** | 5.362 | 6.718 | 4.740 | 8.325 | **4.570** | 9.506 | 5.645 | 8.593 | 10.701 | 10.971 | 8.205 |
| Quade | 6.952 | 2.835 | **2.211** | 6.122 | 8.978 | 3.66 | 9.123 | 2.415 | 11.65 | 7.343 | 9.886 | 11.23 | 11.96 | 10.64 |
| *R*p1 | | | | | | | | | | | | | | | |
| Friedman | 7.3 | 2.37 | **2.26** | 6.24 | 8.46 | 3.51 | 11.36 | 2.34 | 11.2 | 7.22 | 10.98 | 10.94 | 10.84 | 9.98 |
| Friedman Aligned | 6.493 | 5.73 | **5.687** | 6.154 | 6.691 | 5.806 | 8.293 | **5.687** | 9.425 | 6.435 | 8.094 | 8.308 | 7.875 | 7.462 |
| Quade | 7.162 | 2.367 | 2.358 | 6.113 | 8.725 | 3.444 | 11.05 | **2.311** | 11.48 | 7.213 | 11.21 | 11.08 | 10.71 | 9.781 |
| *I*02 | | | | | | | | | | | | | | | |
| Friedman | 9.62 | 2.78 | **2.29** | 7.98 | 8.94 | 4.14 | 8.96 | 2.49 | 11.46 | 9.6 | 8.96 | 9.16 | 9.45 | 9.17 |
| Friedman Aligned | 8.649 | 5.008 | **4.807** | 6.892 | 8.111 | 5.275 | 7.530 | 4.808 | 9.699 | 7.469 | 7.632 | 7.663 | 7.958 | 6.640 |
| Quade | 9.531 | 2.999 | **2.227** | 8.038 | 8.985 | 4.273 | 8.831 | 2.375 | 11.78 | 9.843 | 8.599 | 8.987 | 9.276 | 9.257 |
| *n*2 | | | | | | | | | | | | | | | |
| Friedman | 7.6 | 2.41 | **2.31** | 5.64 | 8.1 | 3.66 | 9.74 | 2.46 | 11.44 | 7.68 | 9.1 | 10.72 | 10.97 | 13.17 |
| Friedman Aligned | 5.849 | 3.254 | **3.145** | 4.351 | 7.446 | 3.433 | 9.089 | **3.145** | 11.052 | 5.934 | 8.362 | 10.019 | 10.405 | 12.657 |
| Quade | 7.642 | 2.454 | **2.311** | 5.532 | 8.369 | 3.533 | 9.656 | 2.572 | 11.54 | 7.591 | 8.989 | 10.71 | 10.97 | 13.14 |
| *R*p2 | | | | | | | | | | | | | | | |
| Friedman | 7.12 | 2.72 | **2.28** | 8.16 | 10.16 | 4.21 | 9.49 | 2.55 | 11.03 | 7.44 | 9.14 | 9.78 | 10.58 | 10.34 |
| Friedman Aligned | 6.683 | 4.937 | **4.592** | 7.716 | 8.735 | 5.646 | 7.424 | 4.593 | 9.445 | 6.769 | 7.389 | 7.690 | 8.544 | 7.978 |
| Quade | 6.956 | 3.071 | **2.309** | 8.925 | 10.21 | 4.462 | 9.142 | 2.491 | 11.34 | 7.465 | 8.784 | 9.207 | 10.54 | 10.1 |
| *R*s | | | | | | | | | | | | | | | |
| Friedman | 7.8 | 2.5 | **2.31** | 6.28 | 8.68 | 3.75 | 9.34 | 2.38 | 12.62 | 9.22 | 10.1 | 10.38 | 9.62 | 10.02 |
| Friedman Aligned | 7.358 | 2.416 | **1.994** | 5.419 | 8.051 | 2.793 | 8.732 | 1.995 | 11.78 | 8.819 | 9.974 | 10.33 | 8.905 | 9.572 |
| Quade | 7.349 | 2.553 | **2.359** | 6.479 | 8.252 | 3.846 | 9.004 | 2.394 | 13.41 | 9.028 | 10.04 | 10.35 | 9.766 | 10.18 |
| *I*ph | | | | | | | | | | | | | | | |
| Friedman | 7.3 | 2.4 | **2.21** | 6.14 | 9.02 | 3.72 | 11.34 | 2.39 | 11.72 | 6.88 | 10.56 | 10.62 | 10.72 | 9.98 |
| Friedman Aligned | 5.405 | 4.803 | **4.765** | 5.112 | 6.609 | 4.848 | 9.646 | **4.765** | 10.50 | 5.322 | 8.428 | 9.055 | 9.944 | 8.934 |
| Quade | 7.083 | 2.399 | **2.293** | 6.202 | 8.682 | 3.905 | 11.09 | 2.331 | 12.19 | 6.56 | 10.54 | 10.61 | 11.13 | 9.974 |
| **Table S3** (*continued*) | | | | | | | | | | | | | | |
| Test | DE | EBLSHADE | ADELI | NDE | MABC | TLBO | GOTLBO | STLBO | PSO | IJAYA | ISCA | NNA | CWOA | WW |
| RMSPE | | | | | | | | | | | | | | | |
| Friedman | 7.92 | 2.51 | **2.28** | 5.03 | 8.56 | 3.26 | 10.7 | **2.28** | 9.74 | 6.66 | 11.32 | 11.38 | 11.5 | 11.86 |
| Friedman Aligned | 5.783 | 3.392 | **3.367** | 3.943 | 7.203 | 3.387 | 9.803 | **3.367** | 8.968 | 4.422 | 11.03 | 11.16 | 10.89 | 11.42 |
| Quade | 7.93 | 2.449 | **2.281** | 5.009 | 8.478 | 3.272 | 10.6 | **2.281** | 9.312 | 6.623 | 11.92 | 11.75 | 11.59 | 11.51 |
| Comp | | | | | | | | | | | | | | | |
| Friedman | 7.4 | **2** | 3.55 | 6.5 | 8.3 | 3.75 | 9.6 | 3.7 | 10.85 | 8.3 | 9.3 | 9.7 | 10.9 | 11.15 |
| Friedman Aligned | 7.23 | 4.165 | 5.305 | 5.36 | 7.84 | 5.295 | 7.58 | **4.045** | 8.685 | 7.34 | 7.05 | 9.15 | 9.59 | 10.06 |
| Quade | 7.945 | **2.409** | 4.364 | 7.073 | 8.945 | 4.355 | 8.745 | 3.782 | 10.31 | 8.891 | 8.964 | 8.673 | 9.636 | 10.91 |
| ***IV set case*** | | | | | | | | | | | | | | | |
| Friedman | 7.81 | 3.86 | **2.19** | 4.84 | 8.86 | 2.61 | 9.54 | 2.75 | 11.2 | 6.77 | 10.9 | 11.6 | 11.3 | 10.7 |
| Friedman Aligned | 6.181 | 4.583 | 4.379 | 4.722 | 7.154 | 4.378 | 8.004 | **4.226** | 10.50 | 5.850 | 9.774 | 9.278 | 9.743 | 9.302 |
| Quade | 8.056 | 3.931 | **2.336** | 4.956 | 8.895 | 2.71 | 9.135 | 2.812 | 11.88 | 6.855 | 10.63 | 11.11 | 11.42 | 10.27 |

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| **Table S4.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 8.61820E-02 | 8.98122E-02 | 8.98122E-02 | 8.61820E-02 |
| WW | Friedman Aligned | 2.30441E-08 | 7.09049E-08 | 7.09049E-08 | 7.09049E-08 |
| WW | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.80292E-01 |
| PSO | Friedman | 2.38076E-01 | 4.91631E-01 | 4.91631E-01 | 3.94673E-01 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.80292E-01 |
| MABC | Friedman | 5.95703E-01 | 1.0 | 1.0 | 8.99625E-01 |
| MABC | Friedman Aligned | 6.53233E-12 | 1.32871E-11 | 1.32871E-11 | 1.32871E-11 |
| MABC | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.99953E-01 |
| ISCA | Friedman | 8.26230E-01 | 1.0 | 1.0 | 9.95414E-01 |
| ISCA | Friedman Aligned | 3.32249E-07 | 1.15009E-06 | 1.15009E-06 | 1.15009E-06 |
| ISCA | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.99970E-01 |
| GOTLBO | Friedman | 9.94739E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 6.53233E-12 | 1.20597E-11 | 1.20597E-11 | 1.20597E-11 |
| GOTLBO | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.99953E-01 |
| CWOA | Friedman | 9.94739E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 6.22265E-07 | 2.29759E-06 | 2.29759E-06 | 2.29759E-06 |
| CWOA | Quade | 9.80292E-01 | 1.0 | 1.0 | 9.99970E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S4** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.97117E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S5.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 6.00409E-13 | 1.59650E-12 | 1.59650E-12 | 1.59650E-12 |
| DE | Friedman Aligned | 2.11188E-08 | 7.96017E-08 | 7.96017E-08 | 7.96017E-08 |
| DE | Quade | 4.39270E-02 | 1.66115E-01 | 1.30659E-01 | 1.54746E-01 |
| GOTLBO | Friedman | 6.00409E-13 | 6.00409E-13 | 6.00409E-13 | 6.00409E-13 |
| GOTLBO | Friedman Aligned | 1.14652E-08 | 3.96874E-08 | 3.70043E-08 | 3.96874E-08 |
| GOTLBO | Quade | 2.64966E-02 | 6.79570E-02 | 6.52926E-02 | 6.58962E-02 |
| ISCA | Friedman | 6.00409E-13 | 1.41664E-12 | 1.41664E-12 | 1.41664E-12 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.64966E-02 | 8.49735E-02 | 8.49735E-02 | 8.18808E-02 |
| CWOA | Friedman | 6.00409E-13 | 7.88702E-13 | 7.88702E-13 | 7.88702E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 2.64966E-02 | 8.09879E-02 | 8.09879E-02 | 7.81332E-02 |
| NDE | Friedman | 1.19158E-12 | 4.12470E-12 | 4.12470E-12 | 4.12470E-12 |
| NDE | Friedman Aligned | 1.71258E-03 | 5.27053E-03 | 5.27053E-03 | 5.26012E-03 |
| NDE | Quade | 4.39270E-02 | 1.66115E-01 | 1.30659E-01 | 1.54746E-01 |
| IJAYA | Friedman | 3.31860E-12 | 1.22533E-11 | 1.22533E-11 | 1.22533E-11 |
| IJAYA | Friedman Aligned | 1.17856E-07 | 4.07961E-07 | 4.07961E-07 | 4.07961E-07 |
| IJAYA | Quade | 4.36225E-02 | 1.66115E-01 | 1.30659E-01 | 1.54746E-01 |
| MABC | Friedman | 6.32573E-12 | 2.38431E-11 | 2.38431E-11 | 2.38431E-11 |
| MABC | Friedman Aligned | 1.14652E-08 | 3.96874E-08 | 3.70043E-08 | 3.96874E-08 |
| MABC | Quade | 2.64966E-02 | 6.79570E-02 | 6.52926E-02 | 6.58962E-02 |
| NNA | Friedman | 2.20572E-10 | 8.14419E-10 | 8.08514E-10 | 8.14419E-10 |
| NNA | Friedman Aligned | 3.72214E-08 | 1.37433E-07 | 1.37433E-07 | 1.37433E-07 |
| NNA | Quade | 4.39270E-02 | 1.66115E-01 | 1.30659E-01 | 1.54746E-01 |
| **Table S5** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.33571E-10 | 8.14419E-10 | 8.08514E-10 | 8.14419E-10 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.11341E-02 | 1.17606E-02 | 1.17606E-02 | 1.16974E-02 |
| WW | Friedman | 3.41671E-09 | 1.05129E-08 | 1.05129E-08 | 1.05129E-08 |
| WW | Friedman Aligned | 3.32036E-11 | 1.02165E-10 | 1.02165E-10 | 1.02165E-10 |
| WW | Quade | 1.11341E-02 | 1.11918E-02 | 1.11918E-02 | 1.11341E-02 |
| TLBO | Friedman | 1.30872E-01 | 3.35738E-01 | 3.35738E-01 | 2.99567E-01 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 6.24383E-01 | 1.0 | 1.0 | 9.16727E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S6.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Friedman Aligned | 4.81753E-11 | 1.66761E-10 | 1.66761E-10 | 1.66761E-10 |
| WW | Quade | 3.13831E-03 | 3.14287E-03 | 3.14287E-03 | 3.13831E-03 |
| DE | Friedman | <1E-13 | 2.10054E-13 | 2.10054E-13 | 2.10054E-13 |
| DE | Friedman Aligned | 3.56117E-11 | 1.09575E-10 | 1.09575E-10 | 1.09575E-10 |
| DE | Quade | 1.76412E-02 | 6.53596E-02 | 5.33566E-02 | 6.36053E-02 |
| NDE | Friedman | <1E-13 | 1.54543E-13 | 1.54543E-13 | 1.54543E-13 |
| NDE | Friedman Aligned | 2.17264E-05 | 6.68505E-05 | 6.68505E-05 | 6.68488E-05 |
| NDE | Quade | 1.76412E-02 | 6.53596E-02 | 5.33566E-02 | 6.36053E-02 |
| IJAYA | Friedman | <1E-13 | 3.04201E-13 | 3.04201E-13 | 3.04201E-13 |
| IJAYA | Friedman Aligned | 2.12767E-10 | 8.01968E-10 | 8.01968E-10 | 8.01968E-10 |
| IJAYA | Quade | 1.72505E-02 | 6.52823E-02 | 5.33566E-02 | 6.34840E-02 |
| CWOA | Friedman | 1.09690E-13 | 3.79696E-13 | 3.79696E-13 | 3.79696E-13 |
| CWOA | Friedman Aligned | 1.10735E-09 | 4.08867E-09 | 4.08867E-09 | 4.08867E-09 |
| CWOA | Quade | 9.04167E-03 | 2.85526E-02 | 2.85526E-02 | 2.81930E-02 |
| GOTLBO | Friedman | 1.28934E-13 | 4.76064E-13 | 4.76064E-13 | 4.76064E-13 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 9.04167E-03 | 2.30322E-02 | 2.22560E-02 | 2.27926E-02 |
| NNA | Friedman | 6.62388E-12 | 2.49669E-11 | 2.49669E-11 | 2.49669E-11 |
| NNA | Friedman Aligned | 5.41195E-11 | 1.99826E-10 | 1.99826E-10 | 1.99826E-10 |
| NNA | Quade | 1.76412E-02 | 6.53596E-02 | 5.33566E-02 | 6.36053E-02 |
| ISCA | Friedman | 6.84661E-12 | 2.52798E-11 | 2.52798E-11 | 2.52798E-11 |
| ISCA | Friedman Aligned | 1.38616E-09 | 4.79825E-09 | 4.79825E-09 | 4.79825E-09 |
| ISCA | Quade | 9.04167E-03 | 3.04966E-02 | 3.04966E-02 | 3.00928E-02 |
| **Table S6** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 9.26368E-11 | 3.20666E-10 | 3.20666E-10 | 3.20666E-10 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 9.04167E-03 | 2.30322E-02 | 2.22560E-02 | 2.27926E-02 |
| PSO | Friedman | 2.14340E-09 | 6.59507E-09 | 6.59507E-09 | 6.59507E-09 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 3.13831E-03 | 3.34101E-03 | 3.34101E-03 | 3.33590E-03 |
| TLBO | Friedman | 3.93259E-02 | 1.00134E-01 | 1.00134E-01 | 9.68289E-02 |
| TLBO | Friedman Aligned | 8.39430E-01 | 1.0 | 1.0 | 9.65839E-01 |
| TLBO | Quade | 4.09330E-01 | 1.0 | 8.45736E-01 | 7.37234E-01 |
| EBLSHADE | Friedman | 6.20041E-01 | 1.0 | 8.01816E-01 | 8.32456E-01 |
| EBLSHADE | Friedman Aligned | 3.15644E-01 | 8.23571E-01 | 8.23571E-01 | 6.18170E-01 |
| EBLSHADE | Quade | 7.62820E-01 | 1.0 | 8.45736E-01 | 9.29806E-01 |
| STLBO | Friedman | 8.01816E-01 | 1.0 | 8.01816E-01 | 8.32456E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 8.45736E-01 | 1.0 | 8.45736E-01 | 9.29806E-01 |

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| **Table S7.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 5.62824E-02 | 5.77994E-02 | 5.77994E-02 | 5.62824E-02 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.79432E-01 |
| PSO | Friedman | 1.72572E-01 | 3.44675E-01 | 3.44675E-01 | 2.95116E-01 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.79432E-01 |
| MABC | Friedman | 4.92255E-01 | 1.0 | 1.0 | 8.21025E-01 |
| MABC | Friedman Aligned | 9.56302E-10 | 3.31028E-09 | 3.29539E-09 | 3.31028E-09 |
| MABC | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.99948E-01 |
| ISCA | Friedman | 7.39566E-01 | 1.0 | 1.0 | 9.84073E-01 |
| ISCA | Friedman Aligned | <1E-13 | 1.46549E-13 | 1.46549E-13 | 1.46549E-13 |
| ISCA | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.99966E-01 |
| GOTLBO | Friedman | 9.74456E-01 | 1.0 | 1.0 | 9.99997E-01 |
| GOTLBO | Friedman Aligned | 9.56302E-10 | 3.31028E-09 | 3.29539E-09 | 3.31028E-09 |
| GOTLBO | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.99948E-01 |
| CWOA | Friedman | 9.74456E-01 | 1.0 | 1.0 | 9.99997E-01 |
| CWOA | Friedman Aligned | <1E-13 | 2.86438E-13 | 2.86438E-13 | 2.86438E-13 |
| CWOA | Quade | 9.79432E-01 | 1.0 | 1.0 | 9.99966E-01 |
| DE | Friedman | 9.82263E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 2.28343E-02 | 8.65263E-02 | 8.65263E-02 | 8.33830E-02 |
| DE | Quade | 9.99841E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S7** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 4.50905E-02 | 1.57187E-01 | 1.57187E-01 | 1.47610E-01 |
| IJAYA | Quade | 9.96518E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 2.79302E-02 | 1.03688E-01 | 1.03688E-01 | 9.93104E-02 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S8.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.04976E-01 | 1.0 | 1.0 | 9.04976E-01 |
| WW | Friedman Aligned | 3.09282E-08 | 3.09282E-08 | 3.09282E-08 | 3.09282E-08 |
| WW | Quade | 9.99971E-01 | 1.0 | 1.0 | 9.99971E-01 |
| PSO | Friedman | 9.83045E-01 | 1.0 | 1.0 | 9.99462E-01 |
| PSO | Friedman Aligned | 1.62361E-04 | 2.99763E-04 | 2.99763E-04 | 2.99722E-04 |
| PSO | Quade | 9.99971E-01 | 1.0 | 1.0 | 9.99971E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S8** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S9.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.73195E-13 | 1.73195E-13 | 1.73195E-13 | 1.73195E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 7.37772E-02 | 7.87500E-02 | 7.87500E-02 | 7.59689E-02 |
| MABC | Friedman | 6.30140E-12 | 1.30429E-11 | 1.30429E-11 | 1.30429E-11 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 1.26592E-01 | 3.38277E-01 | 3.21918E-01 | 2.90779E-01 |
| WW | Friedman | 6.30140E-12 | 1.16334E-11 | 1.16334E-11 | 1.16334E-11 |
| WW | Friedman Aligned | 5.34616E-11 | 1.64497E-10 | 1.64497E-10 | 1.64497E-10 |
| WW | Quade | 7.37772E-02 | 7.64150E-02 | 7.64150E-02 | 7.37772E-02 |
| ISCA | Friedman | 1.24759E-10 | 3.83875E-10 | 3.83875E-10 | 3.83875E-10 |
| ISCA | Friedman Aligned | 8.36943E-10 | 3.09025E-09 | 2.80188E-09 | 3.09025E-09 |
| ISCA | Quade | 1.26592E-01 | 3.84352E-01 | 3.84352E-01 | 3.25573E-01 |
| GOTLBO | Friedman | 6.17865E-09 | 2.13876E-08 | 2.13876E-08 | 2.13876E-08 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.26592E-01 | 3.38277E-01 | 3.21918E-01 | 2.90779E-01 |
| CWOA | Friedman | 6.88175E-09 | 2.54096E-08 | 2.54096E-08 | 2.54096E-08 |
| CWOA | Friedman Aligned | 7.23793E-10 | 2.72814E-09 | 2.72814E-09 | 2.72814E-09 |
| CWOA | Quade | 1.26592E-01 | 3.77401E-01 | 3.77401E-01 | 3.19919E-01 |
| DE | Friedman | 1.20683E-08 | 4.54881E-08 | 4.54881E-08 | 4.54881E-08 |
| DE | Friedman Aligned | 1.38245E-10 | 4.78541E-10 | 4.78541E-10 | 4.78541E-10 |
| DE | Quade | 1.64554E-01 | 6.45899E-01 | 4.76691E-01 | 4.92200E-01 |
| NDE | Friedman | 2.44925E-08 | 9.04338E-08 | 9.04338E-08 | 9.04338E-08 |
| NDE | Friedman Aligned | 6.08400E-05 | 1.87201E-04 | 1.87201E-04 | 1.87188E-04 |
| NDE | Quade | 1.64554E-01 | 6.45899E-01 | 4.76691E-01 | 4.92200E-01 |
| **Table S9** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 5.66935E-08 | 1.96247E-07 | 1.96247E-07 | 1.96247E-07 |
| IJAYA | Friedman Aligned | 8.36943E-10 | 3.09025E-09 | 2.80188E-09 | 3.09025E-09 |
| IJAYA | Quade | 1.64554E-01 | 6.45899E-01 | 4.76691E-01 | 4.92200E-01 |
| NNA | Friedman | 1.68226E-06 | 5.17618E-06 | 5.17618E-06 | 5.17617E-06 |
| NNA | Friedman Aligned | 2.55778E-10 | 9.44411E-10 | 9.44411E-10 | 9.44411E-10 |
| NNA | Quade | 1.64554E-01 | 6.45899E-01 | 4.76691E-01 | 4.92200E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 4.42830E-01 | 1.0 | 1.0 | 7.73432E-01 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S10.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.37121E-01 | 1.46648E-01 | 1.46648E-01 | 1.37121E-01 |
| WW | Friedman Aligned | 3.61499E-08 | 3.61499E-08 | 3.61499E-08 | 3.61499E-08 |
| WW | Quade | 9.99959E-01 | 1.0 | 1.0 | 9.99959E-01 |
| PSO | Friedman | 3.33849E-01 | 7.27025E-01 | 7.27025E-01 | 5.27624E-01 |
| PSO | Friedman Aligned | 1.81858E-04 | 3.35764E-04 | 3.35764E-04 | 3.35712E-04 |
| PSO | Quade | 9.99959E-01 | 1.0 | 1.0 | 9.99959E-01 |
| MABC | Friedman | 7.14527E-01 | 1.0 | 1.0 | 9.58507E-01 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.07106E-01 | 1.0 | 1.0 | 9.99332E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S10** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S11.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.67422E-13 | 2.22267E-13 | 2.22267E-13 | 2.22267E-13 |
| DE | Friedman Aligned | 3.49457E-11 | 1.07525E-10 | 1.07525E-10 | 1.07525E-10 |
| DE | Quade | 3.02027E-02 | 1.13113E-01 | 9.04256E-02 | 1.07775E-01 |
| GOTLBO | Friedman | 1.67422E-13 | 1.67422E-13 | 1.59872E-13 | 1.67422E-13 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.70097E-02 | 4.34638E-02 | 4.18609E-02 | 4.26152E-02 |
| CWOA | Friedman | 1.67422E-13 | 1.67422E-13 | 1.59872E-13 | 1.67422E-13 |
| CWOA | Friedman Aligned | 1.11444E-09 | 4.11484E-09 | 4.11484E-09 | 4.11484E-09 |
| CWOA | Quade | 1.70097E-02 | 5.26703E-02 | 5.26703E-02 | 5.14540E-02 |
| NDE | Friedman | 1.78968E-13 | 5.50671E-13 | 5.50671E-13 | 5.50671E-13 |
| NDE | Friedman Aligned | 2.14581E-05 | 6.60250E-05 | 6.60250E-05 | 6.60233E-05 |
| NDE | Quade | 3.02027E-02 | 1.13113E-01 | 9.04256E-02 | 1.07775E-01 |
| IJAYA | Friedman | 4.96492E-13 | 1.71863E-12 | 1.71863E-12 | 1.71863E-12 |
| IJAYA | Friedman Aligned | 2.08974E-10 | 7.87669E-10 | 7.87669E-10 | 7.87669E-10 |
| IJAYA | Quade | 2.98017E-02 | 1.13113E-01 | 9.04256E-02 | 1.07775E-01 |
| ISCA | Friedman | 1.94555E-12 | 7.18359E-12 | 7.18359E-12 | 7.18359E-12 |
| ISCA | Friedman Aligned | 1.39470E-09 | 4.82782E-09 | 4.82782E-09 | 4.82782E-09 |
| ISCA | Quade | 1.70097E-02 | 5.56810E-02 | 5.56810E-02 | 5.43433E-02 |
| MABC | Friedman | 3.23165E-11 | 1.21808E-10 | 1.20929E-10 | 1.21808E-10 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 1.70097E-02 | 4.34638E-02 | 4.18609E-02 | 4.26152E-02 |
| NNA | Friedman | 3.27515E-11 | 1.21808E-10 | 1.20929E-10 | 1.21808E-10 |
| NNA | Friedman Aligned | 5.31237E-11 | 1.96149E-10 | 1.96149E-10 | 1.96149E-10 |
| NNA | Quade | 3.02027E-02 | 1.13113E-01 | 9.04256E-02 | 1.07775E-01 |
| **Table S11** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 8.45375E-10 | 2.92630E-09 | 2.92630E-09 | 2.92630E-09 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.58951E-03 | 6.97972E-03 | 6.97972E-03 | 6.95743E-03 |
| WW | Friedman | 9.80423E-09 | 3.01669E-08 | 3.01669E-08 | 3.01669E-08 |
| WW | Friedman Aligned | 4.82405E-11 | 1.66986E-10 | 1.66986E-10 | 1.66986E-10 |
| WW | Quade | 6.58951E-03 | 6.60964E-03 | 6.60964E-03 | 6.58951E-03 |
| TLBO | Friedman | 7.11999E-02 | 1.81756E-01 | 1.81756E-01 | 1.70967E-01 |
| TLBO | Friedman Aligned | 8.37421E-01 | 1.0 | 9.97806E-01 | 9.65045E-01 |
| TLBO | Quade | 5.28241E-01 | 1.0 | 1.0 | 8.51492E-01 |
| EBLSHADE | Friedman | 8.00557E-01 | 1.0 | 1.0 | 9.49025E-01 |
| EBLSHADE | Friedman Aligned | 3.14299E-01 | 8.19952E-01 | 8.19952E-01 | 6.16263E-01 |
| EBLSHADE | Quade | 9.04532E-01 | 1.0 | 1.0 | 9.86919E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 9.97806E-01 | 1.0 | 9.97806E-01 | 9.97806E-01 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S12.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.99908E-01 | 1.0 | 1.0 | 9.99908E-01 |
| WW | Friedman Aligned | 6.53248E-01 | 1.0 | 1.0 | 6.53248E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S12** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S13.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 3.32214E-02 | 3.37419E-02 | 3.37419E-02 | 3.32214E-02 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 9.87045E-01 | 1.0 | 1.0 | 9.87045E-01 |
| PSO | Friedman | 1.14549E-01 | 2.22512E-01 | 2.22512E-01 | 2.01165E-01 |
| PSO | Friedman Aligned | 1.21060E-09 | 3.72493E-09 | 3.72493E-09 | 3.72493E-09 |
| PSO | Quade | 9.87045E-01 | 1.0 | 1.0 | 9.87045E-01 |
| MABC | Friedman | 3.78814E-01 | 1.0 | 1.0 | 7.01392E-01 |
| MABC | Friedman Aligned | 5.00822E-13 | 1.02585E-12 | 1.02585E-12 | 1.02585E-12 |
| MABC | Quade | 9.87097E-01 | 1.0 | 1.0 | 9.99984E-01 |
| ISCA | Friedman | 6.26168E-01 | 1.0 | 1.0 | 9.51565E-01 |
| ISCA | Friedman Aligned | 4.74790E-08 | 1.64351E-07 | 1.64351E-07 | 1.64351E-07 |
| ISCA | Quade | 9.87097E-01 | 1.0 | 1.0 | 9.99992E-01 |
| GOTLBO | Friedman | 9.25970E-01 | 1.0 | 1.0 | 9.99878E-01 |
| GOTLBO | Friedman Aligned | 5.00822E-13 | 9.24594E-13 | 9.24594E-13 | 9.24594E-13 |
| GOTLBO | Quade | 9.87097E-01 | 1.0 | 1.0 | 9.99984E-01 |
| CWOA | Friedman | 9.25970E-01 | 1.0 | 1.0 | 9.99878E-01 |
| CWOA | Friedman Aligned | 9.31630E-08 | 3.43987E-07 | 3.43987E-07 | 3.43987E-07 |
| CWOA | Quade | 9.87097E-01 | 1.0 | 1.0 | 9.99991E-01 |
| DE | Friedman | 9.27163E-01 | 1.0 | 1.0 | 9.99948E-01 |
| DE | Friedman Aligned | 9.09797E-01 | 1.0 | 1.0 | 9.99885E-01 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 9.62357E-01 | 1.0 | 1.0 | 9.99994E-01 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S13** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 9.37660E-01 | 1.0 | 1.0 | 9.99965E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S14.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 5.46183E-01 | 7.66533E-01 | 7.66533E-01 | 5.46183E-01 |
| WW | Friedman Aligned | 1.67422E-13 | 1.67422E-13 | 1.67422E-13 | 1.67422E-13 |
| WW | Quade | 9.99427E-01 | 1.0 | 1.0 | 9.99427E-01 |
| PSO | Friedman | 7.98259E-01 | 1.0 | 1.0 | 9.47935E-01 |
| PSO | Friedman Aligned | 9.59407E-09 | 1.77121E-08 | 1.77121E-08 | 1.77121E-08 |
| PSO | Quade | 9.99427E-01 | 1.0 | 1.0 | 9.99427E-01 |
| MABC | Friedman | 9.84137E-01 | 1.0 | 1.0 | 9.99973E-01 |
| MABC | Friedman Aligned | 2.43064E-01 | 6.84667E-01 | 6.59303E-01 | 5.06830E-01 |
| MABC | Quade | 9.99765E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S14** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 2.43064E-01 | 6.84667E-01 | 6.59303E-01 | 5.06830E-01 |
| GOTLBO | Quade | 9.99765E-01 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 9.99765E-01 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S15.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 3.15655E-03 | 3.16116E-03 | 3.16116E-03 | 3.15655E-03 |
| WW | Friedman Aligned | 2.84215E-08 | 8.74507E-08 | 8.74507E-08 | 8.74507E-08 |
| WW | Quade | 9.67443E-01 | 1.0 | 1.0 | 9.67443E-01 |
| PSO | Friedman | 1.67510E-02 | 3.11464E-02 | 3.11464E-02 | 3.07056E-02 |
| PSO | Friedman Aligned | 9.00108E-10 | 2.28489E-09 | 2.28489E-09 | 2.28489E-09 |
| PSO | Quade | 9.67443E-01 | 1.0 | 1.0 | 9.67443E-01 |
| MABC | Friedman | 9.36544E-02 | 2.46808E-01 | 2.46808E-01 | 2.20902E-01 |
| MABC | Friedman Aligned | 5.44120E-12 | 6.05649E-12 | 6.05649E-12 | 6.05649E-12 |
| MABC | Quade | 9.67711E-01 | 1.0 | 1.0 | 9.99836E-01 |
| ISCA | Friedman | 2.23633E-01 | 7.49303E-01 | 7.49303E-01 | 5.41072E-01 |
| ISCA | Friedman Aligned | 1.70405E-07 | 5.89862E-07 | 5.89862E-07 | 5.89862E-07 |
| ISCA | Quade | 9.67711E-01 | 1.0 | 1.0 | 9.99883E-01 |
| DE | Friedman | 5.36748E-01 | 1.0 | 1.0 | 9.41253E-01 |
| DE | Friedman Aligned | 9.87042E-01 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 9.90483E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 5.36748E-01 | 1.0 | 1.0 | 9.30303E-01 |
| GOTLBO | Friedman Aligned | 5.44120E-12 | 5.44120E-12 | 5.44120E-12 | 5.44120E-12 |
| GOTLBO | Quade | 9.67711E-01 | 1.0 | 1.0 | 9.99836E-01 |
| CWOA | Friedman | 5.36748E-01 | 1.0 | 1.0 | 9.30303E-01 |
| CWOA | Friedman Aligned | 3.24827E-07 | 1.19936E-06 | 1.19936E-06 | 1.19936E-06 |
| CWOA | Quade | 9.67711E-01 | 1.0 | 1.0 | 9.99883E-01 |
| NDE | Friedman | 5.75197E-01 | 1.0 | 1.0 | 9.57621E-01 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 9.90483E-01 | 1.0 | 1.0 | 1.0 |
| **Table S15** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 6.44122E-01 | 1.0 | 1.0 | 9.72022E-01 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.86183E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S16.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.20537E-01 | 1.27812E-01 | 1.27812E-01 | 1.20537E-01 |
| WW | Friedman Aligned | 2.91545E-13 | 2.91545E-13 | 2.91545E-13 | 2.91545E-13 |
| WW | Quade | 9.99748E-01 | 1.0 | 1.0 | 9.99748E-01 |
| PSO | Friedman | 3.04410E-01 | 6.51777E-01 | 6.51777E-01 | 4.88366E-01 |
| PSO | Friedman Aligned | 3.75852E-09 | 6.93880E-09 | 6.93880E-09 | 6.93880E-09 |
| PSO | Quade | 9.99748E-01 | 1.0 | 1.0 | 9.99748E-01 |
| MABC | Friedman | 6.81406E-01 | 1.0 | 1.0 | 9.45174E-01 |
| MABC | Friedman Aligned | 1.76838E-01 | 4.83063E-01 | 4.66752E-01 | 3.89813E-01 |
| MABC | Quade | 9.99953E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 8.86583E-01 | 1.0 | 1.0 | 9.98766E-01 |
| ISCA | Friedman Aligned | 9.96008E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 9.99795E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.76838E-01 | 4.83063E-01 | 4.66752E-01 | 3.89813E-01 |
| GOTLBO | Quade | 9.99953E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S16** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S17.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *I*01 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S17** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S18.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 9.13669E-07 | 9.13669E-07 | 9.13669E-07 | 9.13669E-07 |
| CWOA | Friedman Aligned | 3.17443E-10 | 9.76748E-10 | 9.76748E-10 | 9.76748E-10 |
| CWOA | Quade | 4.21326E-01 | 5.35667E-01 | 5.35667E-01 | 4.21326E-01 |
| NNA | Friedman | 1.61653E-05 | 2.98438E-05 | 2.98438E-05 | 2.98434E-05 |
| NNA | Friedman Aligned | 3.15806E-10 | 8.01662E-10 | 8.01662E-10 | 8.01662E-10 |
| NNA | Quade | 4.21326E-01 | 8.89041E-01 | 8.89041E-01 | 6.04273E-01 |
| PSO | Friedman | 2.03695E-05 | 5.17077E-05 | 5.17077E-05 | 5.17065E-05 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 4.21326E-01 | 6.62888E-01 | 6.62888E-01 | 4.94345E-01 |
| WW | Friedman | 5.48061E-05 | 1.68637E-04 | 1.68637E-04 | 1.68625E-04 |
| WW | Friedman Aligned | 2.17279E-09 | 7.52120E-09 | 7.52120E-09 | 7.52120E-09 |
| WW | Quade | 4.21326E-01 | 1.0 | 1.0 | 7.59069E-01 |
| ISCA | Friedman | 1.94934E-03 | 6.75178E-03 | 6.75178E-03 | 6.73155E-03 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 4.95300E-01 | 1.0 | 1.0 | 9.06235E-01 |
| GOTLBO | Friedman | 6.07282E-03 | 2.24595E-02 | 2.24595E-02 | 2.22401E-02 |
| GOTLBO | Friedman Aligned | 5.81901E-09 | 2.14856E-08 | 2.14856E-08 | 2.14856E-08 |
| GOTLBO | Quade | 6.39735E-01 | 1.0 | 1.0 | 9.76937E-01 |
| MABC | Friedman | 1.81819E-02 | 6.88217E-02 | 6.88217E-02 | 6.68248E-02 |
| MABC | Friedman Aligned | 3.53249E-07 | 1.33148E-06 | 1.33148E-06 | 1.33148E-06 |
| MABC | Quade | 6.39735E-01 | 1.0 | 1.0 | 9.76937E-01 |
| IJAYA | Friedman | 9.98394E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 9.08636E-01 | 1.0 | 1.0 | 9.99854E-01 |
| IJAYA | Quade | 9.65203E-01 | 1.0 | 1.0 | 9.99996E-01 |
| **Table S18** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S19.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 2.57175E-03 | 2.57480E-03 | 2.57480E-03 | 2.57175E-03 |
| MABC | Friedman | 2.13607E-13 | 3.94351E-13 | 3.94351E-13 | 3.94351E-13 |
| MABC | Friedman Aligned | 3.33763E-10 | 1.25803E-09 | 1.25803E-09 | 1.25803E-09 |
| MABC | Quade | 2.25210E-02 | 8.53328E-02 | 8.53328E-02 | 8.22748E-02 |
| GOTLBO | Friedman | 2.44012E-12 | 6.19416E-12 | 6.19416E-12 | 6.19416E-12 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 2.21704E-02 | 8.23542E-02 | 8.23542E-02 | 7.94473E-02 |
| ISCA | Friedman | 1.94065E-11 | 5.97122E-11 | 5.97122E-11 | 5.97122E-11 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.04000E-02 | 3.61159E-02 | 3.61159E-02 | 3.55416E-02 |
| WW | Friedman | 1.60152E-09 | 5.54373E-09 | 5.54373E-09 | 5.54373E-09 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 4.71779E-03 | 1.45400E-02 | 1.45400E-02 | 1.44453E-02 |
| PSO | Friedman | 4.11590E-09 | 1.51972E-08 | 1.51972E-08 | 1.51972E-08 |
| PSO | Friedman Aligned | 1.29144E-10 | 4.47038E-10 | 4.47038E-10 | 4.47038E-10 |
| PSO | Quade | 2.57175E-03 | 3.86298E-03 | 3.86298E-03 | 3.85615E-03 |
| NNA | Friedman | 5.85484E-09 | 2.20682E-08 | 2.20682E-08 | 2.20682E-08 |
| NNA | Friedman Aligned | 1.73241E-10 | 6.39659E-10 | 6.39659E-10 | 6.39659E-10 |
| NNA | Quade | 2.65209E-03 | 6.73911E-03 | 6.73911E-03 | 6.71851E-03 |
| IJAYA | Friedman | 7.80303E-08 | 2.88112E-07 | 2.74456E-07 | 2.88112E-07 |
| IJAYA | Friedman Aligned | 8.81170E-06 | 3.25356E-05 | 3.25356E-05 | 3.25351E-05 |
| IJAYA | Quade | 1.04801E-01 | 3.95158E-01 | 3.95158E-01 | 3.35534E-01 |
| **Table S19** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 7.92873E-08 | 2.88112E-07 | 2.74456E-07 | 2.88112E-07 |
| DE | Friedman Aligned | 3.00304E-05 | 1.03952E-04 | 1.03952E-04 | 1.03948E-04 |
| DE | Quade | 1.31444E-01 | 4.64771E-01 | 4.64771E-01 | 3.86031E-01 |
| NDE | Friedman | 6.84857E-06 | 2.10725E-05 | 2.10725E-05 | 2.10724E-05 |
| NDE | Friedman Aligned | 1.50161E-03 | 4.62113E-03 | 4.62113E-03 | 4.61313E-03 |
| NDE | Quade | 2.27244E-01 | 7.19509E-01 | 7.19509E-01 | 5.47608E-01 |
| TLBO | Friedman | 3.12274E-01 | 8.14506E-01 | 8.14506E-01 | 6.13379E-01 |
| TLBO | Friedman Aligned | 7.47586E-01 | 1.0 | 1.0 | 9.69641E-01 |
| TLBO | Quade | 7.92910E-01 | 1.0 | 1.0 | 9.81630E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S20.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | 1.41434E-10 | 4.89580E-10 | 4.51671E-10 | 4.89580E-10 |
| PSO | Quade | 9.10568E-04 | 1.40843E-03 | 1.40843E-03 | 1.40752E-03 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Friedman Aligned | 1.41434E-10 | 4.89580E-10 | 4.51671E-10 | 4.89580E-10 |
| NNA | Quade | 1.00825E-03 | 2.56039E-03 | 2.56039E-03 | 2.55742E-03 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 9.10568E-04 | 9.10951E-04 | 9.10951E-04 | 9.10568E-04 |
| MABC | Friedman | 2.70184E-12 | 8.31335E-12 | 8.31335E-12 | 8.31335E-12 |
| MABC | Friedman Aligned | 1.75948E-09 | 6.63187E-09 | 6.63187E-09 | 6.63187E-09 |
| MABC | Quade | 1.06705E-02 | 4.03192E-02 | 4.03192E-02 | 3.96291E-02 |
| GOTLBO | Friedman | 2.50012E-11 | 8.65428E-11 | 8.65428E-11 | 8.65428E-11 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.03648E-02 | 3.83774E-02 | 3.83774E-02 | 3.77392E-02 |
| ISCA | Friedman | 1.56474E-10 | 5.77749E-10 | 5.77749E-10 | 5.77749E-10 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 4.51230E-03 | 1.56412E-02 | 1.56412E-02 | 1.55329E-02 |
| IJAYA | Friedman | 5.89865E-09 | 2.22334E-08 | 1.97169E-08 | 2.22334E-08 |
| IJAYA | Friedman Aligned | 1.36159E-06 | 5.02741E-06 | 5.02741E-06 | 5.02740E-06 |
| IJAYA | Quade | 5.82602E-02 | 2.17592E-01 | 2.17592E-01 | 1.98793E-01 |
| DE | Friedman | 5.96217E-09 | 2.22334E-08 | 1.97169E-08 | 2.22334E-08 |
| DE | Friedman Aligned | 5.16020E-06 | 1.78623E-05 | 1.78623E-05 | 1.78621E-05 |
| DE | Quade | 7.57041E-02 | 2.65210E-01 | 2.65210E-01 | 2.38529E-01 |
| **Table S20** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 5.96217E-09 | 2.22334E-08 | 1.97169E-08 | 2.22334E-08 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.90142E-03 | 5.85437E-03 | 5.85437E-03 | 5.83897E-03 |
| NDE | Friedman | 6.71920E-07 | 2.06745E-06 | 2.06745E-06 | 2.06745E-06 |
| NDE | Friedman Aligned | 3.70876E-04 | 1.14121E-03 | 1.14121E-03 | 1.14072E-03 |
| NDE | Quade | 1.41276E-01 | 4.42227E-01 | 4.42227E-01 | 3.74146E-01 |
| TLBO | Friedman | 1.37223E-01 | 3.52222E-01 | 3.52222E-01 | 3.12487E-01 |
| TLBO | Friedman Aligned | 4.91056E-01 | 1.0 | 1.0 | 8.19950E-01 |
| TLBO | Quade | 6.15068E-01 | 1.0 | 9.33437E-01 | 9.11384E-01 |
| EBLSHADE | Friedman | 6.70491E-01 | 1.0 | 8.29657E-01 | 8.71202E-01 |
| EBLSHADE | Friedman Aligned | 7.33523E-01 | 1.0 | 1.0 | 9.12968E-01 |
| EBLSHADE | Quade | 8.24213E-01 | 1.0 | 9.33437E-01 | 9.59624E-01 |
| STLBO | Friedman | 8.29657E-01 | 1.0 | 8.29657E-01 | 8.71202E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 9.33437E-01 | 1.0 | 9.33437E-01 | 9.59624E-01 |

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| **Table S21.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 4.80155E-09 | 4.80155E-09 | 4.80155E-09 | 4.80155E-09 |
| CWOA | Friedman Aligned | 3.03064E-10 | 1.01341E-09 | 1.01341E-09 | 1.01341E-09 |
| CWOA | Quade | 2.02938E-01 | 2.24855E-01 | 2.24855E-01 | 2.02938E-01 |
| NNA | Friedman | 1.48126E-07 | 2.73464E-07 | 2.73464E-07 | 2.73464E-07 |
| NNA | Friedman Aligned | 3.03064E-10 | 9.32505E-10 | 9.32505E-10 | 9.32505E-10 |
| NNA | Quade | 2.02938E-01 | 4.07942E-01 | 4.07942E-01 | 3.40121E-01 |
| PSO | Friedman | 2.08081E-07 | 5.28205E-07 | 5.28205E-07 | 5.28205E-07 |
| PSO | Friedman Aligned | 4.93547E-11 | 1.25285E-10 | 1.25285E-10 | 1.25285E-10 |
| PSO | Quade | 2.02938E-01 | 2.88952E-01 | 2.88952E-01 | 2.53595E-01 |
| WW | Friedman | 6.93545E-07 | 2.13398E-06 | 2.13398E-06 | 2.13398E-06 |
| WW | Friedman Aligned | 1.17732E-08 | 4.43760E-08 | 4.43760E-08 | 4.43760E-08 |
| WW | Quade | 2.02938E-01 | 6.53907E-01 | 6.53907E-01 | 4.91488E-01 |
| ISCA | Friedman | 5.43490E-05 | 1.88134E-04 | 1.88134E-04 | 1.88118E-04 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.92346E-01 | 1.0 | 1.0 | 6.97900E-01 |
| GOTLBO | Friedman | 2.33350E-04 | 8.61656E-04 | 8.61656E-04 | 8.61331E-04 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 4.17424E-01 | 1.0 | 1.0 | 8.63978E-01 |
| MABC | Friedman | 9.80244E-04 | 3.69560E-03 | 3.69560E-03 | 3.68975E-03 |
| MABC | Friedman Aligned | 1.16884E-09 | 4.31572E-09 | 4.31572E-09 | 4.31572E-09 |
| MABC | Quade | 4.17424E-01 | 1.0 | 1.0 | 8.63978E-01 |
| DE | Friedman | 5.20298E-01 | 1.0 | 1.0 | 9.33618E-01 |
| DE | Friedman Aligned | 4.19991E-01 | 1.0 | 1.0 | 8.48253E-01 |
| DE | Quade | 8.52896E-01 | 1.0 | 1.0 | 9.98686E-01 |
| **Table S21** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 5.20298E-01 | 1.0 | 1.0 | 9.33618E-01 |
| IJAYA | Friedman Aligned | 2.96026E-01 | 1.0 | 1.0 | 7.26390E-01 |
| IJAYA | Quade | 7.90937E-01 | 1.0 | 1.0 | 9.96908E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S22.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 6.27529E-02 | 6.46470E-02 | 6.46470E-02 | 6.27529E-02 |
| CWOA | Friedman Aligned | 3.90675E-11 | 1.35234E-10 | 1.35234E-10 | 1.35234E-10 |
| CWOA | Quade | 9.63252E-01 | 1.0 | 1.0 | 9.63252E-01 |
| PSO | Friedman | 1.98011E-01 | 5.05235E-01 | 5.05235E-01 | 4.03816E-01 |
| PSO | Friedman Aligned | 8.64602E-09 | 3.19237E-08 | 3.19237E-08 | 3.19237E-08 |
| PSO | Quade | 9.63252E-01 | 1.0 | 1.0 | 9.79096E-01 |
| NNA | Friedman | 1.98011E-01 | 4.00536E-01 | 4.00536E-01 | 3.34604E-01 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 9.63252E-01 | 1.0 | 1.0 | 9.92351E-01 |
| WW | Friedman | 2.51369E-01 | 8.52274E-01 | 8.52274E-01 | 5.89672E-01 |
| WW | Friedman Aligned | 3.28118E-11 | 1.00959E-10 | 1.00959E-10 | 1.00959E-10 |
| WW | Quade | 9.63252E-01 | 1.0 | 1.0 | 9.98990E-01 |
| ISCA | Friedman | 7.68325E-01 | 1.0 | 1.0 | 9.93668E-01 |
| ISCA | Friedman Aligned | 7.18181E-12 | 1.82308E-11 | 1.82308E-11 | 1.82308E-11 |
| ISCA | Quade | 9.63252E-01 | 1.0 | 1.0 | 9.99986E-01 |
| GOTLBO | Friedman | 9.17851E-01 | 1.0 | 1.0 | 9.99902E-01 |
| GOTLBO | Friedman Aligned | 1.29896E-12 | 2.39808E-12 | 2.39808E-12 | 2.39808E-12 |
| GOTLBO | Quade | 9.98660E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S22** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S23.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.85517E-02 | 9.97146E-02 | 9.97146E-02 | 9.54079E-02 |
| GOTLBO | Friedman | 1.76370E-12 | 3.25606E-12 | 3.25606E-12 | 3.25606E-12 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 5.51141E-02 | 2.06606E-01 | 2.06606E-01 | 1.88865E-01 |
| WW | Friedman | 9.56997E-12 | 2.42930E-11 | 2.42930E-11 | 2.42930E-11 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.42835E-02 | 4.41684E-02 | 4.41684E-02 | 4.33008E-02 |
| MABC | Friedman | 1.61944E-11 | 4.98290E-11 | 4.98290E-11 | 4.98290E-11 |
| MABC | Friedman Aligned | 6.35232E-11 | 2.19888E-10 | 2.19888E-10 | 2.19888E-10 |
| MABC | Quade | 5.51141E-02 | 2.10249E-01 | 2.10249E-01 | 1.92225E-01 |
| PSO | Friedman | 2.85766E-11 | 9.89189E-11 | 9.89189E-11 | 9.89189E-11 |
| PSO | Friedman Aligned | 9.31095E-11 | 3.43789E-10 | 3.43789E-10 | 3.43789E-10 |
| PSO | Quade | 9.23007E-03 | 1.33680E-02 | 1.33680E-02 | 1.32864E-02 |
| NNA | Friedman | 4.87447E-11 | 1.79980E-10 | 1.79980E-10 | 1.79980E-10 |
| NNA | Friedman Aligned | 1.82343E-10 | 6.87292E-10 | 6.87292E-10 | 6.87292E-10 |
| NNA | Quade | 9.23007E-03 | 2.20922E-02 | 2.20922E-02 | 2.18717E-02 |
| CWOA | Friedman | 1.08691E-09 | 4.09682E-09 | 4.09682E-09 | 4.09682E-09 |
| CWOA | Friedman Aligned | 3.22900E-11 | 9.93539E-11 | 9.93539E-11 | 9.93539E-11 |
| CWOA | Quade | 9.23007E-03 | 9.26962E-03 | 9.26962E-03 | 9.23007E-03 |
| DE | Friedman | 2.08871E-05 | 7.71220E-05 | 7.16714E-05 | 7.71195E-05 |
| DE | Friedman Aligned | 1.67354E-04 | 5.79317E-04 | 5.79317E-04 | 5.79183E-04 |
| DE | Quade | 2.48241E-01 | 8.96274E-01 | 8.96274E-01 | 6.27573E-01 |
| **Table S23** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.08871E-05 | 7.71220E-05 | 7.16714E-05 | 7.71195E-05 |
| IJAYA | Friedman Aligned | 5.49245E-05 | 2.02800E-04 | 2.02800E-04 | 2.02783E-04 |
| IJAYA | Quade | 2.06971E-01 | 7.97941E-01 | 7.97941E-01 | 5.75239E-01 |
| NDE | Friedman | 7.17418E-04 | 2.20762E-03 | 2.20762E-03 | 2.20580E-03 |
| NDE | Friedman Aligned | 5.71229E-03 | 1.75879E-02 | 1.75879E-02 | 1.74722E-02 |
| NDE | Quade | 3.88843E-01 | 1.0 | 1.0 | 7.80209E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S24.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 1.92232E-01 | 2.11737E-01 | 2.11737E-01 | 1.92232E-01 |
| CWOA | Friedman Aligned | 6.82306E-09 | 1.25964E-08 | 1.25964E-08 | 1.25964E-08 |
| CWOA | Quade | 9.75324E-01 | 1.0 | 1.0 | 9.75324E-01 |
| PSO | Friedman | 4.39552E-01 | 1.0 | 1.0 | 7.28974E-01 |
| PSO | Friedman Aligned | 2.73702E-07 | 6.94782E-07 | 6.94782E-07 | 6.94781E-07 |
| PSO | Quade | 9.75324E-01 | 1.0 | 1.0 | 9.86727E-01 |
| NNA | Friedman | 4.39552E-01 | 1.0 | 1.0 | 6.56634E-01 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 9.75324E-01 | 1.0 | 1.0 | 9.95625E-01 |
| WW | Friedman | 4.92980E-01 | 1.0 | 1.0 | 8.76296E-01 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.75324E-01 | 1.0 | 1.0 | 9.99544E-01 |
| ISCA | Friedman | 9.57091E-01 | 1.0 | 1.0 | 9.99982E-01 |
| ISCA | Friedman Aligned | 5.54018E-01 | 1.0 | 1.0 | 9.16636E-01 |
| ISCA | Quade | 9.75324E-01 | 1.0 | 1.0 | 9.99997E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S24** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S25.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.28896E-03 | 1.28973E-03 | 1.28973E-03 | 1.28896E-03 |
| MABC | Friedman | 1.27587E-12 | 2.35545E-12 | 2.35545E-12 | 2.35545E-12 |
| MABC | Friedman Aligned | 1.75948E-09 | 6.63187E-09 | 6.63187E-09 | 6.63187E-09 |
| MABC | Quade | 1.37262E-02 | 5.19022E-02 | 5.19022E-02 | 5.07619E-02 |
| GOTLBO | Friedman | 1.19004E-11 | 3.02087E-11 | 3.02087E-11 | 3.02087E-11 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.33923E-02 | 4.96280E-02 | 4.96280E-02 | 4.85638E-02 |
| ISCA | Friedman | 7.79167E-11 | 2.39744E-10 | 2.39744E-10 | 2.39744E-10 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 5.97483E-03 | 2.07202E-02 | 2.07202E-02 | 2.05304E-02 |
| WW | Friedman | 4.49481E-09 | 1.55589E-08 | 1.55589E-08 | 1.55589E-08 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.57937E-03 | 7.94361E-03 | 7.94361E-03 | 7.91528E-03 |
| PSO | Friedman | 1.06456E-08 | 3.93067E-08 | 3.93067E-08 | 3.93067E-08 |
| PSO | Friedman Aligned | 1.41434E-10 | 4.89580E-10 | 4.51671E-10 | 4.89580E-10 |
| PSO | Quade | 1.28896E-03 | 1.97444E-03 | 1.97444E-03 | 1.97266E-03 |
| NNA | Friedman | 1.46074E-08 | 5.50586E-08 | 5.50586E-08 | 5.50586E-08 |
| NNA | Friedman Aligned | 1.41434E-10 | 4.89580E-10 | 4.51671E-10 | 4.89580E-10 |
| NNA | Quade | 1.39422E-03 | 3.54107E-03 | 3.54107E-03 | 3.53537E-03 |
| IJAYA | Friedman | 1.85427E-08 | 6.84653E-08 | 6.55898E-08 | 6.84653E-08 |
| IJAYA | Friedman Aligned | 1.36159E-06 | 5.02741E-06 | 5.02741E-06 | 5.02740E-06 |
| IJAYA | Quade | 7.11225E-02 | 2.66321E-01 | 2.66321E-01 | 2.38460E-01 |
| **Table S25** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.89482E-08 | 6.84653E-08 | 6.55898E-08 | 6.84653E-08 |
| DE | Friedman Aligned | 5.16020E-06 | 1.78623E-05 | 1.78623E-05 | 1.78621E-05 |
| DE | Quade | 9.13398E-02 | 3.20806E-01 | 3.20806E-01 | 2.82197E-01 |
| NDE | Friedman | 2.01368E-06 | 6.19594E-06 | 6.19594E-06 | 6.19592E-06 |
| NDE | Friedman Aligned | 3.70876E-04 | 1.14121E-03 | 1.14121E-03 | 1.14072E-03 |
| NDE | Quade | 1.66209E-01 | 5.21958E-01 | 5.21958E-01 | 4.28391E-01 |
| TLBO | Friedman | 2.05435E-01 | 5.30463E-01 | 5.30463E-01 | 4.42194E-01 |
| TLBO | Friedman Aligned | 4.91056E-01 | 1.0 | 1.0 | 8.19950E-01 |
| TLBO | Quade | 6.72809E-01 | 1.0 | 1.0 | 9.41340E-01 |
| EBLSHADE | Friedman | 8.26822E-01 | 1.0 | 1.0 | 9.60723E-01 |
| EBLSHADE | Friedman Aligned | 7.33523E-01 | 1.0 | 1.0 | 9.12968E-01 |
| EBLSHADE | Quade | 8.85007E-01 | 1.0 | 1.0 | 9.81556E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S26.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 9.99088E-01 | 1.0 | 1.0 | 9.99088E-01 |
| CWOA | Friedman Aligned | 2.64607E-10 | 2.64607E-10 | 2.64607E-10 | 2.64607E-10 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 2.86786E-07 | 5.29452E-07 | 5.29452E-07 | 5.29452E-07 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S26** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S27.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 1.04337E-06 | 1.04337E-06 | 1.04337E-06 | 1.04337E-06 |
| CWOA | Friedman Aligned | 2.99270E-10 | 9.20832E-10 | 9.20832E-10 | 9.20832E-10 |
| CWOA | Quade | 5.51537E-01 | 7.77695E-01 | 7.77695E-01 | 5.51537E-01 |
| NNA | Friedman | 1.81715E-05 | 3.35477E-05 | 3.35477E-05 | 3.35472E-05 |
| NNA | Friedman Aligned | 2.90478E-10 | 7.37368E-10 | 7.37368E-10 | 7.37368E-10 |
| NNA | Quade | 5.51537E-01 | 1.0 | 1.0 | 7.31301E-01 |
| PSO | Friedman | 2.28284E-05 | 5.79495E-05 | 5.79495E-05 | 5.79480E-05 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 5.51537E-01 | 9.45753E-01 | 9.45753E-01 | 6.26599E-01 |
| WW | Friedman | 6.10355E-05 | 1.87806E-04 | 1.87806E-04 | 1.87790E-04 |
| WW | Friedman Aligned | 1.09380E-09 | 3.78623E-09 | 3.78623E-09 | 3.78623E-09 |
| WW | Quade | 5.51537E-01 | 1.0 | 1.0 | 8.60596E-01 |
| ISCA | Friedman | 2.12534E-03 | 7.36176E-03 | 7.36176E-03 | 7.33772E-03 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 6.03485E-01 | 1.0 | 1.0 | 9.59322E-01 |
| GOTLBO | Friedman | 6.56427E-03 | 2.42803E-02 | 2.42803E-02 | 2.40239E-02 |
| GOTLBO | Friedman Aligned | 3.19607E-09 | 1.18009E-08 | 1.18009E-08 | 1.18009E-08 |
| GOTLBO | Quade | 7.44807E-01 | 1.0 | 1.0 | 9.93544E-01 |
| MABC | Friedman | 1.94748E-02 | 7.37379E-02 | 7.37379E-02 | 7.14482E-02 |
| MABC | Friedman Aligned | 1.63074E-06 | 6.14664E-06 | 6.14664E-06 | 6.14663E-06 |
| MABC | Quade | 7.44807E-01 | 1.0 | 1.0 | 9.93544E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S27** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S28.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 4.38236E-01 | 5.64070E-01 | 5.64070E-01 | 4.38236E-01 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 9.98650E-01 | 1.0 | 1.0 | 9.98650E-01 |
| PSO | Friedman | 7.26197E-01 | 1.0 | 1.0 | 9.41422E-01 |
| PSO | Friedman Aligned | 1.22720E-04 | 3.11535E-04 | 3.11535E-04 | 3.11491E-04 |
| PSO | Quade | 9.98650E-01 | 1.0 | 1.0 | 9.99526E-01 |
| NNA | Friedman | 7.26197E-01 | 1.0 | 1.0 | 9.08499E-01 |
| NNA | Friedman Aligned | 2.86687E-09 | 5.29268E-09 | 5.29268E-09 | 5.29268E-09 |
| NNA | Quade | 9.98650E-01 | 1.0 | 1.0 | 9.99934E-01 |
| WW | Friedman | 7.54881E-01 | 1.0 | 1.0 | 9.86782E-01 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.98650E-01 | 1.0 | 1.0 | 9.99999E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S28** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S29.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 9.99864E-01 | 1.0 | 1.0 | 9.99864E-01 |
| CWOA | Friedman Aligned | 9.57403E-01 | 1.0 | 1.0 | 9.57403E-01 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S29** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S30.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S30** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S31.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *n*1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 9.85182E-01 | 1.0 | 1.0 | 9.85182E-01 |
| CWOA | Friedman Aligned | 1.67199E-08 | 3.60651E-08 | 3.60651E-08 | 3.60651E-08 |
| CWOA | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99991E-01 |
| PSO | Friedman | 9.99446E-01 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.67199E-08 | 3.08676E-08 | 3.08676E-08 | 3.08676E-08 |
| PSO | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99999E-01 |
| NNA | Friedman | 9.99446E-01 | 1.0 | 1.0 | 9.99999E-01 |
| NNA | Friedman Aligned | 2.58561E-09 | 2.58561E-09 | 2.58561E-09 | 2.58561E-09 |
| NNA | Quade | 9.99991E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S31** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 8.96669E-01 | 1.0 | 1.0 | 9.99613E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 2.25568E-01 | 7.56404E-01 | 7.56404E-01 | 5.44583E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S32.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.58394E-05 | 1.58395E-05 | 1.58395E-05 | 1.58394E-05 |
| GOTLBO | Friedman Aligned | 1.10556E-12 | 2.04103E-12 | 2.04103E-12 | 2.04103E-12 |
| GOTLBO | Quade | 6.53381E-01 | 1.0 | 1.0 | 7.22069E-01 |
| PSO | Friedman | 2.04155E-05 | 3.76906E-05 | 3.76906E-05 | 3.76899E-05 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.53381E-01 | 1.0 | 1.0 | 6.53381E-01 |
| ISCA | Friedman | 4.72466E-05 | 1.19936E-04 | 1.19936E-04 | 1.19929E-04 |
| ISCA | Friedman Aligned | 1.10556E-12 | 2.72826E-12 | 2.72826E-12 | 2.72826E-12 |
| ISCA | Quade | 6.53381E-01 | 1.0 | 1.0 | 7.12615E-01 |
| NNA | Friedman | 4.72466E-05 | 1.35747E-04 | 1.35747E-04 | 1.35739E-04 |
| NNA | Friedman Aligned | 1.10556E-12 | 2.75335E-12 | 2.75335E-12 | 2.75335E-12 |
| NNA | Quade | 6.53381E-01 | 1.0 | 1.0 | 7.22069E-01 |
| CWOA | Friedman | 6.04602E-05 | 2.09289E-04 | 2.09289E-04 | 2.09270E-04 |
| CWOA | Friedman Aligned | 6.56553E-10 | 2.27268E-09 | 2.27268E-09 | 2.27268E-09 |
| CWOA | Quade | 6.53381E-01 | 1.0 | 1.0 | 7.63921E-01 |
| WW | Friedman | 2.94224E-03 | 1.08723E-02 | 1.08723E-02 | 1.08207E-02 |
| WW | Friedman Aligned | 1.94472E-05 | 7.18054E-05 | 7.18054E-05 | 7.18031E-05 |
| WW | Quade | 6.53381E-01 | 1.0 | 1.0 | 9.31924E-01 |
| MABC | Friedman | 2.85543E-01 | 1.0 | 1.0 | 7.18420E-01 |
| MABC | Friedman Aligned | 5.68648E-01 | 1.0 | 1.0 | 9.57966E-01 |
| MABC | Quade | 7.47708E-01 | 1.0 | 1.0 | 9.94433E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S32** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.98751E-01 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S33.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 1.40443E-09 | 4.32133E-09 | 4.32133E-09 | 4.32133E-09 |
| GOTLBO | Quade | 2.61275E-03 | 4.15154E-03 | 3.95252E-03 | 4.14372E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 2.61275E-03 | 2.61590E-03 | 2.61590E-03 | 2.61275E-03 |
| MABC | Friedman | 1.66844E-12 | 4.23528E-12 | 4.23528E-12 | 4.23528E-12 |
| MABC | Friedman Aligned | 1.97530E-05 | 7.44541E-05 | 7.44541E-05 | 7.44517E-05 |
| MABC | Quade | 1.75248E-02 | 6.63245E-02 | 6.63245E-02 | 6.44687E-02 |
| WW | Friedman | 9.41487E-11 | 2.89688E-10 | 2.89688E-10 | 2.89688E-10 |
| WW | Friedman Aligned | <1E-13 | 2.10054E-13 | 2.10054E-13 | 2.10054E-13 |
| WW | Quade | 5.37659E-03 | 1.98809E-02 | 1.98809E-02 | 1.97088E-02 |
| CWOA | Friedman | 7.48653E-09 | 2.59149E-08 | 2.59149E-08 | 2.59149E-08 |
| CWOA | Friedman Aligned | 1.94632E-09 | 7.18643E-09 | 7.18643E-09 | 7.18643E-09 |
| CWOA | Quade | 2.61275E-03 | 6.00747E-03 | 6.00747E-03 | 5.99146E-03 |
| DE | Friedman | 8.54237E-09 | 3.15410E-08 | 3.15118E-08 | 3.15410E-08 |
| DE | Friedman Aligned | 7.66528E-04 | 2.83067E-03 | 2.83067E-03 | 2.82734E-03 |
| DE | Quade | 7.68637E-02 | 2.88156E-01 | 2.51938E-01 | 2.55695E-01 |
| NNA | Friedman | 8.54237E-09 | 3.15410E-08 | 3.15118E-08 | 3.15410E-08 |
| NNA | Friedman Aligned | 1.40443E-09 | 4.60157E-09 | 4.60157E-09 | 4.60157E-09 |
| NNA | Quade | 2.61275E-03 | 4.15154E-03 | 3.95252E-03 | 4.14372E-03 |
| ISCA | Friedman | 8.70900E-09 | 3.21563E-08 | 3.21563E-08 | 3.21563E-08 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.61275E-03 | 3.70459E-03 | 3.70459E-03 | 3.69830E-03 |
| **Table S33** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.00756E-08 | 3.48770E-08 | 3.48770E-08 | 3.48770E-08 |
| IJAYA | Friedman Aligned | 1.77340E-03 | 6.14036E-03 | 6.14036E-03 | 6.12529E-03 |
| IJAYA | Quade | 7.68637E-02 | 2.88156E-01 | 2.51938E-01 | 2.55695E-01 |
| NDE | Friedman | 4.85736E-06 | 1.49457E-05 | 1.49457E-05 | 1.49457E-05 |
| NDE | Friedman Aligned | 6.70249E-02 | 2.07871E-01 | 2.07871E-01 | 1.92221E-01 |
| NDE | Quade | 1.61095E-01 | 5.05559E-01 | 5.05559E-01 | 4.17534E-01 |
| TLBO | Friedman | 2.01098E-01 | 5.19063E-01 | 5.19063E-01 | 4.34434E-01 |
| TLBO | Friedman Aligned | 7.84943E-01 | 1.0 | 1.0 | 9.79783E-01 |
| TLBO | Quade | 7.20831E-01 | 1.0 | 1.0 | 9.60794E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S34.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 2.23361E-09 | 6.87266E-09 | 6.87266E-09 | 6.87266E-09 |
| GOTLBO | Quade | 2.57827E-03 | 4.09880E-03 | 3.90245E-03 | 4.09117E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 2.57827E-03 | 2.58134E-03 | 2.58134E-03 | 2.57827E-03 |
| MABC | Friedman | 6.35048E-13 | 1.61204E-12 | 1.61204E-12 | 1.61204E-12 |
| MABC | Friedman Aligned | 7.88131E-06 | 2.97065E-05 | 2.97065E-05 | 2.97062E-05 |
| MABC | Quade | 1.73550E-02 | 6.56791E-02 | 6.56791E-02 | 6.38590E-02 |
| WW | Friedman | 1.84926E-10 | 5.69003E-10 | 5.69003E-10 | 5.69003E-10 |
| WW | Friedman Aligned | 3.15599E-13 | 8.01137E-13 | 8.01137E-13 | 8.01137E-13 |
| WW | Quade | 5.31725E-03 | 1.96611E-02 | 1.96611E-02 | 1.94928E-02 |
| DE | Friedman | 4.61292E-09 | 1.59678E-08 | 1.59678E-08 | 1.59678E-08 |
| DE | Friedman Aligned | 3.62181E-04 | 1.33738E-03 | 1.33738E-03 | 1.33663E-03 |
| DE | Quade | 7.62673E-02 | 2.85885E-01 | 2.49968E-01 | 2.53918E-01 |
| IJAYA | Friedman | 6.88175E-09 | 2.54096E-08 | 2.54096E-08 | 2.54096E-08 |
| IJAYA | Friedman Aligned | 8.79672E-04 | 3.04543E-03 | 3.04543E-03 | 3.04172E-03 |
| IJAYA | Quade | 7.62673E-02 | 2.85885E-01 | 2.49968E-01 | 2.53918E-01 |
| CWOA | Friedman | 8.73483E-09 | 3.29236E-08 | 3.29236E-08 | 3.29236E-08 |
| CWOA | Friedman Aligned | 4.27917E-09 | 1.58000E-08 | 1.58000E-08 | 1.58000E-08 |
| CWOA | Quade | 2.57827E-03 | 5.93402E-03 | 5.93402E-03 | 5.91840E-03 |
| NNA | Friedman | 1.17491E-08 | 4.33811E-08 | 4.27586E-08 | 4.33811E-08 |
| NNA | Friedman Aligned | 2.23361E-09 | 7.25937E-09 | 7.25937E-09 | 7.25937E-09 |
| NNA | Quade | 2.57827E-03 | 4.09880E-03 | 3.90245E-03 | 4.09117E-03 |
| **Table S34** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.23525E-08 | 4.33811E-08 | 4.27586E-08 | 4.33811E-08 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.57827E-03 | 3.65691E-03 | 3.65691E-03 | 3.65079E-03 |
| NDE | Friedman | 2.55436E-06 | 7.85957E-06 | 7.85957E-06 | 7.85955E-06 |
| NDE | Friedman Aligned | 4.19953E-02 | 1.29854E-01 | 1.29854E-01 | 1.23666E-01 |
| NDE | Quade | 1.60056E-01 | 5.02233E-01 | 5.02233E-01 | 4.15313E-01 |
| TLBO | Friedman | 1.57702E-01 | 4.05499E-01 | 4.05499E-01 | 3.53159E-01 |
| TLBO | Friedman Aligned | 6.48054E-01 | 1.0 | 1.0 | 9.29409E-01 |
| TLBO | Quade | 7.18467E-01 | 1.0 | 1.0 | 9.59945E-01 |
| EBLSHADE | Friedman | 9.13338E-01 | 1.0 | 9.23824E-01 | 9.89059E-01 |
| EBLSHADE | Friedman Aligned | 8.67482E-01 | 1.0 | 1.0 | 9.76034E-01 |
| EBLSHADE | Quade | 9.98363E-01 | 1.0 | 1.0 | 9.99993E-01 |
| STLBO | Friedman | 9.23824E-01 | 1.0 | 9.23824E-01 | 9.89059E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S35.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.27739E-08 | 1.27739E-08 | 1.27739E-08 | 1.27739E-08 |
| GOTLBO | Friedman Aligned | 2.60296E-09 | 8.00911E-09 | 8.00911E-09 | 8.00911E-09 |
| GOTLBO | Quade | 3.14219E-01 | 4.69400E-01 | 4.39320E-01 | 3.81037E-01 |
| PSO | Friedman | 2.06453E-08 | 3.81143E-08 | 3.81143E-08 | 3.81143E-08 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 3.14219E-01 | 3.71777E-01 | 3.71777E-01 | 3.14219E-01 |
| ISCA | Friedman | 6.53133E-08 | 1.65795E-07 | 1.65795E-07 | 1.65795E-07 |
| ISCA | Friedman Aligned | 4.15456E-11 | 1.05462E-10 | 1.05462E-10 | 1.05462E-10 |
| ISCA | Quade | 3.14219E-01 | 4.50989E-01 | 4.39320E-01 | 3.68516E-01 |
| NNA | Friedman | 6.53133E-08 | 1.98658E-07 | 1.98658E-07 | 1.98658E-07 |
| NNA | Friedman Aligned | 2.77977E-09 | 9.62227E-09 | 9.62227E-09 | 9.62227E-09 |
| NNA | Quade | 3.14219E-01 | 4.69400E-01 | 4.39320E-01 | 3.81037E-01 |
| CWOA | Friedman | 1.02048E-07 | 3.53244E-07 | 3.53244E-07 | 3.53244E-07 |
| CWOA | Friedman Aligned | <1E-13 | 1.78524E-13 | 1.78524E-13 | 1.78524E-13 |
| CWOA | Quade | 3.14219E-01 | 5.48252E-01 | 5.48252E-01 | 4.32016E-01 |
| WW | Friedman | 1.69355E-05 | 6.25314E-05 | 6.25314E-05 | 6.25297E-05 |
| WW | Friedman Aligned | 4.63527E-09 | 1.71148E-08 | 1.71148E-08 | 1.71148E-08 |
| WW | Quade | 3.14219E-01 | 1.0 | 1.0 | 6.85077E-01 |
| MABC | Friedman | 1.47478E-02 | 5.57785E-02 | 5.57785E-02 | 5.44627E-02 |
| MABC | Friedman Aligned | 2.56191E-02 | 9.71425E-02 | 9.71425E-02 | 9.31905E-02 |
| MABC | Quade | 4.65703E-01 | 1.0 | 1.0 | 9.05822E-01 |
| DE | Friedman | 3.11442E-01 | 1.0 | 1.0 | 7.47869E-01 |
| DE | Friedman Aligned | 1.88248E-01 | 7.22700E-01 | 7.22700E-01 | 5.37019E-01 |
| DE | Quade | 8.21502E-01 | 1.0 | 1.0 | 9.98275E-01 |
| **Table S35** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 3.29145E-01 | 1.0 | 1.0 | 7.48888E-01 |
| IJAYA | Friedman Aligned | 2.72182E-01 | 9.87202E-01 | 9.87202E-01 | 6.67044E-01 |
| IJAYA | Quade | 8.21502E-01 | 1.0 | 1.0 | 9.98275E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S36.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 6.84156E-03 | 6.86326E-03 | 6.86326E-03 | 6.84156E-03 |
| GOTLBO | Friedman Aligned | 1.87628E-12 | 2.89635E-12 | 2.89635E-12 | 2.89635E-12 |
| GOTLBO | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.89041E-01 |
| PSO | Friedman | 6.84988E-03 | 1.26827E-02 | 1.26827E-02 | 1.26093E-02 |
| PSO | Friedman Aligned | 7.99504E-09 | 2.46001E-08 | 2.46001E-08 | 2.46001E-08 |
| PSO | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.80537E-01 |
| ISCA | Friedman | 1.11987E-02 | 2.85508E-02 | 2.85508E-02 | 2.81832E-02 |
| ISCA | Friedman Aligned | 5.83509E-10 | 1.48121E-09 | 1.48121E-09 | 1.48121E-09 |
| ISCA | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.88524E-01 |
| NNA | Friedman | 1.11987E-02 | 3.03504E-02 | 3.03504E-02 | 2.99392E-02 |
| NNA | Friedman Aligned | 1.87628E-12 | 1.87628E-12 | 1.87628E-12 | 1.87628E-12 |
| NNA | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.89041E-01 |
| CWOA | Friedman | 1.15188E-02 | 4.00150E-02 | 4.00150E-02 | 3.93107E-02 |
| CWOA | Friedman Aligned | 1.52119E-07 | 5.26565E-07 | 5.26565E-07 | 5.26565E-07 |
| CWOA | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.92456E-01 |
| WW | Friedman | 1.44016E-01 | 5.54046E-01 | 5.54046E-01 | 4.36826E-01 |
| WW | Friedman Aligned | 8.90158E-04 | 3.28753E-03 | 3.28753E-03 | 3.28280E-03 |
| WW | Quade | 9.80537E-01 | 1.0 | 1.0 | 9.99848E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S36** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S37.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 2.04947E-13 | 2.04947E-13 | 2.04947E-13 | 2.04947E-13 |
| WW | Friedman Aligned | 1.71270E-13 | 4.34763E-13 | 4.34763E-13 | 4.34763E-13 |
| WW | Quade | 2.09412E-02 | 7.77621E-02 | 7.77621E-02 | 7.51674E-02 |
| CWOA | Friedman | 2.93825E-11 | 5.42446E-11 | 5.42446E-11 | 5.42446E-11 |
| CWOA | Friedman Aligned | 5.78031E-10 | 1.77856E-09 | 1.71036E-09 | 1.77856E-09 |
| CWOA | Quade | 1.35083E-02 | 2.74130E-02 | 2.74130E-02 | 2.70814E-02 |
| ISCA | Friedman | 3.89592E-11 | 1.17459E-10 | 1.17459E-10 | 1.17459E-10 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.35083E-02 | 1.83968E-02 | 1.83968E-02 | 1.82425E-02 |
| NNA | Friedman | 3.89592E-11 | 9.88964E-11 | 9.88964E-11 | 9.88964E-11 |
| NNA | Friedman Aligned | 5.78031E-10 | 1.77856E-09 | 1.71036E-09 | 1.77856E-09 |
| NNA | Quade | 1.35083E-02 | 2.01743E-02 | 1.91111E-02 | 1.99904E-02 |
| PSO | Friedman | 1.23417E-10 | 4.27212E-10 | 4.27212E-10 | 4.27212E-10 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.35083E-02 | 1.35932E-02 | 1.35932E-02 | 1.35083E-02 |
| GOTLBO | Friedman | 2.64018E-10 | 9.74834E-10 | 9.74834E-10 | 9.74834E-10 |
| GOTLBO | Friedman Aligned | 5.78031E-10 | 1.77856E-09 | 1.71036E-09 | 1.77856E-09 |
| GOTLBO | Quade | 1.35083E-02 | 2.01743E-02 | 1.91111E-02 | 1.99904E-02 |
| MABC | Friedman | 6.34021E-09 | 2.38977E-08 | 2.38977E-08 | 2.38977E-08 |
| MABC | Friedman Aligned | 9.29163E-05 | 3.50231E-04 | 3.50231E-04 | 3.50178E-04 |
| MABC | Quade | 5.71120E-02 | 2.18187E-01 | 2.18187E-01 | 1.98812E-01 |
| DE | Friedman | 9.58882E-06 | 3.54050E-05 | 3.54050E-05 | 3.54044E-05 |
| DE | Friedman Aligned | 2.67052E-03 | 9.86544E-03 | 9.86544E-03 | 9.82497E-03 |
| DE | Quade | 1.93779E-01 | 7.44857E-01 | 6.46164E-01 | 5.48560E-01 |
| **Table S37** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.33429E-05 | 4.61871E-05 | 4.61871E-05 | 4.61862E-05 |
| IJAYA | Friedman Aligned | 5.66798E-03 | 1.96371E-02 | 1.96371E-02 | 1.94834E-02 |
| IJAYA | Quade | 1.93779E-01 | 7.44857E-01 | 6.46164E-01 | 5.48560E-01 |
| NDE | Friedman | 1.43301E-03 | 4.40998E-03 | 4.40998E-03 | 4.40270E-03 |
| NDE | Friedman Aligned | 1.41455E-01 | 4.42799E-01 | 4.42799E-01 | 3.74549E-01 |
| NDE | Quade | 3.43054E-01 | 1.0 | 1.0 | 7.25493E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S38.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 2.72905E-06 | 2.72905E-06 | 2.72905E-06 | 2.72905E-06 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S38** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S39.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 2.23361E-09 | 6.87266E-09 | 6.87266E-09 | 6.87266E-09 |
| GOTLBO | Quade | 2.38776E-03 | 3.80690E-03 | 3.62535E-03 | 3.80032E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 2.38776E-03 | 2.39040E-03 | 2.39040E-03 | 2.38776E-03 |
| MABC | Friedman | 1.28357E-12 | 3.25828E-12 | 3.25828E-12 | 3.25828E-12 |
| MABC | Friedman Aligned | 7.88131E-06 | 2.97065E-05 | 2.97065E-05 | 2.97062E-05 |
| MABC | Quade | 1.64044E-02 | 6.20680E-02 | 6.20680E-02 | 6.04412E-02 |
| WW | Friedman | 1.13508E-10 | 3.49256E-10 | 3.49256E-10 | 3.49256E-10 |
| WW | Friedman Aligned | 3.15599E-13 | 8.01137E-13 | 8.01137E-13 | 8.01137E-13 |
| WW | Quade | 4.98681E-03 | 1.84376E-02 | 1.84376E-02 | 1.82896E-02 |
| DE | Friedman | 8.25810E-09 | 2.85857E-08 | 2.63838E-08 | 2.85857E-08 |
| DE | Friedman Aligned | 3.62181E-04 | 1.33738E-03 | 1.33738E-03 | 1.33663E-03 |
| DE | Quade | 7.29045E-02 | 2.73093E-01 | 2.38867E-01 | 2.43841E-01 |
| CWOA | Friedman | 8.25810E-09 | 2.85857E-08 | 2.63838E-08 | 2.85857E-08 |
| CWOA | Friedman Aligned | 4.27917E-09 | 1.58000E-08 | 1.58000E-08 | 1.58000E-08 |
| CWOA | Quade | 2.38776E-03 | 5.52683E-03 | 5.52683E-03 | 5.51327E-03 |
| IJAYA | Friedman | 9.53069E-09 | 3.59234E-08 | 3.04931E-08 | 3.59234E-08 |
| IJAYA | Friedman Aligned | 8.79672E-04 | 3.04543E-03 | 3.04543E-03 | 3.04172E-03 |
| IJAYA | Quade | 7.29045E-02 | 2.73093E-01 | 2.38867E-01 | 2.43841E-01 |
| ISCA | Friedman | 9.53069E-09 | 3.59234E-08 | 3.04931E-08 | 3.59234E-08 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.38776E-03 | 3.39323E-03 | 3.39323E-03 | 3.38795E-03 |
| **Table S39** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 9.53069E-09 | 3.59234E-08 | 3.04931E-08 | 3.59234E-08 |
| NNA | Friedman Aligned | 2.23361E-09 | 7.25937E-09 | 7.25937E-09 | 7.25937E-09 |
| NNA | Quade | 2.38776E-03 | 3.80690E-03 | 3.62535E-03 | 3.80032E-03 |
| NDE | Friedman | 4.08314E-06 | 1.25635E-05 | 1.25635E-05 | 1.25635E-05 |
| NDE | Friedman Aligned | 4.19953E-02 | 1.29854E-01 | 1.29854E-01 | 1.23666E-01 |
| NDE | Quade | 1.54173E-01 | 4.83401E-01 | 4.83401E-01 | 4.02619E-01 |
| TLBO | Friedman | 1.88486E-01 | 4.85963E-01 | 4.85963E-01 | 4.11494E-01 |
| TLBO | Friedman Aligned | 6.48054E-01 | 1.0 | 1.0 | 9.29409E-01 |
| TLBO | Quade | 7.04858E-01 | 1.0 | 9.84554E-01 | 9.54846E-01 |
| EBLSHADE | Friedman | 9.78729E-01 | 1.0 | 1.0 | 9.99182E-01 |
| EBLSHADE | Friedman Aligned | 8.67482E-01 | 1.0 | 1.0 | 9.76034E-01 |
| EBLSHADE | Quade | 9.87023E-01 | 1.0 | 9.84554E-01 | 9.99671E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 9.87023E-01 | 1.0 | 9.84554E-01 | 9.99671E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S40.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S40** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S41.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 9.73564E-06 | 9.73569E-06 | 9.73569E-06 | 9.73564E-06 |
| GOTLBO | Friedman Aligned | 4.31832E-12 | 1.09619E-11 | 1.09619E-11 | 1.09619E-11 |
| GOTLBO | Quade | 6.70250E-01 | 1.0 | 1.0 | 7.37556E-01 |
| PSO | Friedman | 1.27717E-05 | 2.35787E-05 | 2.35787E-05 | 2.35785E-05 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.70250E-01 | 1.0 | 1.0 | 6.70250E-01 |
| ISCA | Friedman | 3.02807E-05 | 7.68673E-05 | 7.68673E-05 | 7.68646E-05 |
| ISCA | Friedman Aligned | 2.29483E-13 | 4.23661E-13 | 4.23661E-13 | 4.23661E-13 |
| ISCA | Quade | 6.70250E-01 | 1.0 | 1.0 | 7.28467E-01 |
| NNA | Friedman | 3.02807E-05 | 8.73835E-05 | 8.73835E-05 | 8.73801E-05 |
| NNA | Friedman Aligned | 5.02987E-12 | 1.54765E-11 | 1.54765E-11 | 1.54765E-11 |
| NNA | Quade | 6.70250E-01 | 1.0 | 1.0 | 7.37556E-01 |
| CWOA | Friedman | 3.93486E-05 | 1.36208E-04 | 1.36208E-04 | 1.36200E-04 |
| CWOA | Friedman Aligned | 1.16523E-10 | 4.03347E-10 | 4.03347E-10 | 4.03347E-10 |
| CWOA | Quade | 6.70250E-01 | 1.0 | 1.0 | 7.78072E-01 |
| WW | Friedman | 2.10239E-03 | 7.76707E-03 | 7.76707E-03 | 7.74073E-03 |
| WW | Friedman Aligned | 5.51419E-06 | 2.03601E-05 | 2.03601E-05 | 2.03600E-05 |
| WW | Quade | 6.70250E-01 | 1.0 | 1.0 | 9.38720E-01 |
| MABC | Friedman | 2.41545E-01 | 9.68227E-01 | 9.68227E-01 | 6.47281E-01 |
| MABC | Friedman Aligned | 4.01332E-01 | 1.0 | 1.0 | 8.55401E-01 |
| MABC | Quade | 7.60748E-01 | 1.0 | 1.0 | 9.95442E-01 |
| DE | Friedman | 9.84761E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 9.21905E-01 | 1.0 | 1.0 | 9.99918E-01 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S41** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S42.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 9.99999E-01 | 1.0 | 1.0 | 9.99999E-01 |
| GOTLBO | Friedman Aligned | 9.23523E-01 | 1.0 | 1.0 | 9.92894E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 9.99999E-01 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.42884E-08 | 1.42884E-08 | 1.42884E-08 | 1.42884E-08 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S42** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 9.23523E-01 | 1.0 | 1.0 | 9.91314E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S43.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 9.99996E-01 | 1.0 | 1.0 | 9.99996E-01 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 9.99996E-01 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 3.95810E-06 | 3.95810E-06 | 3.95810E-06 | 3.95810E-06 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.99999E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S43** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S44.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *R*p1 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 9.99951E-01 | 1.0 | 1.0 | 9.99951E-01 |
| GOTLBO | Friedman Aligned | 2.69091E-01 | 6.09156E-01 | 6.09156E-01 | 4.65633E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 9.99951E-01 | 1.0 | 1.0 | 9.99998E-01 |
| PSO | Friedman Aligned | 1.74407E-11 | 1.74407E-11 | 1.74407E-11 | 1.74407E-11 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.99951E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 7.07645E-01 | 1.0 | 1.0 | 9.77267E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.99951E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 2.69091E-01 | 5.64974E-01 | 5.64974E-01 | 4.39377E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S44** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S45.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *R*p1evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 7.42350E-01 | 1.0 | 1.0 | 7.42350E-01 |
| GOTLBO | Friedman Aligned | 6.80259E-04 | 1.52988E-03 | 1.52988E-03 | 1.52881E-03 |
| GOTLBO | Quade | 9.99837E-01 | 1.0 | 1.0 | 9.99953E-01 |
| PSO | Friedman | 7.42350E-01 | 1.0 | 1.0 | 8.46939E-01 |
| PSO | Friedman Aligned | 2.26308E-10 | 2.26308E-10 | 2.26308E-10 | 2.26308E-10 |
| PSO | Quade | 9.99837E-01 | 1.0 | 1.0 | 9.99837E-01 |
| ISCA | Friedman | 7.42350E-01 | 1.0 | 1.0 | 9.45174E-01 |
| ISCA | Friedman Aligned | 1.21307E-02 | 3.74832E-02 | 3.74832E-02 | 3.68572E-02 |
| ISCA | Quade | 9.99837E-01 | 1.0 | 1.0 | 9.99947E-01 |
| NNA | Friedman | 7.42350E-01 | 1.0 | 1.0 | 9.45174E-01 |
| NNA | Friedman Aligned | 6.80259E-04 | 1.25623E-03 | 1.25623E-03 | 1.25550E-03 |
| NNA | Quade | 9.99837E-01 | 1.0 | 1.0 | 9.99953E-01 |
| CWOA | Friedman | 7.42350E-01 | 1.0 | 1.0 | 9.61674E-01 |
| CWOA | Friedman Aligned | 1.44448E-01 | 5.24146E-01 | 5.24146E-01 | 4.17268E-01 |
| CWOA | Quade | 9.99837E-01 | 1.0 | 1.0 | 9.99984E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S45** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S46.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.07433E-01 | 3.62209E-01 | 3.62209E-01 | 3.07433E-01 |
| PSO | Friedman Aligned | 1.93615E-05 | 1.93617E-05 | 1.93617E-05 | 1.93615E-05 |
| PSO | Quade | 9.96926E-01 | 1.0 | 1.0 | 9.96926E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S46** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S47.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 3.11751E-13 | 8.99281E-13 | 8.99281E-13 | 8.99281E-13 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 3.35107E-02 | 8.46505E-02 | 8.46505E-02 | 8.14674E-02 |
| IJAYA | Friedman | 3.11751E-13 | 8.41549E-13 | 8.41549E-13 | 8.41549E-13 |
| IJAYA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| IJAYA | Quade | 3.35107E-02 | 6.27616E-02 | 6.27616E-02 | 6.09874E-02 |
| NNA | Friedman | 3.11751E-13 | 3.32179E-13 | 3.32179E-13 | 3.32179E-13 |
| NNA | Friedman Aligned | 1.48834E-09 | 4.57951E-09 | 4.57951E-09 | 4.57951E-09 |
| NNA | Quade | 3.35256E-02 | 1.16402E-01 | 1.02123E-01 | 1.10644E-01 |
| CWOA | Friedman | 3.11751E-13 | 3.11751E-13 | 3.11751E-13 | 3.11751E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 3.35256E-02 | 1.04376E-01 | 9.59914E-02 | 9.96075E-02 |
| WW | Friedman | 3.11751E-13 | 3.30402E-13 | 3.30402E-13 | 3.30402E-13 |
| WW | Friedman Aligned | 2.28617E-13 | 7.91367E-13 | 7.91367E-13 | 7.91367E-13 |
| WW | Quade | 3.35256E-02 | 1.04376E-01 | 9.59914E-02 | 9.96075E-02 |
| MABC | Friedman | 3.78623E-13 | 1.39799E-12 | 1.24967E-12 | 1.39799E-12 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 3.35256E-02 | 1.16402E-01 | 1.02123E-01 | 1.10644E-01 |
| GOTLBO | Friedman | 3.78623E-13 | 1.39799E-12 | 1.22324E-12 | 1.39799E-12 |
| GOTLBO | Friedman Aligned | 4.42446E-10 | 1.63365E-09 | 1.63365E-09 | 1.63365E-09 |
| GOTLBO | Quade | 3.35256E-02 | 1.16402E-01 | 1.04050E-01 | 1.10644E-01 |
| ISCA | Friedman | 3.78623E-13 | 1.39799E-12 | 1.22324E-12 | 1.39799E-12 |
| ISCA | Friedman Aligned | 1.21214E-09 | 4.19586E-09 | 4.19586E-09 | 4.19586E-09 |
| ISCA | Quade | 3.35256E-02 | 1.16402E-01 | 1.11569E-01 | 1.10644E-01 |
| **Table S47** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 7.79360E-10 | 2.69779E-09 | 2.69779E-09 | 2.69779E-09 |
| NDE | Friedman Aligned | 4.65894E-12 | 1.72022E-11 | 1.72022E-11 | 1.72022E-11 |
| NDE | Quade | 5.14231E-02 | 1.59184E-01 | 1.59184E-01 | 1.49931E-01 |
| PSO | Friedman | 9.39925E-09 | 2.89208E-08 | 2.89208E-08 | 2.89208E-08 |
| PSO | Friedman Aligned | 6.99497E-11 | 2.63656E-10 | 2.63656E-10 | 2.63656E-10 |
| PSO | Quade | 4.42167E-03 | 4.43072E-03 | 4.43072E-03 | 4.42167E-03 |
| TLBO | Friedman | 1.21775E-01 | 3.12161E-01 | 3.12161E-01 | 2.80806E-01 |
| TLBO | Friedman Aligned | 2.56398E-01 | 6.65169E-01 | 6.65169E-01 | 5.28586E-01 |
| TLBO | Quade | 6.64444E-01 | 1.0 | 1.0 | 9.37458E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S48.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | 1.37251E-10 | 4.75100E-10 | 4.75100E-10 | 4.75100E-10 |
| PSO | Quade | 1.26537E-03 | 1.26611E-03 | 1.26611E-03 | 1.26537E-03 |
| MABC | Friedman | 1.32783E-13 | 2.45137E-13 | 2.37588E-13 | 2.45137E-13 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 1.30356E-02 | 4.64870E-02 | 4.07958E-02 | 4.55525E-02 |
| GOTLBO | Friedman | 1.32783E-13 | 2.61346E-13 | 2.37588E-13 | 2.61346E-13 |
| GOTLBO | Friedman Aligned | 3.62435E-09 | 1.33822E-08 | 1.33822E-08 | 1.33822E-08 |
| GOTLBO | Quade | 1.30356E-02 | 4.64870E-02 | 4.23263E-02 | 4.55525E-02 |
| ISCA | Friedman | 1.32783E-13 | 2.61346E-13 | 2.37588E-13 | 2.61346E-13 |
| ISCA | Friedman Aligned | 7.90632E-09 | 2.73680E-08 | 2.73680E-08 | 2.73680E-08 |
| ISCA | Quade | 1.34430E-02 | 4.66302E-02 | 4.66302E-02 | 4.57685E-02 |
| NNA | Friedman | 3.34843E-13 | 1.15907E-12 | 1.12266E-12 | 1.15907E-12 |
| NNA | Friedman Aligned | 9.12892E-09 | 2.80890E-08 | 2.80890E-08 | 2.80890E-08 |
| NNA | Quade | 1.30356E-02 | 4.64870E-02 | 4.07958E-02 | 4.55525E-02 |
| WW | Friedman | 3.34843E-13 | 1.15907E-12 | 1.12266E-12 | 1.15907E-12 |
| WW | Friedman Aligned | 1.56092E-12 | 4.80282E-12 | 4.80282E-12 | 4.80282E-12 |
| WW | Quade | 1.30356E-02 | 4.02919E-02 | 3.71360E-02 | 3.95691E-02 |
| CWOA | Friedman | 2.43957E-12 | 9.19531E-12 | 9.19531E-12 | 9.19531E-12 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.30356E-02 | 4.02919E-02 | 3.71360E-02 | 3.95691E-02 |
| IJAYA | Friedman | 6.38042E-12 | 2.35585E-11 | 2.26019E-11 | 2.35585E-11 |
| IJAYA | Friedman Aligned | 2.28953E-09 | 8.62977E-09 | 8.62977E-09 | 8.62977E-09 |
| IJAYA | Quade | 1.22051E-02 | 2.26497E-02 | 2.26497E-02 | 2.24160E-02 |
| **Table S48** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 6.52944E-12 | 2.35585E-11 | 2.26019E-11 | 2.35585E-11 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 1.24297E-02 | 3.17044E-02 | 3.17044E-02 | 3.12514E-02 |
| NDE | Friedman | 1.48064E-11 | 4.55582E-11 | 4.55582E-11 | 4.55582E-11 |
| NDE | Friedman Aligned | 6.02958E-10 | 2.22631E-09 | 2.22631E-09 | 2.22631E-09 |
| NDE | Quade | 2.30164E-02 | 7.10095E-02 | 7.10095E-02 | 6.91409E-02 |
| TLBO | Friedman | 3.18582E-02 | 8.10716E-02 | 8.10716E-02 | 7.89005E-02 |
| TLBO | Friedman Aligned | 3.76448E-02 | 9.58407E-02 | 9.58407E-02 | 9.28115E-02 |
| TLBO | Quade | 4.57286E-01 | 1.0 | 9.51773E-01 | 7.88058E-01 |
| EBLSHADE | Friedman | 5.87176E-01 | 1.0 | 8.11070E-01 | 8.04727E-01 |
| EBLSHADE | Friedman Aligned | 3.79133E-01 | 7.11894E-01 | 7.11894E-01 | 5.85196E-01 |
| EBLSHADE | Quade | 7.80025E-01 | 1.0 | 9.51773E-01 | 9.38917E-01 |
| STLBO | Friedman | 8.11070E-01 | 1.0 | 8.11070E-01 | 8.11070E-01 |
| STLBO | Friedman Aligned | 9.94880E-01 | 9.94880E-01 | 9.94880E-01 | 9.94880E-01 |
| STLBO | Quade | 9.51773E-01 | 1.0 | 9.51773E-01 | 9.51773E-01 |

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| **Table S49.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 4.14742E-04 | 4.14821E-04 | 4.14821E-04 | 4.14742E-04 |
| PSO | Friedman Aligned | 3.02198E-08 | 5.57904E-08 | 5.57904E-08 | 5.57904E-08 |
| PSO | Quade | 8.28789E-01 | 1.0 | 1.0 | 8.28789E-01 |
| DE | Friedman | 2.83400E-01 | 5.99704E-01 | 5.81181E-01 | 4.59472E-01 |
| DE | Friedman Aligned | 5.25358E-13 | 5.25358E-13 | 5.25358E-13 | 5.25358E-13 |
| DE | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99815E-01 |
| IJAYA | Friedman | 2.83400E-01 | 5.99704E-01 | 5.81181E-01 | 4.59472E-01 |
| IJAYA | Friedman Aligned | 1.33614E-02 | 4.94618E-02 | 4.94618E-02 | 4.84535E-02 |
| IJAYA | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99403E-01 |
| CWOA | Friedman | 2.83400E-01 | 7.89202E-01 | 7.89202E-01 | 5.60486E-01 |
| CWOA | Friedman Aligned | 3.39155E-06 | 1.04356E-05 | 1.04356E-05 | 1.04355E-05 |
| CWOA | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99926E-01 |
| NNA | Friedman | 3.54469E-01 | 1.0 | 1.0 | 7.80203E-01 |
| NNA | Friedman Aligned | 1.07552E-03 | 3.72420E-03 | 3.72420E-03 | 3.71804E-03 |
| NNA | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99931E-01 |
| WW | Friedman | 3.54469E-01 | 1.0 | 1.0 | 7.80203E-01 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99926E-01 |
| MABC | Friedman | 4.01459E-01 | 1.0 | 1.0 | 8.55518E-01 |
| MABC | Friedman Aligned | 1.04059E-07 | 2.64149E-07 | 2.64149E-07 | 2.64149E-07 |
| MABC | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99931E-01 |
| GOTLBO | Friedman | 4.01459E-01 | 1.0 | 1.0 | 8.55518E-01 |
| GOTLBO | Friedman Aligned | 6.40261E-03 | 2.41687E-02 | 2.41687E-02 | 2.39198E-02 |
| GOTLBO | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99931E-01 |
| **Table S49** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 4.01459E-01 | 1.0 | 1.0 | 8.55518E-01 |
| ISCA | Friedman Aligned | 1.50390E-03 | 5.55512E-03 | 5.55512E-03 | 5.54164E-03 |
| ISCA | Quade | 9.82071E-01 | 1.0 | 1.0 | 9.99931E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S50.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.32214E-02 | 3.37419E-02 | 3.37419E-02 | 3.32214E-02 |
| PSO | Friedman Aligned | 5.02265E-12 | 5.02265E-12 | 5.02265E-12 | 5.02265E-12 |
| PSO | Quade | 9.77998E-01 | 1.0 | 1.0 | 9.77998E-01 |
| DE | Friedman | 9.69804E-01 | 1.0 | 1.0 | 9.98438E-01 |
| DE | Friedman Aligned | 8.55596E-02 | 1.63995E-01 | 1.63995E-01 | 1.52213E-01 |
| DE | Quade | 9.99780E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 9.69804E-01 | 1.0 | 1.0 | 9.98438E-01 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.99780E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.69804E-01 | 1.0 | 1.0 | 9.99595E-01 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 9.99780E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.81260E-01 | 1.0 | 1.0 | 9.99999E-01 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.81260E-01 | 1.0 | 1.0 | 9.99999E-01 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.99780E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 9.99360E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.99360E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S50** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S51.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 5.47757E-11 | 5.47757E-11 | 5.47757E-11 | 5.47757E-11 |
| PSO | Friedman Aligned | 5.78066E-11 | 2.00100E-10 | 2.00100E-10 | 2.00100E-10 |
| PSO | Quade | 2.81980E-02 | 2.85718E-02 | 2.85718E-02 | 2.81980E-02 |
| DE | Friedman | 4.02282E-10 | 7.42675E-10 | 7.42675E-10 | 7.42675E-10 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 1.40685E-01 | 3.51358E-01 | 3.51358E-01 | 3.00292E-01 |
| IJAYA | Friedman | 4.02282E-10 | 7.97424E-10 | 7.97424E-10 | 7.97424E-10 |
| IJAYA | Friedman Aligned | 3.62409E-09 | 1.33812E-08 | 1.33812E-08 | 1.33812E-08 |
| IJAYA | Quade | 1.40685E-01 | 2.76675E-01 | 2.76675E-01 | 2.44151E-01 |
| CWOA | Friedman | 7.58384E-10 | 2.33349E-09 | 2.33349E-09 | 2.33349E-09 |
| CWOA | Friedman Aligned | 2.81525E-09 | 1.06113E-08 | 1.06113E-08 | 1.06113E-08 |
| CWOA | Quade | 1.40685E-01 | 4.12529E-01 | 3.77842E-01 | 3.43793E-01 |
| NNA | Friedman | 4.96355E-09 | 1.71815E-08 | 1.64311E-08 | 1.71815E-08 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.40685E-01 | 4.35460E-01 | 3.77842E-01 | 3.60942E-01 |
| WW | Friedman | 4.96355E-09 | 1.71815E-08 | 1.64311E-08 | 1.71815E-08 |
| WW | Friedman Aligned | 8.94877E-10 | 3.30416E-09 | 3.30416E-09 | 3.30416E-09 |
| WW | Quade | 1.40685E-01 | 4.12529E-01 | 3.77842E-01 | 3.43793E-01 |
| MABC | Friedman | 1.60093E-08 | 6.03426E-08 | 4.96032E-08 | 6.03426E-08 |
| MABC | Friedman Aligned | 8.61753E-09 | 2.98299E-08 | 2.55256E-08 | 2.98299E-08 |
| MABC | Quade | 1.40685E-01 | 4.35460E-01 | 3.77842E-01 | 3.60942E-01 |
| GOTLBO | Friedman | 1.60093E-08 | 6.03426E-08 | 4.96032E-08 | 6.03426E-08 |
| GOTLBO | Friedman Aligned | 8.61753E-09 | 2.98299E-08 | 2.55256E-08 | 2.98299E-08 |
| GOTLBO | Quade | 1.40685E-01 | 4.35460E-01 | 3.77842E-01 | 3.60942E-01 |
| **Table S51** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.60093E-08 | 6.03426E-08 | 4.96032E-08 | 6.03426E-08 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.40685E-01 | 4.35460E-01 | 3.87838E-01 | 3.60942E-01 |
| NDE | Friedman | 5.77124E-06 | 1.77577E-05 | 1.77577E-05 | 1.77575E-05 |
| NDE | Friedman Aligned | 4.58966E-13 | 1.41220E-12 | 1.41220E-12 | 1.41220E-12 |
| NDE | Quade | 1.58827E-01 | 4.98296E-01 | 4.98296E-01 | 4.12676E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S52.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.58882E-02 | 3.64967E-02 | 3.64967E-02 | 3.58882E-02 |
| PSO | Friedman Aligned | 1.81719E-08 | 1.81719E-08 | 1.81719E-08 | 1.81719E-08 |
| PSO | Quade | 9.66028E-01 | 1.0 | 1.0 | 9.66028E-01 |
| DE | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.98829E-01 |
| DE | Friedman Aligned | 1.92213E-06 | 3.54855E-06 | 3.54855E-06 | 3.54855E-06 |
| DE | Quade | 9.99387E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.98829E-01 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.99387E-01 | 1.0 | 1.0 | 9.99999E-01 |
| CWOA | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.99716E-01 |
| CWOA | Friedman Aligned | 1.53881E-01 | 5.01146E-01 | 5.01146E-01 | 4.01985E-01 |
| CWOA | Quade | 9.99387E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.85128E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 8.70151E-01 | 1.0 | 1.0 | 9.99147E-01 |
| NNA | Quade | 9.99387E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.85128E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.99387E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S52** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 3.33973E-02 | 8.58886E-02 | 8.58886E-02 | 8.26128E-02 |
| MABC | Quade | 9.99387E-01 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 8.90777E-01 | 1.0 | 1.0 | 9.99719E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S53.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | 1.36951E-10 | 4.74063E-10 | 4.74063E-10 | 4.74063E-10 |
| PSO | Quade | 1.62108E-03 | 1.62229E-03 | 1.62229E-03 | 1.62108E-03 |
| MABC | Friedman | 1.02474E-13 | 1.89182E-13 | 1.77636E-13 | 1.89182E-13 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 1.57469E-02 | 5.58419E-02 | 4.90027E-02 | 5.44965E-02 |
| GOTLBO | Friedman | 1.02474E-13 | 1.89182E-13 | 1.73417E-13 | 1.89182E-13 |
| GOTLBO | Friedman Aligned | 3.57744E-09 | 1.32090E-08 | 1.32090E-08 | 1.32090E-08 |
| GOTLBO | Quade | 1.57469E-02 | 5.58419E-02 | 5.06633E-02 | 5.44965E-02 |
| ISCA | Friedman | 1.02474E-13 | 1.89182E-13 | 1.73417E-13 | 1.89182E-13 |
| ISCA | Friedman Aligned | 7.81461E-09 | 2.70506E-08 | 2.70506E-08 | 2.70506E-08 |
| ISCA | Quade | 1.60006E-02 | 5.58419E-02 | 5.55239E-02 | 5.44965E-02 |
| NNA | Friedman | 1.02474E-13 | 2.11831E-13 | 2.02505E-13 | 2.11831E-13 |
| NNA | Friedman Aligned | 9.02635E-09 | 2.77734E-08 | 2.77734E-08 | 2.77734E-08 |
| NNA | Quade | 1.57469E-02 | 5.58419E-02 | 4.90027E-02 | 5.44965E-02 |
| WW | Friedman | 1.02474E-13 | 2.11831E-13 | 2.02505E-13 | 2.11831E-13 |
| WW | Friedman Aligned | 1.49597E-12 | 4.60298E-12 | 4.60298E-12 | 4.60298E-12 |
| WW | Quade | 1.57469E-02 | 4.87185E-02 | 4.48837E-02 | 4.76642E-02 |
| CWOA | Friedman | 5.07213E-13 | 1.91180E-12 | 1.91180E-12 | 1.91180E-12 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.57469E-02 | 4.87185E-02 | 4.48837E-02 | 4.76642E-02 |
| IJAYA | Friedman | 1.45953E-12 | 5.38902E-12 | 5.23359E-12 | 5.38902E-12 |
| IJAYA | Friedman Aligned | 2.25780E-09 | 8.51019E-09 | 8.51019E-09 | 8.51019E-09 |
| IJAYA | Quade | 1.49333E-02 | 2.77449E-02 | 2.77449E-02 | 2.73948E-02 |
| **Table S53** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.51193E-12 | 5.38902E-12 | 5.23359E-12 | 5.38902E-12 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 1.51015E-02 | 3.85593E-02 | 3.85593E-02 | 3.78906E-02 |
| NDE | Friedman | 7.43248E-11 | 2.28692E-10 | 2.28692E-10 | 2.28692E-10 |
| NDE | Friedman Aligned | 5.85711E-10 | 2.16263E-09 | 2.16263E-09 | 2.16263E-09 |
| NDE | Quade | 2.70504E-02 | 8.34946E-02 | 8.34946E-02 | 8.09165E-02 |
| TLBO | Friedman | 5.71734E-02 | 1.45785E-01 | 1.45785E-01 | 1.38816E-01 |
| TLBO | Friedman Aligned | 3.82516E-02 | 9.73902E-02 | 9.73902E-02 | 9.42628E-02 |
| TLBO | Quade | 4.94637E-01 | 1.0 | 1.0 | 8.23149E-01 |
| EBLSHADE | Friedman | 7.56821E-01 | 1.0 | 1.0 | 9.26494E-01 |
| EBLSHADE | Friedman Aligned | 3.82635E-01 | 7.18601E-01 | 7.18601E-01 | 5.89504E-01 |
| EBLSHADE | Quade | 8.24330E-01 | 1.0 | 1.0 | 9.59673E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S54.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S54** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S55.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.91949E-01 | 3.40696E-01 | 3.40696E-01 | 2.91949E-01 |
| PSO | Friedman Aligned | 5.39802E-08 | 5.39802E-08 | 5.39802E-08 | 5.39802E-08 |
| PSO | Quade | 9.99326E-01 | 1.0 | 1.0 | 9.99326E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 4.13136E-07 | 7.62714E-07 | 7.62714E-07 | 7.62713E-07 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.40272E-02 | 3.58013E-02 | 3.58013E-02 | 3.52243E-02 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 9.38730E-01 | 1.0 | 1.0 | 9.99973E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S55** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 7.29777E-01 | 1.0 | 1.0 | 9.92025E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 7.04009E-01 | 1.0 | 1.0 | 9.85215E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 7.90035E-02 | 2.50048E-01 | 2.50048E-01 | 2.23709E-01 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S56.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.58882E-02 | 3.64967E-02 | 3.64967E-02 | 3.58882E-02 |
| PSO | Friedman Aligned | 2.40712E-09 | 2.40712E-09 | 2.40712E-09 | 2.40712E-09 |
| PSO | Quade | 9.39986E-01 | 1.0 | 1.0 | 9.39986E-01 |
| DE | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.98829E-01 |
| DE | Friedman Aligned | 2.06881E-05 | 3.81937E-05 | 3.81937E-05 | 3.81931E-05 |
| DE | Quade | 9.97867E-01 | 1.0 | 1.0 | 9.99998E-01 |
| IJAYA | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.98829E-01 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.97867E-01 | 1.0 | 1.0 | 9.99988E-01 |
| CWOA | Friedman | 9.74166E-01 | 1.0 | 1.0 | 9.99716E-01 |
| CWOA | Friedman Aligned | 3.77795E-01 | 1.0 | 1.0 | 7.67754E-01 |
| CWOA | Quade | 9.97867E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.85128E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 9.96719E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 9.97867E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.85128E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.97867E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S56** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.17077E-01 | 3.11585E-01 | 3.11585E-01 | 2.71001E-01 |
| MABC | Quade | 9.97867E-01 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 9.97867E-01 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S57.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 7.49779E-02 | 7.77045E-02 | 7.77045E-02 | 7.49779E-02 |
| PSO | Friedman Aligned | 1.24163E-09 | 1.24163E-09 | 1.24163E-09 | 1.24163E-09 |
| PSO | Quade | 9.78151E-01 | 1.0 | 1.0 | 9.78151E-01 |
| DE | Friedman | 9.96576E-01 | 1.0 | 1.0 | 9.99972E-01 |
| DE | Friedman Aligned | 4.03245E-05 | 7.44465E-05 | 7.44465E-05 | 7.44440E-05 |
| DE | Quade | 9.99784E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 9.96576E-01 | 1.0 | 1.0 | 9.99972E-01 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.99784E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.96576E-01 | 1.0 | 1.0 | 9.99998E-01 |
| CWOA | Friedman Aligned | 4.67657E-01 | 1.0 | 1.0 | 8.56281E-01 |
| CWOA | Quade | 9.99784E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.99994E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 9.99784E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S57** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.62259E-01 | 4.40367E-01 | 4.40367E-01 | 3.62005E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S58.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.92232E-01 | 2.11737E-01 | 2.11737E-01 | 1.92232E-01 |
| PSO | Friedman Aligned | 3.20410E-13 | 3.20410E-13 | 3.20410E-13 | 3.20410E-13 |
| PSO | Quade | 9.91529E-01 | 1.0 | 1.0 | 9.91529E-01 |
| DE | Friedman | 9.99993E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 9.96242E-03 | 1.84702E-02 | 1.84702E-02 | 1.83146E-02 |
| DE | Quade | 9.99984E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 9.99993E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 9.99984E-01 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 9.42723E-01 | 1.0 | 1.0 | 9.99297E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S58** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S59.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *I*02 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 7.76548E-02 | 8.05850E-02 | 8.05850E-02 | 7.76548E-02 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 9.90947E-01 | 1.0 | 1.0 | 9.90947E-01 |
| DE | Friedman | 9.96991E-01 | 1.0 | 1.0 | 9.99978E-01 |
| DE | Friedman Aligned | 2.24129E-10 | 5.68944E-10 | 5.68944E-10 | 5.68944E-10 |
| DE | Quade | 9.99980E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 9.96991E-01 | 1.0 | 1.0 | 9.99978E-01 |
| IJAYA | Friedman Aligned | 2.35391E-04 | 8.69175E-04 | 8.69175E-04 | 8.68860E-04 |
| IJAYA | Quade | 9.99980E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.96991E-01 | 1.0 | 1.0 | 9.99998E-01 |
| CWOA | Friedman Aligned | 5.19146E-09 | 1.59737E-08 | 1.59737E-08 | 1.59737E-08 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 3.36136E-01 | 1.0 | 1.0 | 7.57830E-01 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.10441E-10 | 2.03890E-10 | 2.03890E-10 | 2.03890E-10 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S59** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 8.28991E-05 | 3.12472E-04 | 3.12472E-04 | 3.12430E-04 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.16470E-05 | 4.30045E-05 | 4.30045E-05 | 4.30037E-05 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 7.14139E-06 | 2.47202E-05 | 2.47202E-05 | 2.47200E-05 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S60.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 3.92321E-10 | 3.92321E-10 | 3.92321E-10 | 3.92321E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.79373E-01 | 3.23540E-01 | 3.23540E-01 | 2.79373E-01 |
| PSO | Friedman | 2.88559E-05 | 5.32730E-05 | 5.32730E-05 | 5.32717E-05 |
| PSO | Friedman Aligned | 1.74677E-10 | 6.44961E-10 | 6.44961E-10 | 6.44961E-10 |
| PSO | Quade | 5.37934E-01 | 1.0 | 1.0 | 7.59568E-01 |
| CWOA | Friedman | 2.43825E-04 | 6.18999E-04 | 6.18999E-04 | 6.18825E-04 |
| CWOA | Friedman Aligned | 7.59015E-11 | 2.62736E-10 | 2.62736E-10 | 2.62736E-10 |
| CWOA | Quade | 5.65449E-01 | 1.0 | 1.0 | 8.79446E-01 |
| NNA | Friedman | 6.24368E-04 | 1.92155E-03 | 1.92155E-03 | 1.91989E-03 |
| NNA | Friedman Aligned | 3.95173E-11 | 1.21592E-10 | 1.21592E-10 | 1.21592E-10 |
| NNA | Quade | 5.65449E-01 | 1.0 | 1.0 | 9.06685E-01 |
| GOTLBO | Friedman | 2.71581E-02 | 9.48059E-02 | 9.48059E-02 | 9.09078E-02 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 7.47711E-01 | 1.0 | 1.0 | 9.91495E-01 |
| ISCA | Friedman | 1.51455E-01 | 5.83984E-01 | 5.83984E-01 | 4.54688E-01 |
| ISCA | Friedman Aligned | 4.49465E-10 | 1.69414E-09 | 1.69414E-09 | 1.69414E-09 |
| ISCA | Quade | 8.49293E-01 | 1.0 | 1.0 | 9.99077E-01 |
| MABC | Friedman | 7.73122E-01 | 1.0 | 1.0 | 9.96269E-01 |
| MABC | Friedman Aligned | 1.26240E-12 | 3.20455E-12 | 3.20455E-12 | 3.20455E-12 |
| MABC | Quade | 9.33013E-01 | 1.0 | 1.0 | 9.99962E-01 |
| IJAYA | Friedman | 9.84761E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 8.57775E-01 | 1.0 | 1.0 | 9.99254E-01 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S60** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S61.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.36721E-03 | 2.52555E-03 | 2.52555E-03 | 2.52263E-03 |
| ISCA | Friedman | 1.78968E-13 | 3.30402E-13 | 3.30402E-13 | 3.30402E-13 |
| ISCA | Friedman Aligned | 1.55372E-10 | 5.73682E-10 | 5.73682E-10 | 5.73682E-10 |
| ISCA | Quade | 1.65281E-02 | 6.13009E-02 | 6.13009E-02 | 5.96818E-02 |
| GOTLBO | Friedman | 1.95883E-11 | 4.97242E-11 | 4.97242E-11 | 4.97242E-11 |
| GOTLBO | Friedman Aligned | 2.08030E-10 | 7.84112E-10 | 7.84112E-10 | 7.84112E-10 |
| GOTLBO | Quade | 8.54988E-03 | 2.96740E-02 | 2.96740E-02 | 2.92856E-02 |
| MABC | Friedman | 3.70161E-11 | 1.13896E-10 | 1.13896E-10 | 1.13896E-10 |
| MABC | Friedman Aligned | 4.17948E-11 | 1.28599E-10 | 1.28599E-10 | 1.28599E-10 |
| MABC | Quade | 2.91472E-02 | 1.10612E-01 | 1.10612E-01 | 1.05504E-01 |
| IJAYA | Friedman | 8.24453E-10 | 2.85388E-09 | 2.85388E-09 | 2.85388E-09 |
| IJAYA | Friedman Aligned | 2.11001E-09 | 7.30389E-09 | 7.30389E-09 | 7.30389E-09 |
| IJAYA | Quade | 5.50979E-02 | 2.05651E-01 | 1.80331E-01 | 1.88814E-01 |
| DE | Friedman | 1.26059E-09 | 4.65450E-09 | 4.65450E-09 | 4.65450E-09 |
| DE | Friedman Aligned | 9.99304E-10 | 3.68974E-09 | 3.68974E-09 | 3.68974E-09 |
| DE | Quade | 5.50979E-02 | 2.05651E-01 | 1.80331E-01 | 1.88814E-01 |
| NNA | Friedman | 2.52900E-09 | 9.53238E-09 | 9.53238E-09 | 9.53238E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 2.46551E-03 | 7.59267E-03 | 7.59267E-03 | 7.56678E-03 |
| CWOA | Friedman | 7.00046E-09 | 2.58479E-08 | 2.31404E-08 | 2.58479E-08 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 2.22641E-03 | 5.65651E-03 | 5.65651E-03 | 5.64199E-03 |
| **Table S61** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 7.00046E-09 | 2.58479E-08 | 2.31404E-08 | 2.58479E-08 |
| WW | Friedman Aligned | 1.32567E-10 | 4.58885E-10 | 4.58885E-10 | 4.58885E-10 |
| WW | Quade | 1.69100E-04 | 1.69113E-04 | 1.69113E-04 | 1.69100E-04 |
| NDE | Friedman | 1.47046E-04 | 4.52458E-04 | 4.52458E-04 | 4.52382E-04 |
| NDE | Friedman Aligned | 6.50237E-07 | 2.00073E-06 | 2.00073E-06 | 2.00073E-06 |
| NDE | Quade | 2.62860E-01 | 8.36446E-01 | 8.36446E-01 | 6.08744E-01 |
| TLBO | Friedman | 1.57702E-01 | 4.05499E-01 | 4.05499E-01 | 3.53159E-01 |
| TLBO | Friedman Aligned | 4.66638E-01 | 1.0 | 1.0 | 7.97205E-01 |
| TLBO | Quade | 7.20268E-01 | 1.0 | 1.0 | 9.60593E-01 |
| STLBO | Friedman | 9.63022E-01 | 1.0 | 1.0 | 9.97729E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 9.70725E-01 | 1.0 | 1.0 | 9.98525E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S62.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.08556E-03 | 2.00503E-03 | 2.00503E-03 | 2.00319E-03 |
| ISCA | Friedman | 4.21441E-13 | 7.78044E-13 | 7.78044E-13 | 7.78044E-13 |
| ISCA | Friedman Aligned | 1.77441E-10 | 6.55168E-10 | 6.55168E-10 | 6.55168E-10 |
| ISCA | Quade | 1.38937E-02 | 5.14932E-02 | 5.14932E-02 | 5.03480E-02 |
| MABC | Friedman | 2.15926E-11 | 5.48119E-11 | 5.48119E-11 | 5.48119E-11 |
| MABC | Friedman Aligned | 5.46148E-11 | 1.68046E-10 | 1.68046E-10 | 1.68046E-10 |
| MABC | Quade | 2.48402E-02 | 9.41718E-02 | 9.41718E-02 | 9.04551E-02 |
| GOTLBO | Friedman | 2.92194E-11 | 8.99059E-11 | 8.99059E-11 | 8.99059E-11 |
| GOTLBO | Friedman Aligned | 1.87348E-10 | 7.06158E-10 | 7.06158E-10 | 7.06158E-10 |
| GOTLBO | Quade | 7.08114E-03 | 2.45652E-02 | 2.45652E-02 | 2.42987E-02 |
| IJAYA | Friedman | 3.81470E-10 | 1.32047E-09 | 1.32047E-09 | 1.32047E-09 |
| IJAYA | Friedman Aligned | 5.75403E-09 | 1.99178E-08 | 1.99178E-08 | 1.99178E-08 |
| IJAYA | Quade | 4.77133E-02 | 1.77825E-01 | 1.56099E-01 | 1.65159E-01 |
| DE | Friedman | 5.89532E-10 | 2.17673E-09 | 2.17673E-09 | 2.17673E-09 |
| DE | Friedman Aligned | 3.00876E-09 | 1.11092E-08 | 1.11092E-08 | 1.11092E-08 |
| DE | Quade | 4.77133E-02 | 1.77825E-01 | 1.56099E-01 | 1.65159E-01 |
| NNA | Friedman | 4.05858E-09 | 1.52977E-08 | 1.52977E-08 | 1.52977E-08 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.99442E-03 | 6.14092E-03 | 6.14092E-03 | 6.12398E-03 |
| WW | Friedman | 9.35983E-09 | 3.45594E-08 | 3.32115E-08 | 3.45594E-08 |
| WW | Friedman Aligned | 1.45939E-10 | 5.05172E-10 | 5.05172E-10 | 5.05172E-10 |
| WW | Quade | 1.29473E-04 | 1.29480E-04 | 1.29480E-04 | 1.29473E-04 |
| **Table S62** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 9.59443E-09 | 3.45594E-08 | 3.32115E-08 | 3.45594E-08 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.79060E-03 | 4.54851E-03 | 4.54851E-03 | 4.53912E-03 |
| NDE | Friedman | 8.95473E-05 | 2.75533E-04 | 2.75533E-04 | 2.75505E-04 |
| NDE | Friedman Aligned | 4.36010E-08 | 1.34157E-07 | 1.34157E-07 | 1.34157E-07 |
| NDE | Quade | 2.38174E-01 | 7.55260E-01 | 7.55260E-01 | 5.67008E-01 |
| TLBO | Friedman | 1.24750E-01 | 3.19870E-01 | 3.19870E-01 | 2.86976E-01 |
| TLBO | Friedman Aligned | 2.17176E-01 | 5.61378E-01 | 5.61378E-01 | 4.62882E-01 |
| TLBO | Quade | 6.79515E-01 | 1.0 | 9.53684E-01 | 9.44344E-01 |
| STLBO | Friedman | 8.79054E-01 | 1.0 | 9.04861E-01 | 9.79755E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 9.31129E-01 | 1.0 | 9.53684E-01 | 9.92841E-01 |
| EBLSHADE | Friedman | 9.04861E-01 | 1.0 | 9.04861E-01 | 9.79755E-01 |
| EBLSHADE | Friedman Aligned | 6.46794E-01 | 1.0 | 1.0 | 8.53584E-01 |
| EBLSHADE | Quade | 9.53684E-01 | 1.0 | 9.53684E-01 | 9.92841E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S63.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 5.95906E-11 | 5.95906E-11 | 5.95906E-11 | 5.95906E-11 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 8.92612E-02 | 1.71378E-01 | 1.71378E-01 | 1.58537E-01 |
| WW | Friedman | 1.13108E-10 | 2.08814E-10 | 2.08814E-10 | 2.08814E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.45418E-02 | 2.48242E-02 | 2.48242E-02 | 2.45418E-02 |
| CWOA | Friedman | 8.66736E-10 | 2.20018E-09 | 2.20018E-09 | 2.20018E-09 |
| CWOA | Friedman Aligned | 1.27564E-10 | 4.71006E-10 | 4.71006E-10 | 4.71006E-10 |
| CWOA | Quade | 1.10293E-01 | 2.92688E-01 | 2.92688E-01 | 2.56697E-01 |
| NNA | Friedman | 4.29575E-09 | 1.32177E-08 | 1.32177E-08 | 1.32177E-08 |
| NNA | Friedman Aligned | 1.65481E-10 | 5.72820E-10 | 5.72820E-10 | 5.72820E-10 |
| NNA | Quade | 1.10293E-01 | 3.47534E-01 | 3.47534E-01 | 2.97926E-01 |
| GOTLBO | Friedman | 2.48635E-06 | 8.60661E-06 | 8.60661E-06 | 8.60658E-06 |
| GOTLBO | Friedman Aligned | 7.60474E-11 | 2.86640E-10 | 2.86640E-10 | 2.86640E-10 |
| GOTLBO | Quade | 2.22940E-01 | 8.32115E-01 | 8.32115E-01 | 5.82358E-01 |
| ISCA | Friedman | 7.67415E-05 | 2.83359E-04 | 2.83359E-04 | 2.83324E-04 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 3.11725E-01 | 1.0 | 1.0 | 7.48251E-01 |
| MABC | Friedman | 6.08165E-03 | 2.29554E-02 | 2.29554E-02 | 2.27308E-02 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 4.09668E-01 | 1.0 | 1.0 | 8.62846E-01 |
| IJAYA | Friedman | 2.38708E-02 | 8.85474E-02 | 8.85474E-02 | 8.53440E-02 |
| IJAYA | Friedman Aligned | 1.19504E-12 | 4.13669E-12 | 4.13669E-12 | 4.13669E-12 |
| IJAYA | Quade | 5.51337E-01 | 1.0 | 1.0 | 9.48146E-01 |
| **Table S63** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 2.75393E-02 | 9.57372E-02 | 9.57372E-02 | 9.21405E-02 |
| DE | Friedman Aligned | 1.55452E-11 | 5.73976E-11 | 5.73976E-11 | 5.73976E-11 |
| DE | Quade | 5.51337E-01 | 1.0 | 1.0 | 9.48146E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S64.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.84990E-08 | 1.84990E-08 | 1.84990E-08 | 1.84990E-08 |
| WW | Friedman Aligned | 2.64637E-10 | 8.14269E-10 | 8.14269E-10 | 8.14269E-10 |
| WW | Quade | 4.97749E-01 | 6.70733E-01 | 6.70733E-01 | 4.97749E-01 |
| PSO | Friedman | 4.25680E-04 | 7.86013E-04 | 7.86013E-04 | 7.85730E-04 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 7.58062E-01 | 1.0 | 1.0 | 9.27185E-01 |
| CWOA | Friedman | 2.60995E-03 | 6.63191E-03 | 6.63191E-03 | 6.61195E-03 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 7.72259E-01 | 1.0 | 1.0 | 9.76617E-01 |
| NNA | Friedman | 5.64123E-03 | 1.73916E-02 | 1.73916E-02 | 1.72562E-02 |
| NNA | Friedman Aligned | 1.26098E-09 | 4.36494E-09 | 4.36494E-09 | 4.36494E-09 |
| NNA | Quade | 7.72259E-01 | 1.0 | 1.0 | 9.84364E-01 |
| GOTLBO | Friedman | 1.24793E-01 | 4.49778E-01 | 4.49778E-01 | 3.69603E-01 |
| GOTLBO | Friedman Aligned | 2.57868E-13 | 6.54587E-13 | 6.54587E-13 | 6.54587E-13 |
| GOTLBO | Quade | 9.07365E-01 | 1.0 | 1.0 | 9.99735E-01 |
| ISCA | Friedman | 4.35559E-01 | 1.0 | 1.0 | 8.78968E-01 |
| ISCA | Friedman Aligned | 5.82208E-05 | 2.14973E-04 | 2.14973E-04 | 2.14952E-04 |
| ISCA | Quade | 9.69469E-01 | 1.0 | 1.0 | 9.99997E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S64** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S65.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 5.46141E-12 | 5.46141E-12 | 5.46141E-12 | 5.46141E-12 |
| GOTLBO | Friedman Aligned | 1.85656E-10 | 6.85500E-10 | 6.85500E-10 | 6.85500E-10 |
| GOTLBO | Quade | 3.21257E-02 | 1.12323E-01 | 1.12323E-01 | 1.06876E-01 |
| NNA | Friedman | 5.46141E-12 | 7.30616E-12 | 7.30616E-12 | 7.30616E-12 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.10836E-02 | 3.42350E-02 | 3.42350E-02 | 3.37124E-02 |
| CWOA | Friedman | 1.70145E-11 | 4.31906E-11 | 4.31906E-11 | 4.31906E-11 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.04534E-02 | 2.66429E-02 | 2.66429E-02 | 2.63226E-02 |
| PSO | Friedman | 2.64060E-10 | 8.12492E-10 | 7.63813E-10 | 8.12492E-10 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 7.07405E-03 | 1.30990E-02 | 1.30990E-02 | 1.30207E-02 |
| ISCA | Friedman | 2.64060E-10 | 8.12492E-10 | 7.63813E-10 | 8.12492E-10 |
| ISCA | Friedman Aligned | 1.03659E-10 | 3.90714E-10 | 3.90714E-10 | 3.90714E-10 |
| ISCA | Quade | 5.54732E-02 | 2.07973E-01 | 2.07973E-01 | 1.90003E-01 |
| WW | Friedman | 3.54090E-10 | 1.30741E-09 | 1.30741E-09 | 1.30741E-09 |
| WW | Friedman Aligned | 9.35998E-11 | 3.45599E-10 | 3.45599E-10 | 3.45599E-10 |
| WW | Quade | 1.15226E-03 | 1.15287E-03 | 1.15287E-03 | 1.15226E-03 |
| MABC | Friedman | 2.07209E-07 | 7.81020E-07 | 7.81020E-07 | 7.81020E-07 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 8.81588E-02 | 3.39358E-01 | 3.39358E-01 | 2.93802E-01 |
| IJAYA | Friedman | 2.51710E-06 | 9.29391E-06 | 9.29391E-06 | 9.29387E-06 |
| IJAYA | Friedman Aligned | 3.03666E-10 | 1.05115E-09 | 1.05115E-09 | 1.05115E-09 |
| IJAYA | Quade | 1.47660E-01 | 5.61846E-01 | 4.88755E-01 | 4.45628E-01 |
| **Table S65** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 3.59231E-06 | 1.24349E-05 | 1.24349E-05 | 1.24349E-05 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 1.47660E-01 | 5.61846E-01 | 4.88755E-01 | 4.45628E-01 |
| NDE | Friedman | 2.32779E-02 | 7.18185E-02 | 7.18185E-02 | 6.99073E-02 |
| NDE | Friedman Aligned | 3.36822E-05 | 1.03638E-04 | 1.03638E-04 | 1.03634E-04 |
| NDE | Quade | 5.01560E-01 | 1.0 | 1.0 | 8.82625E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S66.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 5.37814E-04 | 5.37948E-04 | 5.37948E-04 | 5.37814E-04 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 8.88379E-01 | 1.0 | 1.0 | 8.88379E-01 |
| PSO | Friedman | 2.44230E-01 | 5.05979E-01 | 5.05979E-01 | 4.03667E-01 |
| PSO | Friedman Aligned | 1.12035E-10 | 2.06835E-10 | 2.06835E-10 | 2.06835E-10 |
| PSO | Quade | 9.77652E-01 | 1.0 | 1.0 | 9.99104E-01 |
| CWOA | Friedman | 4.83801E-01 | 1.0 | 1.0 | 8.13363E-01 |
| CWOA | Friedman Aligned | 7.28206E-09 | 1.84852E-08 | 1.84852E-08 | 1.84852E-08 |
| CWOA | Quade | 9.79642E-01 | 1.0 | 1.0 | 9.99949E-01 |
| NNA | Friedman | 5.92700E-01 | 1.0 | 1.0 | 9.36943E-01 |
| NNA | Friedman Aligned | 6.56552E-05 | 2.02020E-04 | 2.02020E-04 | 2.02002E-04 |
| NNA | Quade | 9.79642E-01 | 1.0 | 1.0 | 9.99984E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S66** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S67.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.65138E-03 | 3.05083E-03 | 3.05083E-03 | 3.04656E-03 |
| ISCA | Friedman | 1.24123E-13 | 2.29150E-13 | 2.29150E-13 | 2.29150E-13 |
| ISCA | Friedman Aligned | 1.77441E-10 | 6.55168E-10 | 6.55168E-10 | 6.55168E-10 |
| ISCA | Quade | 1.90410E-02 | 7.06693E-02 | 7.06693E-02 | 6.85226E-02 |
| GOTLBO | Friedman | 1.37420E-11 | 3.48837E-11 | 3.48837E-11 | 3.48837E-11 |
| GOTLBO | Friedman Aligned | 1.87348E-10 | 7.06158E-10 | 7.06158E-10 | 7.06158E-10 |
| GOTLBO | Quade | 9.97190E-03 | 3.46246E-02 | 3.46246E-02 | 3.40965E-02 |
| MABC | Friedman | 5.56843E-11 | 1.71336E-10 | 1.71336E-10 | 1.71336E-10 |
| MABC | Friedman Aligned | 5.46148E-11 | 1.68046E-10 | 1.68046E-10 | 1.68046E-10 |
| MABC | Quade | 3.31985E-02 | 1.26107E-01 | 1.26107E-01 | 1.19493E-01 |
| IJAYA | Friedman | 1.20599E-09 | 4.17460E-09 | 4.17460E-09 | 4.17460E-09 |
| IJAYA | Friedman Aligned | 5.75403E-09 | 1.99178E-08 | 1.99178E-08 | 1.99178E-08 |
| IJAYA | Quade | 6.19298E-02 | 2.31468E-01 | 2.02790E-01 | 2.10260E-01 |
| DE | Friedman | 1.83414E-09 | 6.77223E-09 | 6.77223E-09 | 6.77223E-09 |
| DE | Friedman Aligned | 3.00876E-09 | 1.11092E-08 | 1.11092E-08 | 1.11092E-08 |
| DE | Quade | 6.19298E-02 | 2.31468E-01 | 2.02790E-01 | 2.10260E-01 |
| NNA | Friedman | 1.98348E-09 | 7.47618E-09 | 7.47618E-09 | 7.47618E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 2.93233E-03 | 9.03172E-03 | 9.03172E-03 | 8.99510E-03 |
| CWOA | Friedman | 5.60543E-09 | 2.06970E-08 | 2.06949E-08 | 2.06970E-08 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 2.66069E-03 | 6.76098E-03 | 6.76098E-03 | 6.74024E-03 |
| **Table S67** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 5.97853E-09 | 2.06970E-08 | 2.06949E-08 | 2.06970E-08 |
| WW | Friedman Aligned | 1.45939E-10 | 5.05172E-10 | 5.05172E-10 | 5.05172E-10 |
| WW | Quade | 2.10491E-04 | 2.10511E-04 | 2.10511E-04 | 2.10491E-04 |
| NDE | Friedman | 1.87474E-04 | 5.76856E-04 | 5.76856E-04 | 5.76731E-04 |
| NDE | Friedman Aligned | 4.36010E-08 | 1.34157E-07 | 1.34157E-07 | 1.34157E-07 |
| NDE | Quade | 2.84587E-01 | 9.08417E-01 | 9.08417E-01 | 6.43152E-01 |
| TLBO | Friedman | 1.76463E-01 | 4.54482E-01 | 4.54482E-01 | 3.89108E-01 |
| TLBO | Friedman Aligned | 2.17176E-01 | 5.61378E-01 | 5.61378E-01 | 4.62882E-01 |
| TLBO | Quade | 7.54166E-01 | 1.0 | 1.0 | 9.71610E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 6.46794E-01 | 1.0 | 1.0 | 8.53584E-01 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S68.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 4.01067E-01 | 5.02631E-01 | 5.02631E-01 | 4.01067E-01 |
| WW | Friedman Aligned | 2.83462E-12 | 2.83462E-12 | 2.83462E-12 | 2.83462E-12 |
| WW | Quade | 9.99914E-01 | 1.0 | 1.0 | 9.99914E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S68** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S69.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 7.43248E-10 | 7.43248E-10 | 7.43248E-10 | 7.43248E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.66782E-01 | 3.06638E-01 | 3.06638E-01 | 2.66782E-01 |
| PSO | Friedman | 4.54207E-05 | 8.38553E-05 | 8.38553E-05 | 8.38520E-05 |
| PSO | Friedman Aligned | 1.35070E-10 | 5.09112E-10 | 5.09112E-10 | 5.09112E-10 |
| PSO | Quade | 5.22216E-01 | 1.0 | 1.0 | 7.44252E-01 |
| CWOA | Friedman | 3.64540E-04 | 9.25501E-04 | 9.25501E-04 | 9.25112E-04 |
| CWOA | Friedman Aligned | 5.32651E-11 | 1.96671E-10 | 1.96671E-10 | 1.96671E-10 |
| CWOA | Quade | 5.50483E-01 | 1.0 | 1.0 | 8.68626E-01 |
| NNA | Friedman | 9.08440E-04 | 2.79608E-03 | 2.79608E-03 | 2.79256E-03 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 5.50483E-01 | 1.0 | 1.0 | 8.97503E-01 |
| GOTLBO | Friedman | 3.55101E-02 | 1.24289E-01 | 1.24289E-01 | 1.17640E-01 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 7.34526E-01 | 1.0 | 1.0 | 9.89856E-01 |
| ISCA | Friedman | 1.84143E-01 | 7.17234E-01 | 7.17234E-01 | 5.28316E-01 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 8.38066E-01 | 1.0 | 1.0 | 9.98796E-01 |
| MABC | Friedman | 8.30669E-01 | 1.0 | 1.0 | 9.98761E-01 |
| MABC | Friedman Aligned | 1.20936E-11 | 4.18625E-11 | 4.18625E-11 | 4.18625E-11 |
| MABC | Quade | 9.24393E-01 | 1.0 | 1.0 | 9.99941E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 9.98735E-01 | 1.0 | 1.0 | 1.0 |
| **Table S69** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S70.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.49117E-05 | 1.49118E-05 | 1.49118E-05 | 1.49117E-05 |
| WW | Friedman Aligned | 1.07945E-10 | 1.99283E-10 | 1.99283E-10 | 1.99283E-10 |
| WW | Quade | 7.08152E-01 | 1.0 | 1.0 | 7.08152E-01 |
| PSO | Friedman | 3.30715E-02 | 6.19271E-02 | 6.19271E-02 | 6.01993E-02 |
| PSO | Friedman Aligned | 5.28264E-09 | 1.62543E-08 | 1.62543E-08 | 1.62543E-08 |
| PSO | Quade | 9.00243E-01 | 1.0 | 1.0 | 9.85813E-01 |
| CWOA | Friedman | 1.05547E-01 | 2.79535E-01 | 2.79535E-01 | 2.46592E-01 |
| CWOA | Friedman Aligned | 4.87572E-10 | 1.23768E-09 | 1.23768E-09 | 1.23768E-09 |
| CWOA | Quade | 9.05533E-01 | 1.0 | 1.0 | 9.97495E-01 |
| NNA | Friedman | 1.61730E-01 | 5.28346E-01 | 5.28346E-01 | 4.18890E-01 |
| NNA | Friedman Aligned | 4.82059E-13 | 4.82059E-13 | 4.82059E-13 | 4.82059E-13 |
| NNA | Quade | 9.05533E-01 | 1.0 | 1.0 | 9.98649E-01 |
| GOTLBO | Friedman | 7.82941E-01 | 1.0 | 1.0 | 9.94947E-01 |
| GOTLBO | Friedman Aligned | 2.23133E-03 | 7.72913E-03 | 7.72913E-03 | 7.70263E-03 |
| GOTLBO | Quade | 9.81758E-01 | 1.0 | 1.0 | 9.99999E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S70** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S71.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 4.34105E-02 | 4.43053E-02 | 4.43053E-02 | 4.34105E-02 |
| WW | Friedman Aligned | 1.25781E-08 | 1.25781E-08 | 1.25781E-08 | 1.25781E-08 |
| WW | Quade | 9.93459E-01 | 1.0 | 1.0 | 9.93459E-01 |
| PSO | Friedman | 9.59537E-01 | 1.0 | 1.0 | 9.97318E-01 |
| PSO | Friedman Aligned | 1.41924E-05 | 2.62016E-05 | 2.62016E-05 | 2.62013E-05 |
| PSO | Quade | 9.99820E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.98121E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 2.92359E-01 | 8.43733E-01 | 8.43733E-01 | 5.84323E-01 |
| CWOA | Quade | 9.99978E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S71** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S72.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.05634E-01 | 1.11163E-01 | 1.11163E-01 | 1.05634E-01 |
| WW | Friedman Aligned | 7.79425E-08 | 7.79425E-08 | 7.79425E-08 | 7.79425E-08 |
| WW | Quade | 9.97790E-01 | 1.0 | 1.0 | 9.97790E-01 |
| PSO | Friedman | 9.96116E-01 | 1.0 | 1.0 | 9.99965E-01 |
| PSO | Friedman Aligned | 1.94787E-02 | 3.62606E-02 | 3.62606E-02 | 3.56640E-02 |
| PSO | Quade | 9.99983E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S72** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S73.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *n*2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S73** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S74.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.85241E-05 | 3.85248E-05 | 3.85248E-05 | 3.85241E-05 |
| PSO | Friedman Aligned | 1.30970E-08 | 3.32462E-08 | 3.16401E-08 | 3.32462E-08 |
| PSO | Quade | 6.28939E-01 | 9.54531E-01 | 9.54531E-01 | 6.28939E-01 |
| CWOA | Friedman | 2.30207E-04 | 4.25038E-04 | 4.25038E-04 | 4.24956E-04 |
| CWOA | Friedman Aligned | 1.45657E-11 | 1.45657E-11 | 1.45657E-11 | 1.45657E-11 |
| CWOA | Quade | 6.36202E-01 | 1.0 | 1.0 | 8.45375E-01 |
| WW | Friedman | 5.14600E-04 | 1.30655E-03 | 1.30655E-03 | 1.30577E-03 |
| WW | Friedman Aligned | 1.30970E-08 | 3.32462E-08 | 3.16401E-08 | 3.32462E-08 |
| WW | Quade | 6.36202E-01 | 1.0 | 1.0 | 8.93749E-01 |
| MABC | Friedman | 9.08440E-04 | 2.79608E-03 | 2.79608E-03 | 2.79256E-03 |
| MABC | Friedman Aligned | 8.90533E-10 | 1.64406E-09 | 1.64406E-09 | 1.64406E-09 |
| MABC | Quade | 6.36202E-01 | 1.0 | 1.0 | 8.93749E-01 |
| NNA | Friedman | 3.83377E-03 | 1.32864E-02 | 1.32864E-02 | 1.32082E-02 |
| NNA | Friedman Aligned | 8.30815E-06 | 3.06763E-05 | 3.06763E-05 | 3.06759E-05 |
| NNA | Quade | 6.84588E-01 | 1.0 | 1.0 | 9.81577E-01 |
| GOTLBO | Friedman | 9.97395E-03 | 3.69263E-02 | 3.69263E-02 | 3.63352E-02 |
| GOTLBO | Friedman Aligned | 1.25934E-03 | 4.74813E-03 | 4.74813E-03 | 4.73848E-03 |
| GOTLBO | Quade | 6.84588E-01 | 1.0 | 1.0 | 9.81577E-01 |
| ISCA | Friedman | 2.90759E-02 | 1.10340E-01 | 1.10340E-01 | 1.05257E-01 |
| ISCA | Friedman Aligned | 1.94427E-03 | 7.18153E-03 | 7.18153E-03 | 7.16008E-03 |
| ISCA | Quade | 6.84588E-01 | 1.0 | 1.0 | 9.81577E-01 |
| NDE | Friedman | 3.23617E-01 | 1.0 | 1.0 | 7.63942E-01 |
| NDE | Friedman Aligned | 5.67700E-06 | 1.96512E-05 | 1.96512E-05 | 1.96510E-05 |
| NDE | Quade | 6.84588E-01 | 1.0 | 1.0 | 9.81577E-01 |
| **Table S74** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 8.26099E-01 | 1.0 | 1.0 | 9.97654E-01 |
| IJAYA | Friedman Aligned | 8.17591E-01 | 1.0 | 1.0 | 9.97233E-01 |
| IJAYA | Quade | 9.26311E-01 | 1.0 | 1.0 | 9.99880E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S75.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 2.82885E-13 | 2.82885E-13 | 2.82885E-13 | 2.82885E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 3.19021E-02 | 1.18526E-01 | 1.18526E-01 | 1.12824E-01 |
| GOTLBO | Friedman | 3.53606E-13 | 6.52811E-13 | 6.52811E-13 | 6.52811E-13 |
| GOTLBO | Friedman Aligned | 2.87605E-10 | 1.06193E-09 | 1.06193E-09 | 1.06193E-09 |
| GOTLBO | Quade | 3.16479E-02 | 1.10636E-01 | 1.05998E-01 | 1.05349E-01 |
| NNA | Friedman | 2.63833E-12 | 6.69731E-12 | 6.69731E-12 | 6.69731E-12 |
| NNA | Friedman Aligned | 4.20856E-09 | 1.45681E-08 | 1.45681E-08 | 1.45681E-08 |
| NNA | Quade | 3.16479E-02 | 1.10636E-01 | 1.05998E-01 | 1.05349E-01 |
| MABC | Friedman | 3.12516E-11 | 9.61586E-11 | 9.61586E-11 | 9.61586E-11 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 1.54402E-02 | 3.94292E-02 | 3.94292E-02 | 3.87301E-02 |
| WW | Friedman | 8.01828E-11 | 2.77556E-10 | 2.77556E-10 | 2.77556E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.54402E-02 | 4.15868E-02 | 4.15868E-02 | 4.08171E-02 |
| NDE | Friedman | 1.83881E-10 | 6.78945E-10 | 6.78945E-10 | 6.78945E-10 |
| NDE | Friedman Aligned | 4.73813E-09 | 1.45789E-08 | 1.45789E-08 | 1.45789E-08 |
| NDE | Quade | 3.16479E-02 | 1.18446E-01 | 1.18446E-01 | 1.12600E-01 |
| CWOA | Friedman | 2.39580E-10 | 9.03031E-10 | 9.03031E-10 | 9.03031E-10 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.49768E-02 | 2.78262E-02 | 2.78262E-02 | 2.74741E-02 |
| PSO | Friedman | 2.21287E-09 | 8.17061E-09 | 8.17061E-09 | 8.17061E-09 |
| PSO | Friedman Aligned | 4.91679E-11 | 1.85325E-10 | 1.85325E-10 | 1.85325E-10 |
| PSO | Quade | 9.54010E-03 | 9.58237E-03 | 9.58237E-03 | 9.54010E-03 |
| **Table S75** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.50012E-08 | 8.65425E-08 | 8.65425E-08 | 8.65425E-08 |
| IJAYA | Friedman Aligned | 9.85286E-13 | 3.63798E-12 | 3.63798E-12 | 3.63798E-12 |
| IJAYA | Quade | 1.03731E-01 | 3.65075E-01 | 3.65075E-01 | 3.15515E-01 |
| DE | Friedman | 1.88313E-07 | 5.79424E-07 | 5.79424E-07 | 5.79424E-07 |
| DE | Friedman Aligned | <1E-13 | 2.51799E-13 | 2.51799E-13 | 2.51799E-13 |
| DE | Quade | 1.44238E-01 | 4.51670E-01 | 4.51670E-01 | 3.80764E-01 |
| TLBO | Friedman | 8.79380E-02 | 2.24791E-01 | 2.24791E-01 | 2.08368E-01 |
| TLBO | Friedman Aligned | 1.36519E-03 | 3.46585E-03 | 3.46585E-03 | 3.46185E-03 |
| TLBO | Quade | 6.31532E-01 | 1.0 | 1.0 | 9.20691E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S76.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.54143E-12 | 1.54143E-12 | 1.54143E-12 | 1.54143E-12 |
| ISCA | Friedman Aligned | 6.19721E-09 | 2.14519E-08 | 2.14519E-08 | 2.14519E-08 |
| ISCA | Quade | 1.33574E-02 | 4.94471E-02 | 4.94471E-02 | 4.84395E-02 |
| NDE | Friedman | 1.23935E-11 | 2.57512E-11 | 2.57512E-11 | 2.57512E-11 |
| NDE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NDE | Quade | 1.28596E-02 | 4.86156E-02 | 4.86156E-02 | 4.76143E-02 |
| GOTLBO | Friedman | 1.23935E-11 | 2.28804E-11 | 2.28804E-11 | 2.28804E-11 |
| GOTLBO | Friedman Aligned | 7.46673E-09 | 2.29745E-08 | 2.29745E-08 | 2.29745E-08 |
| GOTLBO | Quade | 1.26457E-02 | 4.39450E-02 | 4.24241E-02 | 4.30964E-02 |
| NNA | Friedman | 4.65187E-11 | 1.43134E-10 | 1.43134E-10 | 1.43134E-10 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.26457E-02 | 4.39450E-02 | 4.24241E-02 | 4.30964E-02 |
| MABC | Friedman | 3.75683E-10 | 1.30044E-09 | 1.30044E-09 | 1.30044E-09 |
| MABC | Friedman Aligned | 2.94570E-11 | 1.01966E-10 | 1.01966E-10 | 1.01966E-10 |
| MABC | Quade | 5.47342E-03 | 1.39234E-02 | 1.39234E-02 | 1.38356E-02 |
| WW | Friedman | 8.36500E-10 | 3.08861E-09 | 3.08861E-09 | 3.08861E-09 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 5.47342E-03 | 1.48853E-02 | 1.48853E-02 | 1.47860E-02 |
| IJAYA | Friedman | 1.35369E-09 | 5.10235E-09 | 5.10235E-09 | 5.10235E-09 |
| IJAYA | Friedman Aligned | 2.63984E-09 | 9.74710E-09 | 9.74710E-09 | 9.74710E-09 |
| IJAYA | Quade | 5.07250E-02 | 1.76988E-01 | 1.76988E-01 | 1.64894E-01 |
| CWOA | Friedman | 2.10865E-09 | 7.78579E-09 | 7.78579E-09 | 7.78579E-09 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 5.10914E-03 | 9.45270E-03 | 9.45270E-03 | 9.41186E-03 |
| **Table S76** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.08138E-08 | 3.74326E-08 | 3.74326E-08 | 3.74326E-08 |
| DE | Friedman Aligned | 5.65963E-10 | 2.13325E-09 | 2.13325E-09 | 2.13325E-09 |
| DE | Quade | 7.46403E-02 | 2.31704E-01 | 2.31704E-01 | 2.12337E-01 |
| PSO | Friedman | 1.25898E-08 | 3.87379E-08 | 3.87379E-08 | 3.87379E-08 |
| PSO | Friedman Aligned | 1.07413E-10 | 3.96600E-10 | 3.96600E-10 | 3.96600E-10 |
| PSO | Quade | 2.95239E-03 | 2.95642E-03 | 2.95642E-03 | 2.95239E-03 |
| TLBO | Friedman | 2.48488E-02 | 6.31994E-02 | 6.31994E-02 | 6.18773E-02 |
| TLBO | Friedman Aligned | 1.59818E-06 | 4.05692E-06 | 4.05692E-06 | 4.05691E-06 |
| TLBO | Quade | 4.31217E-01 | 1.0 | 9.40692E-01 | 7.61251E-01 |
| EBLSHADE | Friedman | 6.28359E-01 | 1.0 | 7.46914E-01 | 8.39165E-01 |
| EBLSHADE | Friedman Aligned | 1.22462E-01 | 2.27198E-01 | 2.27198E-01 | 2.14293E-01 |
| EBLSHADE | Quade | 7.82837E-01 | 1.0 | 9.40692E-01 | 9.40351E-01 |
| STLBO | Friedman | 7.46914E-01 | 1.0 | 7.46914E-01 | 8.39165E-01 |
| STLBO | Friedman Aligned | 9.97806E-01 | 9.97806E-01 | 9.97806E-01 | 9.97806E-01 |
| STLBO | Quade | 9.40692E-01 | 1.0 | 9.40692E-01 | 9.40692E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S77.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 7.80942E-03 | 7.83771E-03 | 7.83771E-03 | 7.80942E-03 |
| PSO | Friedman Aligned | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 |
| PSO | Quade | 9.93803E-01 | 1.0 | 1.0 | 9.93803E-01 |
| CWOA | Friedman | 2.45863E-02 | 4.58695E-02 | 4.58695E-02 | 4.49174E-02 |
| CWOA | Friedman Aligned | 6.34585E-04 | 1.61126E-03 | 1.61126E-03 | 1.61008E-03 |
| CWOA | Quade | 9.93803E-01 | 1.0 | 1.0 | 9.99812E-01 |
| WW | Friedman | 3.91395E-02 | 1.00885E-01 | 1.00885E-01 | 9.63840E-02 |
| WW | Friedman Aligned | 5.71982E-01 | 1.0 | 1.0 | 9.26542E-01 |
| WW | Quade | 9.93803E-01 | 1.0 | 1.0 | 9.99958E-01 |
| MABC | Friedman | 5.36610E-02 | 1.68274E-01 | 1.68274E-01 | 1.56087E-01 |
| MABC | Friedman Aligned | 1.94364E-05 | 3.58829E-05 | 3.58829E-05 | 3.58823E-05 |
| MABC | Quade | 9.93803E-01 | 1.0 | 1.0 | 9.99958E-01 |
| NNA | Friedman | 1.31625E-01 | 4.75511E-01 | 4.75511E-01 | 3.86475E-01 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 9.97994E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 2.26749E-01 | 8.95302E-01 | 8.95302E-01 | 6.13059E-01 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 9.97994E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 4.01459E-01 | 1.0 | 1.0 | 8.55518E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S77** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S78.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.90021E-01 | 1.0 | 1.0 | 9.90021E-01 |
| PSO | Friedman Aligned | 1.47252E-02 | 1.48262E-02 | 1.48262E-02 | 1.47252E-02 |
| PSO | Quade | 9.99998E-01 | 1.0 | 1.0 | 9.99998E-01 |
| CWOA | Friedman | 9.98002E-01 | 1.0 | 1.0 | 9.99990E-01 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.99533E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S78** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S79.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 4.24327E-13 | 4.24327E-13 | 4.24327E-13 | 4.24327E-13 |
| CWOA | Friedman Aligned | 1.58213E-08 | 5.84171E-08 | 5.84171E-08 | 5.84171E-08 |
| CWOA | Quade | 8.27070E-02 | 1.58322E-01 | 1.58322E-01 | 1.47324E-01 |
| PSO | Friedman | 5.47007E-13 | 1.00986E-12 | 1.00986E-12 | 1.00986E-12 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.29272E-02 | 6.48321E-02 | 6.48321E-02 | 6.29272E-02 |
| WW | Friedman | 1.17580E-12 | 2.98472E-12 | 2.98472E-12 | 2.98472E-12 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 8.27070E-02 | 2.15423E-01 | 2.15423E-01 | 1.95696E-01 |
| MABC | Friedman | 4.19564E-12 | 1.29097E-11 | 1.29097E-11 | 1.29097E-11 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 8.27070E-02 | 2.09263E-01 | 2.09263E-01 | 1.90452E-01 |
| NNA | Friedman | 7.84642E-11 | 2.71607E-10 | 2.71607E-10 | 2.71607E-10 |
| NNA | Friedman Aligned | 2.47028E-10 | 9.12102E-10 | 9.12102E-10 | 9.12102E-10 |
| NNA | Quade | 1.31675E-01 | 4.75701E-01 | 4.49624E-01 | 3.86597E-01 |
| GOTLBO | Friedman | 6.36465E-10 | 2.35003E-09 | 2.35003E-09 | 2.35003E-09 |
| GOTLBO | Friedman Aligned | 2.11298E-13 | 7.31415E-13 | 7.31415E-13 | 7.31415E-13 |
| GOTLBO | Quade | 1.31675E-01 | 4.75701E-01 | 4.49624E-01 | 3.86597E-01 |
| ISCA | Friedman | 7.32203E-09 | 2.75984E-08 | 2.75984E-08 | 2.75984E-08 |
| ISCA | Friedman Aligned | <1E-13 | 2.62013E-13 | 2.62013E-13 | 2.62013E-13 |
| ISCA | Quade | 1.31675E-01 | 4.80357E-01 | 4.66941E-01 | 3.92032E-01 |
| NDE | Friedman | 3.81094E-06 | 1.40712E-05 | 1.40712E-05 | 1.40711E-05 |
| NDE | Friedman Aligned | 3.64961E-10 | 1.37562E-09 | 1.37562E-09 | 1.37562E-09 |
| NDE | Quade | 1.31675E-01 | 4.80357E-01 | 4.66941E-01 | 3.92032E-01 |
| **Table S79** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.63384E-04 | 5.65573E-04 | 5.65573E-04 | 5.65445E-04 |
| IJAYA | Friedman Aligned | 3.87465E-07 | 1.34123E-06 | 1.34123E-06 | 1.34123E-06 |
| IJAYA | Quade | 3.02189E-01 | 1.0 | 1.0 | 7.12198E-01 |
| DE | Friedman | 6.56389E-04 | 2.01981E-03 | 2.01981E-03 | 2.01828E-03 |
| DE | Friedman Aligned | 2.66423E-06 | 8.19762E-06 | 8.19762E-06 | 8.19760E-06 |
| DE | Quade | 3.81323E-01 | 1.0 | 1.0 | 7.71781E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S80.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 5.86488E-01 | 8.53743E-01 | 8.53743E-01 | 5.86488E-01 |
| PSO | Friedman Aligned | 8.81758E-10 | 8.81758E-10 | 8.81758E-10 | 8.81758E-10 |
| PSO | Quade | 9.97484E-01 | 1.0 | 1.0 | 9.97484E-01 |
| CWOA | Friedman | 7.51157E-01 | 1.0 | 1.0 | 9.23302E-01 |
| CWOA | Friedman Aligned | 1.22647E-06 | 3.11335E-06 | 3.11335E-06 | 3.11335E-06 |
| CWOA | Quade | 9.97484E-01 | 1.0 | 1.0 | 9.99959E-01 |
| WW | Friedman | 7.99268E-01 | 1.0 | 1.0 | 9.83028E-01 |
| WW | Friedman Aligned | 3.57471E-02 | 1.11380E-01 | 1.11380E-01 | 1.05960E-01 |
| WW | Quade | 9.97484E-01 | 1.0 | 1.0 | 9.99994E-01 |
| MABC | Friedman | 8.32806E-01 | 1.0 | 1.0 | 9.95927E-01 |
| MABC | Friedman Aligned | 1.26421E-08 | 2.33393E-08 | 2.33393E-08 | 2.33393E-08 |
| MABC | Quade | 9.97484E-01 | 1.0 | 1.0 | 9.99994E-01 |
| NNA | Friedman | 9.66409E-01 | 1.0 | 1.0 | 9.99992E-01 |
| NNA | Friedman Aligned | 4.19070E-01 | 1.0 | 1.0 | 8.65391E-01 |
| NNA | Quade | 9.99955E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S80** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 4.05106E-01 | 1.0 | 1.0 | 8.34341E-01 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S81.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.84741E-13 | 1.84741E-13 | 1.84741E-13 | 1.84741E-13 |
| ISCA | Friedman Aligned | 6.16534E-09 | 2.13416E-08 | 2.13416E-08 | 2.13416E-08 |
| ISCA | Quade | 1.65864E-02 | 6.14388E-02 | 6.14388E-02 | 5.98873E-02 |
| GOTLBO | Friedman | 1.50679E-12 | 2.78177E-12 | 2.78177E-12 | 2.78177E-12 |
| GOTLBO | Friedman Aligned | 7.42973E-09 | 2.28607E-08 | 2.28607E-08 | 2.28607E-08 |
| GOTLBO | Quade | 1.58830E-02 | 5.52505E-02 | 5.32410E-02 | 5.39130E-02 |
| NNA | Friedman | 9.56997E-12 | 2.42930E-11 | 2.42930E-11 | 2.42930E-11 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.58830E-02 | 5.52505E-02 | 5.32410E-02 | 5.39130E-02 |
| NDE | Friedman | 7.10301E-11 | 2.18554E-10 | 2.18554E-10 | 2.18554E-10 |
| NDE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NDE | Quade | 1.60291E-02 | 6.06427E-02 | 6.06427E-02 | 5.90891E-02 |
| MABC | Friedman | 7.53190E-11 | 2.60719E-10 | 2.60719E-10 | 2.60719E-10 |
| MABC | Friedman Aligned | 2.94091E-11 | 1.01801E-10 | 1.01801E-10 | 1.01801E-10 |
| MABC | Quade | 7.07439E-03 | 1.80071E-02 | 1.80071E-02 | 1.78605E-02 |
| WW | Friedman | 1.86658E-10 | 6.89200E-10 | 6.89200E-10 | 6.89200E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 7.07439E-03 | 1.91887E-02 | 1.91887E-02 | 1.90239E-02 |
| CWOA | Friedman | 6.11462E-10 | 2.30474E-09 | 2.30474E-09 | 2.30474E-09 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 6.66498E-03 | 1.23394E-02 | 1.23394E-02 | 1.22699E-02 |
| PSO | Friedman | 4.89640E-09 | 1.80790E-08 | 1.80790E-08 | 1.80790E-08 |
| PSO | Friedman Aligned | 1.07310E-10 | 3.96220E-10 | 3.96220E-10 | 3.96220E-10 |
| PSO | Quade | 3.94226E-03 | 3.94945E-03 | 3.94945E-03 | 3.94226E-03 |
| **Table S81** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 7.58306E-09 | 2.62490E-08 | 2.62490E-08 | 2.62490E-08 |
| IJAYA | Friedman Aligned | 2.61112E-09 | 9.64106E-09 | 9.64106E-09 | 9.64106E-09 |
| IJAYA | Quade | 6.06906E-02 | 2.12098E-01 | 2.12098E-01 | 1.94851E-01 |
| DE | Friedman | 6.24243E-08 | 1.92075E-07 | 1.92075E-07 | 1.92075E-07 |
| DE | Friedman Aligned | 5.59014E-10 | 2.10705E-09 | 2.10705E-09 | 2.10705E-09 |
| DE | Quade | 8.80902E-02 | 2.73906E-01 | 2.73906E-01 | 2.47035E-01 |
| TLBO | Friedman | 5.55943E-02 | 1.41741E-01 | 1.41741E-01 | 1.35150E-01 |
| TLBO | Friedman Aligned | 1.62041E-06 | 4.11334E-06 | 4.11334E-06 | 4.11334E-06 |
| TLBO | Quade | 4.76082E-01 | 1.0 | 1.0 | 8.06197E-01 |
| EBLSHADE | Friedman | 8.61718E-01 | 1.0 | 1.0 | 9.74075E-01 |
| EBLSHADE | Friedman Aligned | 1.23136E-01 | 2.28456E-01 | 2.28456E-01 | 2.15408E-01 |
| EBLSHADE | Quade | 8.37323E-01 | 1.0 | 1.0 | 9.65006E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S82.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S82** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S83.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.31344E-04 | 2.31368E-04 | 2.31368E-04 | 2.31344E-04 |
| PSO | Friedman Aligned | 6.11085E-09 | 1.55122E-08 | 1.55122E-08 | 1.55122E-08 |
| PSO | Quade | 7.91155E-01 | 1.0 | 1.0 | 7.91155E-01 |
| CWOA | Friedman | 1.13512E-03 | 2.09662E-03 | 2.09662E-03 | 2.09461E-03 |
| CWOA | Friedman Aligned | 9.81437E-13 | 9.81437E-13 | 9.81437E-13 | 9.81437E-13 |
| CWOA | Quade | 7.91155E-01 | 1.0 | 1.0 | 9.40998E-01 |
| WW | Friedman | 2.28574E-03 | 5.80737E-03 | 5.80737E-03 | 5.79207E-03 |
| WW | Friedman Aligned | 1.00298E-07 | 3.08611E-07 | 3.08611E-07 | 3.08611E-07 |
| WW | Quade | 7.91155E-01 | 1.0 | 1.0 | 9.65039E-01 |
| MABC | Friedman | 3.73238E-03 | 1.14991E-02 | 1.14991E-02 | 1.14398E-02 |
| MABC | Friedman Aligned | 1.20086E-10 | 2.21697E-10 | 2.21697E-10 | 2.21697E-10 |
| MABC | Quade | 7.91155E-01 | 1.0 | 1.0 | 9.65039E-01 |
| NNA | Friedman | 1.33622E-02 | 4.64453E-02 | 4.64453E-02 | 4.54980E-02 |
| NNA | Friedman Aligned | 5.19667E-05 | 1.91880E-04 | 1.91880E-04 | 1.91864E-04 |
| NNA | Quade | 8.14745E-01 | 1.0 | 1.0 | 9.97080E-01 |
| GOTLBO | Friedman | 3.06760E-02 | 1.14216E-01 | 1.14216E-01 | 1.08668E-01 |
| GOTLBO | Friedman Aligned | 4.97230E-03 | 1.87633E-02 | 1.87633E-02 | 1.86131E-02 |
| GOTLBO | Quade | 8.14745E-01 | 1.0 | 1.0 | 9.97080E-01 |
| ISCA | Friedman | 7.68884E-02 | 2.95155E-01 | 2.95155E-01 | 2.60335E-01 |
| ISCA | Friedman Aligned | 7.23856E-03 | 2.67643E-02 | 2.67643E-02 | 2.64676E-02 |
| ISCA | Quade | 8.14745E-01 | 1.0 | 1.0 | 9.97080E-01 |
| NDE | Friedman | 5.51498E-01 | 1.0 | 1.0 | 9.48214E-01 |
| NDE | Friedman Aligned | 3.71045E-05 | 1.28440E-04 | 1.28440E-04 | 1.28433E-04 |
| NDE | Quade | 8.14745E-01 | 1.0 | 1.0 | 9.97080E-01 |
| **Table S83** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S84.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.69676E-01 | 3.10499E-01 | 3.10499E-01 | 2.69676E-01 |
| PSO | Friedman Aligned | 1.90081E-09 | 1.90081E-09 | 1.90081E-09 | 1.90081E-09 |
| PSO | Quade | 9.89623E-01 | 1.0 | 1.0 | 9.89623E-01 |
| CWOA | Friedman | 4.39552E-01 | 1.0 | 1.0 | 6.56634E-01 |
| CWOA | Friedman Aligned | 5.21440E-07 | 1.32366E-06 | 1.32366E-06 | 1.32366E-06 |
| CWOA | Quade | 9.89623E-01 | 1.0 | 1.0 | 9.99557E-01 |
| WW | Friedman | 5.09275E-01 | 1.0 | 1.0 | 8.35864E-01 |
| WW | Friedman Aligned | 2.25658E-02 | 6.99826E-02 | 6.99826E-02 | 6.78193E-02 |
| WW | Quade | 9.89623E-01 | 1.0 | 1.0 | 9.99883E-01 |
| MABC | Friedman | 5.59198E-01 | 1.0 | 1.0 | 9.19580E-01 |
| MABC | Friedman Aligned | 4.73291E-09 | 8.73769E-09 | 8.73769E-09 | 8.73769E-09 |
| MABC | Quade | 9.89623E-01 | 1.0 | 1.0 | 9.99883E-01 |
| NNA | Friedman | 7.82941E-01 | 1.0 | 1.0 | 9.94947E-01 |
| NNA | Friedman Aligned | 3.27655E-01 | 1.0 | 1.0 | 7.69104E-01 |
| NNA | Quade | 9.94298E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 9.12830E-01 | 1.0 | 1.0 | 9.99878E-01 |
| GOTLBO | Friedman Aligned | 9.78655E-01 | 1.0 | 1.0 | 9.99999E-01 |
| GOTLBO | Quade | 9.94298E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S84** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 3.13388E-01 | 1.0 | 1.0 | 7.27874E-01 |
| NDE | Quade | 9.96741E-01 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S85.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 8.48601E-01 | 1.0 | 1.0 | 8.48601E-01 |
| PSO | Friedman Aligned | 4.90719E-13 | 4.90719E-13 | 4.90719E-13 | 4.90719E-13 |
| PSO | Quade | 9.98135E-01 | 1.0 | 1.0 | 9.98135E-01 |
| CWOA | Friedman | 9.32174E-01 | 1.0 | 1.0 | 9.93041E-01 |
| CWOA | Friedman Aligned | 3.95822E-04 | 1.00493E-03 | 1.00493E-03 | 1.00447E-03 |
| CWOA | Quade | 9.98135E-01 | 1.0 | 1.0 | 9.99976E-01 |
| WW | Friedman | 9.51791E-01 | 1.0 | 1.0 | 9.99546E-01 |
| WW | Friedman Aligned | 4.91869E-01 | 1.0 | 1.0 | 8.75460E-01 |
| WW | Quade | 9.98135E-01 | 1.0 | 1.0 | 9.99997E-01 |
| MABC | Friedman | 9.66929E-01 | 1.0 | 1.0 | 9.99972E-01 |
| MABC | Friedman Aligned | 1.10045E-05 | 2.03160E-05 | 2.03160E-05 | 2.03159E-05 |
| MABC | Quade | 9.98135E-01 | 1.0 | 1.0 | 9.99997E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 9.97980E-01 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S85** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S86.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.99991E-01 | 1.0 | 1.0 | 9.99991E-01 |
| PSO | Friedman Aligned | 4.75831E-04 | 4.75935E-04 | 4.75935E-04 | 4.75831E-04 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 9.56126E-01 | 1.0 | 1.0 | 9.96886E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S86** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S87.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *R*p2 evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.98940E-01 | 1.0 | 1.0 | 9.98940E-01 |
| PSO | Friedman Aligned | 2.50197E-10 | 2.50197E-10 | 2.50197E-10 | 2.50197E-10 |
| PSO | Quade | 9.99995E-01 | 1.0 | 1.0 | 9.99995E-01 |
| CWOA | Friedman | 9.99937E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 4.02222E-02 | 1.03720E-01 | 1.03720E-01 | 9.89662E-02 |
| CWOA | Quade | 9.99997E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 3.37036E-03 | 6.23109E-03 | 6.23109E-03 | 6.21332E-03 |
| MABC | Quade | 9.99999E-01 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S87** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S88.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.65316E-06 | 1.65316E-06 | 1.65316E-06 | 1.65316E-06 |
| PSO | Friedman Aligned | 1.53731E-10 | 5.67622E-10 | 5.67622E-10 | 5.67622E-10 |
| PSO | Quade | 3.88398E-01 | 4.82491E-01 | 4.82491E-01 | 3.88398E-01 |
| GOTLBO | Friedman | 8.93210E-06 | 1.64901E-05 | 1.64901E-05 | 1.64900E-05 |
| GOTLBO | Friedman Aligned | 4.73962E-11 | 1.45834E-10 | 1.45834E-10 | 1.45834E-10 |
| GOTLBO | Quade | 4.90459E-01 | 1.0 | 1.0 | 7.11990E-01 |
| CWOA | Friedman | 1.88793E-04 | 4.79278E-04 | 4.79278E-04 | 4.79174E-04 |
| CWOA | Friedman Aligned | 7.33780E-11 | 2.54001E-10 | 2.54001E-10 | 2.54001E-10 |
| CWOA | Quade | 4.90459E-01 | 1.0 | 1.0 | 7.11990E-01 |
| NNA | Friedman | 2.35379E-04 | 7.24303E-04 | 7.24303E-04 | 7.24067E-04 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 4.90459E-01 | 1.0 | 1.0 | 8.02179E-01 |
| ISCA | Friedman | 2.53779E-04 | 8.78536E-04 | 8.78536E-04 | 8.78193E-04 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 4.90459E-01 | 1.0 | 1.0 | 8.02179E-01 |
| WW | Friedman | 2.94224E-03 | 1.08723E-02 | 1.08723E-02 | 1.08207E-02 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 4.90459E-01 | 1.0 | 1.0 | 8.86478E-01 |
| MABC | Friedman | 7.26555E-02 | 2.78617E-01 | 2.78617E-01 | 2.47469E-01 |
| MABC | Friedman Aligned | 6.49287E-08 | 2.44731E-07 | 2.44731E-07 | 2.44731E-07 |
| MABC | Quade | 7.38143E-01 | 1.0 | 1.0 | 9.93595E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S88** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S89.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 1.34914E-10 | 4.67010E-10 | 4.67010E-10 | 4.67010E-10 |
| GOTLBO | Quade | 2.01733E-03 | 3.72749E-03 | 3.62027E-03 | 3.72113E-03 |
| MABC | Friedman | 5.02265E-13 | 9.27258E-13 | 9.27258E-13 | 9.27258E-13 |
| MABC | Friedman Aligned | 4.27647E-12 | 7.89502E-12 | 7.89502E-12 | 7.89502E-12 |
| MABC | Quade | 1.69013E-02 | 6.39553E-02 | 6.39553E-02 | 6.22288E-02 |
| WW | Friedman | 3.31974E-10 | 8.42703E-10 | 8.42703E-10 | 8.42703E-10 |
| WW | Friedman Aligned | 5.25791E-11 | 1.33470E-10 | 1.33470E-10 | 1.33470E-10 |
| WW | Quade | 3.73309E-03 | 1.37976E-02 | 1.37976E-02 | 1.37146E-02 |
| PSO | Friedman | 5.31136E-10 | 1.63426E-09 | 1.63426E-09 | 1.63426E-09 |
| PSO | Friedman Aligned | 2.13919E-10 | 8.06309E-10 | 8.06309E-10 | 8.06309E-10 |
| PSO | Quade | 6.98330E-04 | 6.98555E-04 | 6.98555E-04 | 6.98330E-04 |
| DE | Friedman | 3.19170E-09 | 1.10482E-08 | 1.10482E-08 | 1.10482E-08 |
| DE | Friedman Aligned | 5.47403E-03 | 2.02331E-02 | 2.02331E-02 | 2.00633E-02 |
| DE | Quade | 8.10275E-02 | 3.04024E-01 | 3.04024E-01 | 2.68016E-01 |
| ISCA | Friedman | 3.57233E-09 | 1.31901E-08 | 1.31901E-08 | 1.31901E-08 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.22682E-03 | 6.90912E-03 | 6.90912E-03 | 6.88795E-03 |
| NNA | Friedman | 4.05858E-09 | 1.52977E-08 | 1.52977E-08 | 1.52977E-08 |
| NNA | Friedman Aligned | 5.32343E-11 | 1.63798E-10 | 1.63798E-10 | 1.63798E-10 |
| NNA | Quade | 2.22682E-03 | 6.85703E-03 | 6.85703E-03 | 6.83591E-03 |
| CWOA | Friedman | 5.60543E-09 | 2.06970E-08 | 2.06970E-08 | 2.06970E-08 |
| CWOA | Friedman Aligned | 1.69719E-10 | 6.26656E-10 | 6.26656E-10 | 6.26656E-10 |
| CWOA | Quade | 2.01733E-03 | 3.72749E-03 | 3.62027E-03 | 3.72113E-03 |
| **Table S89** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 3.52483E-08 | 1.22013E-07 | 1.22013E-07 | 1.22013E-07 |
| IJAYA | Friedman Aligned | 1.53493E-02 | 5.32586E-02 | 5.32586E-02 | 5.21360E-02 |
| IJAYA | Quade | 1.15779E-01 | 4.08298E-01 | 4.08298E-01 | 3.46842E-01 |
| NDE | Friedman | 3.42808E-06 | 1.05479E-05 | 1.05479E-05 | 1.05479E-05 |
| NDE | Friedman Aligned | 1.43525E-01 | 4.49397E-01 | 4.49397E-01 | 3.79176E-01 |
| NDE | Quade | 1.41545E-01 | 4.43086E-01 | 4.43086E-01 | 3.74750E-01 |
| TLBO | Friedman | 8.34811E-02 | 2.13320E-01 | 2.13320E-01 | 1.98511E-01 |
| TLBO | Friedman Aligned | 7.63709E-01 | 1.0 | 1.0 | 9.74324E-01 |
| TLBO | Quade | 5.70319E-01 | 1.0 | 9.87681E-01 | 8.82846E-01 |
| EBLSHADE | Friedman | 8.44298E-01 | 1.0 | 8.29657E-01 | 9.67726E-01 |
| EBLSHADE | Friedman Aligned | 8.82085E-01 | 1.0 | 1.0 | 9.80682E-01 |
| EBLSHADE | Quade | 9.74027E-01 | 1.0 | 9.87681E-01 | 9.98817E-01 |
| STLBO | Friedman | 8.44298E-01 | 1.0 | 8.29657E-01 | 9.67726E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 9.87681E-01 | 1.0 | 9.87681E-01 | 9.98817E-01 |

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| **Table S90.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 1.26962E-10 | 4.39482E-10 | 4.39482E-10 | 4.39482E-10 |
| GOTLBO | Quade | 2.37937E-03 | 4.39710E-03 | 4.26800E-03 | 4.38825E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | 2.13792E-10 | 8.05830E-10 | 8.05830E-10 | 8.05830E-10 |
| PSO | Quade | 8.38441E-04 | 8.38765E-04 | 8.38765E-04 | 8.38441E-04 |
| MABC | Friedman | <1E-13 | 1.83187E-13 | 1.83187E-13 | 1.83187E-13 |
| MABC | Friedman Aligned | 1.31339E-12 | 2.42473E-12 | 2.42473E-12 | 2.42473E-12 |
| MABC | Quade | 1.91431E-02 | 7.24764E-02 | 7.24764E-02 | 7.02637E-02 |
| WW | Friedman | 7.79167E-11 | 2.39744E-10 | 2.39744E-10 | 2.39744E-10 |
| WW | Friedman Aligned | 4.75574E-11 | 1.20723E-10 | 1.20723E-10 | 1.20723E-10 |
| WW | Quade | 4.31959E-03 | 1.59678E-02 | 1.59678E-02 | 1.58567E-02 |
| ISCA | Friedman | 1.68524E-09 | 5.83353E-09 | 5.83353E-09 | 5.83353E-09 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.60407E-03 | 8.07052E-03 | 8.07052E-03 | 8.04163E-03 |
| NNA | Friedman | 1.89918E-09 | 7.01236E-09 | 7.01236E-09 | 7.01236E-09 |
| NNA | Friedman Aligned | 4.85501E-11 | 1.49385E-10 | 1.49385E-10 | 1.49385E-10 |
| NNA | Quade | 2.60407E-03 | 8.01975E-03 | 8.01975E-03 | 7.99087E-03 |
| CWOA | Friedman | 2.65354E-09 | 1.00018E-08 | 1.00018E-08 | 1.00018E-08 |
| CWOA | Friedman Aligned | 1.61977E-10 | 5.98069E-10 | 5.98069E-10 | 5.98069E-10 |
| CWOA | Quade | 2.37937E-03 | 4.39710E-03 | 4.26800E-03 | 4.38825E-03 |
| DE | Friedman | 7.94319E-09 | 2.93287E-08 | 2.93287E-08 | 2.93287E-08 |
| DE | Friedman Aligned | 9.47613E-03 | 3.50528E-02 | 3.50528E-02 | 3.45449E-02 |
| DE | Quade | 8.93754E-02 | 3.35921E-01 | 3.35921E-01 | 2.92269E-01 |
| **Table S90** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.23860E-07 | 4.28745E-07 | 4.28745E-07 | 4.28745E-07 |
| IJAYA | Friedman Aligned | 2.49893E-02 | 8.68378E-02 | 8.68378E-02 | 8.38734E-02 |
| IJAYA | Quade | 1.26669E-01 | 4.47523E-01 | 4.47523E-01 | 3.74268E-01 |
| NDE | Friedman | 1.01613E-05 | 3.12657E-05 | 3.12657E-05 | 3.12654E-05 |
| NDE | Friedman Aligned | 2.00048E-01 | 6.31055E-01 | 6.31055E-01 | 4.96806E-01 |
| NDE | Quade | 1.54053E-01 | 4.83018E-01 | 4.83018E-01 | 4.02358E-01 |
| TLBO | Friedman | 1.34018E-01 | 3.43902E-01 | 3.43902E-01 | 3.05986E-01 |
| TLBO | Friedman Aligned | 8.84270E-01 | 1.0 | 1.0 | 9.95806E-01 |
| TLBO | Quade | 5.99326E-01 | 1.0 | 1.0 | 9.01893E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S91.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.61989E-10 | 3.61989E-10 | 3.61989E-10 | 3.61989E-10 |
| PSO | Friedman Aligned | 1.81743E-10 | 6.85032E-10 | 6.85032E-10 | 6.85032E-10 |
| PSO | Quade | 1.73209E-01 | 1.88818E-01 | 1.88818E-01 | 1.73209E-01 |
| GOTLBO | Friedman | 3.50712E-09 | 6.47468E-09 | 6.47468E-09 | 6.47468E-09 |
| GOTLBO | Friedman Aligned | 7.27926E-11 | 2.51974E-10 | 2.51974E-10 | 2.51974E-10 |
| GOTLBO | Quade | 2.54954E-01 | 5.31222E-01 | 5.04676E-01 | 4.19195E-01 |
| CWOA | Friedman | 1.94580E-07 | 4.93934E-07 | 4.93934E-07 | 4.93934E-07 |
| CWOA | Friedman Aligned | 1.03934E-10 | 3.83757E-10 | 3.83757E-10 | 3.83757E-10 |
| CWOA | Quade | 2.54954E-01 | 5.31222E-01 | 5.04676E-01 | 4.19195E-01 |
| NNA | Friedman | 2.78684E-07 | 8.57490E-07 | 8.57490E-07 | 8.57490E-07 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 2.54954E-01 | 7.17822E-01 | 6.91359E-01 | 5.25213E-01 |
| ISCA | Friedman | 3.30631E-07 | 1.14449E-06 | 1.14449E-06 | 1.14449E-06 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.54954E-01 | 7.17822E-01 | 6.91359E-01 | 5.25213E-01 |
| WW | Friedman | 9.61871E-06 | 3.55153E-05 | 3.55153E-05 | 3.55148E-05 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.54954E-01 | 9.90015E-01 | 9.90015E-01 | 6.52450E-01 |
| MABC | Friedman | 1.07108E-03 | 4.03815E-03 | 4.03815E-03 | 4.03117E-03 |
| MABC | Friedman Aligned | 2.42220E-11 | 7.45293E-11 | 7.45293E-11 | 7.45293E-11 |
| MABC | Quade | 4.99948E-01 | 1.0 | 1.0 | 9.26630E-01 |
| DE | Friedman | 2.54875E-01 | 9.93629E-01 | 9.93629E-01 | 6.62534E-01 |
| DE | Friedman Aligned | 2.74197E-01 | 1.0 | 1.0 | 6.93733E-01 |
| DE | Quade | 8.73049E-01 | 1.0 | 1.0 | 9.99510E-01 |
| **Table S91** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 4.94513E-01 | 1.0 | 1.0 | 9.05728E-01 |
| IJAYA | Friedman Aligned | 4.44005E-01 | 1.0 | 1.0 | 8.68915E-01 |
| IJAYA | Quade | 9.55250E-01 | 1.0 | 1.0 | 9.99979E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| **Table S92.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.61343E-02 | 1.62557E-02 | 1.62557E-02 | 1.61343E-02 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 8.83074E-01 | 1.0 | 1.0 | 8.83074E-01 |
| GOTLBO | Friedman | 3.55630E-02 | 6.66648E-02 | 6.66648E-02 | 6.46651E-02 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 9.16596E-01 | 1.0 | 1.0 | 9.89806E-01 |
| CWOA | Friedman | 1.70290E-01 | 4.63814E-01 | 4.63814E-01 | 3.77416E-01 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 9.16596E-01 | 1.0 | 1.0 | 9.89806E-01 |
| ISCA | Friedman | 1.70313E-01 | 5.91053E-01 | 5.91053E-01 | 4.57385E-01 |
| ISCA | Friedman Aligned | 6.75460E-13 | 2.49401E-12 | 2.49401E-12 | 2.49401E-12 |
| ISCA | Quade | 9.16596E-01 | 1.0 | 1.0 | 9.96412E-01 |
| NNA | Friedman | 1.70313E-01 | 5.58293E-01 | 5.58293E-01 | 4.37004E-01 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 9.16596E-01 | 1.0 | 1.0 | 9.96412E-01 |
| WW | Friedman | 4.65704E-01 | 1.0 | 1.0 | 9.01170E-01 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 9.16596E-01 | 1.0 | 1.0 | 9.99320E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S92** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S93.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.11422E-12 | 1.19904E-12 | 1.19904E-12 | 1.19904E-12 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.05739E-02 | 6.19145E-02 | 6.12106E-02 | 6.02176E-02 |
| NNA | Friedman | 1.11422E-12 | 1.82943E-12 | 1.82943E-12 | 1.82943E-12 |
| NNA | Friedman Aligned | 4.34834E-11 | 1.33795E-10 | 1.33795E-10 | 1.33795E-10 |
| NNA | Quade | 2.05739E-02 | 6.19145E-02 | 6.12106E-02 | 6.02176E-02 |
| WW | Friedman | 1.11422E-12 | 1.11422E-12 | 1.11422E-12 | 1.11422E-12 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 2.85496E-02 | 1.06236E-01 | 1.06236E-01 | 1.01427E-01 |
| CWOA | Friedman | 1.22824E-12 | 3.77920E-12 | 3.77920E-12 | 3.77920E-12 |
| CWOA | Friedman Aligned | 1.53052E-10 | 5.65116E-10 | 5.65116E-10 | 5.65116E-10 |
| CWOA | Quade | 2.05739E-02 | 3.83174E-02 | 3.68718E-02 | 3.76516E-02 |
| GOTLBO | Friedman | 8.01828E-11 | 2.77556E-10 | 2.77556E-10 | 2.77556E-10 |
| GOTLBO | Friedman Aligned | 1.18047E-10 | 4.08623E-10 | 4.08623E-10 | 4.08623E-10 |
| GOTLBO | Quade | 2.05739E-02 | 3.83174E-02 | 3.68718E-02 | 3.76516E-02 |
| MABC | Friedman | 5.45986E-10 | 2.01595E-09 | 1.96197E-09 | 2.01595E-09 |
| MABC | Friedman Aligned | 2.04947E-13 | 5.20251E-13 | 5.20251E-13 | 5.20251E-13 |
| MABC | Quade | 9.31341E-02 | 3.58952E-01 | 3.58952E-01 | 3.08217E-01 |
| PSO | Friedman | 5.45986E-10 | 2.01595E-09 | 1.96197E-09 | 2.01595E-09 |
| PSO | Friedman Aligned | 2.12199E-10 | 7.99827E-10 | 7.99827E-10 | 7.99827E-10 |
| PSO | Quade | 9.34861E-03 | 9.38919E-03 | 9.38919E-03 | 9.34861E-03 |
| DE | Friedman | 3.05182E-05 | 1.12683E-04 | 1.12683E-04 | 1.12678E-04 |
| DE | Friedman Aligned | 1.72967E-02 | 6.40787E-02 | 6.40787E-02 | 6.23920E-02 |
| DE | Quade | 2.96784E-01 | 1.0 | 1.0 | 7.27477E-01 |
| **Table S93** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.29338E-04 | 7.93891E-04 | 7.93891E-04 | 7.93639E-04 |
| IJAYA | Friedman Aligned | 4.24809E-02 | 1.48029E-01 | 1.48029E-01 | 1.39519E-01 |
| IJAYA | Quade | 3.76114E-01 | 1.0 | 1.0 | 8.04679E-01 |
| NDE | Friedman | 4.96635E-03 | 1.52898E-02 | 1.52898E-02 | 1.52024E-02 |
| NDE | Friedman Aligned | 2.83997E-01 | 9.06459E-01 | 9.06459E-01 | 6.42247E-01 |
| NDE | Quade | 4.27401E-01 | 1.0 | 1.0 | 8.20144E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S94.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.99999E-01 | 1.0 | 1.0 | 9.99999E-01 |
| PSO | Friedman Aligned | 1.10006E-03 | 1.10062E-03 | 1.10062E-03 | 1.10006E-03 |
| PSO | Quade | 9.99999E-01 | 1.0 | 1.0 | 9.99999E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S94** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 7.09370E-01 | 1.0 | 1.0 | 8.97849E-01 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S95.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Friedman Aligned | 1.34914E-10 | 4.67010E-10 | 4.67010E-10 | 4.67010E-10 |
| GOTLBO | Quade | 2.14059E-03 | 3.95545E-03 | 3.84083E-03 | 3.94829E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | 2.13919E-10 | 8.06309E-10 | 8.06309E-10 | 8.06309E-10 |
| PSO | Quade | 7.45736E-04 | 7.45992E-04 | 7.45992E-04 | 7.45736E-04 |
| MABC | Friedman | <1E-13 | 1.95399E-13 | 1.95399E-13 | 1.95399E-13 |
| MABC | Friedman Aligned | 4.27647E-12 | 7.89502E-12 | 7.89502E-12 | 7.89502E-12 |
| MABC | Quade | 1.76757E-02 | 6.68978E-02 | 6.68978E-02 | 6.50101E-02 |
| WW | Friedman | 8.30101E-11 | 2.55416E-10 | 2.55416E-10 | 2.55416E-10 |
| WW | Friedman Aligned | 5.25791E-11 | 1.33470E-10 | 1.33470E-10 | 1.33470E-10 |
| WW | Quade | 3.93413E-03 | 1.45414E-02 | 1.45414E-02 | 1.44493E-02 |
| ISCA | Friedman | 1.77301E-09 | 6.13733E-09 | 6.13733E-09 | 6.13733E-09 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 2.35565E-03 | 7.30587E-03 | 7.30587E-03 | 7.28220E-03 |
| NNA | Friedman | 1.99588E-09 | 7.36942E-09 | 7.36942E-09 | 7.36942E-09 |
| NNA | Friedman Aligned | 5.32343E-11 | 1.63798E-10 | 1.63798E-10 | 1.63798E-10 |
| NNA | Quade | 2.35565E-03 | 7.25406E-03 | 7.25406E-03 | 7.23042E-03 |
| CWOA | Friedman | 2.78373E-09 | 1.04925E-08 | 1.04925E-08 | 1.04925E-08 |
| CWOA | Friedman Aligned | 1.69719E-10 | 6.26656E-10 | 6.26656E-10 | 6.26656E-10 |
| CWOA | Quade | 2.14059E-03 | 3.95545E-03 | 3.84083E-03 | 3.94829E-03 |
| DE | Friedman | 7.39494E-09 | 2.73044E-08 | 2.73044E-08 | 2.73044E-08 |
| DE | Friedman Aligned | 5.47403E-03 | 2.02331E-02 | 2.02331E-02 | 2.00633E-02 |
| DE | Quade | 8.39403E-02 | 3.15141E-01 | 3.15141E-01 | 2.76546E-01 |
| **Table S95** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.15930E-07 | 4.01296E-07 | 4.01296E-07 | 4.01296E-07 |
| IJAYA | Friedman Aligned | 1.53493E-02 | 5.32586E-02 | 5.32586E-02 | 5.21360E-02 |
| IJAYA | Quade | 1.19590E-01 | 4.22010E-01 | 4.22010E-01 | 3.56536E-01 |
| NDE | Friedman | 9.60841E-06 | 2.95644E-05 | 2.95644E-05 | 2.95640E-05 |
| NDE | Friedman Aligned | 1.43525E-01 | 4.49397E-01 | 4.49397E-01 | 3.79176E-01 |
| NDE | Quade | 1.45931E-01 | 4.57073E-01 | 4.57073E-01 | 3.84528E-01 |
| TLBO | Friedman | 1.30872E-01 | 3.35738E-01 | 3.35738E-01 | 2.99567E-01 |
| TLBO | Friedman Aligned | 7.63709E-01 | 1.0 | 1.0 | 9.74324E-01 |
| TLBO | Quade | 5.80649E-01 | 1.0 | 1.0 | 8.89865E-01 |
| EBLSHADE | Friedman | 9.93529E-01 | 1.0 | 1.0 | 9.99909E-01 |
| EBLSHADE | Friedman Aligned | 8.82085E-01 | 1.0 | 1.0 | 9.80682E-01 |
| EBLSHADE | Quade | 9.83928E-01 | 1.0 | 1.0 | 9.99512E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S96.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S96** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S97.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.73246E-08 | 9.73246E-08 | 9.73246E-08 | 9.73246E-08 |
| PSO | Friedman Aligned | 1.70370E-10 | 6.29058E-10 | 6.29058E-10 | 6.29058E-10 |
| PSO | Quade | 2.46974E-01 | 2.80583E-01 | 2.80583E-01 | 2.46974E-01 |
| GOTLBO | Friedman | 6.35961E-07 | 1.17408E-06 | 1.17408E-06 | 1.17408E-06 |
| GOTLBO | Friedman Aligned | 5.77172E-11 | 1.77591E-10 | 1.77591E-10 | 1.77591E-10 |
| GOTLBO | Quade | 3.41083E-01 | 7.45945E-01 | 7.07294E-01 | 5.37051E-01 |
| CWOA | Friedman | 1.92373E-05 | 4.88336E-05 | 4.88336E-05 | 4.88325E-05 |
| CWOA | Friedman Aligned | 8.61309E-11 | 2.98146E-10 | 2.98146E-10 | 2.98146E-10 |
| CWOA | Quade | 3.41083E-01 | 7.45945E-01 | 7.07294E-01 | 5.37051E-01 |
| NNA | Friedman | 2.54032E-05 | 7.81643E-05 | 7.81643E-05 | 7.81616E-05 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 3.41083E-01 | 9.81080E-01 | 9.41198E-01 | 6.43922E-01 |
| ISCA | Friedman | 2.83482E-05 | 9.81294E-05 | 9.81294E-05 | 9.81251E-05 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 3.41083E-01 | 9.81080E-01 | 9.41198E-01 | 6.43922E-01 |
| WW | Friedman | 4.57580E-04 | 1.68973E-03 | 1.68973E-03 | 1.68849E-03 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 3.41083E-01 | 1.0 | 1.0 | 7.60671E-01 |
| MABC | Friedman | 1.94748E-02 | 7.37379E-02 | 7.37379E-02 | 7.14482E-02 |
| MABC | Friedman Aligned | 7.15972E-09 | 2.69866E-08 | 2.69866E-08 | 2.69866E-08 |
| MABC | Quade | 5.96552E-01 | 1.0 | 1.0 | 9.67332E-01 |
| DE | Friedman | 7.88581E-01 | 1.0 | 1.0 | 9.96777E-01 |
| DE | Friedman Aligned | 8.62956E-01 | 1.0 | 1.0 | 9.99350E-01 |
| DE | Quade | 9.44493E-01 | 1.0 | 1.0 | 9.99977E-01 |
| **Table S97** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S98.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.04976E-01 | 1.0 | 1.0 | 9.04976E-01 |
| PSO | Friedman Aligned | 1.47451E-09 | 2.72216E-09 | 2.72216E-09 | 2.72216E-09 |
| PSO | Quade | 9.99878E-01 | 1.0 | 1.0 | 9.99878E-01 |
| GOTLBO | Friedman | 9.39917E-01 | 1.0 | 1.0 | 9.94436E-01 |
| GOTLBO | Friedman Aligned | 1.04059E-07 | 2.64149E-07 | 2.64149E-07 | 2.64149E-07 |
| GOTLBO | Quade | 9.99979E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99718E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 5.38809E-11 | 5.38809E-11 | 5.38809E-11 | 5.38809E-11 |
| CWOA | Quade | 9.99979E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.99909E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.31567E-02 | 4.06680E-02 | 4.06680E-02 | 3.99318E-02 |
| NNA | Quade | 9.99994E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S98** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 5.21317E-02 | 1.83435E-01 | 1.83435E-01 | 1.69170E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S99.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.33915E-01 | 1.0 | 1.0 | 9.33915E-01 |
| PSO | Friedman Aligned | 4.34003E-10 | 4.34003E-10 | 4.34003E-10 | 4.34003E-10 |
| PSO | Quade | 9.99928E-01 | 1.0 | 1.0 | 9.99928E-01 |
| GOTLBO | Friedman | 9.59537E-01 | 1.0 | 1.0 | 9.97318E-01 |
| GOTLBO | Friedman Aligned | 2.86941E-02 | 7.36566E-02 | 7.36566E-02 | 7.12394E-02 |
| GOTLBO | Quade | 9.99991E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99963E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 3.00592E-04 | 5.55010E-04 | 5.55010E-04 | 5.54869E-04 |
| CWOA | Quade | 9.99991E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S99** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S100.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.67662E-01 | 1.0 | 1.0 | 9.67662E-01 |
| PSO | Friedman Aligned | 1.24911E-01 | 1.32747E-01 | 1.32747E-01 | 1.24911E-01 |
| PSO | Quade | 9.99999E-01 | 1.0 | 1.0 | 9.99999E-01 |
| GOTLBO | Friedman | 9.81485E-01 | 1.0 | 1.0 | 9.99367E-01 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S100** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S101.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *I*ph evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.92009E-01 | 4.88192E-01 | 4.88192E-01 | 3.92009E-01 |
| PSO | Friedman Aligned | 9.14469E-12 | 9.14469E-12 | 9.14469E-12 | 9.14469E-12 |
| PSO | Quade | 9.97302E-01 | 1.0 | 1.0 | 9.97302E-01 |
| GOTLBO | Friedman | 5.10410E-01 | 1.0 | 1.0 | 7.32463E-01 |
| GOTLBO | Friedman Aligned | 4.73013E-03 | 1.20291E-02 | 1.20291E-02 | 1.19636E-02 |
| GOTLBO | Quade | 9.98614E-01 | 1.0 | 1.0 | 9.99995E-01 |
| ISCA | Friedman | 8.70839E-01 | 1.0 | 1.0 | 9.97589E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 9.98614E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 8.70839E-01 | 1.0 | 1.0 | 9.97192E-01 |
| NNA | Friedman Aligned | 9.40262E-01 | 1.0 | 1.0 | 9.99828E-01 |
| NNA | Quade | 9.98614E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 8.70839E-01 | 1.0 | 1.0 | 9.94458E-01 |
| CWOA | Friedman Aligned | 2.40580E-05 | 4.44153E-05 | 4.44153E-05 | 4.44144E-05 |
| CWOA | Quade | 9.98614E-01 | 1.0 | 1.0 | 9.99995E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S101** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S102.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.12065E-07 | 1.12065E-07 | 1.12065E-07 | 1.12065E-07 |
| PSO | Friedman Aligned | 9.63011E-11 | 2.44457E-10 | 2.36238E-10 | 2.44457E-10 |
| PSO | Quade | 1.61148E-01 | 1.74539E-01 | 1.74539E-01 | 1.61148E-01 |
| NNA | Friedman | 1.32148E-02 | 2.45341E-02 | 2.45341E-02 | 2.42601E-02 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.50205E-01 |
| ISCA | Friedman | 2.56447E-02 | 6.57499E-02 | 6.57499E-02 | 6.38197E-02 |
| ISCA | Friedman Aligned | 1.65848E-09 | 6.12362E-09 | 6.12362E-09 | 6.12362E-09 |
| ISCA | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.58241E-01 |
| WW | Friedman | 2.56658E-02 | 7.96836E-02 | 7.96836E-02 | 7.68862E-02 |
| WW | Friedman Aligned | 5.78214E-09 | 2.17942E-08 | 2.17942E-08 | 2.17942E-08 |
| WW | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.56969E-01 |
| CWOA | Friedman | 7.51644E-02 | 2.66458E-01 | 2.66458E-01 | 2.36988E-01 |
| CWOA | Friedman Aligned | 9.81004E-12 | 1.81108E-11 | 1.81108E-11 | 1.81108E-11 |
| CWOA | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.70509E-01 |
| GOTLBO | Friedman | 1.36860E-01 | 5.25381E-01 | 5.25381E-01 | 4.19245E-01 |
| GOTLBO | Friedman Aligned | 8.50149E-10 | 2.94282E-09 | 2.94282E-09 | 2.94282E-09 |
| GOTLBO | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.95652E-01 |
| IJAYA | Friedman | 1.60075E-01 | 6.27579E-01 | 6.27579E-01 | 4.81863E-01 |
| IJAYA | Friedman Aligned | 9.63011E-11 | 2.44457E-10 | 2.36238E-10 | 2.44457E-10 |
| IJAYA | Quade | 8.03072E-01 | 1.0 | 1.0 | 9.95652E-01 |
| MABC | Friedman | 4.30602E-01 | 1.0 | 1.0 | 8.74997E-01 |
| MABC | Friedman Aligned | 2.44538E-03 | 9.03334E-03 | 9.03334E-03 | 8.99941E-03 |
| MABC | Quade | 8.68097E-01 | 1.0 | 1.0 | 9.99435E-01 |
| **Table S102** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S103.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 4.61853E-13 | 4.61853E-13 | 4.61853E-13 | 4.61853E-13 |
| IJAYA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| IJAYA | Quade | 1.77868E-02 | 6.59918E-02 | 5.94563E-02 | 6.41177E-02 |
| GOTLBO | Friedman | 6.49480E-13 | 1.19904E-12 | 1.19904E-12 | 1.19904E-12 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.77868E-02 | 6.59918E-02 | 5.94563E-02 | 6.41177E-02 |
| MABC | Friedman | 7.57246E-13 | 1.92224E-12 | 1.92224E-12 | 1.92224E-12 |
| MABC | Friedman Aligned | 1.47660E-10 | 4.54338E-10 | 4.54338E-10 | 4.54338E-10 |
| MABC | Quade | 3.24065E-02 | 1.20412E-01 | 1.20412E-01 | 1.14530E-01 |
| CWOA | Friedman | 3.15142E-12 | 9.69669E-12 | 9.69669E-12 | 9.69669E-12 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 9.53581E-03 | 2.92630E-02 | 2.92630E-02 | 2.88853E-02 |
| WW | Friedman | 4.24027E-11 | 1.46779E-10 | 1.46779E-10 | 1.46779E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 9.53581E-03 | 2.05775E-02 | 2.05775E-02 | 2.03861E-02 |
| ISCA | Friedman | 5.89440E-11 | 2.17639E-10 | 2.17639E-10 | 2.17639E-10 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 9.53581E-03 | 2.25189E-02 | 2.25189E-02 | 2.22920E-02 |
| NNA | Friedman | 2.68345E-10 | 1.01145E-09 | 1.01145E-09 | 1.01145E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 9.53581E-03 | 1.76760E-02 | 1.76760E-02 | 1.75335E-02 |
| DE | Friedman | 4.09489E-10 | 1.51196E-09 | 1.51196E-09 | 1.51196E-09 |
| DE | Friedman Aligned | 8.23115E-11 | 2.96018E-10 | 2.84924E-10 | 2.96018E-10 |
| DE | Quade | 7.19727E-02 | 2.51985E-01 | 2.51985E-01 | 2.27835E-01 |
| **Table S103** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.40866E-09 | 4.87613E-09 | 4.87613E-09 | 4.87613E-09 |
| PSO | Friedman Aligned | 8.01715E-11 | 2.96018E-10 | 2.84924E-10 | 2.96018E-10 |
| PSO | Quade | 1.23157E-04 | 1.23164E-04 | 1.23164E-04 | 1.23157E-04 |
| NDE | Friedman | 8.11697E-06 | 2.49753E-05 | 2.49753E-05 | 2.49751E-05 |
| NDE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NDE | Quade | 1.39601E-01 | 4.36892E-01 | 4.36892E-01 | 3.70384E-01 |
| TLBO | Friedman | 1.57702E-01 | 4.05499E-01 | 4.05499E-01 | 3.53159E-01 |
| TLBO | Friedman Aligned | 9.86791E-02 | 2.52471E-01 | 2.52471E-01 | 2.31820E-01 |
| TLBO | Quade | 6.59156E-01 | 1.0 | 1.0 | 9.34925E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S104.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 4.24327E-13 | 4.24327E-13 | 4.24327E-13 | 4.24327E-13 |
| MABC | Friedman Aligned | 1.30897E-10 | 4.93382E-10 | 4.67194E-10 | 4.93382E-10 |
| MABC | Quade | 2.61883E-02 | 9.71881E-02 | 9.71881E-02 | 9.33364E-02 |
| IJAYA | Friedman | 1.17484E-12 | 2.16893E-12 | 2.16893E-12 | 2.16893E-12 |
| IJAYA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| IJAYA | Quade | 1.40454E-02 | 5.20574E-02 | 4.69358E-02 | 5.08871E-02 |
| GOTLBO | Friedman | 2.08219E-12 | 5.28555E-12 | 5.28555E-12 | 5.28555E-12 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.40454E-02 | 5.20574E-02 | 4.69358E-02 | 5.08871E-02 |
| CWOA | Friedman | 1.27601E-11 | 3.92619E-11 | 3.92619E-11 | 3.92619E-11 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 7.23714E-03 | 2.25799E-02 | 2.25799E-02 | 2.23546E-02 |
| DE | Friedman | 1.39301E-10 | 4.82194E-10 | 4.57383E-10 | 4.82194E-10 |
| DE | Friedman Aligned | 1.37839E-10 | 4.93382E-10 | 4.77135E-10 | 4.93382E-10 |
| DE | Quade | 5.97508E-02 | 2.08782E-01 | 2.08782E-01 | 1.92059E-01 |
| WW | Friedman | 1.39301E-10 | 4.82194E-10 | 4.57383E-10 | 4.82194E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 7.23714E-03 | 1.56830E-02 | 1.56830E-02 | 1.55717E-02 |
| ISCA | Friedman | 1.59993E-10 | 6.03050E-10 | 6.03050E-10 | 6.03050E-10 |
| ISCA | Friedman Aligned | 2.51032E-06 | 7.72406E-06 | 7.72406E-06 | 7.72404E-06 |
| ISCA | Quade | 7.23714E-03 | 1.72329E-02 | 1.72329E-02 | 1.70999E-02 |
| NNA | Friedman | 6.61310E-10 | 2.44176E-09 | 2.44176E-09 | 2.44176E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 7.23714E-03 | 1.34020E-02 | 1.34020E-02 | 1.33199E-02 |
| **Table S104** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.30556E-09 | 7.98080E-09 | 7.98080E-09 | 7.98080E-09 |
| PSO | Friedman Aligned | 1.30897E-10 | 4.93382E-10 | 4.67194E-10 | 4.93382E-10 |
| PSO | Quade | 8.49909E-05 | 8.49943E-05 | 8.49943E-05 | 8.49909E-05 |
| NDE | Friedman | 2.70991E-06 | 8.33820E-06 | 8.33820E-06 | 8.33817E-06 |
| NDE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NDE | Quade | 1.18862E-01 | 3.71008E-01 | 3.71008E-01 | 3.22508E-01 |
| TLBO | Friedman | 9.99240E-02 | 2.55682E-01 | 2.55682E-01 | 2.34510E-01 |
| TLBO | Friedman Aligned | 2.97627E-04 | 7.55533E-04 | 7.55533E-04 | 7.55343E-04 |
| TLBO | Quade | 6.04542E-01 | 1.0 | 9.88447E-01 | 9.05102E-01 |
| EBLSHADE | Friedman | 8.44298E-01 | 1.0 | 9.33322E-01 | 9.67726E-01 |
| EBLSHADE | Friedman Aligned | 5.75004E-02 | 1.06394E-01 | 1.06394E-01 | 1.03564E-01 |
| EBLSHADE | Quade | 9.49745E-01 | 1.0 | 9.88447E-01 | 9.95999E-01 |
| STLBO | Friedman | 9.33322E-01 | 1.0 | 9.33322E-01 | 9.67726E-01 |
| STLBO | Friedman Aligned | 9.97074E-01 | 9.97074E-01 | 9.97074E-01 | 9.97074E-01 |
| STLBO | Quade | 9.88447E-01 | 1.0 | 9.88447E-01 | 9.95999E-01 |

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| **Table S105.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 5.48450E-13 | 5.48450E-13 | 5.48450E-13 | 5.48450E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 5.93630E-02 | 6.10542E-02 | 6.10542E-02 | 5.93630E-02 |
| NNA | Friedman | 6.21587E-06 | 1.14755E-05 | 1.14755E-05 | 1.14754E-05 |
| NNA | Friedman Aligned | 8.83864E-11 | 3.26350E-10 | 3.26350E-10 | 3.26350E-10 |
| NNA | Quade | 5.46368E-01 | 1.0 | 1.0 | 7.67608E-01 |
| ISCA | Friedman | 2.15654E-05 | 5.47435E-05 | 5.47435E-05 | 5.47421E-05 |
| ISCA | Friedman Aligned | 5.41510E-11 | 2.04108E-10 | 2.04108E-10 | 2.04108E-10 |
| ISCA | Quade | 5.46368E-01 | 1.0 | 1.0 | 7.94113E-01 |
| WW | Friedman | 2.54032E-05 | 7.81643E-05 | 7.81643E-05 | 7.81616E-05 |
| WW | Friedman Aligned | 2.52162E-11 | 9.31060E-11 | 9.31060E-11 | 9.31060E-11 |
| WW | Quade | 5.46368E-01 | 1.0 | 1.0 | 7.87852E-01 |
| CWOA | Friedman | 1.70294E-04 | 5.89510E-04 | 5.89510E-04 | 5.89355E-04 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 5.46368E-01 | 1.0 | 1.0 | 8.32107E-01 |
| GOTLBO | Friedman | 5.51957E-04 | 2.03830E-03 | 2.03830E-03 | 2.03648E-03 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 5.46368E-01 | 1.0 | 1.0 | 9.41246E-01 |
| IJAYA | Friedman | 8.19698E-04 | 3.09021E-03 | 3.09021E-03 | 3.08612E-03 |
| IJAYA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| IJAYA | Quade | 5.46368E-01 | 1.0 | 1.0 | 9.41246E-01 |
| MABC | Friedman | 6.69221E-03 | 2.47416E-02 | 2.47416E-02 | 2.44879E-02 |
| MABC | Friedman Aligned | 1.31135E-09 | 4.53928E-09 | 4.53928E-09 | 4.53928E-09 |
| MABC | Quade | 6.42995E-01 | 1.0 | 1.0 | 9.77698E-01 |
| **Table S105** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 9.84763E-02 | 3.46279E-01 | 3.46279E-01 | 3.01524E-01 |
| DE | Friedman Aligned | 2.46722E-11 | 8.54037E-11 | 8.54037E-11 | 8.54037E-11 |
| DE | Quade | 8.43172E-01 | 1.0 | 1.0 | 9.98360E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S106.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.23303E-05 | 3.23308E-05 | 3.23308E-05 | 3.23303E-05 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 3.74066E-01 | 4.60169E-01 | 4.60169E-01 | 3.74066E-01 |
| NNA | Friedman | 2.44230E-01 | 5.05979E-01 | 5.05979E-01 | 4.03667E-01 |
| NNA | Friedman Aligned | 3.04347E-08 | 9.36452E-08 | 9.36452E-08 | 9.36452E-08 |
| NNA | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.97479E-01 |
| ISCA | Friedman | 3.34378E-01 | 9.86196E-01 | 9.86196E-01 | 6.44147E-01 |
| ISCA | Friedman Aligned | 2.68086E-11 | 6.80527E-11 | 6.80527E-11 | 6.80527E-11 |
| ISCA | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.98098E-01 |
| WW | Friedman | 3.34378E-01 | 1.0 | 1.0 | 6.85519E-01 |
| WW | Friedman Aligned | 2.27968E-11 | 4.20863E-11 | 4.20863E-11 | 4.20863E-11 |
| WW | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.98033E-01 |
| CWOA | Friedman | 5.44864E-01 | 1.0 | 1.0 | 9.34440E-01 |
| CWOA | Friedman Aligned | 2.33931E-04 | 8.09818E-04 | 8.09818E-04 | 8.09527E-04 |
| CWOA | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.99016E-01 |
| GOTLBO | Friedman | 7.04380E-01 | 1.0 | 1.0 | 9.88888E-01 |
| GOTLBO | Friedman Aligned | 3.35103E-03 | 1.26406E-02 | 1.26406E-02 | 1.25723E-02 |
| GOTLBO | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.99985E-01 |
| IJAYA | Friedman | 7.42795E-01 | 1.0 | 1.0 | 9.94013E-01 |
| IJAYA | Friedman Aligned | 9.34352E-04 | 3.45078E-03 | 3.45078E-03 | 3.44558E-03 |
| IJAYA | Quade | 9.60869E-01 | 1.0 | 1.0 | 9.99985E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S106** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S107.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 1.24342E-03 | 1.24413E-03 | 1.24413E-03 | 1.24342E-03 |
| NNA | Friedman | 1.15463E-13 | 2.13163E-13 | 2.13163E-13 | 2.13163E-13 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 5.08290E-02 | 9.59217E-02 | 9.59217E-02 | 9.18149E-02 |
| ISCA | Friedman | 1.69346E-13 | 4.29878E-13 | 4.29878E-13 | 4.29878E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 5.08290E-02 | 1.14968E-01 | 1.14968E-01 | 1.09199E-01 |
| WW | Friedman | 2.55462E-13 | 7.86038E-13 | 7.86038E-13 | 7.86038E-13 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 5.08290E-02 | 1.07920E-01 | 1.07920E-01 | 1.02778E-01 |
| CWOA | Friedman | 6.62297E-12 | 2.29257E-11 | 2.29257E-11 | 2.29257E-11 |
| CWOA | Friedman Aligned | 1.32214E-10 | 4.88175E-10 | 4.88175E-10 | 4.88175E-10 |
| CWOA | Quade | 5.08290E-02 | 1.41499E-01 | 1.41499E-01 | 1.32919E-01 |
| GOTLBO | Friedman | 5.56590E-11 | 2.05510E-10 | 2.05510E-10 | 2.05510E-10 |
| GOTLBO | Friedman Aligned | 1.58709E-10 | 5.98211E-10 | 5.07874E-10 | 5.98211E-10 |
| GOTLBO | Quade | 7.32625E-02 | 2.76054E-01 | 2.47539E-01 | 2.44918E-01 |
| IJAYA | Friedman | 1.24403E-10 | 4.68905E-10 | 4.68905E-10 | 4.68905E-10 |
| IJAYA | Friedman Aligned | 1.58709E-10 | 5.98211E-10 | 5.07874E-10 | 5.98211E-10 |
| IJAYA | Quade | 7.32625E-02 | 2.76054E-01 | 2.47539E-01 | 2.44918E-01 |
| MABC | Friedman | 6.40678E-09 | 2.36558E-08 | 2.36558E-08 | 2.36558E-08 |
| MABC | Friedman Aligned | 1.58709E-10 | 5.98211E-10 | 5.07874E-10 | 5.98211E-10 |
| MABC | Quade | 1.14751E-01 | 4.33578E-01 | 4.33578E-01 | 3.62399E-01 |
| **Table S107** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.86918E-06 | 6.47023E-06 | 6.47023E-06 | 6.47021E-06 |
| DE | Friedman Aligned | 7.73811E-11 | 2.67858E-10 | 2.67858E-10 | 2.67858E-10 |
| DE | Quade | 2.13275E-01 | 7.65059E-01 | 7.65059E-01 | 5.64100E-01 |
| NDE | Friedman | 3.24249E-03 | 9.98062E-03 | 9.98062E-03 | 9.94333E-03 |
| NDE | Friedman Aligned | 1.10920E-09 | 3.41294E-09 | 3.41294E-09 | 3.41294E-09 |
| NDE | Quade | 3.50848E-01 | 1.0 | 1.0 | 7.35391E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S108.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.14886E-03 | 1.14947E-03 | 1.14947E-03 | 1.14886E-03 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.23178E-01 | 9.40245E-01 | 9.40245E-01 | 6.23178E-01 |
| NNA | Friedman | 7.90699E-01 | 1.0 | 1.0 | 9.44276E-01 |
| NNA | Friedman Aligned | 1.74782E-12 | 3.22675E-12 | 3.22675E-12 | 3.22675E-12 |
| NNA | Quade | 9.96635E-01 | 1.0 | 1.0 | 9.99973E-01 |
| ISCA | Friedman | 8.58987E-01 | 1.0 | 1.0 | 9.93075E-01 |
| ISCA | Friedman Aligned | 5.51352E-08 | 1.39958E-07 | 1.39958E-07 | 1.39958E-07 |
| ISCA | Quade | 9.96635E-01 | 1.0 | 1.0 | 9.99986E-01 |
| WW | Friedman | 8.58987E-01 | 1.0 | 1.0 | 9.95414E-01 |
| WW | Friedman Aligned | 3.83622E-04 | 1.18053E-03 | 1.18053E-03 | 1.17991E-03 |
| WW | Quade | 9.96635E-01 | 1.0 | 1.0 | 9.99983E-01 |
| CWOA | Friedman | 9.69231E-01 | 1.0 | 1.0 | 9.99994E-01 |
| CWOA | Friedman Aligned | 7.64084E-01 | 1.0 | 1.0 | 9.93258E-01 |
| CWOA | Quade | 9.96635E-01 | 1.0 | 1.0 | 9.99997E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S108** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 9.20605E-01 | 1.0 | 1.0 | 9.99913E-01 |
| IJAYA | Quade | 9.99972E-01 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S109.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 7.82263E-13 | 7.82263E-13 | 7.82263E-13 | 7.82263E-13 |
| MABC | Friedman Aligned | 1.30815E-10 | 4.93071E-10 | 4.68469E-10 | 4.93071E-10 |
| MABC | Quade | 2.72384E-02 | 1.01106E-01 | 1.01106E-01 | 9.69411E-02 |
| IJAYA | Friedman | 7.82263E-13 | 1.19904E-12 | 1.19904E-12 | 1.19904E-12 |
| IJAYA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| IJAYA | Quade | 1.46704E-02 | 5.43832E-02 | 4.90263E-02 | 5.31067E-02 |
| GOTLBO | Friedman | 1.18350E-12 | 3.00426E-12 | 3.00426E-12 | 3.00426E-12 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.46704E-02 | 5.43832E-02 | 4.90263E-02 | 5.31067E-02 |
| CWOA | Friedman | 7.72016E-12 | 2.37543E-11 | 2.37543E-11 | 2.37543E-11 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 7.61417E-03 | 2.36840E-02 | 2.36840E-02 | 2.34363E-02 |
| WW | Friedman | 9.08066E-11 | 3.14331E-10 | 3.14331E-10 | 3.14331E-10 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 7.61417E-03 | 1.64871E-02 | 1.64871E-02 | 1.63641E-02 |
| ISCA | Friedman | 1.23284E-10 | 4.55202E-10 | 4.55202E-10 | 4.55202E-10 |
| ISCA | Friedman Aligned | 2.50662E-06 | 7.71268E-06 | 7.71268E-06 | 7.71266E-06 |
| ISCA | Quade | 7.61417E-03 | 1.81029E-02 | 1.81029E-02 | 1.79562E-02 |
| DE | Friedman | 1.84419E-10 | 6.95118E-10 | 6.95118E-10 | 6.95118E-10 |
| DE | Friedman Aligned | 1.37739E-10 | 4.93071E-10 | 4.76787E-10 | 4.93071E-10 |
| DE | Quade | 6.18417E-02 | 2.16161E-01 | 2.16161E-01 | 1.98262E-01 |
| NNA | Friedman | 4.55458E-10 | 1.68169E-09 | 1.68169E-09 | 1.68169E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 7.61417E-03 | 1.41024E-02 | 1.41024E-02 | 1.40116E-02 |
| **Table S109** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.92899E-09 | 6.67728E-09 | 6.67728E-09 | 6.67728E-09 |
| PSO | Friedman Aligned | 1.30815E-10 | 4.93071E-10 | 4.68469E-10 | 4.93071E-10 |
| PSO | Quade | 9.09831E-05 | 9.09869E-05 | 9.09869E-05 | 9.09831E-05 |
| NDE | Friedman | 4.08314E-06 | 1.25635E-05 | 1.25635E-05 | 1.25635E-05 |
| NDE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NDE | Quade | 1.22455E-01 | 3.82395E-01 | 3.82395E-01 | 3.30971E-01 |
| TLBO | Friedman | 1.18855E-01 | 3.04601E-01 | 3.04601E-01 | 2.74721E-01 |
| TLBO | Friedman Aligned | 3.01915E-04 | 7.66418E-04 | 7.66418E-04 | 7.66223E-04 |
| TLBO | Quade | 6.14412E-01 | 1.0 | 1.0 | 9.11000E-01 |
| EBLSHADE | Friedman | 9.04828E-01 | 1.0 | 1.0 | 9.86993E-01 |
| EBLSHADE | Friedman Aligned | 5.79889E-02 | 1.07300E-01 | 1.07300E-01 | 1.04422E-01 |
| EBLSHADE | Quade | 9.59583E-01 | 1.0 | 1.0 | 9.97324E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S110.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S110** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S111.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 6.27525E-04 | 6.27707E-04 | 6.27707E-04 | 6.27525E-04 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 6.31482E-01 | 9.60899E-01 | 9.60899E-01 | 6.31482E-01 |
| NNA | Friedman | 6.91741E-01 | 1.0 | 1.0 | 8.86116E-01 |
| NNA | Friedman Aligned | 3.06237E-11 | 5.65361E-11 | 5.65361E-11 | 5.65361E-11 |
| NNA | Quade | 9.96978E-01 | 1.0 | 1.0 | 9.99978E-01 |
| ISCA | Friedman | 7.77272E-01 | 1.0 | 1.0 | 9.77902E-01 |
| ISCA | Friedman Aligned | 5.16236E-07 | 1.31045E-06 | 1.31045E-06 | 1.31045E-06 |
| ISCA | Quade | 9.96978E-01 | 1.0 | 1.0 | 9.99989E-01 |
| WW | Friedman | 7.77272E-01 | 1.0 | 1.0 | 9.84073E-01 |
| WW | Friedman Aligned | 1.81771E-03 | 5.59646E-03 | 5.59646E-03 | 5.58239E-03 |
| WW | Quade | 9.96978E-01 | 1.0 | 1.0 | 9.99987E-01 |
| CWOA | Friedman | 9.25970E-01 | 1.0 | 1.0 | 9.99878E-01 |
| CWOA | Friedman Aligned | 9.53239E-01 | 1.0 | 1.0 | 9.99975E-01 |
| CWOA | Quade | 9.96978E-01 | 1.0 | 1.0 | 9.99998E-01 |
| GOTLBO | Friedman | 9.90942E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S111** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S112.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 3.32214E-02 | 3.37419E-02 | 3.37419E-02 | 3.32214E-02 |
| PSO | Friedman Aligned | 2.88658E-12 | 2.88658E-12 | 2.88658E-12 | 2.88658E-12 |
| PSO | Quade | 9.10497E-01 | 1.0 | 1.0 | 9.10497E-01 |
| NNA | Friedman | 9.99834E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 5.04334E-01 | 1.0 | 1.0 | 7.26301E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S112** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S113.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.22987E-02 | 9.64801E-02 | 9.64801E-02 | 9.22987E-02 |
| PSO | Friedman Aligned | 3.98146E-10 | 3.98146E-10 | 3.98146E-10 | 3.98146E-10 |
| PSO | Quade | 9.54610E-01 | 1.0 | 1.0 | 9.54610E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S113** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S114.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 4.36171E-03 | 4.37052E-03 | 4.37052E-03 | 4.36171E-03 |
| PSO | Friedman Aligned | 5.39684E-08 | 9.96340E-08 | 9.96340E-08 | 9.96340E-08 |
| PSO | Quade | 8.53378E-01 | 1.0 | 1.0 | 8.53378E-01 |
| NNA | Friedman | 9.47047E-01 | 1.0 | 1.0 | 9.95593E-01 |
| NNA | Friedman Aligned | 9.03118E-10 | 9.03118E-10 | 9.03118E-10 | 9.03118E-10 |
| NNA | Quade | 9.99981E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.73183E-01 | 1.0 | 1.0 | 9.99898E-01 |
| ISCA | Friedman Aligned | 4.17781E-06 | 1.06052E-05 | 1.06052E-05 | 1.06052E-05 |
| ISCA | Quade | 9.99981E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.73183E-01 | 1.0 | 1.0 | 9.99955E-01 |
| WW | Friedman Aligned | 7.30958E-03 | 2.25482E-02 | 2.25482E-02 | 2.23207E-02 |
| WW | Quade | 9.99981E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S114** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S115.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, *R*s evaluation task). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 2.42446E-02 | 2.45202E-02 | 2.45202E-02 | 2.42446E-02 |
| PSO | Friedman Aligned | 3.88231E-08 | 3.88231E-08 | 3.88231E-08 | 3.88231E-08 |
| PSO | Quade | 9.32459E-01 | 1.0 | 1.0 | 9.32459E-01 |
| NNA | Friedman | 9.99213E-01 | 1.0 | 1.0 | 9.99998E-01 |
| NNA | Friedman Aligned | 3.27961E-03 | 6.06308E-03 | 6.06308E-03 | 6.04626E-03 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 9.99986E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 2.53096E-01 | 7.16378E-01 | 7.16378E-01 | 5.23253E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S115** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S116.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 3.23303E-05 | 3.23308E-05 | 3.23308E-05 | 3.23303E-05 |
| WW | Friedman Aligned | 3.09062E-10 | 8.13039E-10 | 7.96436E-10 | 8.13039E-10 |
| WW | Quade | 7.59275E-01 | 1.0 | 1.0 | 7.97323E-01 |
| CWOA | Friedman | 1.22067E-04 | 2.25367E-04 | 2.25367E-04 | 2.25343E-04 |
| CWOA | Friedman Aligned | 3.09062E-10 | 7.84543E-10 | 7.65346E-10 | 7.84543E-10 |
| CWOA | Quade | 7.59275E-01 | 1.0 | 1.0 | 7.97323E-01 |
| NNA | Friedman | 1.53477E-04 | 3.89619E-04 | 3.89619E-04 | 3.89550E-04 |
| NNA | Friedman Aligned | 3.09062E-10 | 8.13039E-10 | 7.74680E-10 | 8.13039E-10 |
| NNA | Quade | 7.59275E-01 | 1.0 | 1.0 | 7.81433E-01 |
| ISCA | Friedman | 1.56918E-04 | 4.82851E-04 | 4.82851E-04 | 4.82746E-04 |
| ISCA | Friedman Aligned | 3.09062E-10 | 8.13039E-10 | 7.65346E-10 | 8.13039E-10 |
| ISCA | Quade | 7.59275E-01 | 1.0 | 1.0 | 7.59275E-01 |
| GOTLBO | Friedman | 2.31597E-03 | 8.02254E-03 | 8.02254E-03 | 7.99400E-03 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 7.59275E-01 | 1.0 | 1.0 | 9.45886E-01 |
| PSO | Friedman | 6.30413E-02 | 2.36852E-01 | 2.36852E-01 | 2.13709E-01 |
| PSO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| PSO | Quade | 8.41580E-01 | 1.0 | 1.0 | 9.98890E-01 |
| MABC | Friedman | 6.64164E-01 | 1.0 | 1.0 | 9.83637E-01 |
| MABC | Friedman Aligned | 3.09062E-10 | 8.13039E-10 | 7.65346E-10 | 8.13039E-10 |
| MABC | Quade | 9.59880E-01 | 1.0 | 1.0 | 9.99995E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S116** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S117.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.45556E-03 | 1.45654E-03 | 1.45654E-03 | 1.45556E-03 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.45556E-03 | 1.77232E-03 | 1.77232E-03 | 1.77088E-03 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.45556E-03 | 2.10264E-03 | 2.10264E-03 | 2.10063E-03 |
| WW | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.45556E-03 | 2.18579E-03 | 2.18579E-03 | 2.18364E-03 |
| MABC | Friedman | 1.41904E-12 | 4.91207E-12 | 4.91207E-12 | 4.91207E-12 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 2.56699E-02 | 9.73363E-02 | 9.73363E-02 | 9.33686E-02 |
| PSO | Friedman | 4.78499E-12 | 1.76676E-11 | 1.76676E-11 | 1.76676E-11 |
| PSO | Friedman Aligned | 1.80279E-10 | 6.65645E-10 | 6.65645E-10 | 6.65645E-10 |
| PSO | Quade | 1.10383E-02 | 4.08787E-02 | 4.08787E-02 | 4.01550E-02 |
| DE | Friedman | 1.99447E-10 | 7.51762E-10 | 7.51762E-10 | 7.51762E-10 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 4.08670E-02 | 1.52102E-01 | 1.52102E-01 | 1.42782E-01 |
| GOTLBO | Friedman | 1.22587E-09 | 4.52629E-09 | 4.52629E-09 | 4.52629E-09 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 2.30921E-03 | 7.99910E-03 | 7.99910E-03 | 7.97072E-03 |
| **Table S117** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.01726E-06 | 3.52129E-06 | 3.52129E-06 | 3.52128E-06 |
| IJAYA | Friedman Aligned | 3.40542E-06 | 1.17880E-05 | 1.17880E-05 | 1.17879E-05 |
| IJAYA | Quade | 1.25398E-01 | 4.42937E-01 | 4.42937E-01 | 3.71110E-01 |
| NDE | Friedman | 3.37287E-03 | 1.03821E-02 | 1.03821E-02 | 1.03418E-02 |
| NDE | Friedman Aligned | 1.50714E-02 | 4.64546E-02 | 4.64546E-02 | 4.56516E-02 |
| NDE | Quade | 3.66833E-01 | 1.0 | 1.0 | 7.54932E-01 |
| TLBO | Friedman | 4.20792E-01 | 1.0 | 1.0 | 7.49986E-01 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 7.93916E-01 | 1.0 | 1.0 | 9.81856E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S118.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.09625E-03 | 1.09680E-03 | 1.09680E-03 | 1.09625E-03 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.09625E-03 | 1.34054E-03 | 1.34054E-03 | 1.33971E-03 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.09625E-03 | 1.59708E-03 | 1.59708E-03 | 1.59592E-03 |
| MABC | Friedman | 2.33813E-13 | 7.19425E-13 | 7.19425E-13 | 7.19425E-13 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 2.11738E-02 | 8.02031E-02 | 8.02031E-02 | 7.74983E-02 |
| PSO | Friedman | 2.85766E-11 | 9.89189E-11 | 9.89189E-11 | 9.89189E-11 |
| PSO | Friedman Aligned | 1.82294E-10 | 6.73084E-10 | 6.73084E-10 | 6.73084E-10 |
| PSO | Quade | 8.90739E-03 | 3.29680E-02 | 3.29680E-02 | 3.24964E-02 |
| DE | Friedman | 3.71229E-11 | 1.37069E-10 | 1.37069E-10 | 1.37069E-10 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 3.41907E-02 | 1.27086E-01 | 1.27086E-01 | 1.20544E-01 |
| WW | Friedman | 3.79121E-10 | 1.42899E-09 | 1.42899E-09 | 1.42899E-09 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.09625E-03 | 1.66392E-03 | 1.66392E-03 | 1.66267E-03 |
| GOTLBO | Friedman | 3.71983E-09 | 1.37348E-08 | 1.37348E-08 | 1.37348E-08 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.80120E-03 | 6.23839E-03 | 6.23839E-03 | 6.22112E-03 |
| **Table S118** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.38212E-07 | 8.24579E-07 | 8.24579E-07 | 8.24578E-07 |
| IJAYA | Friedman Aligned | 1.92652E-06 | 6.66873E-06 | 6.66873E-06 | 6.66871E-06 |
| IJAYA | Quade | 1.08536E-01 | 3.82291E-01 | 3.82291E-01 | 3.28134E-01 |
| NDE | Friedman | 1.31676E-03 | 4.05218E-03 | 4.05218E-03 | 4.04603E-03 |
| NDE | Friedman Aligned | 1.08197E-02 | 3.33332E-02 | 3.33332E-02 | 3.29189E-02 |
| NDE | Quade | 3.30743E-01 | 1.0 | 1.0 | 7.09355E-01 |
| TLBO | Friedman | 2.78642E-01 | 7.24406E-01 | 7.24406E-01 | 5.63564E-01 |
| TLBO | Friedman Aligned | 9.40972E-01 | 1.0 | 1.0 | 9.99241E-01 |
| TLBO | Quade | 7.45664E-01 | 1.0 | 1.0 | 9.69051E-01 |
| EBLSHADE | Friedman | 8.09315E-01 | 1.0 | 1.0 | 9.53081E-01 |
| EBLSHADE | Friedman Aligned | 9.40972E-01 | 1.0 | 1.0 | 9.99241E-01 |
| EBLSHADE | Quade | 9.56989E-01 | 1.0 | 1.0 | 9.96998E-01 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S119.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| CWOA | Friedman | 2.04947E-13 | 2.04947E-13 | 2.04947E-13 | 2.04947E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 6.08936E-02 | 7.94811E-02 | 7.94811E-02 | 7.66710E-02 |
| NNA | Friedman | 2.51132E-13 | 4.63629E-13 | 4.63629E-13 | 4.63629E-13 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 6.08936E-02 | 7.13516E-02 | 7.13516E-02 | 6.90638E-02 |
| ISCA | Friedman | 2.84809E-13 | 7.22977E-13 | 7.22977E-13 | 7.22977E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 6.08936E-02 | 6.26749E-02 | 6.26749E-02 | 6.08936E-02 |
| WW | Friedman | 2.98039E-13 | 9.17044E-13 | 9.17044E-13 | 9.17044E-13 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 6.08936E-02 | 7.99347E-02 | 7.99347E-02 | 7.71198E-02 |
| GOTLBO | Friedman | 3.48809E-11 | 1.20741E-10 | 1.20741E-10 | 1.20741E-10 |
| GOTLBO | Friedman Aligned | 1.79116E-10 | 6.61351E-10 | 6.61351E-10 | 6.61351E-10 |
| GOTLBO | Quade | 6.08936E-02 | 2.03799E-01 | 2.03799E-01 | 1.86283E-01 |
| PSO | Friedman | 4.01794E-08 | 1.48355E-07 | 1.48355E-07 | 1.48355E-07 |
| PSO | Friedman Aligned | 1.19200E-10 | 4.49293E-10 | 4.49293E-10 | 4.49293E-10 |
| PSO | Quade | 1.63536E-01 | 6.32903E-01 | 6.32903E-01 | 4.82809E-01 |
| MABC | Friedman | 4.55403E-05 | 1.71654E-04 | 1.71654E-04 | 1.71641E-04 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 2.71658E-01 | 1.0 | 1.0 | 6.97232E-01 |
| DE | Friedman | 8.96693E-04 | 3.31144E-03 | 3.31144E-03 | 3.30687E-03 |
| DE | Friedman Aligned | 1.27875E-12 | 4.72156E-12 | 4.72156E-12 | 4.72156E-12 |
| DE | Quade | 3.50621E-01 | 1.0 | 1.0 | 7.96911E-01 |
| **Table S119** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 7.33717E-02 | 2.56942E-01 | 2.56942E-01 | 2.31857E-01 |
| IJAYA | Friedman Aligned | 4.02808E-02 | 1.40313E-01 | 1.40313E-01 | 1.32656E-01 |
| IJAYA | Quade | 6.43209E-01 | 1.0 | 1.0 | 9.71773E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S120.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.04014E-03 | 1.04064E-03 | 1.04064E-03 | 1.04014E-03 |
| WW | Friedman Aligned | 3.59772E-11 | 1.24536E-10 | 1.24536E-10 | 1.24536E-10 |
| WW | Quade | 8.97219E-01 | 1.0 | 1.0 | 9.18511E-01 |
| CWOA | Friedman | 2.86600E-03 | 5.29751E-03 | 5.29751E-03 | 5.28467E-03 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 8.97219E-01 | 1.0 | 1.0 | 9.18511E-01 |
| ISCA | Friedman | 3.24679E-03 | 9.70884E-03 | 9.70884E-03 | 9.66653E-03 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 8.97219E-01 | 1.0 | 1.0 | 8.97219E-01 |
| NNA | Friedman | 3.24679E-03 | 8.25217E-03 | 8.25217E-03 | 8.22129E-03 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 8.97219E-01 | 1.0 | 1.0 | 9.09994E-01 |
| GOTLBO | Friedman | 2.71581E-02 | 9.48059E-02 | 9.48059E-02 | 9.09078E-02 |
| GOTLBO | Friedman Aligned | 1.40579E-09 | 5.19061E-09 | 5.19061E-09 | 5.19061E-09 |
| GOTLBO | Quade | 8.97219E-01 | 1.0 | 1.0 | 9.87898E-01 |
| PSO | Friedman | 3.11831E-01 | 1.0 | 1.0 | 7.48395E-01 |
| PSO | Friedman Aligned | 1.73195E-13 | 5.32907E-13 | 5.32907E-13 | 5.32907E-13 |
| PSO | Quade | 9.43078E-01 | 1.0 | 1.0 | 9.99975E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S120** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S121.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.96287E-13 | 1.96287E-13 | 1.96287E-13 | 1.96287E-13 |
| PSO | Friedman Aligned | 1.80688E-10 | 6.67154E-10 | 6.67154E-10 | 6.67154E-10 |
| PSO | Quade | 2.94896E-02 | 1.09763E-01 | 1.09763E-01 | 1.04634E-01 |
| GOTLBO | Friedman | 6.25031E-11 | 1.15390E-10 | 1.15390E-10 | 1.15390E-10 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 7.28397E-03 | 2.52705E-02 | 2.52705E-02 | 2.49885E-02 |
| MABC | Friedman | 1.09197E-09 | 2.77193E-09 | 2.77193E-09 | 2.77193E-09 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 6.15993E-02 | 2.35585E-01 | 2.35585E-01 | 2.13090E-01 |
| ISCA | Friedman | 1.25475E-09 | 3.86077E-09 | 3.86077E-09 | 3.86077E-09 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 5.44202E-03 | 5.45574E-03 | 5.45574E-03 | 5.44202E-03 |
| NNA | Friedman | 1.37295E-09 | 4.75250E-09 | 4.75250E-09 | 4.75250E-09 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 5.44202E-03 | 6.49673E-03 | 6.49673E-03 | 6.47742E-03 |
| CWOA | Friedman | 2.09713E-09 | 7.74326E-09 | 7.74326E-09 | 7.74326E-09 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 5.44202E-03 | 7.55156E-03 | 7.55156E-03 | 7.52569E-03 |
| WW | Friedman | 9.53069E-09 | 3.59234E-08 | 3.59234E-08 | 3.59234E-08 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 5.44202E-03 | 7.76630E-03 | 7.76630E-03 | 7.73921E-03 |
| DE | Friedman | 4.24571E-08 | 1.56765E-07 | 1.56765E-07 | 1.56765E-07 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 9.15391E-02 | 3.44207E-01 | 3.44207E-01 | 2.98458E-01 |
| **Table S121** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 6.97445E-05 | 2.41426E-04 | 2.41426E-04 | 2.41402E-04 |
| IJAYA | Friedman Aligned | 3.05560E-06 | 1.05771E-05 | 1.05771E-05 | 1.05770E-05 |
| IJAYA | Quade | 2.37971E-01 | 8.57542E-01 | 8.57542E-01 | 6.09662E-01 |
| NDE | Friedman | 4.44651E-02 | 1.37531E-01 | 1.37531E-01 | 1.30599E-01 |
| NDE | Friedman Aligned | 1.41555E-02 | 4.36271E-02 | 4.36271E-02 | 4.29185E-02 |
| NDE | Quade | 5.71073E-01 | 1.0 | 1.0 | 9.26061E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 9.91583E-01 | 1.0 | 1.0 | 9.99995E-01 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S122.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.04976E-01 | 1.0 | 1.0 | 9.04976E-01 |
| WW | Friedman Aligned | 1.67999E-12 | 1.67999E-12 | 1.67999E-12 | 1.67999E-12 |
| WW | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99997E-01 |
| ISCA | Friedman | 9.32174E-01 | 1.0 | 1.0 | 9.97839E-01 |
| ISCA | Friedman Aligned | 7.66599E-08 | 1.94598E-07 | 1.94598E-07 | 1.94598E-07 |
| ISCA | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99991E-01 |
| NNA | Friedman | 9.32174E-01 | 1.0 | 1.0 | 9.97323E-01 |
| NNA | Friedman Aligned | 3.08669E-09 | 5.69850E-09 | 5.69850E-09 | 5.69850E-09 |
| NNA | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99995E-01 |
| CWOA | Friedman | 9.32174E-01 | 1.0 | 1.0 | 9.93041E-01 |
| CWOA | Friedman Aligned | 2.23479E-06 | 6.87627E-06 | 6.87627E-06 | 6.87625E-06 |
| CWOA | Quade | 9.99991E-01 | 1.0 | 1.0 | 9.99997E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S122** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S123.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 1.09625E-03 | 1.09680E-03 | 1.09680E-03 | 1.09625E-03 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 1.09625E-03 | 1.34054E-03 | 1.34054E-03 | 1.33971E-03 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 1.09625E-03 | 1.59708E-03 | 1.59708E-03 | 1.59592E-03 |
| MABC | Friedman | 2.33813E-13 | 7.19425E-13 | 7.19425E-13 | 7.19425E-13 |
| MABC | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| MABC | Quade | 2.11738E-02 | 8.02031E-02 | 8.02031E-02 | 7.74983E-02 |
| PSO | Friedman | 2.85766E-11 | 9.89189E-11 | 9.89189E-11 | 9.89189E-11 |
| PSO | Friedman Aligned | 1.82294E-10 | 6.73084E-10 | 6.73084E-10 | 6.73084E-10 |
| PSO | Quade | 8.90739E-03 | 3.29680E-02 | 3.29680E-02 | 3.24964E-02 |
| DE | Friedman | 3.71229E-11 | 1.37069E-10 | 1.37069E-10 | 1.37069E-10 |
| DE | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| DE | Quade | 3.41907E-02 | 1.27086E-01 | 1.27086E-01 | 1.20544E-01 |
| WW | Friedman | 3.79121E-10 | 1.42899E-09 | 1.42899E-09 | 1.42899E-09 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 1.09625E-03 | 1.66392E-03 | 1.66392E-03 | 1.66267E-03 |
| GOTLBO | Friedman | 3.71983E-09 | 1.37348E-08 | 1.37348E-08 | 1.37348E-08 |
| GOTLBO | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| GOTLBO | Quade | 1.80120E-03 | 6.23839E-03 | 6.23839E-03 | 6.22112E-03 |
| **Table S123** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.38212E-07 | 8.24579E-07 | 8.24579E-07 | 8.24578E-07 |
| IJAYA | Friedman Aligned | 1.92652E-06 | 6.66873E-06 | 6.66873E-06 | 6.66871E-06 |
| IJAYA | Quade | 1.08536E-01 | 3.82291E-01 | 3.82291E-01 | 3.28134E-01 |
| NDE | Friedman | 1.31676E-03 | 4.05218E-03 | 4.05218E-03 | 4.04603E-03 |
| NDE | Friedman Aligned | 1.08197E-02 | 3.33332E-02 | 3.33332E-02 | 3.29189E-02 |
| NDE | Quade | 3.30743E-01 | 1.0 | 1.0 | 7.09355E-01 |
| TLBO | Friedman | 2.78642E-01 | 7.24406E-01 | 7.24406E-01 | 5.63564E-01 |
| TLBO | Friedman Aligned | 9.40972E-01 | 1.0 | 1.0 | 9.99241E-01 |
| TLBO | Quade | 7.45664E-01 | 1.0 | 1.0 | 9.69051E-01 |
| EBLSHADE | Friedman | 8.09315E-01 | 1.0 | 1.0 | 9.53081E-01 |
| EBLSHADE | Friedman Aligned | 9.40972E-01 | 1.0 | 1.0 | 9.99241E-01 |
| EBLSHADE | Quade | 9.56989E-01 | 1.0 | 1.0 | 9.96998E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S124.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.37121E-01 | 1.46648E-01 | 1.46648E-01 | 1.37121E-01 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 9.87878E-01 | 1.0 | 1.0 | 9.91564E-01 |
| ISCA | Friedman | 2.08923E-01 | 5.89641E-01 | 5.89641E-01 | 4.55419E-01 |
| ISCA | Friedman Aligned | 7.82109E-10 | 1.98535E-09 | 1.98535E-09 | 1.98535E-09 |
| ISCA | Quade | 9.87878E-01 | 1.0 | 1.0 | 9.87878E-01 |
| NNA | Friedman | 2.08923E-01 | 5.49729E-01 | 5.49729E-01 | 4.31038E-01 |
| NNA | Friedman Aligned | 7.43077E-09 | 2.28639E-08 | 2.28639E-08 | 2.28639E-08 |
| NNA | Quade | 9.87878E-01 | 1.0 | 1.0 | 9.90189E-01 |
| CWOA | Friedman | 2.08923E-01 | 4.24958E-01 | 4.24958E-01 | 3.51222E-01 |
| CWOA | Friedman Aligned | 3.54082E-11 | 6.53690E-11 | 6.53690E-11 | 6.53690E-11 |
| CWOA | Quade | 9.87878E-01 | 1.0 | 1.0 | 9.91564E-01 |
| GOTLBO | Friedman | 5.28655E-01 | 1.0 | 1.0 | 9.25997E-01 |
| GOTLBO | Friedman Aligned | 3.35675E-04 | 1.16207E-03 | 1.16207E-03 | 1.16147E-03 |
| GOTLBO | Quade | 9.87878E-01 | 1.0 | 1.0 | 9.99741E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S124** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S125.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 7.01424E-09 | 7.01424E-09 | 7.01424E-09 | 7.01424E-09 |
| WW | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| WW | Quade | 3.33895E-01 | 4.68680E-01 | 4.61937E-01 | 3.80571E-01 |
| CWOA | Friedman | 4.86623E-08 | 8.98381E-08 | 8.98381E-08 | 8.98381E-08 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 3.33895E-01 | 4.68680E-01 | 4.61937E-01 | 3.80571E-01 |
| NNA | Friedman | 7.50035E-08 | 1.90393E-07 | 1.90393E-07 | 1.90393E-07 |
| NNA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| NNA | Quade | 3.33895E-01 | 4.37241E-01 | 4.37241E-01 | 3.59435E-01 |
| ISCA | Friedman | 8.49143E-08 | 2.61275E-07 | 2.61275E-07 | 2.61275E-07 |
| ISCA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| ISCA | Quade | 3.33895E-01 | 4.00024E-01 | 4.00024E-01 | 3.33895E-01 |
| GOTLBO | Friedman | 3.57285E-06 | 1.23676E-05 | 1.23676E-05 | 1.23675E-05 |
| GOTLBO | Friedman Aligned | 2.09884E-10 | 7.74957E-10 | 7.74957E-10 | 7.74957E-10 |
| GOTLBO | Quade | 3.33895E-01 | 9.45824E-01 | 9.45824E-01 | 6.31865E-01 |
| PSO | Friedman | 5.02694E-04 | 1.85635E-03 | 1.85635E-03 | 1.85485E-03 |
| PSO | Friedman Aligned | 7.43825E-11 | 2.57478E-10 | 2.57478E-10 | 2.57478E-10 |
| PSO | Quade | 4.98202E-01 | 1.0 | 1.0 | 9.21610E-01 |
| MABC | Friedman | 4.25676E-02 | 1.62057E-01 | 1.62057E-01 | 1.51226E-01 |
| MABC | Friedman Aligned | 6.05896E-09 | 2.23716E-08 | 2.23716E-08 | 2.23716E-08 |
| MABC | Quade | 6.69600E-01 | 1.0 | 1.0 | 9.84613E-01 |
| DE | Friedman | 2.05603E-01 | 7.92421E-01 | 7.92421E-01 | 5.72528E-01 |
| DE | Friedman Aligned | 8.71728E-10 | 3.28574E-09 | 3.28574E-09 | 3.28574E-09 |
| DE | Quade | 7.68822E-01 | 1.0 | 1.0 | 9.95518E-01 |
| **Table S125** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S126.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.99926E-01 | 1.0 | 1.0 | 9.99926E-01 |
| WW | Friedman Aligned | 6.29593E-01 | 9.56165E-01 | 9.56165E-01 | 6.29593E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99990E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.99996E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 9.94434E-01 | 1.0 | 1.0 | 9.99931E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S126** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S127.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.99981E-01 | 1.0 | 1.0 | 9.99981E-01 |
| WW | Friedman Aligned | 9.68408E-01 | 1.0 | 1.0 | 9.68408E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99999E-01 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S127** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S128.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 9.99999E-01 | 1.0 | 1.0 | 9.99999E-01 |
| WW | Friedman Aligned | 1.65346E-01 | 1.79488E-01 | 1.79488E-01 | 1.65346E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S128** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 9.50839E-01 | 1.0 | 1.0 | 9.99523E-01 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 7.72845E-01 | 1.0 | 1.0 | 9.35186E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S129.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, RMSPE value). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S129** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S130.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (DE is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 4.50560E-01 | 7.36426E-01 | 7.16850E-01 | 5.32330E-01 |
| PSO | Friedman Aligned | 1.31972E-02 | 4.07936E-02 | 4.07936E-02 | 4.00528E-02 |
| PSO | Quade | 9.99988E-01 | 1.0 | 1.0 | 9.99998E-01 |
| CWOA | Friedman | 4.50560E-01 | 7.36426E-01 | 7.16850E-01 | 5.32330E-01 |
| CWOA | Friedman Aligned | 2.07247E-05 | 3.82613E-05 | 3.82613E-05 | 3.82606E-05 |
| CWOA | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 4.50560E-01 | 5.85271E-01 | 5.85271E-01 | 4.50560E-01 |
| WW | Friedman Aligned | 2.92524E-07 | 2.92524E-07 | 2.92524E-07 | 2.92524E-07 |
| WW | Quade | 9.99988E-01 | 1.0 | 1.0 | 9.99988E-01 |
| GOTLBO | Friedman | 5.52020E-01 | 1.0 | 1.0 | 9.15482E-01 |
| GOTLBO | Friedman Aligned | 7.67176E-01 | 1.0 | 1.0 | 9.95399E-01 |
| GOTLBO | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 5.52020E-01 | 1.0 | 1.0 | 9.15482E-01 |
| NNA | Friedman Aligned | 6.53162E-04 | 1.65844E-03 | 1.65844E-03 | 1.65719E-03 |
| NNA | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 5.52204E-01 | 1.0 | 1.0 | 9.48515E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 8.42576E-01 | 1.0 | 1.0 | 9.99059E-01 |
| MABC | Friedman Aligned | 4.90703E-01 | 1.0 | 1.0 | 9.03246E-01 |
| MABC | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 8.42576E-01 | 1.0 | 1.0 | 9.99059E-01 |
| IJAYA | Friedman Aligned | 9.62004E-01 | 1.0 | 1.0 | 9.99996E-01 |
| IJAYA | Quade | 9.99988E-01 | 1.0 | 1.0 | 1.0 |
| **Table S130** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S131.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (EBLSHADE is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.30508E-05 | 2.46344E-05 | 2.46344E-05 | 2.46341E-05 |
| PSO | Friedman Aligned | 4.90853E-11 | 1.24601E-10 | 1.24601E-10 | 1.24601E-10 |
| PSO | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 8.40980E-01 |
| CWOA | Friedman | 1.30508E-05 | 2.35507E-05 | 2.35507E-05 | 2.35504E-05 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 8.86126E-01 |
| WW | Friedman | 1.30508E-05 | 1.30509E-05 | 1.30509E-05 | 1.30508E-05 |
| WW | Friedman Aligned | 8.76076E-10 | 3.03257E-09 | 3.03257E-09 | 3.03257E-09 |
| WW | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 7.93250E-01 |
| NNA | Friedman | 1.25380E-04 | 3.85802E-04 | 3.85802E-04 | 3.85735E-04 |
| NNA | Friedman Aligned | 1.73171E-09 | 6.52721E-09 | 6.52721E-09 | 6.52721E-09 |
| NNA | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| GOTLBO | Friedman | 1.26295E-04 | 4.37193E-04 | 4.37193E-04 | 4.37109E-04 |
| GOTLBO | Friedman Aligned | 5.58257E-11 | 1.71771E-10 | 1.71771E-10 | 1.71771E-10 |
| GOTLBO | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| ISCA | Friedman | 2.06680E-04 | 7.63167E-04 | 7.63167E-04 | 7.62912E-04 |
| ISCA | Friedman Aligned | 1.83740E-08 | 6.36024E-08 | 6.36024E-08 | 6.36024E-08 |
| ISCA | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| MABC | Friedman | 1.40828E-03 | 5.30987E-03 | 4.55132E-03 | 5.29780E-03 |
| MABC | Friedman Aligned | 3.00493E-12 | 5.54756E-12 | 5.54756E-12 | 5.54756E-12 |
| MABC | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| IJAYA | Friedman | 1.40828E-03 | 5.30987E-03 | 4.55132E-03 | 5.29780E-03 |
| IJAYA | Friedman Aligned | 8.76076E-10 | 3.10840E-09 | 3.10840E-09 | 3.10840E-09 |
| IJAYA | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| **Table S131** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 5.62340E-03 | 1.94825E-02 | 1.94825E-02 | 1.93313E-02 |
| DE | Friedman Aligned | 2.45853E-09 | 9.07765E-09 | 9.07765E-09 | 9.07765E-09 |
| DE | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| NDE | Friedman | 2.09529E-02 | 6.46277E-02 | 6.46277E-02 | 6.30782E-02 |
| NDE | Friedman Aligned | 2.37713E-02 | 7.33451E-02 | 5.14343E-02 | 7.13523E-02 |
| NDE | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.19984E-01 |
| TLBO | Friedman | 3.98503E-01 | 1.0 | 4.07382E-01 | 7.24836E-01 |
| TLBO | Friedman Aligned | 2.88150E-02 | 7.33451E-02 | 5.14343E-02 | 7.15329E-02 |
| TLBO | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.77197E-01 |
| STLBO | Friedman | 3.98503E-01 | 1.0 | 4.07382E-01 | 7.24836E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 7.98639E-01 | 1.0 | 7.98639E-01 | 9.77197E-01 |
| ADELI | Friedman | 4.07382E-01 | 1.0 | 4.07382E-01 | 7.24836E-01 |
| ADELI | Friedman Aligned | 2.88150E-02 | 7.33451E-02 | 5.14343E-02 | 7.15329E-02 |
| ADELI | Quade | 7.93250E-01 | 1.0 | 7.98639E-01 | 9.77197E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S132.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ADELI is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 6.31318E-04 | 1.04935E-03 | 1.04935E-03 | 1.04885E-03 |
| PSO | Friedman Aligned | 1.18842E-10 | 3.01677E-10 | 3.01677E-10 | 3.01677E-10 |
| PSO | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.76795E-01 |
| CWOA | Friedman | 6.31318E-04 | 1.02471E-03 | 1.02471E-03 | 1.02423E-03 |
| CWOA | Friedman Aligned | 4.50306E-12 | 8.31335E-12 | 8.31335E-12 | 8.31335E-12 |
| CWOA | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.87201E-01 |
| WW | Friedman | 6.31318E-04 | 6.31502E-04 | 6.31502E-04 | 6.31318E-04 |
| WW | Friedman Aligned | 4.21371E-10 | 1.29653E-09 | 1.29653E-09 | 1.29653E-09 |
| WW | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.62893E-01 |
| GOTLBO | Friedman | 3.28358E-03 | 1.09916E-02 | 1.09916E-02 | 1.09381E-02 |
| GOTLBO | Friedman Aligned | 1.53943E-05 | 5.68406E-05 | 5.68406E-05 | 5.68392E-05 |
| GOTLBO | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| NNA | Friedman | 3.28358E-03 | 1.01148E-02 | 1.01148E-02 | 1.00689E-02 |
| NNA | Friedman Aligned | 5.08038E-13 | 5.08038E-13 | 5.08038E-13 | 5.08038E-13 |
| NNA | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| ISCA | Friedman | 4.57816E-03 | 1.69249E-02 | 1.69249E-02 | 1.68001E-02 |
| ISCA | Friedman Aligned | 8.26661E-04 | 2.86188E-03 | 2.86188E-03 | 2.85861E-03 |
| ISCA | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| MABC | Friedman | 2.05485E-02 | 7.78229E-02 | 6.67054E-02 | 7.52749E-02 |
| MABC | Friedman Aligned | 1.46218E-06 | 5.06140E-06 | 5.06140E-06 | 5.06139E-06 |
| MABC | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| IJAYA | Friedman | 2.05485E-02 | 7.78229E-02 | 6.67054E-02 | 7.52749E-02 |
| IJAYA | Friedman Aligned | 1.09560E-04 | 4.12967E-04 | 4.12967E-04 | 4.12893E-04 |
| IJAYA | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| **Table S132** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 5.66909E-02 | 1.97993E-01 | 1.97993E-01 | 1.82921E-01 |
| DE | Friedman Aligned | 2.35433E-04 | 8.69330E-04 | 8.69330E-04 | 8.69015E-04 |
| DE | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| NDE | Friedman | 1.46638E-01 | 4.59328E-01 | 4.59328E-01 | 3.86093E-01 |
| NDE | Friedman Aligned | 9.58524E-01 | 1.0 | 1.0 | 9.99944E-01 |
| NDE | Quade | 9.62893E-01 | 1.0 | 1.0 | 9.93168E-01 |
| TLBO | Friedman | 9.45602E-01 | 1.0 | 1.0 | 9.99383E-01 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 9.49185E-01 | 1.0 | 1.0 | 9.99383E-01 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S133.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NDE is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.55714E-01 | 2.24134E-01 | 2.20690E-01 | 2.02484E-01 |
| PSO | Friedman Aligned | 2.45681E-10 | 6.23651E-10 | 6.23651E-10 | 6.23651E-10 |
| PSO | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99926E-01 |
| CWOA | Friedman | 1.55714E-01 | 2.24134E-01 | 2.20690E-01 | 2.02484E-01 |
| CWOA | Friedman Aligned | 2.18658E-12 | 4.03677E-12 | 4.03677E-12 | 4.03677E-12 |
| CWOA | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99984E-01 |
| WW | Friedman | 1.55714E-01 | 1.68167E-01 | 1.68167E-01 | 1.55714E-01 |
| WW | Friedman Aligned | 2.49057E-10 | 7.66329E-10 | 7.66329E-10 | 7.66329E-10 |
| WW | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99775E-01 |
| GOTLBO | Friedman | 2.56546E-01 | 8.77639E-01 | 8.77639E-01 | 6.02847E-01 |
| GOTLBO | Friedman Aligned | 2.54839E-05 | 9.40951E-05 | 9.40951E-05 | 9.40913E-05 |
| GOTLBO | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| NNA | Friedman | 2.56546E-01 | 8.71786E-01 | 8.71786E-01 | 5.98341E-01 |
| NNA | Friedman Aligned | 1.12288E-12 | 1.12288E-12 | 1.12288E-12 | 1.12288E-12 |
| NNA | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| ISCA | Friedman | 2.68694E-01 | 1.0 | 1.0 | 6.85071E-01 |
| ISCA | Friedman Aligned | 1.22826E-03 | 4.25249E-03 | 4.25249E-03 | 4.24526E-03 |
| ISCA | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| MABC | Friedman | 5.32517E-01 | 1.0 | 1.0 | 9.43079E-01 |
| MABC | Friedman Aligned | 2.55400E-06 | 8.84079E-06 | 8.84079E-06 | 8.84076E-06 |
| MABC | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| IJAYA | Friedman | 5.32517E-01 | 1.0 | 1.0 | 9.43079E-01 |
| IJAYA | Friedman Aligned | 1.72659E-04 | 6.50817E-04 | 6.50817E-04 | 6.50635E-04 |
| IJAYA | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| **Table S133** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 7.62590E-01 | 1.0 | 1.0 | 9.93109E-01 |
| DE | Friedman Aligned | 3.62802E-04 | 1.33967E-03 | 1.33967E-03 | 1.33892E-03 |
| DE | Quade | 9.99775E-01 | 1.0 | 1.0 | 9.99998E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S134.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (MABC is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.84463E-01 |
| PSO | Friedman Aligned | 2.77918E-01 | 9.53341E-01 | 9.53341E-01 | 6.32817E-01 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.84463E-01 |
| CWOA | Friedman Aligned | 3.58148E-03 | 6.62200E-03 | 6.62200E-03 | 6.60193E-03 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.30603E-01 |
| WW | Friedman Aligned | 1.46115E-04 | 1.46124E-04 | 1.46124E-04 | 1.46115E-04 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.97657E-01 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.99247E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.97657E-01 |
| NNA | Friedman Aligned | 4.14291E-02 | 1.06884E-01 | 1.06884E-01 | 1.01840E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S134** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S135.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (TLBO is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.92560E-04 | 1.62336E-03 | 1.62336E-03 | 1.62216E-03 |
| PSO | Friedman Aligned | 1.04019E-10 | 2.64048E-10 | 2.64048E-10 | 2.64048E-10 |
| PSO | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.76514E-01 |
| CWOA | Friedman | 9.92560E-04 | 1.58954E-03 | 1.58954E-03 | 1.58839E-03 |
| CWOA | Friedman Aligned | 5.11791E-12 | 9.44844E-12 | 9.44844E-12 | 9.44844E-12 |
| CWOA | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.87026E-01 |
| WW | Friedman | 9.92560E-04 | 9.93015E-04 | 9.93015E-04 | 9.92560E-04 |
| WW | Friedman Aligned | 4.62743E-10 | 1.42383E-09 | 1.42383E-09 | 1.42383E-09 |
| WW | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.62491E-01 |
| GOTLBO | Friedman | 4.77179E-03 | 1.58963E-02 | 1.58963E-02 | 1.57845E-02 |
| GOTLBO | Friedman Aligned | 1.40291E-05 | 5.17999E-05 | 5.17999E-05 | 5.17987E-05 |
| GOTLBO | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| NNA | Friedman | 4.77179E-03 | 1.47067E-02 | 1.47067E-02 | 1.46098E-02 |
| NNA | Friedman Aligned | 4.38760E-13 | 4.38760E-13 | 4.38760E-13 | 4.38760E-13 |
| NNA | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| ISCA | Friedman | 6.51265E-03 | 2.40890E-02 | 2.40890E-02 | 2.38367E-02 |
| ISCA | Friedman Aligned | 7.68321E-04 | 2.65989E-03 | 2.65989E-03 | 2.65706E-03 |
| ISCA | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| MABC | Friedman | 2.77009E-02 | 1.05088E-01 | 9.00750E-02 | 1.00471E-01 |
| MABC | Friedman Aligned | 1.31956E-06 | 4.56772E-06 | 4.56772E-06 | 4.56771E-06 |
| MABC | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| IJAYA | Friedman | 2.77009E-02 | 1.05088E-01 | 9.00750E-02 | 1.00471E-01 |
| IJAYA | Friedman Aligned | 1.00742E-04 | 3.79729E-04 | 3.79729E-04 | 3.79667E-04 |
| IJAYA | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| **Table S135** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 7.29030E-02 | 2.55281E-01 | 2.55281E-01 | 2.30511E-01 |
| DE | Friedman Aligned | 2.17370E-04 | 8.02629E-04 | 8.02629E-04 | 8.02360E-04 |
| DE | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| NDE | Friedman | 1.80006E-01 | 5.66315E-01 | 5.66315E-01 | 4.56998E-01 |
| NDE | Friedman Aligned | 9.48516E-01 | 1.0 | 1.0 | 9.99891E-01 |
| NDE | Quade | 9.62491E-01 | 1.0 | 1.0 | 9.93062E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 9.92596E-01 | 1.0 | 1.0 | 9.99996E-01 |
| ADELI | Quade | 9.99595E-01 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S136.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (GOTLBO is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.98888E-01 | 1.0 | 1.0 | 9.99669E-01 |
| PSO | Friedman Aligned | 9.17453E-02 | 2.91753E-01 | 2.91753E-01 | 2.56282E-01 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.98888E-01 | 1.0 | 1.0 | 9.99669E-01 |
| CWOA | Friedman Aligned | 4.72107E-04 | 8.71757E-04 | 8.71757E-04 | 8.71408E-04 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.98888E-01 | 1.0 | 1.0 | 9.98888E-01 |
| WW | Friedman Aligned | 1.21443E-05 | 1.21444E-05 | 1.21444E-05 | 1.21443E-05 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.99965E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 8.38840E-03 | 2.13627E-02 | 2.13627E-02 | 2.11564E-02 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S136** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 9.12281E-01 | 1.0 | 1.0 | 9.99780E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S137.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (STLBO is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 8.87311E-04 | 1.45708E-03 | 1.45708E-03 | 1.45612E-03 |
| PSO | Friedman Aligned | 1.30579E-10 | 4.01781E-10 | 4.01781E-10 | 4.01781E-10 |
| PSO | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.53136E-01 |
| CWOA | Friedman | 8.87311E-04 | 1.42576E-03 | 1.42576E-03 | 1.42483E-03 |
| CWOA | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
| CWOA | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.71605E-01 |
| WW | Friedman | 8.87311E-04 | 8.87675E-04 | 8.87675E-04 | 8.87311E-04 |
| WW | Friedman Aligned | 1.11147E-09 | 4.18940E-09 | 4.18940E-09 | 4.18940E-09 |
| WW | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.30369E-01 |
| GOTLBO | Friedman | 4.35052E-03 | 1.45102E-02 | 1.45102E-02 | 1.44170E-02 |
| GOTLBO | Friedman Aligned | 1.44695E-11 | 3.67302E-11 | 3.67302E-11 | 3.67302E-11 |
| GOTLBO | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| NNA | Friedman | 4.35052E-03 | 1.34064E-02 | 1.34064E-02 | 1.33258E-02 |
| NNA | Friedman Aligned | 3.90710E-09 | 1.44262E-08 | 1.44262E-08 | 1.44262E-08 |
| NNA | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| ISCA | Friedman | 5.96940E-03 | 2.20764E-02 | 2.20764E-02 | 2.18643E-02 |
| ISCA | Friedman Aligned | 4.50262E-09 | 1.55860E-08 | 1.55860E-08 | 1.55860E-08 |
| ISCA | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| MABC | Friedman | 2.57340E-02 | 9.75806E-02 | 8.36406E-02 | 9.35933E-02 |
| MABC | Friedman Aligned | 5.23914E-13 | 9.67226E-13 | 9.67226E-13 | 9.67226E-13 |
| MABC | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| IJAYA | Friedman | 2.57340E-02 | 9.75806E-02 | 8.36406E-02 | 9.35933E-02 |
| IJAYA | Friedman Aligned | 2.18045E-10 | 7.54772E-10 | 7.54772E-10 | 7.54772E-10 |
| IJAYA | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| **Table S137** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 6.85289E-02 | 2.39794E-01 | 2.39794E-01 | 2.17870E-01 |
| DE | Friedman Aligned | 7.42368E-10 | 2.74105E-09 | 2.74105E-09 | 2.74105E-09 |
| DE | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| NDE | Friedman | 1.71181E-01 | 5.37924E-01 | 5.37924E-01 | 4.38814E-01 |
| NDE | Friedman Aligned | 1.22573E-02 | 3.77682E-02 | 2.72258E-02 | 3.72367E-02 |
| NDE | Quade | 9.30369E-01 | 1.0 | 1.0 | 9.83227E-01 |
| TLBO | Friedman | 9.89408E-01 | 1.0 | 1.0 | 9.99990E-01 |
| TLBO | Friedman Aligned | 1.52045E-02 | 3.86414E-02 | 2.72258E-02 | 3.81458E-02 |
| TLBO | Quade | 9.44870E-01 | 1.0 | 1.0 | 9.99362E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 8.12763E-01 | 8.12763E-01 | 8.12763E-01 | 8.12763E-01 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.52045E-02 | 3.86414E-02 | 2.72258E-02 | 3.81458E-02 |
| ADELI | Quade | 9.44870E-01 | 1.0 | 1.0 | 9.99362E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S138.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (PSO is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S138** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 8.54143E-01 | 1.0 | 1.0 | 9.92455E-01 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 3.93493E-01 | 8.88533E-01 | 8.88533E-01 | 6.02734E-01 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 8.06951E-02 | 8.38658E-02 | 8.38658E-02 | 8.06951E-02 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S139.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (IJAYA is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.84463E-01 |
| PSO | Friedman Aligned | 2.55584E-02 | 7.93472E-02 | 7.93472E-02 | 7.65731E-02 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.84463E-01 |
| CWOA | Friedman Aligned | 5.81546E-05 | 1.07365E-04 | 1.07365E-04 | 1.07360E-04 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 8.30603E-01 | 1.0 | 1.0 | 8.30603E-01 |
| WW | Friedman Aligned | 9.75209E-07 | 9.75209E-07 | 9.75209E-07 | 9.75209E-07 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.97657E-01 |
| GOTLBO | Friedman Aligned | 8.87840E-01 | 1.0 | 1.0 | 9.99690E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.99247E-01 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 8.60298E-01 | 1.0 | 1.0 | 9.97657E-01 |
| NNA | Friedman Aligned | 1.53028E-03 | 3.88684E-03 | 3.88684E-03 | 3.87999E-03 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S139** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 6.38258E-01 | 1.0 | 1.0 | 9.70394E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S140.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (ISCA is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.93692E-01 | 1.0 | 1.0 | 9.97469E-01 |
| PSO | Friedman Aligned | 4.05630E-03 | 1.24985E-02 | 1.24985E-02 | 1.24284E-02 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.93692E-01 | 1.0 | 1.0 | 9.97469E-01 |
| CWOA | Friedman Aligned | 3.47277E-06 | 6.41127E-06 | 6.41127E-06 | 6.41126E-06 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.93692E-01 | 1.0 | 1.0 | 9.93692E-01 |
| WW | Friedman Aligned | 3.59568E-08 | 3.59568E-08 | 3.59568E-08 | 3.59568E-08 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 9.96887E-01 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 5.31817E-01 | 1.0 | 1.0 | 9.39316E-01 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 9.96887E-01 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.47184E-04 | 3.73641E-04 | 3.73641E-04 | 3.73578E-04 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 8.75367E-01 | 1.0 | 1.0 | 9.99542E-01 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S140** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 2.80474E-01 | 1.0 | 1.0 | 6.79991E-01 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 7.88732E-01 | 1.0 | 1.0 | 9.97148E-01 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S141.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (NNA is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.99446E-01 | 1.0 | 1.0 | 9.99855E-01 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99446E-01 | 1.0 | 1.0 | 9.99855E-01 |
| CWOA | Friedman Aligned | 9.57624E-01 | 1.0 | 1.0 | 9.97079E-01 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 9.99446E-01 | 1.0 | 1.0 | 9.99446E-01 |
| WW | Friedman Aligned | 6.15608E-01 | 9.21781E-01 | 9.21781E-01 | 6.15608E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S141** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S142.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (CWOA is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S142** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman Aligned | 9.96187E-01 | 1.0 | 1.0 | 9.96187E-01 |
| WW | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S143.** Adjusted *p*-values for multiple comparisons 1×*N* tests in single-IV case (WW is the control algorithm, Comp parameter). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S143** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| NNA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

**Table S144.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *I*01 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| ADELI versus WW | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus NDE | 1.17195E-12 | 1.15907E-12 | 1.00453E-12 |
| STLBO versus CWOA | 1.17195E-12 | 1.15907E-12 | 1.00453E-12 |
| TLBO versus PSO | 1.21236E-12 | 1.17240E-12 | 1.03917E-12 |
| STLBO versus GOTLBO | 1.21236E-12 | 1.17240E-12 | 1.03917E-12 |
| ADELI versus DE | 1.73772E-12 | 1.64224E-12 | 1.48948E-12 |
| STLBO versus DE | 1.83875E-12 | 1.71752E-12 | 1.57607E-12 |
| ADELI versus CWOA | 3.83915E-12 | 3.50164E-12 | 3.29070E-12 |
| EBLSHADE versus GOTLBO | 4.20286E-12 | 3.78719E-12 | 3.60245E-12 |
| STLBO versus NDE | 5.01110E-12 | 4.46043E-12 | 4.29523E-12 |
| ADELI versus GOTLBO | 5.41522E-12 | 4.76064E-12 | 4.64162E-12 |
| EBLSHADE versus CWOA | 5.98099E-12 | 5.19229E-12 | 5.12657E-12 |
| EBLSHADE versus ISCA | 1.17195E-11 | 1.00453E-11 | 1.00453E-11 |
| EBLSHADE versus DE | 1.45282E-11 | 1.22931E-11 | 1.06966E-11 |
| EBLSHADE versus NDE | 4.17053E-11 | 3.43725E-11 | 3.07061E-11 |
| STLBO versus ISCA | 8.17133E-11 | 6.64482E-11 | 6.01625E-11 |
| TLBO versus WW | 8.82197E-11 | 7.07696E-11 | 6.49529E-11 |
| TLBO versus MABC | 1.07900E-10 | 8.53717E-11 | 7.94431E-11 |
| EBLSHADE versus MABC | 3.09961E-10 | 2.38431E-10 | 2.28213E-10 |
| ADELI versus NNA | 3.24570E-10 | 2.46102E-10 | 2.38969E-10 |
| ADELI versus ISCA | 3.83410E-10 | 2.86504E-10 | 2.82291E-10 |
| STLBO versus MABC | 1.58351E-09 | 1.16588E-09 | 1.16588E-09 |
| STLBO versus NNA | 1.83408E-09 | 1.33021E-09 | 1.33021E-09 |
| TLBO versus ISCA | 3.49326E-09 | 2.49519E-09 | 2.22648E-09 |
| ADELI versus MABC | 5.83612E-09 | 4.10452E-09 | 3.71972E-09 |
| EBLSHADE versus NNA | 1.23520E-08 | 8.55140E-09 | 7.87272E-09 |
| EBLSHADE versus PSO | 1.47150E-08 | 1.00256E-08 | 9.37877E-09 |
| STLBO versus PSO | 5.32586E-08 | 3.57008E-08 | 3.39450E-08 |
| ADELI versus PSO | 1.50038E-07 | 9.89261E-08 | 9.56286E-08 |
| TLBO versus GOTLBO | 2.16253E-07 | 1.40208E-07 | 1.37831E-07 |
| EBLSHADE versus WW | 2.39169E-07 | 1.52438E-07 | 1.52438E-07 |
| TLBO versus CWOA | 2.89034E-07 | 1.81043E-07 | 1.77867E-07 |
| TLBO versus DE | 5.91345E-07 | 3.63905E-07 | 3.63905E-07 |
| STLBO versus WW | 6.86296E-07 | 4.14794E-07 | 4.14794E-07 |
| TLBO versus NDE | 1.37158E-06 | 8.13904E-07 | 7.68687E-07 |
| TLBO versus NNA | 1.17758E-04 | 6.72904E-05 | 6.59964E-05 |
| NNA versus WW | 2.21281E-02 | 1.24015E-02 | 1.24015E-02 |
| IJAYA versus WW | 2.36193E-01 | 1.29777E-01 | 1.24585E-01 |
| NNA versus PSO | 2.36193E-01 | 1.29777E-01 | 1.24585E-01 |
| NDE versus WW | 4.04596E-01 | 2.13413E-01 | 2.13413E-01 |
| DE versus WW | 6.28685E-01 | 3.24706E-01 | 3.24706E-01 |
| CWOA versus WW | 8.94683E-01 | 4.52257E-01 | 4.52257E-01 |
| GOTLBO versus WW | 1.0 | 5.07626E-01 | 5.07626E-01 |
| IJAYA versus PSO | 1.0 | 8.15876E-01 | 7.97333E-01 |
| NNA versus MABC | 1.0 | 9.64793E-01 | 9.64793E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus PSO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| DE versus ISCA | 1.0 | 1.0 | 1.0 |
| DE versus NNA | 1.0 | 1.0 | 1.0 |
| DE versus CWOA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus MABC | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus PSO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus ISCA | 1.0 | 1.0 | 1.0 |
| NDE versus NNA | 1.0 | 1.0 | 1.0 |
| NDE versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus PSO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| IJAYA versus NNA | 1.0 | 1.0 | 1.0 |
| IJAYA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S145.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *n*1 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus PSO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus NNA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus ISCA | 1.61648E-12 | 1.52767E-12 | 1.38556E-12 |
| EBLSHADE versus MABC | 2.99050E-12 | 2.79332E-12 | 2.56328E-12 |
| STLBO versus MABC | 1.78622E-11 | 1.64881E-11 | 1.53104E-11 |
| TLBO versus GOTLBO | 2.46918E-11 | 2.25211E-11 | 2.11644E-11 |
| EBLSHADE versus GOTLBO | 5.12426E-11 | 4.61746E-11 | 4.39222E-11 |
| ADELI versus MABC | 7.56515E-11 | 6.73381E-11 | 6.48441E-11 |
| TLBO versus WW | 2.00969E-10 | 1.76676E-10 | 1.72260E-10 |
| STLBO versus GOTLBO | 2.49909E-10 | 2.16954E-10 | 2.14207E-10 |
| TLBO versus MABC | 4.53444E-10 | 3.88666E-10 | 3.88666E-10 |
| EBLSHADE versus ISCA | 5.43381E-10 | 4.59784E-10 | 4.00072E-10 |
| ADELI versus GOTLBO | 8.75044E-10 | 7.30806E-10 | 6.44263E-10 |
| TLBO versus PSO | 1.00018E-09 | 8.24324E-10 | 7.36396E-10 |
| TLBO versus NNA | 2.04728E-09 | 1.66482E-09 | 1.50734E-09 |
| STLBO versus ISCA | 2.18167E-09 | 1.75013E-09 | 1.60628E-09 |
| ADELI versus ISCA | 6.57190E-09 | 5.19974E-09 | 4.83865E-09 |
| NDE versus CWOA | 3.36109E-08 | 2.62239E-08 | 2.47465E-08 |
| TLBO versus CWOA | 5.32586E-08 | 4.09682E-08 | 3.92124E-08 |
| EBLSHADE versus WW | 5.60533E-08 | 4.25019E-08 | 4.12700E-08 |
| STLBO versus WW | 1.57318E-07 | 1.17556E-07 | 1.15828E-07 |
| EBLSHADE versus PSO | 1.72868E-07 | 1.27276E-07 | 1.27276E-07 |
| EBLSHADE versus NNA | 2.86887E-07 | 2.08072E-07 | 2.08072E-07 |
| ADELI versus DE | 3.33882E-07 | 2.34818E-07 | 2.12804E-07 |
| ADELI versus WW | 3.58848E-07 | 2.48433E-07 | 2.28717E-07 |
| STLBO versus PSO | 4.47114E-07 | 3.04627E-07 | 2.84974E-07 |
| STLBO versus NNA | 7.15762E-07 | 4.79796E-07 | 4.56200E-07 |
| STLBO versus DE | 1.19373E-06 | 7.73959E-07 | 7.60841E-07 |
| NDE versus NNA | 2.07377E-06 | 1.32174E-06 | 1.32174E-06 |
| NDE versus PSO | 4.36970E-06 | 2.73706E-06 | 2.68905E-06 |
| EBLSHADE versus DE | 4.99510E-06 | 3.01902E-06 | 3.01902E-06 |
| DE versus CWOA | 6.39569E-06 | 3.79524E-06 | 3.58440E-06 |
| IJAYA versus CWOA | 7.30359E-06 | 4.25374E-06 | 4.09322E-06 |
| NDE versus WW | 1.94193E-05 | 1.10967E-05 | 1.08833E-05 |
| ADELI versus NDE | 4.70344E-05 | 2.63600E-05 | 2.63600E-05 |
| STLBO versus NDE | 1.40958E-04 | 7.74492E-05 | 7.43513E-05 |
| DE versus NNA | 2.26316E-04 | 1.21862E-04 | 1.19375E-04 |
| IJAYA versus NNA | 2.54404E-04 | 1.34191E-04 | 1.34191E-04 |
| DE versus PSO | 4.27764E-04 | 2.20933E-04 | 2.20933E-04 |
| EBLSHADE versus NDE | 4.79400E-04 | 2.42334E-04 | 2.42334E-04 |
| IJAYA versus PSO | 4.79400E-04 | 2.42334E-04 | 2.42334E-04 |
| TLBO versus DE | 1.30442E-03 | 6.16374E-04 | 6.16374E-04 |
| DE versus WW | 1.53460E-03 | 7.08277E-04 | 7.08277E-04 |
| IJAYA versus WW | 1.70903E-03 | 7.70003E-04 | 7.51222E-04 |
| NDE versus ISCA | 1.90225E-03 | 8.36152E-04 | 8.36152E-04 |
| NDE versus GOTLBO | 9.80133E-03 | 4.20057E-03 | 4.20057E-03 |
| NDE versus MABC | 4.80428E-02 | 2.00618E-02 | 2.00618E-02 |
| TLBO versus NDE | 5.02234E-02 | 2.04205E-02 | 2.04205E-02 |
| DE versus ISCA | 6.82680E-02 | 2.70071E-02 | 2.70071E-02 |
| IJAYA versus ISCA | 7.44356E-02 | 2.86291E-02 | 2.86291E-02 |
| DE versus GOTLBO | 2.55477E-01 | 9.54529E-02 | 9.54529E-02 |
| IJAYA versus GOTLBO | 2.76188E-01 | 1.00156E-01 | 9.71211E-02 |
| MABC versus CWOA | 4.52529E-01 | 1.59131E-01 | 1.59131E-01 |
| DE versus MABC | 8.94683E-01 | 3.04782E-01 | 3.04782E-01 |
| IJAYA versus MABC | 9.58593E-01 | 3.16020E-01 | 3.16020E-01 |
| GOTLBO versus CWOA | 1.0 | 4.72336E-01 | 4.72336E-01 |
| MABC versus NNA | 1.0 | 9.34584E-01 | 9.34584E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus PSO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S146.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *R*p1 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus PSO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus WW | 1.43463E-12 | 1.34004E-12 | 1.22968E-12 |
| ADELI versus MABC | 1.33360E-11 | 1.23102E-11 | 1.14309E-11 |
| STLBO versus MABC | 2.69549E-11 | 2.45852E-11 | 2.31042E-11 |
| EBLSHADE versus MABC | 3.50373E-11 | 3.15721E-11 | 3.00320E-11 |
| TLBO versus CWOA | 4.11355E-10 | 3.66151E-10 | 3.52590E-10 |
| TLBO versus NNA | 8.18143E-10 | 7.19247E-10 | 7.01266E-10 |
| TLBO versus ISCA | 1.06888E-09 | 9.27929E-10 | 9.16183E-10 |
| EBLSHADE versus WW | 2.63616E-09 | 2.25957E-09 | 2.25957E-09 |
| STLBO versus WW | 3.17823E-09 | 2.68927E-09 | 2.34002E-09 |
| TLBO versus PSO | 4.31959E-09 | 3.60757E-09 | 3.18036E-09 |
| ADELI versus WW | 5.17792E-09 | 4.26752E-09 | 3.81232E-09 |
| TLBO versus GOTLBO | 1.10887E-08 | 9.01722E-09 | 8.16424E-09 |
| NDE versus GOTLBO | 8.94170E-08 | 7.17301E-08 | 6.58345E-08 |
| ADELI versus DE | 1.61452E-07 | 1.27742E-07 | 1.18871E-07 |
| EBLSHADE versus CWOA | 2.62028E-07 | 2.04440E-07 | 1.92922E-07 |
| NDE versus PSO | 2.89034E-07 | 2.22334E-07 | 2.12805E-07 |
| STLBO versus DE | 2.89034E-07 | 2.22334E-07 | 2.12805E-07 |
| STLBO versus CWOA | 3.00115E-07 | 2.22334E-07 | 2.20964E-07 |
| TLBO versus MABC | 3.10670E-07 | 2.25321E-07 | 2.25321E-07 |
| EBLSHADE versus DE | 3.58779E-07 | 2.56271E-07 | 2.28673E-07 |
| EBLSHADE versus NNA | 4.09653E-07 | 2.88108E-07 | 2.61097E-07 |
| ADELI versus CWOA | 4.28007E-07 | 2.96312E-07 | 2.72795E-07 |
| STLBO versus NNA | 4.67004E-07 | 3.18178E-07 | 2.97651E-07 |
| EBLSHADE versus ISCA | 4.87704E-07 | 3.26922E-07 | 3.10844E-07 |
| STLBO versus ISCA | 5.54974E-07 | 3.59818E-07 | 3.53720E-07 |
| ADELI versus NNA | 6.57947E-07 | 4.12121E-07 | 4.04891E-07 |
| ADELI versus ISCA | 7.78206E-07 | 4.78896E-07 | 4.78896E-07 |
| NDE versus ISCA | 1.37158E-06 | 8.28976E-07 | 8.28976E-07 |
| NDE versus NNA | 1.80779E-06 | 1.07275E-06 | 1.01315E-06 |
| NDE versus CWOA | 3.57169E-06 | 2.08021E-06 | 2.00172E-06 |
| IJAYA versus GOTLBO | 6.81498E-05 | 3.89427E-05 | 3.81938E-05 |
| DE versus GOTLBO | 1.10876E-04 | 6.21395E-05 | 6.21395E-05 |
| IJAYA versus PSO | 1.78805E-04 | 9.82446E-05 | 9.43149E-05 |
| ADELI versus NDE | 1.78805E-04 | 9.82446E-05 | 9.43149E-05 |
| DE versus PSO | 2.85820E-04 | 1.50762E-04 | 1.50762E-04 |
| STLBO versus NDE | 2.85820E-04 | 1.50762E-04 | 1.50762E-04 |
| EBLSHADE versus NDE | 3.40016E-04 | 1.71876E-04 | 1.71876E-04 |
| TLBO versus DE | 5.36975E-04 | 2.65537E-04 | 2.65537E-04 |
| IJAYA versus ISCA | 6.35902E-04 | 3.07469E-04 | 3.00481E-04 |
| NDE versus WW | 7.11295E-04 | 3.36107E-04 | 3.36107E-04 |
| IJAYA versus NNA | 7.95190E-04 | 3.67011E-04 | 3.67011E-04 |
| DE versus ISCA | 9.92197E-04 | 4.36131E-04 | 4.36131E-04 |
| DE versus NNA | 1.23530E-03 | 5.29414E-04 | 5.29414E-04 |
| IJAYA versus CWOA | 1.37722E-03 | 5.75102E-04 | 5.75102E-04 |
| DE versus CWOA | 2.11615E-03 | 8.60411E-04 | 8.60411E-04 |
| MABC versus GOTLBO | 4.80428E-02 | 1.90060E-02 | 1.90060E-02 |
| IJAYA versus WW | 8.83504E-02 | 3.39809E-02 | 3.39809E-02 |
| MABC versus PSO | 9.61775E-02 | 3.59344E-02 | 3.59344E-02 |
| TLBO versus NDE | 1.00327E-01 | 3.63824E-02 | 3.59344E-02 |
| DE versus WW | 1.23672E-01 | 4.34891E-02 | 4.34891E-02 |
| MABC versus ISCA | 2.36193E-01 | 8.04614E-02 | 8.04614E-02 |
| MABC versus NNA | 2.76188E-01 | 9.10511E-02 | 9.10511E-02 |
| MABC versus CWOA | 4.04596E-01 | 1.28937E-01 | 1.28937E-01 |
| NDE versus MABC | 7.25121E-01 | 2.23114E-01 | 2.23114E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S147.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *I*02 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| ADELI versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus GOTLBO | 1.43463E-12 | 1.40310E-12 | 1.22968E-12 |
| STLBO versus ISCA | 1.43463E-12 | 1.40310E-12 | 1.22968E-12 |
| STLBO versus MABC | 1.61648E-12 | 1.54543E-12 | 1.38556E-12 |
| ADELI versus MABC | 1.85896E-12 | 1.75682E-12 | 1.59339E-12 |
| STLBO versus NNA | 2.14184E-12 | 2.00062E-12 | 1.83586E-12 |
| ADELI versus GOTLBO | 2.16205E-12 | 2.00062E-12 | 1.85318E-12 |
| ADELI versus ISCA | 2.16205E-12 | 2.00062E-12 | 1.85318E-12 |
| EBLSHADE versus CWOA | 2.18225E-12 | 2.00062E-12 | 1.87050E-12 |
| STLBO versus WW | 2.30349E-12 | 2.05036E-12 | 1.97442E-12 |
| EBLSHADE versus WW | 2.50555E-12 | 2.20268E-12 | 2.14762E-12 |
| EBLSHADE versus NNA | 2.74802E-12 | 2.38565E-12 | 2.35545E-12 |
| EBLSHADE versus DE | 9.09273E-12 | 7.69385E-12 | 6.69464E-12 |
| ADELI versus NNA | 1.17195E-11 | 9.78773E-12 | 8.62865E-12 |
| ADELI versus WW | 1.27702E-11 | 1.05249E-11 | 9.40226E-12 |
| EBLSHADE versus GOTLBO | 1.59022E-11 | 1.29314E-11 | 1.17082E-11 |
| EBLSHADE versus ISCA | 1.59022E-11 | 1.29314E-11 | 1.17082E-11 |
| EBLSHADE versus MABC | 1.89533E-11 | 1.49960E-11 | 1.39546E-11 |
| STLBO versus CWOA | 2.48535E-11 | 1.93912E-11 | 1.82987E-11 |
| STLBO versus DE | 9.52514E-11 | 7.22236E-11 | 7.01301E-11 |
| ADELI versus CWOA | 1.19539E-10 | 8.93259E-11 | 8.80123E-11 |
| ADELI versus DE | 4.11355E-10 | 2.93825E-10 | 2.78092E-10 |
| TLBO versus PSO | 3.83430E-10 | 2.78092E-10 | 2.78092E-10 |
| ADELI versus NDE | 1.03645E-09 | 7.28932E-10 | 6.60594E-10 |
| STLBO versus NDE | 5.20274E-09 | 3.60189E-09 | 3.31603E-09 |
| TLBO versus DE | 5.63195E-09 | 3.83716E-09 | 3.58960E-09 |
| TLBO versus CWOA | 2.12347E-08 | 1.40009E-08 | 1.35342E-08 |
| EBLSHADE versus NDE | 4.90997E-08 | 3.18339E-08 | 3.12943E-08 |
| TLBO versus WW | 1.73724E-07 | 1.10725E-07 | 1.10725E-07 |
| TLBO versus NNA | 1.86904E-07 | 1.17072E-07 | 1.15018E-07 |
| EBLSHADE versus PSO | 6.57947E-07 | 4.04891E-07 | 4.04891E-07 |
| TLBO versus GOTLBO | 7.84454E-07 | 4.74120E-07 | 4.74120E-07 |
| TLBO versus ISCA | 7.84454E-07 | 4.74120E-07 | 4.74120E-07 |
| TLBO versus MABC | 9.02777E-07 | 5.25793E-07 | 5.05952E-07 |
| TLBO versus NDE | 4.03987E-04 | 2.30850E-04 | 2.26410E-04 |
| NDE versus PSO | 2.90375E-03 | 1.62737E-03 | 1.62737E-03 |
| MABC versus PSO | 2.36193E-01 | 1.29777E-01 | 1.24585E-01 |
| GOTLBO versus PSO | 2.55477E-01 | 1.37564E-01 | 1.34757E-01 |
| ISCA versus PSO | 2.55477E-01 | 1.37564E-01 | 1.34757E-01 |
| NNA versus PSO | 5.43931E-01 | 2.80932E-01 | 2.80932E-01 |
| WW versus PSO | 5.64095E-01 | 2.85147E-01 | 2.85147E-01 |
| CWOA versus PSO | 1.0 | 7.32936E-01 | 7.32936E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus PSO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| DE versus ISCA | 1.0 | 1.0 | 1.0 |
| DE versus NNA | 1.0 | 1.0 | 1.0 |
| DE versus CWOA | 1.0 | 1.0 | 1.0 |
| DE versus WW | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus MABC | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus ISCA | 1.0 | 1.0 | 1.0 |
| NDE versus NNA | 1.0 | 1.0 | 1.0 |
| NDE versus CWOA | 1.0 | 1.0 | 1.0 |
| NDE versus WW | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus PSO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| IJAYA versus NNA | 1.0 | 1.0 | 1.0 |
| IJAYA versus CWOA | 1.0 | 1.0 | 1.0 |
| IJAYA versus WW | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S148.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *n*2 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus PSO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus ISCA | 1.73772E-12 | 1.68043E-12 | 1.48948E-12 |
| EBLSHADE versus ISCA | 2.50555E-12 | 2.39542E-12 | 2.14762E-12 |
| ADELI versus ISCA | 5.90017E-12 | 5.57598E-12 | 5.05729E-12 |
| TLBO versus GOTLBO | 3.82299E-11 | 3.57092E-11 | 3.27685E-11 |
| TLBO versus NNA | 5.54050E-11 | 5.11431E-11 | 4.74900E-11 |
| STLBO versus GOTLBO | 2.88583E-10 | 2.63213E-10 | 2.47357E-10 |
| TLBO versus CWOA | 3.57304E-10 | 3.21966E-10 | 3.06260E-10 |
| EBLSHADE versus GOTLBO | 4.11355E-10 | 3.66151E-10 | 3.52590E-10 |
| NDE versus PSO | 4.17134E-10 | 3.66711E-10 | 3.57543E-10 |
| ADELI versus MABC | 4.53444E-10 | 3.93649E-10 | 3.88666E-10 |
| ADELI versus GOTLBO | 8.18143E-10 | 7.01266E-10 | 7.01266E-10 |
| EBLSHADE versus MABC | 1.03645E-09 | 8.76996E-10 | 7.63100E-10 |
| STLBO versus MABC | 1.55916E-09 | 1.30216E-09 | 1.14795E-09 |
| NDE versus WW | 1.58351E-09 | 1.30509E-09 | 1.16588E-09 |
| DE versus WW | 2.74625E-09 | 2.23321E-09 | 2.02196E-09 |
| IJAYA versus WW | 5.20274E-09 | 4.17362E-09 | 3.83059E-09 |
| TLBO versus PSO | 7.39368E-09 | 5.84994E-09 | 5.44370E-09 |
| TLBO versus ISCA | 7.72300E-09 | 6.02564E-09 | 5.68616E-09 |
| TLBO versus WW | 1.48718E-08 | 1.12764E-08 | 1.09496E-08 |
| NDE versus CWOA | 1.82015E-08 | 1.36011E-08 | 1.34011E-08 |
| ADELI versus DE | 2.47603E-08 | 1.82301E-08 | 1.82301E-08 |
| EBLSHADE versus DE | 5.29450E-08 | 3.72360E-08 | 3.37451E-08 |
| STLBO versus DE | 7.70341E-08 | 5.33313E-08 | 4.90986E-08 |
| STLBO versus NNA | 9.71903E-08 | 6.62176E-08 | 6.19455E-08 |
| NDE versus NNA | 1.20281E-07 | 8.06279E-08 | 7.66626E-08 |
| EBLSHADE versus NNA | 1.23921E-07 | 8.17061E-08 | 7.89826E-08 |
| MABC versus WW | 1.29493E-07 | 8.39569E-08 | 8.25339E-08 |
| ADELI versus NNA | 1.98870E-07 | 1.26753E-07 | 1.26753E-07 |
| STLBO versus CWOA | 3.13904E-07 | 1.96621E-07 | 1.93172E-07 |
| STLBO versus WW | 3.76647E-07 | 2.31783E-07 | 2.31783E-07 |
| EBLSHADE versus CWOA | 3.92026E-07 | 2.36939E-07 | 2.36939E-07 |
| EBLSHADE versus WW | 4.21156E-07 | 2.49917E-07 | 2.36939E-07 |
| ADELI versus WW | 5.24150E-07 | 3.05274E-07 | 2.93755E-07 |
| ADELI versus CWOA | 6.04449E-07 | 3.45400E-07 | 3.38757E-07 |
| TLBO versus MABC | 1.01533E-05 | 5.69029E-06 | 5.69029E-06 |
| NDE versus GOTLBO | 8.70224E-05 | 4.78145E-05 | 4.59019E-05 |
| ISCA versus WW | 1.04382E-04 | 5.62059E-05 | 5.50588E-05 |
| TLBO versus DE | 2.26316E-04 | 1.16888E-04 | 1.16888E-04 |
| DE versus PSO | 4.03987E-04 | 2.04213E-04 | 2.04213E-04 |
| IJAYA versus PSO | 6.35902E-04 | 3.14457E-04 | 3.14457E-04 |
| NDE versus ISCA | 3.22321E-03 | 1.55847E-03 | 1.52305E-03 |
| GOTLBO versus WW | 3.76564E-03 | 1.77937E-03 | 1.77937E-03 |
| DE versus CWOA | 5.12081E-03 | 2.36345E-03 | 2.36345E-03 |
| MABC versus PSO | 5.96060E-03 | 2.68554E-03 | 2.62004E-03 |
| ADELI versus NDE | 6.26838E-03 | 2.75533E-03 | 2.75533E-03 |
| IJAYA versus CWOA | 7.65642E-03 | 3.28132E-03 | 3.28132E-03 |
| EBLSHADE versus NDE | 1.02934E-02 | 4.29835E-03 | 4.29835E-03 |
| STLBO versus NDE | 1.31235E-02 | 5.33592E-03 | 5.33592E-03 |
| DE versus NNA | 1.74861E-02 | 6.91757E-03 | 6.91757E-03 |
| IJAYA versus NNA | 2.54443E-02 | 9.78628E-03 | 9.78628E-03 |
| MABC versus CWOA | 5.48640E-02 | 2.04986E-02 | 2.04986E-02 |
| MABC versus NNA | 1.58264E-01 | 5.73924E-02 | 5.56532E-02 |
| NDE versus MABC | 2.98420E-01 | 1.04939E-01 | 1.04939E-01 |
| NNA versus WW | 3.10137E-01 | 1.05651E-01 | 1.05651E-01 |
| ISCA versus PSO | 4.69614E-01 | 1.54818E-01 | 1.54818E-01 |
| CWOA versus WW | 7.78139E-01 | 2.47978E-01 | 2.47978E-01 |
| DE versus GOTLBO | 9.58593E-01 | 2.94952E-01 | 2.94952E-01 |
| IJAYA versus GOTLBO | 1.0 | 3.72867E-01 | 3.72867E-01 |
| TLBO versus NDE | 1.0 | 4.48866E-01 | 4.48866E-01 |
| NDE versus DE | 1.0 | 4.59538E-01 | 4.59538E-01 |
| ISCA versus CWOA | 1.0 | 5.84482E-01 | 5.84482E-01 |
| PSO versus WW | 1.0 | 8.50607E-01 | 8.50607E-01 |
| GOTLBO versus PSO | 1.0 | 8.85464E-01 | 8.85464E-01 |
| MABC versus GOTLBO | 1.0 | 9.99507E-01 | 9.99507E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| DE versus ISCA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S149.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *R*p2 evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| STLBO versus ISCA | 1.29319E-12 | 1.29319E-12 | 1.29319E-12 |
| EBLSHADE versus ISCA | 1.98019E-12 | 1.95843E-12 | 1.69731E-12 |
| TLBO versus CWOA | 2.97029E-12 | 2.90501E-12 | 2.54596E-12 |
| EBLSHADE versus GOTLBO | 4.95048E-12 | 4.78728E-12 | 4.24327E-12 |
| TLBO versus PSO | 7.65810E-12 | 7.32148E-12 | 6.56408E-12 |
| ADELI versus ISCA | 1.07900E-11 | 1.01972E-11 | 9.24860E-12 |
| STLBO versus GOTLBO | 2.10951E-11 | 1.97042E-11 | 1.80815E-11 |
| TLBO versus WW | 2.46918E-11 | 2.27924E-11 | 2.11644E-11 |
| EBLSHADE versus NNA | 5.54050E-11 | 5.05342E-11 | 4.74900E-11 |
| TLBO versus MABC | 1.17478E-10 | 1.05859E-10 | 1.00695E-10 |
| ADELI versus GOTLBO | 1.73509E-10 | 1.54442E-10 | 1.48722E-10 |
| STLBO versus NNA | 2.00969E-10 | 1.76676E-10 | 1.72260E-10 |
| ADELI versus NDE | 2.13032E-10 | 1.84940E-10 | 1.82599E-10 |
| EBLSHADE versus MABC | 8.75044E-10 | 7.50037E-10 | 7.50037E-10 |
| ADELI versus NNA | 1.30252E-09 | 1.10213E-09 | 9.59000E-10 |
| STLBO versus NDE | 1.98884E-09 | 1.66101E-09 | 1.46431E-09 |
| STLBO versus MABC | 2.63616E-09 | 2.17266E-09 | 1.94091E-09 |
| TLBO versus NNA | 2.74625E-09 | 2.23321E-09 | 2.02196E-09 |
| EBLSHADE versus WW | 2.80640E-09 | 2.25129E-09 | 2.06625E-09 |
| EBLSHADE versus NDE | 7.72300E-09 | 6.11050E-09 | 5.68616E-09 |
| STLBO versus WW | 7.83965E-09 | 6.11665E-09 | 5.77205E-09 |
| EBLSHADE versus CWOA | 1.17394E-08 | 9.03031E-09 | 8.64329E-09 |
| ADELI versus MABC | 1.31489E-08 | 9.97004E-09 | 9.68105E-09 |
| TLBO versus GOTLBO | 2.67315E-08 | 1.99752E-08 | 1.96815E-08 |
| STLBO versus CWOA | 2.99616E-08 | 2.20597E-08 | 2.20597E-08 |
| ADELI versus WW | 3.51330E-08 | 2.54811E-08 | 2.54811E-08 |
| ADELI versus CWOA | 1.18085E-07 | 8.30485E-08 | 7.52627E-08 |
| EBLSHADE versus PSO | 1.23921E-07 | 8.57914E-08 | 7.89826E-08 |
| STLBO versus PSO | 2.74198E-07 | 1.86816E-07 | 1.74764E-07 |
| TLBO versus ISCA | 3.58779E-07 | 2.40501E-07 | 2.28673E-07 |
| ADELI versus DE | 6.81272E-07 | 4.41704E-07 | 4.34218E-07 |
| ADELI versus PSO | 8.81287E-07 | 5.61700E-07 | 5.61700E-07 |
| STLBO versus DE | 4.36970E-06 | 2.68905E-06 | 2.68905E-06 |
| EBLSHADE versus DE | 1.31819E-05 | 7.96708E-06 | 7.96708E-06 |
| TLBO versus NDE | 2.13413E-04 | 1.26641E-04 | 1.19605E-04 |
| DE versus PSO | 2.69673E-04 | 1.57062E-04 | 1.51136E-04 |
| IJAYA versus PSO | 1.61958E-03 | 9.25474E-04 | 9.07676E-04 |
| DE versus CWOA | 3.22321E-03 | 1.80641E-03 | 1.80641E-03 |
| DE versus WW | 1.08087E-02 | 5.82009E-03 | 5.70131E-03 |
| IJAYA versus CWOA | 1.58994E-02 | 8.38648E-03 | 8.38648E-03 |
| DE versus MABC | 2.54443E-02 | 1.31416E-02 | 1.31416E-02 |
| TLBO versus DE | 4.59507E-02 | 2.32278E-02 | 2.32278E-02 |
| IJAYA versus WW | 4.80428E-02 | 2.37574E-02 | 2.37574E-02 |
| NDE versus PSO | 5.48640E-02 | 2.65276E-02 | 2.59247E-02 |
| IJAYA versus MABC | 1.04642E-01 | 4.94461E-02 | 4.94461E-02 |
| DE versus NNA | 1.34341E-01 | 6.20034E-02 | 6.20034E-02 |
| NDE versus CWOA | 3.47844E-01 | 1.56721E-01 | 1.52898E-01 |
| DE versus GOTLBO | 4.20037E-01 | 1.84631E-01 | 1.84631E-01 |
| IJAYA versus NNA | 4.69614E-01 | 2.01263E-01 | 2.01263E-01 |
| NDE versus WW | 8.34597E-01 | 3.48513E-01 | 3.48513E-01 |
| IJAYA versus GOTLBO | 1.0 | 5.28247E-01 | 5.28247E-01 |
| DE versus ISCA | 1.0 | 5.67461E-01 | 5.67461E-01 |
| NDE versus MABC | 1.0 | 5.88959E-01 | 5.88959E-01 |
| ADELI versus TLBO | 1.0 | 7.16260E-01 | 7.16260E-01 |
| ISCA versus PSO | 1.0 | 7.88189E-01 | 7.64304E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus ISCA | 1.0 | 1.0 | 1.0 |
| NDE versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus PSO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S150.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *R*s evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| TLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus NNA | 1.61648E-12 | 1.59872E-12 | 1.38556E-12 |
| ADELI versus MABC | 2.97029E-12 | 2.90501E-12 | 2.54596E-12 |
| TLBO versus ISCA | 3.55627E-12 | 3.39995E-12 | 3.04823E-12 |
| NDE versus PSO | 3.83915E-12 | 3.62821E-12 | 3.29070E-12 |
| STLBO versus MABC | 5.47584E-12 | 5.11480E-12 | 4.69358E-12 |
| TLBO versus WW | 7.15294E-12 | 6.60272E-12 | 6.13110E-12 |
| EBLSHADE versus GOTLBO | 9.09273E-12 | 8.29337E-12 | 7.79377E-12 |
| EBLSHADE versus MABC | 1.59022E-11 | 1.41547E-11 | 1.36304E-11 |
| STLBO versus GOTLBO | 2.48535E-11 | 2.15761E-11 | 2.13030E-11 |
| ADELI versus GOTLBO | 4.37259E-11 | 3.74794E-11 | 3.74794E-11 |
| EBLSHADE versus CWOA | 8.82399E-11 | 7.46645E-11 | 6.49678E-11 |
| STLBO versus CWOA | 2.16164E-10 | 1.80533E-10 | 1.59154E-10 |
| TLBO versus CWOA | 2.31804E-10 | 1.91047E-10 | 1.70669E-10 |
| ADELI versus CWOA | 3.57284E-10 | 2.90538E-10 | 2.63055E-10 |
| EBLSHADE versus WW | 1.48409E-09 | 1.19054E-09 | 1.09269E-09 |
| TLBO versus GOTLBO | 2.33768E-09 | 1.84959E-09 | 1.72115E-09 |
| EBLSHADE versus ISCA | 2.47565E-09 | 1.93155E-09 | 1.82273E-09 |
| STLBO versus WW | 3.17823E-09 | 2.44479E-09 | 2.34002E-09 |
| ADELI versus WW | 4.87552E-09 | 3.69682E-09 | 3.58967E-09 |
| STLBO versus ISCA | 5.17792E-09 | 3.86922E-09 | 3.81232E-09 |
| ADELI versus DE | 5.20274E-09 | 3.86922E-09 | 3.83059E-09 |
| ADELI versus ISCA | 7.83965E-09 | 5.59975E-09 | 4.99670E-09 |
| STLBO versus DE | 9.03653E-09 | 6.35536E-09 | 5.75955E-09 |
| EBLSHADE versus NNA | 1.31489E-08 | 9.10308E-09 | 8.38061E-09 |
| EBLSHADE versus DE | 2.29314E-08 | 1.56236E-08 | 1.46156E-08 |
| STLBO versus NNA | 2.55057E-08 | 1.70972E-08 | 1.62564E-08 |
| ADELI versus NNA | 3.70334E-08 | 2.44176E-08 | 2.36037E-08 |
| EBLSHADE versus PSO | 8.87455E-08 | 5.75383E-08 | 5.65631E-08 |
| STLBO versus PSO | 1.21526E-07 | 7.74564E-08 | 7.74564E-08 |
| ADELI versus PSO | 1.45251E-07 | 9.09811E-08 | 8.93850E-08 |
| TLBO versus MABC | 3.58779E-07 | 2.20787E-07 | 2.20787E-07 |
| DE versus PSO | 7.84454E-07 | 4.74120E-07 | 4.74120E-07 |
| NDE versus NNA | 8.70224E-05 | 5.16397E-05 | 4.87708E-05 |
| TLBO versus DE | 1.17758E-04 | 6.85844E-05 | 6.59964E-05 |
| ADELI versus NDE | 1.89694E-04 | 1.08397E-04 | 1.06312E-04 |
| MABC versus PSO | 2.26316E-04 | 1.26836E-04 | 1.26836E-04 |
| STLBO versus NDE | 2.85820E-04 | 1.57044E-04 | 1.50762E-04 |
| NDE versus ISCA | 4.52878E-04 | 2.43857E-04 | 2.38881E-04 |
| EBLSHADE versus NDE | 5.68189E-04 | 2.99704E-04 | 2.99704E-04 |
| NDE versus WW | 7.11295E-04 | 3.67372E-04 | 3.67372E-04 |
| IJAYA versus PSO | 4.39395E-03 | 2.22112E-03 | 2.22112E-03 |
| NDE versus CWOA | 5.96060E-03 | 2.94755E-03 | 2.94755E-03 |
| GOTLBO versus PSO | 8.04629E-03 | 3.89051E-03 | 3.80209E-03 |
| NDE versus GOTLBO | 2.31856E-02 | 1.09558E-02 | 1.09558E-02 |
| CWOA versus PSO | 3.05936E-02 | 1.41201E-02 | 1.41201E-02 |
| WW versus PSO | 1.71641E-01 | 7.54467E-02 | 7.54467E-02 |
| DE versus NNA | 1.86050E-01 | 7.97358E-02 | 7.97358E-02 |
| TLBO versus NDE | 2.27059E-01 | 9.48159E-02 | 9.48159E-02 |
| ISCA versus PSO | 2.36193E-01 | 9.60346E-02 | 9.60346E-02 |
| NDE versus MABC | 3.75247E-01 | 1.48450E-01 | 1.48450E-01 |
| DE versus ISCA | 5.43931E-01 | 2.09204E-01 | 2.09204E-01 |
| NNA versus PSO | 6.75361E-01 | 2.52333E-01 | 2.52333E-01 |
| DE versus WW | 7.25121E-01 | 2.62956E-01 | 2.54988E-01 |
| DE versus CWOA | 1.0 | 9.47406E-01 | 9.47406E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| IJAYA versus NNA | 1.0 | 1.0 | 1.0 |
| IJAYA versus CWOA | 1.0 | 1.0 | 1.0 |
| IJAYA versus WW | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S151.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. *I*ph evaluation task.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus PSO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus MABC | 1.51545E-12 | 1.43219E-12 | 1.29896E-12 |
| STLBO versus MABC | 1.61648E-12 | 1.50990E-12 | 1.38556E-12 |
| ADELI versus MABC | 7.03171E-12 | 6.49081E-12 | 6.02718E-12 |
| TLBO versus WW | 7.79954E-12 | 7.11387E-12 | 6.68532E-12 |
| TLBO versus ISCA | 9.09273E-12 | 8.19345E-12 | 7.79377E-12 |
| TLBO versus NNA | 1.51343E-11 | 1.34712E-11 | 1.29723E-11 |
| TLBO versus CWOA | 3.43907E-11 | 3.02336E-11 | 2.94778E-11 |
| EBLSHADE versus WW | 2.18167E-09 | 1.89398E-09 | 1.87000E-09 |
| NDE versus PSO | 2.53392E-09 | 2.14409E-09 | 1.99224E-09 |
| STLBO versus WW | 2.32428E-09 | 1.99224E-09 | 1.99224E-09 |
| TLBO versus GOTLBO | 2.80640E-09 | 2.34381E-09 | 2.06625E-09 |
| ADELI versus WW | 6.97145E-09 | 5.74570E-09 | 5.13283E-09 |
| ADELI versus PSO | 1.48718E-08 | 1.20936E-08 | 1.09496E-08 |
| TLBO versus MABC | 2.29314E-08 | 1.83955E-08 | 1.68836E-08 |
| TLBO versus PSO | 2.55057E-08 | 2.01803E-08 | 1.87789E-08 |
| NDE versus GOTLBO | 4.90997E-08 | 3.83086E-08 | 3.61503E-08 |
| EBLSHADE versus ISCA | 5.89835E-08 | 4.53719E-08 | 4.34274E-08 |
| STLBO versus ISCA | 6.20553E-08 | 4.70529E-08 | 4.56890E-08 |
| EBLSHADE versus NNA | 7.97656E-08 | 5.96050E-08 | 5.87285E-08 |
| STLBO versus NNA | 8.38271E-08 | 6.17189E-08 | 6.17189E-08 |
| ADELI versus DE | 1.11709E-07 | 8.10200E-08 | 8.10200E-08 |
| EBLSHADE versus CWOA | 1.30023E-07 | 9.28738E-08 | 8.28720E-08 |
| STLBO versus CWOA | 1.36403E-07 | 9.59315E-08 | 8.69379E-08 |
| ADELI versus ISCA | 1.50038E-07 | 1.03872E-07 | 9.56286E-08 |
| ADELI versus NNA | 1.98870E-07 | 1.35494E-07 | 1.26753E-07 |
| ADELI versus CWOA | 3.13904E-07 | 2.10419E-07 | 2.00071E-07 |
| STLBO versus DE | 4.14117E-07 | 2.73044E-07 | 2.63942E-07 |
| EBLSHADE versus DE | 4.44818E-07 | 2.88399E-07 | 2.83511E-07 |
| IJAYA versus PSO | 6.81272E-07 | 4.34218E-07 | 4.34218E-07 |
| NDE versus CWOA | 4.08618E-06 | 2.51457E-06 | 2.51457E-06 |
| NDE versus NNA | 7.80316E-06 | 4.63045E-06 | 4.41426E-06 |
| IJAYA versus GOTLBO | 8.90345E-06 | 5.08769E-06 | 4.98985E-06 |
| DE versus PSO | 1.15721E-05 | 6.48546E-06 | 6.48546E-06 |
| NDE versus ISCA | 1.15721E-05 | 6.48546E-06 | 6.48546E-06 |
| DE versus GOTLBO | 1.25050E-04 | 6.73346E-05 | 6.59604E-05 |
| ADELI versus NDE | 2.39966E-04 | 1.26575E-04 | 1.26575E-04 |
| NDE versus WW | 4.03987E-04 | 2.08653E-04 | 2.08653E-04 |
| IJAYA versus CWOA | 4.03987E-04 | 2.08653E-04 | 2.08653E-04 |
| STLBO versus NDE | 6.72589E-04 | 3.32599E-04 | 3.32599E-04 |
| EBLSHADE versus NDE | 7.11295E-04 | 3.43923E-04 | 3.36107E-04 |
| IJAYA versus NNA | 7.11295E-04 | 3.43923E-04 | 3.36107E-04 |
| IJAYA versus ISCA | 9.92197E-04 | 4.57937E-04 | 4.57937E-04 |
| TLBO versus DE | 1.70903E-03 | 7.70003E-04 | 7.51222E-04 |
| DE versus CWOA | 3.96494E-03 | 1.74283E-03 | 1.74283E-03 |
| DE versus NNA | 6.59115E-03 | 2.82478E-03 | 2.82478E-03 |
| DE versus ISCA | 8.88298E-03 | 3.70937E-03 | 3.70937E-03 |
| IJAYA versus WW | 1.92207E-02 | 7.60380E-03 | 7.60380E-03 |
| NDE versus MABC | 5.24960E-02 | 2.01908E-02 | 2.01908E-02 |
| MABC versus PSO | 1.13790E-01 | 4.25150E-02 | 4.25150E-02 |
| DE versus WW | 1.23672E-01 | 4.48482E-02 | 4.34891E-02 |
| TLBO versus NDE | 3.47844E-01 | 1.22319E-01 | 1.22319E-01 |
| MABC versus GOTLBO | 5.05541E-01 | 1.72217E-01 | 1.72217E-01 |
| IJAYA versus MABC | 9.58593E-01 | 3.16020E-01 | 3.16020E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S152.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. RMSPE value.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus ISCA | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus NNA | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| EBLSHADE versus WW | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus ISCA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus NNA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus ISCA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus NNA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus PSO | 1.37401E-12 | 1.22302E-12 | 1.17772E-12 |
| NDE versus CWOA | 1.43463E-12 | 1.26121E-12 | 1.22968E-12 |
| NDE versus NNA | 3.51585E-12 | 3.05223E-12 | 3.01359E-12 |
| ADELI versus MABC | 6.54676E-12 | 5.53957E-12 | 5.12657E-12 |
| NDE versus ISCA | 5.98099E-12 | 5.12657E-12 | 5.12657E-12 |
| STLBO versus MABC | 6.54676E-12 | 5.53957E-12 | 5.12657E-12 |
| NDE versus WW | 8.34510E-12 | 6.87783E-12 | 6.14420E-12 |
| EBLSHADE versus MABC | 4.96665E-11 | 4.03881E-11 | 3.65676E-11 |
| EBLSHADE versus PSO | 2.00969E-10 | 1.61217E-10 | 1.47967E-10 |
| TLBO versus GOTLBO | 8.75044E-10 | 6.92342E-10 | 6.44263E-10 |
| ADELI versus PSO | 1.00018E-09 | 7.80360E-10 | 7.36396E-10 |
| STLBO versus PSO | 1.00018E-09 | 7.80360E-10 | 7.36396E-10 |
| NDE versus GOTLBO | 1.22083E-09 | 9.25684E-10 | 8.98853E-10 |
| ADELI versus DE | 1.55916E-09 | 1.16509E-09 | 1.14795E-09 |
| STLBO versus DE | 1.55916E-09 | 1.16509E-09 | 1.14795E-09 |
| EBLSHADE versus DE | 9.77290E-09 | 7.08804E-09 | 7.08804E-09 |
| ADELI versus WW | 1.85769E-08 | 1.32692E-08 | 1.18402E-08 |
| STLBO versus WW | 1.85769E-08 | 1.32692E-08 | 1.18402E-08 |
| TLBO versus MABC | 2.29314E-08 | 1.58756E-08 | 1.46156E-08 |
| TLBO versus ISCA | 3.51330E-08 | 2.39368E-08 | 2.23925E-08 |
| TLBO versus NNA | 4.80531E-08 | 3.22114E-08 | 3.06272E-08 |
| IJAYA versus WW | 4.90997E-08 | 3.23734E-08 | 3.12943E-08 |
| EBLSHADE versus GOTLBO | 6.86488E-08 | 4.45086E-08 | 4.37542E-08 |
| TLBO versus CWOA | 8.80796E-08 | 5.61386E-08 | 5.61386E-08 |
| ADELI versus GOTLBO | 2.08311E-07 | 1.30480E-07 | 1.28191E-07 |
| STLBO versus GOTLBO | 2.08311E-07 | 1.30480E-07 | 1.28191E-07 |
| TLBO versus WW | 4.67004E-07 | 2.82255E-07 | 2.82255E-07 |
| IJAYA versus CWOA | 6.81272E-07 | 4.04272E-07 | 3.81812E-07 |
| IJAYA versus NNA | 1.57507E-06 | 9.17350E-07 | 8.82733E-07 |
| NDE versus PSO | 1.68754E-06 | 9.64306E-07 | 9.45762E-07 |
| TLBO versus DE | 2.37760E-06 | 1.33250E-06 | 1.33250E-06 |
| IJAYA versus ISCA | 2.37760E-06 | 1.33250E-06 | 1.33250E-06 |
| IJAYA versus GOTLBO | 1.25050E-04 | 6.32121E-05 | 6.32121E-05 |
| DE versus WW | 2.26316E-04 | 1.11914E-04 | 1.11914E-04 |
| DE versus CWOA | 1.70903E-03 | 8.26344E-04 | 8.07564E-04 |
| NDE versus MABC | 2.23150E-03 | 1.05444E-03 | 1.05444E-03 |
| DE versus NNA | 3.22321E-03 | 1.48763E-03 | 1.48763E-03 |
| DE versus ISCA | 4.39395E-03 | 1.97969E-03 | 1.93141E-03 |
| MABC versus WW | 7.28445E-03 | 3.12191E-03 | 3.12191E-03 |
| IJAYA versus PSO | 2.11160E-02 | 8.81767E-03 | 8.81767E-03 |
| MABC versus CWOA | 4.01728E-02 | 1.63340E-02 | 1.63340E-02 |
| NDE versus DE | 5.02234E-02 | 1.98686E-02 | 1.98686E-02 |
| MABC versus NNA | 6.82680E-02 | 2.62569E-02 | 2.62569E-02 |
| DE versus GOTLBO | 8.11168E-02 | 3.03074E-02 | 3.03074E-02 |
| MABC versus ISCA | 8.83504E-02 | 3.20392E-02 | 3.10683E-02 |
| ADELI versus NDE | 9.21871E-02 | 3.24174E-02 | 3.24174E-02 |
| STLBO versus NDE | 9.21871E-02 | 3.24174E-02 | 3.24174E-02 |
| EBLSHADE versus NDE | 2.36193E-01 | 7.78659E-02 | 7.78659E-02 |
| MABC versus GOTLBO | 9.58593E-01 | 3.05486E-01 | 3.05486E-01 |
| PSO versus WW | 1.0 | 3.15856E-01 | 3.15856E-01 |
| IJAYA versus MABC | 1.0 | 6.25076E-01 | 6.25076E-01 |
| DE versus PSO | 1.0 | 7.69767E-01 | 7.69767E-01 |
| TLBO versus NDE | 1.0 | 8.59568E-01 | 8.59568E-01 |
| PSO versus CWOA | 1.0 | 8.59568E-01 | 8.59568E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus PSO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S153.** Adjusted *p*-values for tests for multiple comparisons among all methods in the single-IV case. Comp parameter.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus WW | 9.13562E-05 | 9.13562E-05 | 9.13562E-05 |
| EBLSHADE versus CWOA | 1.78593E-04 | 1.76630E-04 | 1.53079E-04 |
| EBLSHADE versus PSO | 2.03794E-04 | 1.99315E-04 | 1.74680E-04 |
| EBLSHADE versus NNA | 3.51080E-03 | 3.39506E-03 | 3.00926E-03 |
| EBLSHADE versus GOTLBO | 4.42051E-03 | 4.22620E-03 | 3.78901E-03 |
| ADELI versus WW | 4.42051E-03 | 4.22620E-03 | 3.78901E-03 |
| STLBO versus WW | 6.21372E-03 | 5.80403E-03 | 5.32605E-03 |
| TLBO versus WW | 6.95110E-03 | 6.41640E-03 | 5.95809E-03 |
| ADELI versus CWOA | 7.77070E-03 | 7.08756E-03 | 6.66060E-03 |
| EBLSHADE versus ISCA | 8.68102E-03 | 7.82246E-03 | 7.44088E-03 |
| ADELI versus PSO | 8.68102E-03 | 7.82246E-03 | 7.44088E-03 |
| STLBO versus CWOA | 1.08120E-02 | 9.50506E-03 | 9.26744E-03 |
| TLBO versus PSO | 1.34296E-02 | 1.13635E-02 | 1.03320E-02 |
| TLBO versus CWOA | 1.20540E-02 | 1.04645E-02 | 1.03320E-02 |
| STLBO versus PSO | 1.20540E-02 | 1.04645E-02 | 1.03320E-02 |
| EBLSHADE versus MABC | 6.90283E-02 | 5.76500E-02 | 5.08231E-02 |
| ADELI versus NNA | 9.20449E-02 | 7.48497E-02 | 6.77693E-02 |
| ADELI versus GOTLBO | 1.11137E-01 | 8.91541E-02 | 8.18263E-02 |
| STLBO versus NNA | 1.21998E-01 | 9.65262E-02 | 8.98230E-02 |
| TLBO versus NNA | 1.33831E-01 | 1.04418E-01 | 9.85352E-02 |
| STLBO versus GOTLBO | 1.46714E-01 | 1.12857E-01 | 1.08020E-01 |
| TLBO versus GOTLBO | 1.60730E-01 | 1.21872E-01 | 1.18339E-01 |
| ADELI versus ISCA | 1.92520E-01 | 1.43861E-01 | 1.41746E-01 |
| STLBO versus ISCA | 2.51119E-01 | 1.84890E-01 | 1.84890E-01 |
| TLBO versus ISCA | 2.74012E-01 | 1.98734E-01 | 1.98734E-01 |
| EBLSHADE versus DE | 3.54582E-01 | 2.53273E-01 | 2.25997E-01 |
| ADELI versus MABC | 1.0 | 7.11524E-01 | 6.44819E-01 |
| NDE versus WW | 1.0 | 8.02025E-01 | 7.50281E-01 |
| STLBO versus MABC | 1.0 | 8.50346E-01 | 8.08525E-01 |
| TLBO versus MABC | 1.0 | 8.85738E-01 | 8.70725E-01 |
| EBLSHADE versus NDE | 1.0 | 9.20945E-01 | 9.04788E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus PSO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| DE versus ISCA | 1.0 | 1.0 | 1.0 |
| DE versus NNA | 1.0 | 1.0 | 1.0 |
| DE versus CWOA | 1.0 | 1.0 | 1.0 |
| DE versus WW | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus DE | 1.0 | 1.0 | 1.0 |
| ADELI versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ADELI versus NDE | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus DE | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus MABC | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus PSO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus ISCA | 1.0 | 1.0 | 1.0 |
| NDE versus NNA | 1.0 | 1.0 | 1.0 |
| NDE versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus PSO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus ISCA | 1.0 | 1.0 | 1.0 |
| MABC versus NNA | 1.0 | 1.0 | 1.0 |
| MABC versus CWOA | 1.0 | 1.0 | 1.0 |
| MABC versus WW | 1.0 | 1.0 | 1.0 |
| TLBO versus DE | 1.0 | 1.0 | 1.0 |
| TLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus NDE | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus PSO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ISCA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NNA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus CWOA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus DE | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus NDE | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus MABC | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus PSO | 1.0 | 1.0 | 1.0 |
| IJAYA versus ISCA | 1.0 | 1.0 | 1.0 |
| IJAYA versus NNA | 1.0 | 1.0 | 1.0 |
| IJAYA versus CWOA | 1.0 | 1.0 | 1.0 |
| IJAYA versus WW | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |

**Table S154.** The results of the compared algorithms in the IV-set case.

| **Algorithm**, | Parameter | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| metric | *I*01 (A) | *n*1 | *R*p1 (Ω) | *I*02 (A) | *n*2 | *R*p2 (Ω) | *R*s (Ω) | *I*ph (A) | RMSPE |
|  |  |  |  |  | ***T* = 260 K** |  |  |  |  |
| true value | 1.50000E-05 | 6.37044E+00 | 1.00000E+04 | 8.96101E-06 | 2.92308E+00 | 1.41753E+04 | 1.00000E+01 | 9.60000E-04 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.69057E-05 | 6.30708E+00 | 2.97192E+04 | 8.65745E-06 | 2.71501E+00 | 1.40692E+04 | 6.56303E+01 | 1.16043E-03 | 1.89083E-01 |
| MEDIAN | 2.62622E-06 | 4.91376E+00 | 2.07122E+03 | 8.39149E-06 | 2.74341E+00 | 1.38837E+04 | 5.31154E+01 | 1.10392E-03 | 1.36102E-01 |
| STD | 1.40807E-04 | 4.83826E+00 | 1.19197E+05 | 1.87434E-06 | 4.85664E-01 | 1.10024E+03 | 6.97079E+01 | 2.23934E-04 | 9.49094E-02 |
| IQR | 1.90272E-05 | 3.82747E+00 | 6.99210E+03 | 2.07603E-06 | 8.01925E-01 | 1.32071E+03 | 8.70225E+01 | 2.75091E-04 | 1.61708E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.01388E-05 | 5.49038E+00 | 7.76643E+03 | 8.16611E-06 | 2.67787E+00 | 1.37765E+04 | 6.74898E+01 | 1.08004E-03 | 1.19451E-01 |
| MEDIAN | 9.90953E-06 | 6.12537E+00 | 6.31620E+03 | 8.95342E-06 | 2.88690E+00 | 1.41506E+04 | 2.55399E+01 | 9.97449E-04 | 1.00133E-01 |
| STD | 4.86370E-05 | 2.63941E+00 | 1.04179E+04 | 1.11268E-06 | 3.26014E-01 | 5.46121E+02 | 6.89751E+01 | 1.75238E-04 | 4.15560E-02 |
| IQR | 1.48880E-05 | 3.38745E+00 | 8.60682E+03 | 1.57957E-06 | 5.17435E-01 | 8.15200E+02 | 1.16329E+02 | 1.68848E-04 | 1.82019E-02 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.48003E-05 | 6.35177E+00 | 9.74887E+03 | 8.96080E-06 | 2.92295E+00 | 1.41751E+04 | 1.03086E+01 | 9.60447E-04 | 9.95037E-02 |
| MEDIAN | 1.49998E-05 | 6.37041E+00 | 1.00019E+04 | 8.96101E-06 | 2.92307E+00 | 1.41753E+04 | 1.00025E+01 | 9.59996E-04 | 9.95037E-02 |
| STD | 5.31369E-07 | 5.01535E-02 | 6.44912E+02 | 5.75513E-10 | 3.56841E-04 | 4.83078E-01 | 8.28714E-01 | 1.22281E-06 | 1.83374E-08 |
| IQR | 4.36500E-12 | 3.89500E-07 | 7.23000E-03 | 0.00000E+00 | 2.50000E-09 | 0.00000E+00 | 3.90000E-07 | 6.00000E-13 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 6.14289E-05 | 8.48588E+00 | 5.08184E+04 | 7.64602E-06 | 2.41768E+00 | 1.40726E+04 | 1.30758E+02 | 5.01164E-03 | 2.74711E-01 |
| MEDIAN | 3.52725E-06 | 5.19947E+00 | 2.31607E+03 | 8.93042E-06 | 2.90231E+00 | 1.41535E+04 | 4.71911E+01 | 1.08179E-03 | 1.16520E-01 |
| STD | 1.83406E-04 | 8.33816E+00 | 1.97124E+05 | 5.06371E-06 | 1.06971E+00 | 3.43420E+03 | 1.43461E+02 | 9.54832E-03 | 2.62947E-01 |
| IQR | 6.55127E-06 | 2.28483E+00 | 3.15183E+03 | 5.42428E-06 | 1.52579E+00 | 1.85976E+03 | 1.87806E+02 | 1.05710E-03 | 2.96819E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.43696E-05 | 1.14305E+01 | 1.51025E+04 | 6.88795E-06 | 2.05296E+00 | 1.30822E+04 | 1.87992E+02 | 8.73693E-03 | 3.29820E-01 |
| MEDIAN | 1.39100E-06 | 9.93725E+00 | 3.91349E+02 | 6.47851E-06 | 1.84359E+00 | 1.27895E+04 | 1.13315E+02 | 1.53906E-03 | 3.53569E-01 |
| STD | 1.72156E-04 | 8.22054E+00 | 6.94018E+04 | 2.38962E-06 | 6.31622E-01 | 1.22683E+03 | 1.71735E+02 | 1.52181E-02 | 1.09211E-01 |
| IQR | 1.18894E-04 | 1.18583E+01 | 6.83317E+02 | 1.03384E-06 | 3.99133E-01 | 4.64595E+02 | 3.59388E+02 | 6.93289E-03 | 1.17934E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.41354E-05 | 6.25434E+00 | 3.61536E+04 | 8.95928E-06 | 2.92201E+00 | 1.41739E+04 | 1.21722E+01 | 9.63674E-04 | 9.95042E-02 |
| MEDIAN | 1.49998E-05 | 6.37041E+00 | 1.00019E+04 | 8.96101E-06 | 2.92307E+00 | 1.41753E+04 | 1.00025E+01 | 9.59996E-04 | 9.95037E-02 |
| STD | 3.64271E-06 | 4.06928E-01 | 1.31353E+05 | 5.98003E-09 | 3.64405E-03 | 4.82182E+00 | 7.40580E+00 | 1.24785E-05 | 2.20001E-06 |
| IQR | 2.49391E-06 | 2.38776E-01 | 2.80094E+03 | 2.66597E-09 | 1.73634E-03 | 2.37254E+00 | 3.15653E+00 | 4.50969E-06 | 2.02140E-07 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.38343E-04 | 1.00611E+01 | 4.98093E+04 | 1.17919E-05 | 3.11751E+00 | 1.73665E+04 | 1.16759E+02 | 1.62579E-02 | 4.77176E-01 |
| MEDIAN | 5.37507E-06 | 7.28573E+00 | 4.15155E+02 | 9.57098E-06 | 2.85578E+00 | 1.36144E+04 | 1.29627E+01 | 2.67967E-03 | 3.90311E-01 |
| STD | 2.62287E-04 | 8.16600E+00 | 1.34161E+05 | 9.12450E-06 | 1.71413E+00 | 9.85001E+03 | 1.61999E+02 | 2.76955E-02 | 2.65655E-01 |
| IQR | 1.44051E-04 | 9.29239E+00 | 5.05273E+03 | 1.47588E-05 | 2.33102E+00 | 8.67457E+03 | 2.23950E+02 | 1.26027E-02 | 3.34857E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.49795E-05 | 6.36854E+00 | 9.97536E+03 | 8.96098E-06 | 2.92306E+00 | 1.41753E+04 | 1.00339E+01 | 9.60039E-04 | 9.95037E-02 |
| MEDIAN | 1.49998E-05 | 6.37041E+00 | 1.00019E+04 | 8.96101E-06 | 2.92307E+00 | 1.41753E+04 | 1.00025E+01 | 9.59996E-04 | 9.95037E-02 |
| STD | 1.44843E-07 | 1.33906E-02 | 1.89741E+02 | 1.76253E-10 | 1.03160E-04 | 1.40774E-01 | 2.24315E-01 | 3.09387E-07 | 1.68034E-09 |
| IQR | 1.45000E-13 | 1.35000E-08 | 2.20000E-04 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 2.00000E-07 | 3.00000E-13 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.96545E-04 | 1.91264E+01 | 4.50294E+05 | 6.73083E-06 | 3.11462E+00 | 1.44364E+04 | 2.73896E+02 | 4.28324E-02 | 3.72144E-01 |
| MEDIAN | 3.93736E-04 | 3.00000E+01 | 6.26289E+02 | 6.46051E-06 | 1.83190E+00 | 1.27767E+04 | 4.06458E+02 | 5.33325E-02 | 3.85700E-01 |
| STD | 4.91736E-04 | 1.25858E+01 | 5.01487E+05 | 7.61651E-06 | 5.71557E+00 | 9.27566E+03 | 2.51077E+02 | 3.94865E-02 | 2.22745E-01 |
| IQR | 1.00000E-03 | 2.45495E+01 | 9.99990E+05 | 7.18939E-06 | 2.05427E+00 | 2.47101E+03 | 4.96305E+02 | 6.45831E-02 | 1.50075E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 9.42349E-06 | 5.29024E+00 | 4.56409E+04 | 8.85416E-06 | 2.89893E+00 | 1.41009E+04 | 2.95165E+01 | 1.03031E-03 | 1.03602E-01 |
| MEDIAN | 4.06721E-06 | 4.99484E+00 | 2.15019E+03 | 8.96174E-06 | 2.92351E+00 | 1.41640E+04 | 2.09875E+01 | 1.03297E-03 | 9.97036E-02 |
| STD | 9.97079E-06 | 1.37877E+00 | 1.50209E+05 | 6.34878E-07 | 1.40577E-01 | 3.50896E+02 | 3.18446E+01 | 6.87619E-05 | 1.39971E-02 |
| IQR | 1.70485E-05 | 2.48413E+00 | 1.00581E+04 | 1.15569E-07 | 5.21455E-02 | 8.11628E+01 | 4.12794E+01 | 9.07897E-05 | 1.38672E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.14398E-04 | 1.13257E+01 | 4.95872E+04 | 1.32313E-05 | 4.09783E+00 | 1.71151E+04 | 4.73098E+01 | 1.38167E-02 | 8.18085E-01 |
| MEDIAN | 4.64450E-05 | 8.71622E+00 | 8.29500E+02 | 1.14849E-05 | 4.22265E+00 | 1.40675E+04 | 6.47950E+00 | 3.14781E-03 | 7.88469E-01 |
| STD | 2.85623E-04 | 7.27020E+00 | 1.37358E+05 | 1.04956E-05 | 2.02014E+00 | 1.02917E+04 | 9.73633E+01 | 2.06994E-02 | 3.51104E-01 |
| IQR | 3.31054E-04 | 1.15029E+01 | 2.90738E+04 | 1.70564E-05 | 3.35400E+00 | 1.04869E+04 | 2.36857E+01 | 1.53414E-02 | 5.49263E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 6.97328E-05 | 1.11960E+01 | 3.53652E+04 | 3.24448E-05 | 6.99158E+00 | 1.39565E+04 | 1.20903E+02 | 2.02108E-02 | 7.63030E-01 |
| MEDIAN | 4.83914E-07 | 5.40878E+00 | 2.85860E+02 | 7.14148E-06 | 4.64963E+00 | 8.24641E+03 | 8.38115E+00 | 7.48303E-03 | 7.72851E-01 |
| STD | 1.73519E-04 | 1.02970E+01 | 1.47089E+05 | 8.29188E-05 | 7.83605E+00 | 1.43488E+04 | 2.04252E+02 | 2.29392E-02 | 3.27747E-01 |
| IQR | 3.03647E-05 | 1.84023E+01 | 4.76218E+03 | 2.75607E-05 | 5.16022E+00 | 8.11209E+03 | 1.42647E+02 | 2.78367E-02 | 4.84035E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.49032E-04 | 1.44168E+01 | 1.85295E+05 | 2.74796E-04 | 9.56700E+00 | 2.60700E+04 | 1.87729E+02 | 2.08770E-02 | 5.30129E-01 |
| MEDIAN | 4.09507E-05 | 8.93518E+00 | 5.11516E+02 | 1.47994E-05 | 5.62832E+00 | 1.43077E+04 | 2.18000E+01 | 5.06958E-03 | 4.31416E-01 |
| STD | 4.90289E-04 | 1.06173E+01 | 3.68325E+05 | 1.40060E-03 | 9.90648E+00 | 1.93858E+04 | 2.42860E+02 | 3.19845E-02 | 2.44593E-01 |
| IQR | 9.99991E-04 | 2.02686E+01 | 3.31672E+04 | 2.48264E-05 | 1.35909E+01 | 3.90139E+04 | 3.84579E+02 | 1.75534E-02 | 3.97857E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.20155E-04 | 1.11588E+01 | 4.54647E+04 | 1.39193E-05 | 3.35375E+00 | 1.85707E+04 | 1.43130E+02 | 1.81508E-02 | 4.63896E-01 |
| MEDIAN | 1.26821E-05 | 7.49752E+00 | 3.58915E+02 | 7.11711E-06 | 1.90408E+00 | 1.19046E+04 | 4.99410E+01 | 4.23071E-03 | 4.19885E-01 |
| STD | 3.27795E-04 | 8.79605E+00 | 1.95860E+05 | 2.06209E-05 | 3.08596E+00 | 1.40779E+04 | 1.64633E+02 | 2.56551E-02 | 2.32534E-01 |
| IQR | 4.03710E-04 | 1.07669E+01 | 1.11765E+03 | 1.81979E-05 | 3.84336E+00 | 8.32636E+03 | 2.54327E+02 | 2.11628E-02 | 3.14131E-01 |
|  |  |  |  |  | ***T* = 270 K** |  |  |  |  |
| true value | 1.50000E-05 | 6.13450E+00 | 1.00000E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 2.00000E+01 | 9.70000E-04 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.97827E-05 | 6.46318E+00 | 1.47957E+04 | 1.60419E-05 | 2.40776E+00 | 8.07538E+03 | 7.98556E+01 | 1.14786E-03 | 2.22913E-01 |
| MEDIAN | 5.77314E-06 | 5.29869E+00 | 2.38569E+03 | 1.56412E-05 | 2.38705E+00 | 7.93938E+03 | 4.24117E+01 | 1.09825E-03 | 1.94071E-01 |
| STD | 1.11777E-04 | 4.47231E+00 | 6.33642E+04 | 4.08053E-06 | 5.99120E-01 | 9.05848E+02 | 8.63818E+01 | 1.81649E-04 | 9.77005E-02 |
| IQR | 2.76233E-05 | 4.99615E+00 | 5.31820E+03 | 5.17515E-06 | 8.98643E-01 | 1.07949E+03 | 1.04027E+02 | 2.48342E-04 | 1.54062E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.20138E-05 | 4.98071E+00 | 3.38125E+04 | 1.57012E-05 | 2.47307E+00 | 8.03848E+03 | 1.04170E+02 | 1.73934E-03 | 1.36977E-01 |
| MEDIAN | 1.01808E-05 | 5.66058E+00 | 7.25031E+03 | 1.71043E-05 | 2.73316E+00 | 8.29864E+03 | 6.89136E+01 | 9.73795E-04 | 1.01068E-01 |
| STD | 1.60470E-05 | 1.92840E+00 | 1.12391E+05 | 2.60446E-06 | 4.99355E-01 | 4.76023E+02 | 1.05545E+02 | 4.74130E-03 | 7.59595E-02 |
| IQR | 1.46272E-05 | 2.85879E+00 | 8.20152E+03 | 4.16504E-06 | 8.06062E-01 | 7.87928E+02 | 1.38323E+02 | 1.21335E-04 | 4.13082E-02 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50038E-05 | 6.13482E+00 | 1.00067E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 1.99953E+01 | 9.69990E-04 | 9.95037E-02 |
| MEDIAN | 1.50041E-05 | 6.13485E+00 | 1.00072E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 1.99947E+01 | 9.69989E-04 | 9.95037E-02 |
| STD | 2.58165E-09 | 2.27269E-04 | 3.34077E+00 | 5.03827E-12 | 2.93864E-06 | 2.37866E-03 | 4.38562E-03 | 4.30177E-09 | 2.80056E-12 |
| IQR | 1.15000E-13 | 9.50000E-09 | 1.65000E-04 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 1.45000E-07 | 2.00000E-13 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.60465E-05 | 7.52609E+00 | 4.39246E+04 | 1.72948E-05 | 2.78308E+00 | 8.80209E+03 | 1.01459E+02 | 4.81775E-03 | 3.23871E-01 |
| MEDIAN | 7.62416E-06 | 5.53708E+00 | 4.46543E+03 | 1.73249E-05 | 2.84084E+00 | 8.34608E+03 | 4.09988E+01 | 9.94233E-04 | 9.95174E-02 |
| STD | 1.37707E-04 | 6.43194E+00 | 1.86180E+05 | 1.10173E-05 | 1.24892E+00 | 3.93863E+03 | 1.23126E+02 | 1.04508E-02 | 3.19557E-01 |
| IQR | 1.01408E-05 | 1.26505E+00 | 6.36841E+03 | 3.40922E-07 | 3.80923E-01 | 3.04136E+02 | 7.78842E+01 | 1.56030E-03 | 4.32743E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.35160E-05 | 1.13300E+01 | 1.90230E+03 | 1.52458E-05 | 1.83437E+00 | 8.14462E+03 | 1.71108E+02 | 6.46840E-03 | 4.09273E-01 |
| MEDIAN | 2.71136E-06 | 6.75135E+00 | 4.44996E+02 | 1.28359E-05 | 1.49147E+00 | 7.32573E+03 | 1.10384E+02 | 1.51852E-03 | 4.53471E-01 |
| STD | 1.77793E-04 | 8.72640E+00 | 6.86129E+03 | 8.14470E-06 | 8.54012E-01 | 2.87251E+03 | 1.63207E+02 | 1.15945E-02 | 1.19907E-01 |
| IQR | 3.74323E-05 | 1.16597E+01 | 4.56164E+02 | 3.63794E-06 | 8.02846E-01 | 7.22304E+02 | 2.89850E+02 | 1.58740E-03 | 1.09724E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.42920E-05 | 6.14136E+00 | 1.03102E+04 | 1.72507E-05 | 2.82232E+00 | 8.33313E+03 | 2.88516E+01 | 2.91144E-03 | 1.06683E-01 |
| MEDIAN | 1.50041E-05 | 6.13485E+00 | 1.00072E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 1.99947E+01 | 9.69989E-04 | 9.95037E-02 |
| STD | 1.37902E-04 | 1.08243E-01 | 5.07984E+03 | 6.99104E-07 | 2.10329E-01 | 1.63655E+02 | 6.26792E+01 | 1.38641E-02 | 5.12710E-02 |
| IQR | 1.65000E-13 | 1.45000E-08 | 2.10000E-04 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 2.80000E-07 | 3.00000E-13 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.21297E-04 | 1.02327E+01 | 5.82929E+04 | 2.63430E-05 | 3.18704E+00 | 1.50645E+04 | 1.82996E+02 | 1.79608E-02 | 5.37131E-01 |
| MEDIAN | 4.36767E-05 | 7.24878E+00 | 6.00680E+02 | 1.74105E-05 | 2.17765E+00 | 7.65899E+03 | 3.58986E+01 | 3.30988E-03 | 4.68831E-01 |
| STD | 3.29794E-04 | 7.75064E+00 | 1.71753E+05 | 2.14681E-05 | 2.49472E+00 | 1.31466E+04 | 2.04525E+02 | 2.51704E-02 | 2.56434E-01 |
| IQR | 3.04017E-04 | 1.37737E+01 | 1.12995E+04 | 3.81661E-05 | 4.72482E+00 | 1.19406E+04 | 3.96259E+02 | 2.55133E-02 | 3.08822E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50041E-05 | 6.13485E+00 | 1.00072E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 1.99947E+01 | 9.69989E-04 | 9.95037E-02 |
| MEDIAN | 1.50041E-05 | 6.13485E+00 | 1.00072E+04 | 1.73488E-05 | 2.85185E+00 | 8.35610E+03 | 1.99947E+01 | 9.69989E-04 | 9.95037E-02 |
| STD | 7.11701E-14 | 6.30226E-09 | 9.65869E-05 | 1.02655E-20 | 4.48508E-16 | 9.18545E-12 | 1.22443E-07 | 1.29342E-13 | 0.00000E+00 |
| IQR | 1.00000E-13 | 9.00000E-09 | 1.25000E-04 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 1.85000E-07 | 1.50000E-13 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.42121E-04 | 1.73060E+01 | 4.04042E+05 | 2.21554E-04 | 1.81735E+00 | 1.15906E+04 | 3.66525E+02 | 5.55091E-02 | 4.57577E-01 |
| MEDIAN | 7.65571E-04 | 1.03874E+01 | 5.01498E+01 | 1.23559E-05 | 1.34967E+00 | 7.18728E+03 | 4.67262E+02 | 5.94252E-02 | 4.65652E-01 |
| STD | 4.73026E-04 | 1.25113E+01 | 4.90627E+05 | 1.39832E-03 | 1.84670E+00 | 1.42994E+04 | 2.48536E+02 | 4.03759E-02 | 1.56622E-01 |
| IQR | 1.00000E-03 | 2.44417E+01 | 9.99990E+05 | 7.56079E-06 | 1.03118E+00 | 8.23241E+02 | 3.67990E+02 | 9.82999E-02 | 8.89681E-02 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.34436E-05 | 5.56862E+00 | 7.06023E+04 | 1.72620E-05 | 2.85474E+00 | 8.33257E+03 | 2.57141E+01 | 1.01548E-03 | 1.04705E-01 |
| MEDIAN | 8.14670E-06 | 5.43119E+00 | 3.84502E+03 | 1.73289E-05 | 2.85875E+00 | 8.35131E+03 | 5.99943E+00 | 9.95066E-04 | 9.97465E-02 |
| STD | 1.27047E-05 | 1.41515E+00 | 1.75091E+05 | 8.14931E-07 | 1.31050E-01 | 1.78679E+02 | 3.22800E+01 | 9.14166E-05 | 2.34925E-02 |
| IQR | 2.05442E-05 | 2.30946E+00 | 2.69783E+04 | 2.64758E-07 | 8.27546E-02 | 7.15931E+01 | 4.59218E+01 | 6.75688E-05 | 6.59079E-04 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.28542E-04 | 8.84677E+00 | 5.20611E+04 | 3.69271E-05 | 5.46702E+00 | 1.50917E+04 | 6.69038E+01 | 1.61026E-02 | 7.96817E-01 |
| MEDIAN | 6.51884E-05 | 7.58798E+00 | 1.83515E+03 | 3.69600E-05 | 5.95693E+00 | 1.01392E+04 | 2.54027E+01 | 5.61353E-03 | 7.96935E-01 |
| STD | 2.94528E-04 | 5.73257E+00 | 1.37975E+05 | 2.35718E-05 | 2.67474E+00 | 1.14491E+04 | 1.03287E+02 | 2.05783E-02 | 3.65124E-01 |
| IQR | 3.44632E-04 | 5.30328E+00 | 2.35572E+04 | 4.36206E-05 | 4.77947E+00 | 1.34149E+04 | 9.05064E+01 | 2.15636E-02 | 6.73399E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.33163E-04 | 1.18191E+01 | 1.34310E+05 | 3.42653E-05 | 7.99323E+00 | 8.49075E+03 | 1.34474E+02 | 2.18238E-02 | 6.45683E-01 |
| MEDIAN | 1.80058E-06 | 9.75274E+00 | 3.66720E+02 | 9.51081E-06 | 5.34996E+00 | 3.74761E+03 | 4.70315E+00 | 7.83039E-03 | 6.02627E-01 |
| STD | 2.67511E-04 | 8.74011E+00 | 2.82548E+05 | 7.36358E-05 | 8.15039E+00 | 1.25501E+04 | 2.14004E+02 | 2.78684E-02 | 3.64232E-01 |
| IQR | 1.21611E-04 | 1.40399E+01 | 7.06111E+04 | 3.55724E-05 | 8.30687E+00 | 5.76668E+03 | 2.43160E+02 | 2.34230E-02 | 4.50381E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.93696E-04 | 1.55911E+01 | 1.09481E+05 | 6.65485E-04 | 9.65336E+00 | 2.68805E+04 | 1.94785E+02 | 2.85699E-02 | 6.35434E-01 |
| MEDIAN | 4.35791E-07 | 1.54541E+01 | 2.42849E+02 | 5.98460E-05 | 6.62586E+00 | 1.70441E+04 | 1.40753E+01 | 1.75843E-02 | 6.05750E-01 |
| STD | 4.77009E-04 | 1.16298E+01 | 2.88059E+05 | 2.36125E-03 | 9.53654E+00 | 2.20374E+04 | 2.58012E+02 | 3.27865E-02 | 2.98087E-01 |
| IQR | 1.00000E-03 | 2.47268E+01 | 1.68690E+03 | 5.32964E-05 | 6.52389E+00 | 4.28198E+04 | 3.88437E+02 | 4.24920E-02 | 3.42745E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.16269E-04 | 9.40052E+00 | 5.15084E+03 | 2.29466E-05 | 3.64496E+00 | 1.32663E+04 | 1.65863E+02 | 2.69972E-02 | 7.00965E-01 |
| MEDIAN | 9.75714E-06 | 7.18348E+00 | 1.81856E+02 | 1.20356E-05 | 3.41832E+00 | 6.57734E+03 | 1.20930E+02 | 1.17396E-02 | 7.09785E-01 |
| STD | 3.51729E-04 | 7.77397E+00 | 1.77662E+04 | 2.79248E-05 | 2.69874E+00 | 1.44664E+04 | 1.70058E+02 | 3.05017E-02 | 2.85715E-01 |
| IQR | 2.91627E-04 | 9.53794E+00 | 9.84394E+02 | 3.08470E-05 | 3.24640E+00 | 6.24479E+03 | 1.93044E+02 | 4.65641E-02 | 5.01708E-01 |
|  |  |  |  |  | ***T* = 280 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.91541E+00 | 1.00000E+04 | 3.20396E-05 | 2.78571E+00 | 5.11528E+03 | 3.00000E+01 | 9.80000E-04 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.03971E-05 | 6.47375E+00 | 3.43403E+04 | 3.19652E-05 | 2.43732E+00 | 5.16621E+03 | 7.48714E+01 | 1.16245E-03 | 2.69919E-01 |
| MEDIAN | 1.05665E-05 | 5.55661E+00 | 2.33187E+03 | 3.00393E-05 | 2.24036E+00 | 4.86298E+03 | 3.35295E+01 | 1.11319E-03 | 2.40187E-01 |
| STD | 7.82385E-05 | 3.76377E+00 | 1.02886E+05 | 1.19898E-05 | 9.93911E-01 | 1.35207E+03 | 8.65413E+01 | 2.04066E-04 | 1.41998E-01 |
| IQR | 3.80577E-05 | 4.53467E+00 | 7.58220E+03 | 1.19566E-05 | 1.26054E+00 | 9.83531E+02 | 1.22586E+02 | 2.28513E-04 | 2.65492E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.18545E-05 | 5.14036E+00 | 8.00183E+03 | 3.04040E-05 | 2.56009E+00 | 4.98407E+03 | 7.10561E+01 | 1.03308E-03 | 1.22161E-01 |
| MEDIAN | 1.50050E-05 | 5.91584E+00 | 9.18706E+03 | 3.20374E-05 | 2.78327E+00 | 5.11486E+03 | 2.99905E+01 | 9.80532E-04 | 9.95039E-02 |
| STD | 1.20503E-05 | 1.57676E+00 | 1.06627E+04 | 3.89328E-06 | 4.69538E-01 | 2.80340E+02 | 7.51483E+01 | 1.06631E-04 | 5.98735E-02 |
| IQR | 1.34067E-05 | 2.02795E+00 | 7.81235E+03 | 2.27881E-06 | 2.81145E-01 | 2.05100E+02 | 7.09991E+01 | 6.26323E-05 | 5.74356E-03 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50050E-05 | 5.91584E+00 | 1.00056E+04 | 3.20396E-05 | 2.78572E+00 | 5.11528E+03 | 2.99905E+01 | 9.79994E-04 | 9.95037E-02 |
| MEDIAN | 1.50050E-05 | 5.91584E+00 | 1.00056E+04 | 3.20396E-05 | 2.78572E+00 | 5.11528E+03 | 2.99905E+01 | 9.79994E-04 | 9.95037E-02 |
| STD | 4.68791E-14 | 4.08594E-09 | 5.84150E-05 | 4.15390E-15 | 1.96039E-10 | 1.96039E-07 | 9.17494E-08 | 7.99019E-14 | 0.00000E+00 |
| IQR | 6.50000E-14 | 6.00000E-09 | 8.50000E-05 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 1.25000E-07 | 1.50000E-13 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.77117E-05 | 8.69583E+00 | 5.56285E+04 | 5.33777E-05 | 3.87503E+00 | 1.31572E+04 | 8.64157E+01 | 3.21307E-03 | 4.11828E-01 |
| MEDIAN | 1.05499E-05 | 5.72903E+00 | 4.33185E+03 | 3.20377E-05 | 2.78288E+00 | 5.11362E+03 | 3.69645E+01 | 1.01834E-03 | 1.01189E-01 |
| STD | 8.06873E-05 | 7.83219E+00 | 1.96568E+05 | 3.96424E-05 | 2.47164E+00 | 1.51291E+04 | 9.27014E+01 | 6.11367E-03 | 3.61927E-01 |
| IQR | 1.36463E-05 | 2.84525E+00 | 8.39135E+03 | 5.06552E-05 | 1.58487E+00 | 9.24994E+03 | 8.21456E+01 | 1.12110E-03 | 6.09675E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.05079E-04 | 9.48064E+00 | 1.00918E+04 | 3.74310E-05 | 2.17608E+00 | 7.21156E+03 | 2.01627E+02 | 9.75615E-03 | 4.43772E-01 |
| MEDIAN | 8.08438E-06 | 5.85840E+00 | 4.74797E+02 | 2.57093E-05 | 1.36866E+00 | 4.37556E+03 | 1.47165E+02 | 1.52239E-03 | 5.30317E-01 |
| STD | 2.37915E-04 | 7.78150E+00 | 4.30445E+04 | 2.39975E-05 | 1.76970E+00 | 7.87100E+03 | 1.93659E+02 | 1.67765E-02 | 1.98345E-01 |
| IQR | 3.18799E-05 | 1.00038E+01 | 1.25100E+03 | 1.56437E-05 | 2.30682E+00 | 1.44114E+03 | 3.72880E+02 | 5.68043E-03 | 3.13886E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.57491E-05 | 5.96851E+00 | 5.39360E+04 | 3.20421E-05 | 2.78672E+00 | 5.11587E+03 | 2.89571E+01 | 9.79193E-04 | 9.95041E-02 |
| MEDIAN | 1.50050E-05 | 5.91584E+00 | 1.00056E+04 | 3.20396E-05 | 2.78572E+00 | 5.11528E+03 | 2.99905E+01 | 9.79994E-04 | 9.95037E-02 |
| STD | 2.73367E-06 | 2.03931E-01 | 1.90143E+05 | 1.22930E-08 | 4.46177E-03 | 2.55500E+00 | 4.17713E+00 | 3.26380E-06 | 1.12462E-06 |
| IQR | 1.35000E-13 | 1.10000E-08 | 1.70000E-04 | 1.00000E-14 | 0.00000E+00 | 0.00000E+00 | 2.45000E-07 | 2.00000E-13 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.33014E-04 | 9.91098E+00 | 1.75797E+04 | 6.13097E-05 | 4.42251E+00 | 1.28409E+04 | 1.39907E+02 | 1.96162E-02 | 7.08323E-01 |
| MEDIAN | 2.95516E-06 | 6.77589E+00 | 3.38128E+02 | 6.45502E-05 | 3.81116E+00 | 7.51306E+03 | 2.34557E+01 | 2.75168E-03 | 6.79184E-01 |
| STD | 2.77360E-04 | 7.83704E+00 | 5.05155E+04 | 3.90846E-05 | 3.18270E+00 | 1.30797E+04 | 1.77222E+02 | 2.83219E-02 | 2.64995E-01 |
| IQR | 7.16887E-05 | 1.22921E+01 | 1.49611E+03 | 7.08709E-05 | 5.29957E+00 | 1.13359E+04 | 2.57643E+02 | 2.71988E-02 | 3.56115E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50050E-05 | 5.91584E+00 | 1.00056E+04 | 3.20396E-05 | 2.78572E+00 | 5.11528E+03 | 2.99905E+01 | 9.79994E-04 | 9.95037E-02 |
| MEDIAN | 1.50050E-05 | 5.91584E+00 | 1.00056E+04 | 3.20396E-05 | 2.78572E+00 | 5.11528E+03 | 2.99905E+01 | 9.79994E-04 | 9.95037E-02 |
| STD | 6.79313E-14 | 5.71795E-09 | 8.35703E-05 | 4.28403E-15 | 1.96039E-10 | 2.37635E-07 | 1.24334E-07 | 1.13863E-13 | 0.00000E+00 |
| IQR | 1.10000E-13 | 9.00000E-09 | 1.35000E-04 | 4.99999E-15 | 0.00000E+00 | 0.00000E+00 | 2.25000E-07 | 2.00000E-13 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.90580E-04 | 1.76613E+01 | 4.91086E+05 | 4.20596E-05 | 2.29212E+00 | 9.41958E+03 | 2.84719E+02 | 3.41257E-02 | 4.34537E-01 |
| MEDIAN | 3.74885E-04 | 1.53835E+01 | 2.13639E+04 | 2.38043E-05 | 8.18861E-01 | 4.11017E+03 | 3.23952E+02 | 2.60703E-03 | 5.18227E-01 |
| STD | 4.72548E-04 | 1.22030E+01 | 5.03958E+05 | 7.40977E-05 | 4.49178E+00 | 1.49906E+04 | 2.64010E+02 | 3.85989E-02 | 2.10950E-01 |
| IQR | 1.00000E-03 | 2.37458E+01 | 9.99990E+05 | 7.19490E-06 | 1.32207E+00 | 4.12745E+02 | 5.18089E+02 | 6.16710E-02 | 2.58364E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.19277E-05 | 5.45879E+00 | 1.63419E+04 | 3.23995E-05 | 2.84490E+00 | 5.15540E+03 | 2.64533E+01 | 1.00538E-03 | 1.00681E-01 |
| MEDIAN | 9.05189E-06 | 5.39475E+00 | 4.01672E+03 | 3.23243E-05 | 2.84374E+00 | 5.14506E+03 | 2.20458E+01 | 1.00048E-03 | 9.96693E-02 |
| STD | 8.87445E-06 | 9.19306E-01 | 3.71416E+04 | 9.63524E-07 | 1.17815E-01 | 8.07806E+01 | 2.35787E+01 | 2.82317E-05 | 2.17705E-03 |
| IQR | 1.17422E-05 | 1.28966E+00 | 4.70664E+03 | 7.86839E-07 | 1.18051E-01 | 8.54310E+01 | 4.03945E+01 | 3.36021E-05 | 9.82662E-04 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.83766E-04 | 9.86647E+00 | 4.69925E+04 | 7.03646E-05 | 6.07375E+00 | 1.25942E+04 | 5.42215E+01 | 1.47866E-02 | 8.75664E-01 |
| MEDIAN | 5.47205E-05 | 8.41675E+00 | 7.75965E+02 | 6.50218E-05 | 6.57588E+00 | 8.94831E+03 | 8.57698E+00 | 4.47212E-03 | 8.50597E-01 |
| STD | 2.51264E-04 | 6.52144E+00 | 9.88665E+04 | 5.30048E-05 | 3.61334E+00 | 1.15304E+04 | 9.58071E+01 | 2.33692E-02 | 3.68388E-01 |
| IQR | 2.53087E-04 | 8.90420E+00 | 2.90583E+04 | 9.40261E-05 | 6.41914E+00 | 1.18267E+04 | 5.34118E+01 | 1.22838E-02 | 4.41164E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.78895E-05 | 1.14990E+01 | 2.67358E+04 | 9.98624E-05 | 9.76851E+00 | 7.62042E+03 | 8.55876E+01 | 1.72191E-02 | 6.43180E-01 |
| MEDIAN | 8.59411E-07 | 6.50432E+00 | 3.25105E+02 | 1.66778E-05 | 4.73042E+00 | 3.19642E+03 | 1.17920E+01 | 7.07644E-03 | 3.43187E-01 |
| STD | 2.21259E-04 | 1.01545E+01 | 9.73571E+04 | 1.79068E-04 | 9.59993E+00 | 1.23248E+04 | 1.37935E+02 | 2.05363E-02 | 4.44218E-01 |
| IQR | 2.08350E-05 | 1.55855E+01 | 1.79409E+03 | 1.03583E-04 | 1.19909E+01 | 2.63282E+03 | 9.10212E+01 | 1.87243E-02 | 7.10095E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.85449E-04 | 1.39379E+01 | 2.70838E+05 | 8.46368E-04 | 9.62326E+00 | 1.74583E+04 | 2.02366E+02 | 2.14748E-02 | 5.27628E-01 |
| MEDIAN | 2.19171E-06 | 8.88450E+00 | 1.00137E+03 | 3.09983E-05 | 5.84803E+00 | 4.23165E+03 | 1.00462E+02 | 4.83641E-03 | 4.81295E-01 |
| STD | 4.74388E-04 | 1.12526E+01 | 4.19853E+05 | 2.68209E-03 | 9.67793E+00 | 2.13337E+04 | 2.37390E+02 | 3.15758E-02 | 3.13645E-01 |
| IQR | 1.00000E-03 | 2.48353E+01 | 4.37554E+05 | 1.03505E-04 | 1.37793E+01 | 4.70393E+04 | 3.85010E+02 | 2.62552E-02 | 3.94971E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.44647E-04 | 8.49699E+00 | 2.25207E+04 | 8.06690E-05 | 5.87753E+00 | 1.55260E+04 | 1.21233E+02 | 2.13644E-02 | 7.02521E-01 |
| MEDIAN | 2.07544E-05 | 5.55207E+00 | 3.49887E+02 | 2.88009E-05 | 3.97374E+00 | 4.18031E+03 | 3.14306E+01 | 1.25676E-02 | 6.55868E-01 |
| STD | 2.67028E-04 | 7.05764E+00 | 1.39847E+05 | 1.26299E-04 | 6.35493E+00 | 1.97252E+04 | 1.69308E+02 | 2.68815E-02 | 3.07217E-01 |
| IQR | 1.14146E-04 | 6.32558E+00 | 1.55561E+03 | 9.78762E-05 | 7.21343E+00 | 1.76767E+04 | 1.56014E+02 | 2.90273E-02 | 4.14570E-01 |
|  |  |  |  |  | ***T* = 290 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.71143E+00 | 1.00000E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 4.00000E+01 | 9.90000E-04 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.46159E-05 | 6.09216E+00 | 2.19158E+04 | 6.71648E-05 | 2.50783E+00 | 4.83207E+03 | 8.12931E+01 | 1.90810E-03 | 3.32500E-01 |
| MEDIAN | 6.48195E-06 | 5.11255E+00 | 1.13697E+03 | 5.54289E-05 | 1.99172E+00 | 3.10085E+03 | 3.25107E+01 | 1.15795E-03 | 3.30132E-01 |
| STD | 7.76808E-05 | 3.80964E+00 | 9.53276E+04 | 3.25963E-05 | 1.60899E+00 | 7.24854E+03 | 1.03942E+02 | 5.16092E-03 | 1.65294E-01 |
| IQR | 1.83053E-05 | 3.87415E+00 | 2.30838E+03 | 2.73442E-05 | 1.84917E+00 | 9.81403E+02 | 1.28220E+02 | 1.95082E-04 | 2.54569E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.30826E-05 | 4.85036E+00 | 1.48021E+04 | 5.33603E-05 | 2.40127E+00 | 3.10172E+03 | 8.61806E+01 | 1.05495E-03 | 1.38395E-01 |
| MEDIAN | 1.39459E-05 | 5.62019E+00 | 5.60258E+03 | 5.66979E-05 | 2.71612E+00 | 3.23758E+03 | 4.22780E+01 | 9.99182E-04 | 9.97064E-02 |
| STD | 2.41108E-05 | 2.18769E+00 | 4.26434E+04 | 6.94163E-06 | 5.83161E-01 | 2.39924E+02 | 8.03303E+01 | 8.83941E-05 | 9.92945E-02 |
| IQR | 1.44295E-05 | 2.39489E+00 | 8.52726E+03 | 6.87811E-06 | 5.03367E-01 | 2.53025E+02 | 7.17242E+01 | 1.17236E-04 | 1.23223E-02 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50007E-05 | 5.71149E+00 | 1.00012E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 3.99991E+01 | 9.89998E-04 | 9.95037E-02 |
| MEDIAN | 1.50007E-05 | 5.71149E+00 | 1.00012E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 3.99991E+01 | 9.89998E-04 | 9.95037E-02 |
| STD | 3.39977E-14 | 2.89381E-09 | 3.79566E-05 | 4.40143E-15 | 3.25396E-10 | 3.21491E-12 | 7.17403E-08 | 5.82759E-14 | 0.00000E+00 |
| IQR | 4.50000E-14 | 4.50000E-09 | 5.00000E-05 | 5.00000E-15 | 0.00000E+00 | 0.00000E+00 | 1.10000E-07 | 1.00000E-13 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.58693E-05 | 5.93582E+00 | 3.26967E+04 | 9.19756E-05 | 4.06791E+00 | 9.83853E+03 | 8.59774E+01 | 4.75296E-03 | 3.98666E-01 |
| MEDIAN | 1.02402E-05 | 5.51328E+00 | 7.23087E+03 | 5.67175E-05 | 2.72357E+00 | 3.23868E+03 | 4.09017E+01 | 1.00029E-03 | 1.02070E-01 |
| STD | 5.46032E-05 | 4.99782E+00 | 1.43416E+05 | 8.80024E-05 | 3.93737E+00 | 1.44569E+04 | 1.06084E+02 | 1.20467E-02 | 3.66697E-01 |
| IQR | 1.44796E-05 | 1.81800E+00 | 9.63269E+03 | 4.18079E-05 | 9.82699E-01 | 2.05120E+03 | 3.58207E+01 | 1.54216E-03 | 5.76480E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 7.01581E-05 | 1.07377E+01 | 7.75671E+03 | 7.08918E-05 | 2.18311E+00 | 4.67703E+03 | 1.36832E+02 | 3.57349E-03 | 4.84575E-01 |
| MEDIAN | 1.15925E-05 | 7.28004E+00 | 6.40583E+02 | 5.04565E-05 | 1.19481E+00 | 2.71026E+03 | 3.48521E+01 | 1.18108E-03 | 5.20898E-01 |
| STD | 1.56622E-04 | 8.52624E+00 | 2.91632E+04 | 5.91263E-05 | 2.99809E+00 | 6.50252E+03 | 1.59505E+02 | 7.09046E-03 | 2.25041E-01 |
| IQR | 7.31985E-05 | 1.12969E+01 | 9.98146E+02 | 3.85287E-05 | 2.23323E+00 | 1.51067E+03 | 2.31349E+02 | 1.38120E-03 | 3.80873E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.54137E-05 | 5.73941E+00 | 2.55179E+04 | 5.67237E-05 | 2.72523E+00 | 3.23963E+03 | 3.93612E+01 | 9.89632E-04 | 9.95041E-02 |
| MEDIAN | 1.50007E-05 | 5.71149E+00 | 1.00012E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 3.99991E+01 | 9.89998E-04 | 9.95037E-02 |
| STD | 2.18704E-06 | 1.57524E-01 | 1.00694E+05 | 1.88543E-08 | 6.14267E-03 | 2.47913E+00 | 3.69459E+00 | 2.23989E-06 | 1.70469E-06 |
| IQR | 5.50000E-14 | 5.00000E-09 | 6.00000E-05 | 1.00000E-14 | 1.00000E-09 | 0.00000E+00 | 1.45000E-07 | 1.00000E-13 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.66251E-04 | 1.09387E+01 | 1.30215E+04 | 1.26431E-04 | 5.70596E+00 | 1.15678E+04 | 1.21993E+02 | 1.80467E-02 | 7.97421E-01 |
| MEDIAN | 2.96412E-05 | 6.50236E+00 | 5.39677E+02 | 1.20935E-04 | 4.70210E+00 | 5.70257E+03 | 2.35265E+01 | 4.30726E-03 | 8.63220E-01 |
| STD | 2.69063E-04 | 8.93296E+00 | 3.44522E+04 | 8.21815E-05 | 4.62093E+00 | 1.38655E+04 | 1.78454E+02 | 2.60908E-02 | 2.69993E-01 |
| IQR | 2.53190E-04 | 1.52243E+01 | 2.25961E+03 | 1.49658E-04 | 8.61052E+00 | 8.73759E+03 | 1.66739E+02 | 2.42244E-02 | 3.11135E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50007E-05 | 5.71149E+00 | 1.00012E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 3.99991E+01 | 9.89998E-04 | 9.95037E-02 |
| MEDIAN | 1.50007E-05 | 5.71149E+00 | 1.00012E+04 | 5.67193E-05 | 2.72414E+00 | 3.23917E+03 | 3.99991E+01 | 9.89998E-04 | 9.95037E-02 |
| STD | 4.68347E-14 | 3.89338E-09 | 5.26118E-05 | 4.40143E-15 | 3.47540E-10 | 3.21491E-12 | 1.00269E-07 | 6.72718E-14 | 0.00000E+00 |
| IQR | 7.50000E-14 | 6.00000E-09 | 7.00000E-05 | 5.00000E-15 | 0.00000E+00 | 0.00000E+00 | 1.60000E-07 | 1.00000E-13 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.51686E-04 | 1.67256E+01 | 3.70327E+05 | 1.20269E-04 | 2.71825E+00 | 9.83965E+03 | 3.16996E+02 | 4.33233E-02 | 5.35518E-01 |
| MEDIAN | 8.26755E-04 | 1.04606E+01 | 4.46531E+02 | 5.06697E-05 | 5.00000E-01 | 2.43531E+03 | 3.96603E+02 | 5.98563E-02 | 6.60803E-01 |
| STD | 4.75206E-04 | 1.18695E+01 | 4.85199E+05 | 1.72785E-04 | 6.04477E+00 | 1.75085E+04 | 2.61133E+02 | 3.89563E-02 | 2.63606E-01 |
| IQR | 1.00000E-03 | 2.42036E+01 | 9.99990E+05 | 3.47754E-06 | 1.65118E+00 | 5.89695E+02 | 5.39438E+02 | 6.62238E-02 | 4.55138E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.53256E-05 | 5.57217E+00 | 6.45141E+04 | 5.78551E-05 | 2.84898E+00 | 3.29560E+03 | 2.54323E+01 | 1.00624E-03 | 1.02239E-01 |
| MEDIAN | 1.19927E-05 | 5.55220E+00 | 5.46455E+03 | 5.71774E-05 | 2.84170E+00 | 3.28778E+03 | 1.58175E+01 | 1.00069E-03 | 9.99281E-02 |
| STD | 1.08122E-05 | 9.61495E-01 | 1.75253E+05 | 3.24031E-06 | 1.70219E-01 | 1.13570E+02 | 2.69828E+01 | 2.23760E-05 | 5.77843E-03 |
| IQR | 1.39318E-05 | 1.27108E+00 | 7.32249E+03 | 1.37186E-06 | 2.20054E-01 | 8.11578E+01 | 4.67049E+01 | 2.48365E-05 | 1.37587E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.88352E-04 | 1.02924E+01 | 5.06431E+04 | 1.51169E-04 | 7.41483E+00 | 1.25388E+04 | 5.27692E+01 | 1.03213E-02 | 9.01972E-01 |
| MEDIAN | 9.07772E-05 | 9.01795E+00 | 2.04181E+03 | 1.52257E-04 | 7.14392E+00 | 5.45077E+03 | 1.10823E+01 | 2.17614E-03 | 9.71728E-01 |
| STD | 2.59465E-04 | 6.07831E+00 | 1.49793E+05 | 1.04137E-04 | 4.94714E+00 | 1.27191E+04 | 9.37927E+01 | 1.70780E-02 | 3.59380E-01 |
| IQR | 2.09978E-04 | 1.01167E+01 | 1.25254E+04 | 1.60292E-04 | 8.67436E+00 | 1.91588E+04 | 5.99782E+01 | 1.11238E-02 | 5.64833E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.20655E-05 | 1.46746E+01 | 2.39911E+04 | 2.05795E-04 | 1.19841E+01 | 5.04294E+03 | 8.92972E+01 | 1.94127E-02 | 5.96072E-01 |
| MEDIAN | 9.63328E-07 | 1.23790E+01 | 2.05760E+02 | 5.51447E-05 | 1.04436E+01 | 1.31096E+03 | 1.16984E+01 | 5.67027E-03 | 3.90102E-01 |
| STD | 1.58362E-04 | 9.20329E+00 | 9.42769E+04 | 4.20445E-04 | 9.72885E+00 | 1.16526E+04 | 1.57603E+02 | 2.55543E-02 | 4.30474E-01 |
| IQR | 6.82542E-05 | 1.60415E+01 | 7.11520E+02 | 2.19951E-04 | 1.54278E+01 | 2.16621E+03 | 1.03763E+02 | 2.87548E-02 | 6.38341E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.45003E-04 | 1.31055E+01 | 2.52782E+05 | 8.63963E-04 | 1.48260E+01 | 2.25333E+04 | 1.74406E+02 | 2.75758E-02 | 5.47280E-01 |
| MEDIAN | 5.34909E-05 | 1.05113E+01 | 7.43261E+02 | 1.77091E-04 | 1.26578E+01 | 9.92153E+03 | 1.46206E+01 | 7.43876E-03 | 5.61402E-01 |
| STD | 4.83552E-04 | 9.70182E+00 | 4.11586E+05 | 2.34060E-03 | 1.02865E+01 | 2.31948E+04 | 2.28218E+02 | 3.62627E-02 | 3.43019E-01 |
| IQR | 9.99961E-04 | 1.59179E+01 | 4.78801E+05 | 5.36351E-04 | 1.90108E+01 | 4.94168E+04 | 3.41167E+02 | 3.38596E-02 | 6.10151E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.37351E-04 | 1.10534E+01 | 4.47609E+04 | 1.77288E-04 | 7.87023E+00 | 1.66819E+04 | 1.10611E+02 | 2.44292E-02 | 8.00307E-01 |
| MEDIAN | 1.99805E-05 | 7.52472E+00 | 4.43570E+02 | 6.75913E-05 | 5.60803E+00 | 2.81063E+03 | 5.08511E+01 | 5.88068E-03 | 8.05164E-01 |
| STD | 3.53358E-04 | 8.94998E+00 | 1.95926E+05 | 2.50230E-04 | 7.65259E+00 | 2.11348E+04 | 1.52380E+02 | 2.93859E-02 | 3.39355E-01 |
| IQR | 3.83407E-04 | 1.19207E+01 | 1.79089E+03 | 1.94079E-04 | 1.09393E+01 | 4.81191E+04 | 1.45186E+02 | 4.89611E-02 | 5.48539E-01 |
|  |  |  |  |  | ***T* = 300 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.52105E+00 | 1.00000E+04 | 9.66582E-05 | 2.66667E+00 | 2.11460E+03 | 5.00000E+01 | 1.00000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.51965E-05 | 5.50271E+00 | 2.99166E+04 | 1.53375E-04 | 3.42276E+00 | 6.24026E+03 | 9.19256E+01 | 1.27377E-03 | 3.23885E-01 |
| MEDIAN | 3.10794E-06 | 4.27872E+00 | 1.70806E+03 | 1.17255E-04 | 2.31232E+00 | 2.20501E+03 | 2.69548E+01 | 1.09209E-03 | 2.73994E-01 |
| STD | 9.18538E-05 | 4.00276E+00 | 8.48576E+04 | 7.64279E-05 | 2.61184E+00 | 8.85376E+03 | 1.23941E+02 | 9.61325E-04 | 1.87727E-01 |
| IQR | 2.23260E-05 | 4.14692E+00 | 4.98422E+03 | 1.15996E-04 | 4.64682E+00 | 3.55642E+03 | 1.26080E+02 | 1.64768E-04 | 2.86723E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.89803E-05 | 5.58048E+00 | 3.60037E+04 | 9.67198E-05 | 2.42509E+00 | 2.16960E+03 | 8.19111E+01 | 1.06391E-03 | 1.51261E-01 |
| MEDIAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| STD | 8.05950E-05 | 3.25435E+00 | 1.49287E+05 | 2.30722E-05 | 8.56891E-01 | 1.07032E+03 | 7.94635E+01 | 2.06469E-04 | 1.45148E-01 |
| IQR | 4.55628E-06 | 3.63684E-01 | 5.79534E+03 | 4.92001E-06 | 4.10559E-01 | 2.30690E+02 | 1.30276E+01 | 1.85992E-05 | 1.26108E-02 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| MEDIAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| STD | 3.96781E-14 | 3.12523E-09 | 4.23079E-05 | 3.25395E-15 | 4.15390E-10 | 1.83709E-12 | 8.87300E-08 | 5.32106E-14 | 1.40159E-17 |
| IQR | 6.50000E-14 | 5.00000E-09 | 6.00000E-05 | 0.00000E+00 | 0.00000E+00 | 0.00000E+00 | 1.35000E-07 | 9.99999E-14 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.82497E-05 | 6.59966E+00 | 4.46612E+04 | 1.47570E-04 | 4.58182E+00 | 6.25574E+03 | 8.39660E+01 | 2.54601E-03 | 3.48055E-01 |
| MEDIAN | 1.50047E-05 | 5.52143E+00 | 9.88441E+03 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99907E+01 | 1.00148E-03 | 9.95052E-02 |
| STD | 1.30992E-04 | 5.27294E+00 | 1.84293E+05 | 1.33767E-04 | 4.80092E+00 | 1.07478E+04 | 9.34517E+01 | 3.89367E-03 | 4.56456E-01 |
| IQR | 8.76603E-06 | 3.54898E-01 | 6.23858E+03 | 1.32674E-06 | 2.86598E-01 | 8.04543E+00 | 1.25602E+01 | 6.81420E-04 | 4.22018E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 6.94090E-05 | 8.71378E+00 | 1.84343E+03 | 1.44709E-04 | 2.46263E+00 | 5.11243E+03 | 1.84834E+02 | 8.41390E-03 | 6.14680E-01 |
| MEDIAN | 3.57725E-06 | 5.74748E+00 | 5.18707E+02 | 1.11707E-04 | 8.93544E-01 | 1.86541E+03 | 9.36889E+01 | 1.50237E-03 | 6.98864E-01 |
| STD | 1.50035E-04 | 6.92668E+00 | 4.64035E+03 | 1.00540E-04 | 3.26196E+00 | 8.10759E+03 | 1.82721E+02 | 1.61845E-02 | 2.76627E-01 |
| IQR | 6.92923E-05 | 8.77817E+00 | 1.04964E+03 | 6.81027E-05 | 2.67293E+00 | 1.68079E+03 | 3.20176E+02 | 3.24728E-03 | 3.73436E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.53432E-05 | 5.54448E+00 | 2.14158E+04 | 9.66637E-05 | 2.66825E+00 | 2.11506E+03 | 4.93823E+01 | 9.99700E-04 | 9.95042E-02 |
| MEDIAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| STD | 1.86055E-06 | 1.26401E-01 | 7.99545E+04 | 3.13636E-08 | 8.70698E-03 | 2.57147E+00 | 3.34853E+00 | 1.59853E-06 | 2.66395E-06 |
| IQR | 6.50000E-14 | 5.50000E-09 | 7.00000E-05 | 0.00000E+00 | 1.00000E-09 | 0.00000E+00 | 1.55000E-07 | 9.99999E-14 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.03177E-04 | 1.12720E+01 | 3.11353E+04 | 2.20241E-04 | 5.42039E+00 | 9.19891E+03 | 1.62162E+02 | 1.67984E-02 | 8.09807E-01 |
| MEDIAN | 8.74259E-05 | 1.09652E+01 | 5.27834E+02 | 2.15163E-04 | 3.17672E+00 | 4.08508E+03 | 5.68037E+01 | 2.44336E-03 | 8.48772E-01 |
| STD | 2.83682E-04 | 6.76314E+00 | 1.02605E+05 | 1.50741E-04 | 5.71032E+00 | 1.26659E+04 | 1.93759E+02 | 2.67072E-02 | 2.25369E-01 |
| IQR | 2.64320E-04 | 9.80581E+00 | 4.18183E+03 | 1.92999E-04 | 8.66259E+00 | 7.68620E+03 | 2.88298E+02 | 1.39422E-02 | 1.97709E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| MEDIAN | 1.50047E-05 | 5.52143E+00 | 1.00057E+04 | 9.66584E-05 | 2.66669E+00 | 2.11460E+03 | 4.99906E+01 | 9.99993E-04 | 9.95037E-02 |
| STD | 3.80041E-14 | 3.01967E-09 | 3.80351E-05 | 5.27666E-15 | 5.01762E-10 | 1.83709E-12 | 9.57435E-08 | 5.02542E-14 | 1.40159E-17 |
| IQR | 5.00000E-14 | 4.00000E-09 | 5.00000E-05 | 0.00000E+00 | 1.00000E-09 | 0.00000E+00 | 1.40000E-07 | 9.99999E-14 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.99841E-04 | 1.65583E+01 | 5.86175E+05 | 1.33541E-04 | 3.66979E+00 | 1.00155E+04 | 2.63100E+02 | 3.70550E-02 | 6.66922E-01 |
| MEDIAN | 3.46468E-04 | 1.04476E+01 | 1.00000E+06 | 1.09294E-04 | 5.00000E-01 | 1.53484E+03 | 1.10413E+02 | 1.50444E-03 | 8.08031E-01 |
| STD | 4.85677E-04 | 1.28935E+01 | 4.94943E+05 | 1.33073E-04 | 8.00745E+00 | 1.86978E+04 | 2.55971E+02 | 4.24542E-02 | 2.29116E-01 |
| IQR | 1.00000E-03 | 2.57803E+01 | 9.99581E+05 | 2.45142E-05 | 1.96857E+00 | 2.79560E+02 | 5.37096E+02 | 7.10609E-02 | 2.75491E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.39583E-05 | 5.16215E+00 | 3.40167E+04 | 9.90186E-05 | 2.82302E+00 | 2.17471E+03 | 4.11632E+01 | 1.02105E-03 | 1.07285E-01 |
| MEDIAN | 9.64908E-06 | 5.07492E+00 | 5.00575E+03 | 9.86551E-05 | 2.85924E+00 | 2.16722E+03 | 2.82659E+01 | 1.01070E-03 | 1.00395E-01 |
| STD | 1.09228E-05 | 1.12643E+00 | 1.02314E+05 | 1.22530E-05 | 4.63833E-01 | 1.69646E+02 | 4.28823E+01 | 3.55346E-05 | 3.84984E-02 |
| IQR | 1.75392E-05 | 1.67109E+00 | 1.60320E+04 | 3.63271E-06 | 3.50526E-01 | 9.28388E+01 | 5.43289E+01 | 3.53854E-05 | 3.02838E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.68071E-04 | 8.26372E+00 | 1.05802E+05 | 2.98667E-04 | 9.83589E+00 | 1.19223E+04 | 8.74530E+01 | 1.63487E-02 | 8.78696E-01 |
| MEDIAN | 1.26977E-04 | 6.57343E+00 | 7.89350E+03 | 2.72764E-04 | 8.46807E+00 | 4.29228E+03 | 1.66668E+01 | 2.28548E-03 | 9.12351E-01 |
| STD | 3.00015E-04 | 4.87900E+00 | 2.28831E+05 | 2.21605E-04 | 7.24243E+00 | 1.38656E+04 | 1.37925E+02 | 2.52095E-02 | 2.94374E-01 |
| IQR | 5.20150E-04 | 6.25902E+00 | 1.00183E+05 | 3.56002E-04 | 1.09203E+01 | 1.64469E+04 | 9.09044E+01 | 1.40251E-02 | 3.10670E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 7.29041E-05 | 1.03187E+01 | 5.23172E+04 | 2.47645E-04 | 1.36773E+01 | 5.69996E+03 | 8.82562E+01 | 1.95798E-02 | 7.48232E-01 |
| MEDIAN | 5.69582E-07 | 6.86258E+00 | 3.42842E+02 | 7.70737E-05 | 1.18282E+01 | 9.76485E+02 | 1.34118E+01 | 9.03104E-03 | 7.48111E-01 |
| STD | 2.01509E-04 | 8.74179E+00 | 1.68414E+05 | 4.06486E-04 | 9.47471E+00 | 1.18583E+04 | 1.46120E+02 | 2.25199E-02 | 3.21327E-01 |
| IQR | 7.21391E-06 | 1.30264E+01 | 2.28832E+03 | 3.11029E-04 | 1.43017E+01 | 2.82092E+03 | 9.48686E+01 | 2.68469E-02 | 6.18640E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.90205E-04 | 1.41316E+01 | 1.35669E+05 | 7.80121E-04 | 1.37397E+01 | 1.92959E+04 | 1.81484E+02 | 2.36425E-02 | 6.60415E-01 |
| MEDIAN | 2.29921E-06 | 1.22522E+01 | 5.67376E+02 | 2.73938E-04 | 1.30797E+01 | 3.57410E+03 | 2.24290E+01 | 4.45749E-03 | 7.43557E-01 |
| STD | 4.29717E-04 | 1.07750E+01 | 2.92205E+05 | 1.96319E-03 | 9.94002E+00 | 2.30073E+04 | 2.37135E+02 | 3.34828E-02 | 2.92262E-01 |
| IQR | 7.75671E-04 | 2.25030E+01 | 7.84951E+04 | 6.06509E-04 | 1.95166E+01 | 4.96717E+04 | 3.90461E+02 | 3.08310E-02 | 4.81705E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.51084E-04 | 1.31224E+01 | 1.01786E+05 | 3.12718E-04 | 1.02195E+01 | 1.81410E+04 | 1.04869E+02 | 1.87520E-02 | 8.27972E-01 |
| MEDIAN | 1.65052E-05 | 1.10316E+01 | 1.68236E+02 | 2.79606E-04 | 8.37853E+00 | 2.85763E+03 | 1.91177E+01 | 5.50126E-03 | 8.61913E-01 |
| STD | 3.51687E-04 | 9.35477E+00 | 2.81086E+05 | 2.51901E-04 | 8.42864E+00 | 2.16979E+04 | 1.68479E+02 | 2.62596E-02 | 2.42413E-01 |
| IQR | 4.60577E-04 | 1.61504E+01 | 5.09554E+03 | 3.74895E-04 | 1.34022E+01 | 4.86799E+04 | 1.15701E+02 | 2.44940E-02 | 2.70548E-01 |
|  |  |  |  |  | ***T* = 310 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.34295E+00 | 1.00000E+04 | 1.59152E-04 | 2.61290E+00 | 1.41896E+03 | 6.00000E+01 | 1.01000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.27913E-05 | 5.83741E+00 | 1.08362E+04 | 2.97902E-04 | 4.24758E+00 | 1.14657E+04 | 8.02052E+01 | 1.17553E-03 | 4.17188E-01 |
| MEDIAN | 5.92881E-06 | 4.57997E+00 | 2.53709E+03 | 3.09783E-04 | 4.52646E+00 | 3.21489E+03 | 3.66747E+01 | 1.13575E-03 | 4.03099E-01 |
| STD | 1.46997E-04 | 3.93926E+00 | 2.64949E+04 | 1.21598E-04 | 2.45028E+00 | 1.66551E+04 | 9.46525E+01 | 1.63952E-04 | 2.10138E-01 |
| IQR | 3.59199E-05 | 3.71012E+00 | 5.06135E+03 | 2.14065E-04 | 3.92978E+00 | 9.16739E+03 | 1.14195E+02 | 1.80142E-04 | 3.29481E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.03670E-05 | 4.78862E+00 | 5.79370E+03 | 1.87413E-04 | 2.54298E+00 | 3.70210E+03 | 1.17724E+02 | 1.21428E-03 | 1.94172E-01 |
| MEDIAN | 9.67504E-06 | 4.87001E+00 | 3.29031E+03 | 1.59151E-04 | 2.59268E+00 | 1.41864E+03 | 7.68485E+01 | 1.03836E-03 | 1.03575E-01 |
| STD | 4.21304E-05 | 2.60373E+00 | 5.98290E+03 | 8.13721E-05 | 1.48032E+00 | 8.53903E+03 | 9.62114E+01 | 8.94416E-04 | 1.90825E-01 |
| IQR | 1.47762E-05 | 2.51336E+00 | 8.27975E+03 | 2.33299E-05 | 1.18970E+00 | 2.20816E+02 | 9.47566E+01 | 1.17037E-04 | 1.05460E-01 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50078E-05 | 5.34355E+00 | 1.00089E+04 | 1.59151E-04 | 2.61295E+00 | 1.41897E+03 | 5.99840E+01 | 1.00999E-03 | 9.95037E-02 |
| MEDIAN | 1.50078E-05 | 5.34355E+00 | 1.00089E+04 | 1.59151E-04 | 2.61295E+00 | 1.41897E+03 | 5.99840E+01 | 1.00999E-03 | 9.95037E-02 |
| STD | 2.18820E-14 | 1.64496E-09 | 2.04786E-05 | 0.00000E+00 | 4.76095E-10 | 4.59272E-13 | 6.10734E-08 | 8.75992E-19 | 1.40159E-17 |
| IQR | 3.00000E-14 | 2.00000E-09 | 3.00000E-05 | 0.00000E+00 | 1.00000E-09 | 0.00000E+00 | 9.00000E-08 | 0.00000E+00 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.03624E-05 | 6.97618E+00 | 4.98906E+04 | 2.36249E-04 | 4.72704E+00 | 3.49302E+03 | 1.04350E+02 | 4.71088E-03 | 3.21355E-01 |
| MEDIAN | 1.50078E-05 | 5.34355E+00 | 6.77703E+03 | 1.59151E-04 | 2.61295E+00 | 1.41837E+03 | 5.99865E+01 | 1.01904E-03 | 9.95390E-02 |
| STD | 1.46708E-04 | 5.28828E+00 | 1.94859E+05 | 2.56322E-04 | 5.52670E+00 | 8.78848E+03 | 9.93430E+01 | 1.01918E-02 | 3.58313E-01 |
| IQR | 8.95872E-06 | 1.69619E+00 | 7.28780E+03 | 1.22426E-06 | 3.05234E-01 | 6.68075E+01 | 5.56161E+01 | 1.02304E-04 | 4.31138E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.44973E-05 | 7.78116E+00 | 3.55852E+03 | 2.38094E-04 | 2.67344E+00 | 3.25170E+03 | 1.57267E+02 | 5.89561E-03 | 6.36940E-01 |
| MEDIAN | 1.76571E-06 | 4.58855E+00 | 6.35767E+02 | 1.95533E-04 | 7.67802E-01 | 1.11911E+03 | 9.53646E+01 | 1.30397E-03 | 6.69238E-01 |
| STD | 1.25503E-04 | 7.57886E+00 | 1.57680E+04 | 1.38735E-04 | 3.14519E+00 | 5.76172E+03 | 1.58093E+02 | 1.85983E-02 | 3.37739E-01 |
| IQR | 3.32981E-05 | 7.30264E+00 | 1.12514E+03 | 1.43949E-04 | 3.54424E+00 | 1.17214E+03 | 2.42287E+02 | 9.32032E-04 | 7.07899E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.56416E-05 | 5.38308E+00 | 2.86965E+04 | 1.59244E-04 | 2.62248E+00 | 1.42101E+03 | 5.84375E+01 | 1.00961E-03 | 9.95057E-02 |
| MEDIAN | 1.50078E-05 | 5.34355E+00 | 1.00089E+04 | 1.59151E-04 | 2.61295E+00 | 1.41897E+03 | 5.99840E+01 | 1.00999E-03 | 9.95037E-02 |
| STD | 3.34333E-06 | 2.06338E-01 | 1.25351E+05 | 6.16257E-07 | 5.73996E-02 | 1.22468E+01 | 8.56092E+00 | 1.89663E-06 | 1.07609E-05 |
| IQR | 4.00000E-14 | 3.00000E-09 | 3.00000E-05 | 0.00000E+00 | 1.00000E-09 | 0.00000E+00 | 8.00000E-08 | 0.00000E+00 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.27436E-04 | 1.07688E+01 | 4.32346E+04 | 4.76334E-04 | 1.03070E+01 | 5.24197E+03 | 8.92025E+01 | 1.16586E-02 | 7.65122E-01 |
| MEDIAN | 2.25272E-06 | 8.84283E+00 | 6.69111E+02 | 3.91107E-04 | 9.52303E+00 | 1.93955E+03 | 1.45832E+01 | 1.87400E-03 | 8.73647E-01 |
| STD | 2.48715E-04 | 8.37863E+00 | 1.69878E+05 | 2.86765E-04 | 7.88097E+00 | 6.54736E+03 | 1.40132E+02 | 2.46066E-02 | 3.38118E-01 |
| IQR | 1.19829E-04 | 1.20362E+01 | 2.05705E+03 | 3.96603E-04 | 1.10699E+01 | 6.20911E+03 | 1.16335E+02 | 3.99547E-03 | 5.43553E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50078E-05 | 5.34355E+00 | 1.00089E+04 | 1.59151E-04 | 2.61295E+00 | 1.41897E+03 | 5.99840E+01 | 1.00999E-03 | 9.95037E-02 |
| MEDIAN | 1.50078E-05 | 5.34355E+00 | 1.00089E+04 | 1.59151E-04 | 2.61295E+00 | 1.41897E+03 | 5.99840E+01 | 1.00999E-03 | 9.95037E-02 |
| STD | 3.22466E-14 | 2.57925E-09 | 2.97295E-05 | 0.00000E+00 | 6.00653E-10 | 3.00327E-07 | 9.20937E-08 | 8.75992E-19 | 1.40159E-17 |
| IQR | 4.00000E-14 | 3.00000E-09 | 4.00000E-05 | 0.00000E+00 | 1.00000E-09 | 0.00000E+00 | 1.15000E-07 | 0.00000E+00 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.58817E-04 | 1.30453E+01 | 4.69617E+05 | 4.51996E-04 | 6.61931E+00 | 5.84557E+03 | 2.97136E+02 | 4.17000E-02 | 6.90010E-01 |
| MEDIAN | 4.39423E-05 | 6.48566E+00 | 1.48109E+03 | 2.16223E-04 | 5.00000E-01 | 1.00695E+03 | 4.82017E+02 | 3.19353E-02 | 7.09783E-01 |
| STD | 4.50034E-04 | 1.19260E+01 | 4.99383E+05 | 1.39382E-03 | 1.11489E+01 | 1.47241E+04 | 2.61643E+02 | 4.06614E-02 | 3.52375E-01 |
| IQR | 1.00000E-03 | 2.58827E+01 | 9.99990E+05 | 7.59159E-05 | 5.24631E+00 | 4.28276E+02 | 5.26325E+02 | 6.49896E-02 | 7.72248E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.72494E-05 | 5.15134E+00 | 5.28239E+04 | 1.76356E-04 | 3.13596E+00 | 1.60237E+03 | 3.65969E+01 | 1.03768E-03 | 1.15207E-01 |
| MEDIAN | 1.24809E-05 | 5.11996E+00 | 5.11879E+03 | 1.67617E-04 | 3.15428E+00 | 1.53277E+03 | 9.21597E+00 | 1.01903E-03 | 1.01439E-01 |
| STD | 1.99954E-05 | 1.46947E+00 | 1.58179E+05 | 3.23727E-05 | 8.90283E-01 | 3.22490E+02 | 6.22089E+01 | 7.01828E-05 | 5.84609E-02 |
| IQR | 1.94096E-05 | 1.79802E+00 | 9.23729E+03 | 1.87428E-05 | 5.93770E-01 | 1.77576E+02 | 3.57547E+01 | 3.49426E-05 | 5.82171E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.24319E-04 | 1.06260E+01 | 7.24301E+04 | 7.45896E-04 | 1.61161E+01 | 6.79780E+03 | 7.35759E+01 | 8.06081E-03 | 9.53550E-01 |
| MEDIAN | 1.44675E-04 | 8.77503E+00 | 3.99817E+03 | 5.45807E-04 | 1.61995E+01 | 2.07570E+03 | 1.29011E+01 | 2.15152E-03 | 9.80318E-01 |
| STD | 2.46235E-04 | 6.61245E+00 | 1.85597E+05 | 5.42216E-04 | 8.76032E+00 | 1.06816E+04 | 9.79728E+01 | 1.59653E-02 | 2.47794E-01 |
| IQR | 3.20991E-04 | 9.05965E+00 | 3.63221E+04 | 7.41526E-04 | 1.51740E+01 | 4.33502E+03 | 1.49216E+02 | 2.13848E-03 | 2.71945E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.53673E-05 | 1.14526E+01 | 4.67456E+04 | 2.48647E-04 | 1.62427E+01 | 3.65305E+03 | 8.87110E+01 | 1.53823E-02 | 8.63015E-01 |
| MEDIAN | 2.63231E-07 | 8.97624E+00 | 3.43780E+02 | 1.01777E-05 | 1.46241E+01 | 5.46250E+02 | 4.19670E+00 | 3.84468E-03 | 7.07078E-01 |
| STD | 9.43393E-05 | 9.00525E+00 | 1.44633E+05 | 3.57340E-04 | 8.88477E+00 | 8.28385E+03 | 1.50249E+02 | 2.12076E-02 | 2.76059E-01 |
| IQR | 7.00772E-06 | 1.66556E+01 | 2.66049E+03 | 3.98779E-04 | 1.60798E+01 | 1.45594E+03 | 1.18683E+02 | 1.67959E-02 | 3.64503E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.42549E-04 | 1.23600E+01 | 1.60225E+05 | 1.29127E-03 | 1.48703E+01 | 1.63984E+04 | 2.39430E+02 | 3.45453E-02 | 8.23218E-01 |
| MEDIAN | 5.71073E-05 | 8.00318E+00 | 5.11507E+02 | 4.00117E-04 | 1.27622E+01 | 1.02316E+03 | 1.50944E+02 | 1.24945E-02 | 7.45968E-01 |
| STD | 4.85517E-04 | 9.95508E+00 | 3.36239E+05 | 2.45881E-03 | 1.15410E+01 | 2.22917E+04 | 2.25625E+02 | 3.83360E-02 | 2.24000E-01 |
| IQR | 9.99995E-04 | 1.23539E+01 | 3.88232E+04 | 1.27213E-03 | 2.44326E+01 | 4.97047E+04 | 4.73841E+02 | 6.15521E-02 | 2.83878E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.04057E-04 | 1.61944E+01 | 5.14322E+04 | 1.09441E-03 | 1.49717E+01 | 2.38136E+04 | 1.32634E+02 | 1.65234E-02 | 8.98584E-01 |
| MEDIAN | 5.43077E-05 | 1.38977E+01 | 3.52454E+02 | 7.85762E-04 | 1.34910E+01 | 5.76096E+03 | 2.62317E+01 | 3.69576E-03 | 8.90367E-01 |
| STD | 3.82272E-04 | 9.56841E+00 | 1.99483E+05 | 1.18760E-03 | 9.78946E+00 | 2.39948E+04 | 1.80861E+02 | 2.29666E-02 | 1.71250E-01 |
| IQR | 6.59899E-04 | 1.71357E+01 | 2.73118E+03 | 1.03855E-03 | 1.85467E+01 | 4.91248E+04 | 2.37493E+02 | 2.52921E-02 | 2.73300E-01 |
|  |  |  |  |  | ***T* = 320 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.17598E+00 | 1.00000E+04 | 2.54008E-04 | 2.56250E+00 | 9.76205E+02 | 7.00000E+01 | 1.02000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 7.26330E-05 | 6.85495E+00 | 9.71347E+03 | 5.11873E-04 | 6.80687E+00 | 7.12817E+03 | 7.77148E+01 | 1.25039E-03 | 5.51930E-01 |
| MEDIAN | 9.30567E-06 | 5.37535E+00 | 2.34236E+03 | 3.87326E-04 | 4.22513E+00 | 9.36575E+02 | 2.32693E+01 | 1.17770E-03 | 5.19937E-01 |
| STD | 1.41165E-04 | 5.09206E+00 | 2.98843E+04 | 4.40747E-04 | 7.98824E+00 | 1.31061E+04 | 9.92735E+01 | 2.95753E-04 | 2.79318E-01 |
| IQR | 9.23265E-05 | 8.22767E+00 | 4.53959E+03 | 4.05243E-04 | 5.71293E+00 | 4.23276E+03 | 1.18074E+02 | 1.76734E-04 | 4.25355E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.71503E-05 | 5.83730E+00 | 9.28327E+03 | 2.85733E-04 | 4.98708E+00 | 2.72951E+03 | 1.01506E+02 | 1.30518E-03 | 2.45268E-01 |
| MEDIAN | 5.31441E-06 | 4.74271E+00 | 5.98265E+03 | 2.53282E-04 | 2.56252E+00 | 9.64449E+02 | 6.99971E+01 | 1.04226E-03 | 1.05279E-01 |
| STD | 3.45535E-05 | 6.33275E+00 | 1.42950E+04 | 1.86435E-04 | 7.07115E+00 | 8.27988E+03 | 9.65207E+01 | 1.30672E-03 | 2.72333E-01 |
| IQR | 1.48147E-05 | 2.70705E+00 | 8.15662E+03 | 1.00118E-04 | 2.76648E+00 | 4.62456E+02 | 1.21334E+02 | 9.29293E-05 | 1.19986E-01 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.48621E-05 | 5.61478E+00 | 2.25242E+04 | 2.51868E-04 | 3.07064E+00 | 9.56061E+02 | 7.47471E+01 | 1.02337E-03 | 1.17985E-01 |
| MEDIAN | 1.50011E-05 | 5.17607E+00 | 1.00009E+04 | 2.54009E-04 | 2.56252E+00 | 9.76210E+02 | 6.99971E+01 | 1.02000E-03 | 9.95037E-02 |
| STD | 4.41223E-06 | 3.52838E+00 | 8.99649E+04 | 4.07513E-05 | 3.84228E+00 | 1.37779E+02 | 5.04158E+01 | 2.90272E-05 | 1.27118E-01 |
| IQR | 3.00000E-14 | 3.00000E-09 | 3.00000E-05 | 1.00000E-13 | 1.00000E-09 | 1.00000E-07 | 1.05000E-07 | 0.00000E+00 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.13673E-05 | 1.07901E+01 | 6.78533E+04 | 2.04782E-04 | 9.69368E+00 | 1.17286E+03 | 6.22102E+01 | 3.46622E-03 | 4.73581E-01 |
| MEDIAN | 4.58545E-06 | 5.31060E+00 | 3.67429E+03 | 2.48647E-04 | 2.74733E+00 | 8.76418E+02 | 4.95192E+01 | 1.06238E-03 | 1.06973E-01 |
| STD | 1.60569E-04 | 1.02441E+01 | 2.26567E+05 | 2.68835E-04 | 9.99184E+00 | 3.05491E+03 | 6.52108E+01 | 9.22788E-03 | 4.41768E-01 |
| IQR | 1.67557E-05 | 1.13360E+01 | 9.91554E+03 | 2.54257E-04 | 1.68951E+01 | 7.37479E+02 | 9.97529E+01 | 4.05764E-04 | 9.07812E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 9.68675E-05 | 1.23065E+01 | 5.44548E+04 | 2.34224E-04 | 9.28653E+00 | 1.45762E+03 | 1.01078E+02 | 2.26295E-03 | 6.93816E-01 |
| MEDIAN | 6.95611E-06 | 8.90569E+00 | 1.30332E+03 | 1.19179E-06 | 5.63072E+00 | 3.49592E+02 | 4.22161E+01 | 1.30592E-03 | 8.31866E-01 |
| STD | 2.07006E-04 | 9.80658E+00 | 1.89291E+05 | 4.77514E-04 | 8.76429E+00 | 6.96057E+03 | 1.36443E+02 | 2.65048E-03 | 3.58807E-01 |
| IQR | 9.95496E-05 | 1.38549E+01 | 5.93767E+03 | 2.43577E-04 | 1.36571E+01 | 4.60622E+02 | 1.30006E+02 | 1.01208E-03 | 7.77650E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.39576E-05 | 5.64122E+00 | 1.11698E+04 | 2.38568E-04 | 3.36379E+00 | 9.32734E+02 | 7.13598E+01 | 1.21300E-03 | 1.52502E-01 |
| MEDIAN | 1.50011E-05 | 5.17607E+00 | 1.00009E+04 | 2.54009E-04 | 2.56252E+00 | 9.76210E+02 | 6.99971E+01 | 1.02000E-03 | 9.95037E-02 |
| STD | 4.61632E-06 | 2.97800E+00 | 1.43867E+04 | 6.03222E-05 | 4.02652E+00 | 1.53019E+02 | 3.71213E+01 | 8.92368E-04 | 2.13885E-01 |
| IQR | 5.00000E-14 | 3.00000E-09 | 5.00000E-05 | 1.00000E-13 | 1.00000E-09 | 3.00000E-07 | 1.60000E-07 | 0.00000E+00 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.33014E-04 | 1.11720E+01 | 9.61439E+04 | 4.86648E-04 | 1.13031E+01 | 2.34334E+03 | 7.61548E+01 | 1.97709E-03 | 7.31274E-01 |
| MEDIAN | 1.43191E-05 | 8.41820E+00 | 5.69572E+03 | 1.00515E-05 | 7.80442E+00 | 4.17426E+02 | 5.16922E+00 | 1.37460E-03 | 8.05013E-01 |
| STD | 2.04914E-04 | 8.48535E+00 | 1.99332E+05 | 1.43244E-03 | 8.32415E+00 | 5.50450E+03 | 1.30764E+02 | 1.41306E-03 | 3.09462E-01 |
| IQR | 2.26827E-04 | 1.17431E+01 | 7.07113E+04 | 5.69483E-04 | 1.39522E+01 | 5.75727E+02 | 6.56241E+01 | 8.65017E-04 | 4.17941E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.47069E-05 | 5.66281E+00 | 9.81358E+03 | 2.49028E-04 | 3.10051E+00 | 9.58697E+02 | 6.90416E+01 | 1.02752E-03 | 1.17304E-01 |
| MEDIAN | 1.50011E-05 | 5.17607E+00 | 1.00009E+04 | 2.54009E-04 | 2.56252E+00 | 9.76210E+02 | 6.99971E+01 | 1.02000E-03 | 9.95037E-02 |
| STD | 2.10056E-06 | 3.47605E+00 | 1.33786E+03 | 3.55683E-05 | 3.84200E+00 | 1.25065E+02 | 6.82386E+00 | 5.37231E-05 | 1.27123E-01 |
| IQR | 5.00000E-14 | 4.00000E-09 | 4.00000E-05 | 1.00000E-13 | 1.00000E-09 | 2.00000E-07 | 1.65000E-07 | 0.00000E+00 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.28573E-04 | 1.30514E+01 | 4.71916E+05 | 9.60042E-04 | 1.61376E+01 | 7.21107E+03 | 1.66622E+02 | 3.06821E-02 | 6.92880E-01 |
| MEDIAN | 7.20290E-05 | 6.97497E+00 | 1.15796E+04 | 1.01463E-10 | 1.89715E+01 | 5.47520E+02 | 1.00000E-01 | 1.19046E-03 | 9.26404E-01 |
| STD | 4.75991E-04 | 1.18202E+01 | 5.02611E+05 | 2.69650E-03 | 1.43659E+01 | 1.72395E+04 | 2.31369E+02 | 4.12168E-02 | 4.05119E-01 |
| IQR | 1.00000E-03 | 2.70695E+01 | 9.99990E+05 | 2.78904E-04 | 2.95000E+01 | 7.48530E+02 | 4.52731E+02 | 6.71751E-02 | 8.68329E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.91128E-05 | 5.61085E+00 | 4.68665E+04 | 3.90409E-04 | 6.29427E+00 | 2.01458E+03 | 3.98225E+01 | 1.13848E-03 | 3.18674E-01 |
| MEDIAN | 4.47984E-06 | 4.22549E+00 | 3.88912E+03 | 3.32444E-04 | 4.72130E+00 | 1.13989E+03 | 1.23042E+01 | 1.05966E-03 | 1.88337E-01 |
| STD | 8.74753E-05 | 4.06095E+00 | 1.49984E+05 | 2.47406E-04 | 5.68530E+00 | 2.38276E+03 | 7.24754E+01 | 2.18656E-04 | 2.86962E-01 |
| IQR | 2.04562E-05 | 3.30507E+00 | 1.76595E+04 | 3.35026E-04 | 4.20486E+00 | 1.21482E+03 | 3.93728E+01 | 1.36508E-04 | 2.40580E-01 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.40725E-04 | 1.14031E+01 | 1.01573E+05 | 8.05252E-04 | 1.28256E+01 | 2.55507E+03 | 6.48675E+01 | 4.68183E-03 | 8.40888E-01 |
| MEDIAN | 4.92732E-05 | 8.72217E+00 | 4.41892E+03 | 2.25511E-04 | 1.24327E+01 | 4.97558E+02 | 6.77838E+00 | 1.53815E-03 | 8.39373E-01 |
| STD | 3.21900E-04 | 7.43918E+00 | 2.01809E+05 | 1.61867E-03 | 7.66339E+00 | 7.86467E+03 | 1.03697E+02 | 1.05459E-02 | 2.42200E-01 |
| IQR | 3.80371E-04 | 1.09995E+01 | 9.82014E+04 | 9.42977E-04 | 1.23849E+01 | 9.51094E+02 | 8.07893E+01 | 1.00389E-03 | 2.70310E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 6.69980E-05 | 1.57615E+01 | 3.49472E+04 | 4.15971E-04 | 1.82391E+01 | 9.56393E+02 | 7.28741E+01 | 6.16946E-03 | 9.84641E-01 |
| MEDIAN | 2.29885E-07 | 1.51050E+01 | 3.17890E+02 | 1.86967E-07 | 1.90479E+01 | 3.31800E+02 | 1.09340E+01 | 2.45555E-03 | 1.00726E+00 |
| STD | 1.38456E-04 | 8.78396E+00 | 1.20768E+05 | 1.10718E-03 | 8.39411E+00 | 3.22574E+03 | 1.15489E+02 | 7.97423E-03 | 1.49736E-01 |
| IQR | 6.39691E-05 | 1.52349E+01 | 7.94627E+02 | 7.53367E-05 | 1.28133E+01 | 3.08576E+02 | 8.80296E+01 | 5.50315E-03 | 1.01562E-02 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.85745E-04 | 1.19415E+01 | 2.36128E+05 | 1.70647E-03 | 1.61498E+01 | 4.55409E+03 | 1.67886E+02 | 1.63148E-02 | 8.05619E-01 |
| MEDIAN | 2.10437E-07 | 7.25140E+00 | 3.33189E+03 | 7.36514E-09 | 1.63437E+01 | 4.57514E+02 | 3.94865E+01 | 3.86311E-03 | 1.00102E+00 |
| STD | 4.25718E-04 | 1.04561E+01 | 4.08767E+05 | 3.63302E-03 | 1.07295E+01 | 1.30381E+04 | 2.04233E+02 | 2.52596E-02 | 3.83244E-01 |
| IQR | 6.98652E-04 | 1.72536E+01 | 1.38863E+05 | 3.24691E-04 | 1.93018E+01 | 4.59135E+02 | 3.38072E+02 | 1.85643E-02 | 2.98172E-01 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.31199E-04 | 1.20148E+01 | 1.09691E+05 | 9.46532E-04 | 1.88406E+01 | 1.13513E+04 | 1.65089E+02 | 7.69268E-03 | 8.85889E-01 |
| MEDIAN | 7.55199E-05 | 8.16182E+00 | 5.92042E+03 | 1.03281E-04 | 1.76841E+01 | 4.54399E+02 | 3.17310E+01 | 1.99298E-03 | 9.38947E-01 |
| STD | 4.04170E-04 | 9.61501E+00 | 2.70733E+05 | 1.96931E-03 | 1.07836E+01 | 2.05170E+04 | 2.01020E+02 | 1.60335E-02 | 1.95426E-01 |
| IQR | 7.43216E-04 | 1.88668E+01 | 5.37071E+04 | 9.34889E-04 | 2.16190E+01 | 3.18900E+03 | 3.04741E+02 | 5.46747E-03 | 2.07929E-01 |
|  |  |  |  |  | ***T* = 330 K** |  |  |  |  |
| true value | 1.50000E-05 | 5.01914E+00 | 1.00000E+04 | 3.94074E-04 | 2.51515E+00 | 6.86999E+02 | 8.00000E+01 | 1.03000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.45306E-05 | 3.89436E+00 | 2.47670E+04 | 5.78041E-04 | 5.44376E+00 | 4.27040E+03 | 6.52316E+01 | 1.10383E-03 | 2.22987E-01 |
| MEDIAN | 1.73918E-06 | 3.39358E+00 | 2.56468E+03 | 4.54094E-04 | 4.29295E+00 | 7.60487E+02 | 4.38098E+01 | 1.08083E-03 | 1.82846E-01 |
| STD | 4.59785E-05 | 2.23582E+00 | 8.59814E+04 | 3.89995E-04 | 4.19410E+00 | 8.03184E+03 | 6.86059E+01 | 7.72389E-05 | 1.14500E-01 |
| IQR | 1.43496E-05 | 2.83764E+00 | 3.01045E+03 | 6.55659E-04 | 5.61193E+00 | 2.83648E+03 | 9.94062E+01 | 9.05259E-05 | 1.56753E-01 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.75078E-05 | 4.96861E+00 | 4.17918E+04 | 3.86868E-04 | 2.48324E+00 | 9.25031E+02 | 8.41984E+01 | 1.03766E-03 | 1.07256E-01 |
| MEDIAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95440E-02 |
| STD | 1.49573E-05 | 1.04815E+00 | 1.59351E+05 | 1.19518E-04 | 1.42077E+00 | 1.93935E+03 | 5.14499E+01 | 2.22986E-05 | 1.68043E-02 |
| IQR | 7.59136E-06 | 6.29958E-01 | 5.22619E+03 | 4.44594E-05 | 7.97547E-01 | 1.44843E+02 | 1.87124E+01 | 7.79881E-06 | 5.89057E-03 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95037E-02 |
| MEDIAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95037E-02 |
| STD | 2.58472E-14 | 1.79433E-09 | 2.14585E-05 | 5.01762E-14 | 1.22266E-09 | 1.68616E-07 | 8.63717E-08 | 8.75992E-19 | 4.20476E-17 |
| IQR | 4.50000E-14 | 3.00000E-09 | 3.40000E-05 | 1.00000E-13 | 2.00000E-09 | 2.50000E-07 | 1.35000E-07 | 0.00000E+00 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 6.11227E-05 | 5.76490E+00 | 1.42779E+04 | 3.85317E-04 | 6.79009E+00 | 5.42006E+02 | 1.06737E+02 | 1.35544E-03 | 4.04987E-01 |
| MEDIAN | 1.50078E-05 | 5.01917E+00 | 9.99808E+03 | 3.94074E-04 | 2.63162E+00 | 6.86981E+02 | 8.00063E+01 | 1.03000E-03 | 9.95166E-02 |
| STD | 1.85101E-04 | 3.64751E+00 | 1.70935E+04 | 4.45975E-04 | 8.48920E+00 | 2.64055E+02 | 7.60261E+01 | 7.79399E-04 | 4.47829E-01 |
| IQR | 1.10713E-05 | 8.15665E-01 | 8.37131E+03 | 9.34878E-05 | 1.51087E+00 | 3.87830E+02 | 3.92110E+01 | 2.92655E-04 | 7.97824E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.39823E-05 | 5.67309E+00 | 2.17155E+04 | 7.60613E-04 | 5.39419E+00 | 3.76996E+03 | 9.74361E+01 | 1.15927E-03 | 3.77969E-01 |
| MEDIAN | 1.73048E-06 | 3.38347E+00 | 1.97362E+03 | 3.78054E-04 | 1.49757E+00 | 4.52821E+02 | 6.05965E+01 | 1.12335E-03 | 1.90273E-01 |
| STD | 1.01742E-04 | 4.61636E+00 | 5.53297E+04 | 1.02115E-03 | 7.17947E+00 | 1.03683E+04 | 1.04887E+02 | 1.42125E-04 | 3.37441E-01 |
| IQR | 6.00519E-05 | 6.12117E+00 | 5.11232E+03 | 6.35138E-04 | 7.10702E+00 | 3.85734E+02 | 1.20090E+02 | 1.54021E-04 | 4.74666E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.62028E-05 | 5.08992E+00 | 6.21055E+04 | 3.95709E-04 | 2.56797E+00 | 6.94133E+02 | 7.65114E+01 | 1.02926E-03 | 9.95078E-02 |
| MEDIAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95037E-02 |
| STD | 4.33790E-06 | 2.53111E-01 | 2.09274E+05 | 8.23971E-06 | 2.29696E-01 | 3.14381E+01 | 1.34179E+01 | 2.58832E-06 | 1.53698E-05 |
| IQR | 3.00000E-14 | 2.00000E-09 | 2.45000E-05 | 1.00000E-13 | 2.00000E-09 | 3.00000E-07 | 1.25000E-07 | 0.00000E+00 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 9.37257E-05 | 7.10471E+00 | 6.70223E+04 | 5.29326E-04 | 1.07708E+01 | 3.56947E+03 | 4.72598E+01 | 1.15025E-03 | 4.60479E-01 |
| MEDIAN | 2.04085E-05 | 6.15577E+00 | 5.91727E+03 | 6.32428E-05 | 6.99296E+00 | 3.81620E+02 | 8.22560E+00 | 1.12897E-03 | 4.61259E-01 |
| STD | 1.76969E-04 | 5.58795E+00 | 1.69100E+05 | 8.20384E-04 | 9.11626E+00 | 8.85932E+03 | 7.57204E+01 | 1.35393E-04 | 2.91012E-01 |
| IQR | 1.08575E-04 | 6.47745E+00 | 3.28656E+04 | 7.59814E-04 | 1.40217E+01 | 5.37263E+02 | 5.89234E+01 | 1.67432E-04 | 5.24704E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95037E-02 |
| MEDIAN | 1.49977E-05 | 5.01897E+00 | 9.99808E+03 | 3.94074E-04 | 2.51510E+00 | 6.86993E+02 | 8.00063E+01 | 1.03000E-03 | 9.95037E-02 |
| STD | 2.26499E-14 | 1.70052E-09 | 1.95374E-05 | 5.40152E-14 | 1.05867E-09 | 1.62432E-07 | 7.70108E-08 | 8.75992E-19 | 4.20476E-17 |
| IQR | 3.50000E-14 | 2.00000E-09 | 2.90000E-05 | 1.00000E-13 | 1.50000E-09 | 3.00000E-07 | 1.00000E-07 | 0.00000E+00 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 4.60127E-04 | 1.70258E+01 | 5.69538E+05 | 1.51389E-03 | 1.51710E+01 | 1.00330E+04 | 9.78458E+01 | 1.05787E-02 | 6.21580E-01 |
| MEDIAN | 3.85429E-05 | 2.73182E+01 | 1.00000E+06 | 5.04845E-04 | 8.31005E+00 | 4.55418E+02 | 1.00000E-01 | 1.12840E-03 | 8.35733E-01 |
| STD | 4.95539E-04 | 1.31314E+01 | 4.99142E+05 | 2.97363E-03 | 1.43395E+01 | 1.99360E+04 | 1.64276E+02 | 2.22018E-02 | 4.47494E-01 |
| IQR | 1.00000E-03 | 2.71327E+01 | 9.97390E+05 | 8.84969E-04 | 2.95000E+01 | 5.25256E+02 | 9.00247E+01 | 1.25410E-04 | 7.55484E-01 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.38133E-05 | 4.48901E+00 | 5.04708E+04 | 5.76225E-04 | 5.16229E+00 | 2.29083E+03 | 3.79302E+01 | 1.05043E-03 | 1.07312E-01 |
| MEDIAN | 9.12089E-06 | 4.51095E+00 | 4.70321E+03 | 4.99642E-04 | 4.81956E+00 | 9.89840E+02 | 5.08097E+00 | 1.03456E-03 | 1.02820E-01 |
| STD | 1.32242E-05 | 1.29283E+00 | 1.35368E+05 | 2.06684E-04 | 2.56985E+00 | 5.49333E+03 | 5.92073E+01 | 3.46902E-05 | 1.19947E-02 |
| IQR | 2.86775E-05 | 2.64207E+00 | 4.06013E+04 | 2.28061E-04 | 2.56737E+00 | 8.19351E+02 | 4.41926E+01 | 5.33229E-05 | 8.22927E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.26209E-04 | 1.14464E+01 | 5.94864E+04 | 1.38330E-03 | 1.33611E+01 | 1.69970E+03 | 5.82906E+01 | 1.22280E-03 | 6.39507E-01 |
| MEDIAN | 1.13127E-04 | 9.35167E+00 | 8.68900E+03 | 3.61387E-04 | 1.35306E+01 | 2.64162E+02 | 5.04152E+00 | 1.20421E-03 | 6.14736E-01 |
| STD | 2.43224E-04 | 6.56184E+00 | 1.36856E+05 | 2.32389E-03 | 8.45890E+00 | 4.50884E+03 | 8.83865E+01 | 1.23423E-04 | 2.76647E-01 |
| IQR | 3.68853E-04 | 1.25112E+01 | 5.22940E+04 | 1.40752E-03 | 1.30999E+01 | 3.31939E+02 | 1.03615E+02 | 1.85733E-04 | 3.45443E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.63359E-04 | 1.20815E+01 | 3.09979E+04 | 5.55116E-04 | 1.65569E+01 | 1.52684E+03 | 3.60443E+01 | 2.93885E-03 | 9.88136E-01 |
| MEDIAN | 1.04304E-05 | 1.00021E+01 | 3.04719E+03 | 6.77431E-07 | 1.81328E+01 | 2.81254E+02 | 1.58449E+00 | 1.51113E-03 | 1.05385E+00 |
| STD | 2.62048E-04 | 9.07136E+00 | 7.59872E+04 | 1.53947E-03 | 8.81570E+00 | 7.09037E+03 | 7.03684E+01 | 4.21691E-03 | 3.19298E-01 |
| IQR | 1.97503E-04 | 1.71852E+01 | 1.50456E+04 | 9.03172E-05 | 1.64293E+01 | 3.01169E+02 | 4.01732E+01 | 1.19544E-03 | 5.90619E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.46426E-04 | 1.19620E+01 | 1.57158E+05 | 2.52922E-03 | 1.67977E+01 | 8.38181E+03 | 1.17385E+02 | 1.08732E-02 | 8.99587E-01 |
| MEDIAN | 8.04574E-07 | 5.93122E+00 | 4.02858E+02 | 6.82975E-08 | 1.67288E+01 | 3.87396E+02 | 1.61285E+01 | 1.81969E-03 | 1.18886E+00 |
| STD | 4.07629E-04 | 1.08393E+01 | 3.62591E+05 | 4.02230E-03 | 1.02405E+01 | 1.73997E+04 | 1.63622E+02 | 2.08707E-02 | 5.50075E-01 |
| IQR | 2.59201E-04 | 1.96042E+01 | 3.76037E+03 | 3.37860E-03 | 1.82677E+01 | 5.99772E+02 | 2.25262E+02 | 8.06087E-03 | 1.12231E+00 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.95696E-04 | 1.52501E+01 | 1.17694E+05 | 1.68950E-03 | 1.58443E+01 | 9.56900E+03 | 5.49070E+01 | 2.52344E-03 | 9.20130E-01 |
| MEDIAN | 2.68794E-04 | 1.44738E+01 | 5.51686E+03 | 2.00828E-04 | 1.33873E+01 | 2.59880E+02 | 9.46265E+00 | 1.28744E-03 | 9.28054E-01 |
| STD | 3.66344E-04 | 8.90406E+00 | 2.97119E+05 | 2.99688E-03 | 1.16357E+01 | 1.91461E+04 | 9.96093E+01 | 5.61169E-03 | 2.45900E-01 |
| IQR | 7.20546E-04 | 1.60080E+01 | 1.84651E+04 | 1.61225E-03 | 2.55228E+01 | 8.84961E+02 | 5.02754E+01 | 3.15797E-04 | 2.74302E-01 |
|  |  |  |  |  | ***T* = 340 K** |  |  |  |  |
| true value | 1.50000E-05 | 4.87151E+00 | 1.00000E+04 | 5.95785E-04 | 2.47059E+00 | 4.93568E+02 | 9.00000E+01 | 1.04000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.79836E-06 | 3.65610E+00 | 4.32122E+04 | 8.49896E-04 | 4.92352E+00 | 3.60831E+03 | 1.00566E+02 | 1.08551E-03 | 1.35532E-01 |
| MEDIAN | 2.84057E-06 | 3.55733E+00 | 3.59710E+03 | 7.54123E-04 | 3.33097E+00 | 5.94661E+02 | 9.01178E+01 | 1.06011E-03 | 1.17021E-01 |
| STD | 1.06895E-05 | 1.42220E+00 | 1.43409E+05 | 4.03068E-04 | 4.08878E+00 | 7.72464E+03 | 8.11411E+01 | 5.68810E-05 | 3.75107E-02 |
| IQR | 1.56516E-05 | 2.59431E+00 | 8.96510E+03 | 5.98051E-04 | 6.34835E+00 | 7.61002E+02 | 1.52281E+02 | 8.46358E-05 | 4.51257E-02 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.56192E-05 | 4.83515E+00 | 3.91746E+04 | 6.65425E-04 | 3.09205E+00 | 1.15850E+03 | 8.34612E+01 | 1.04287E-03 | 1.01161E-01 |
| MEDIAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| STD | 6.60123E-06 | 5.81929E-01 | 1.46878E+05 | 2.33913E-04 | 2.04792E+00 | 2.77162E+03 | 4.25142E+01 | 1.41186E-05 | 4.90941E-03 |
| IQR | 3.00000E-14 | 2.00000E-09 | 3.10000E-05 | 3.05100E-10 | 3.67700E-06 | 1.03980E-03 | 1.81758E-03 | 0.00000E+00 | 3.28653E-05 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| MEDIAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| STD | 1.75790E-14 | 1.20033E-09 | 1.44102E-05 | 1.58770E-13 | 1.88638E-09 | 2.36046E-07 | 7.01952E-08 | 4.37996E-19 | 2.80318E-17 |
| IQR | 3.00000E-14 | 2.00000E-09 | 2.00000E-05 | 2.00000E-13 | 2.50000E-09 | 3.50000E-07 | 9.50000E-08 | 0.00000E+00 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 5.19566E-05 | 6.32741E+00 | 1.01777E+05 | 7.49865E-04 | 6.14737E+00 | 3.19477E+03 | 9.81832E+01 | 1.44226E-03 | 4.34404E-01 |
| MEDIAN | 1.49976E-05 | 4.87135E+00 | 9.44930E+03 | 5.94386E-04 | 2.49628E+00 | 4.86725E+02 | 9.19468E+01 | 1.04114E-03 | 9.95162E-02 |
| STD | 1.13956E-04 | 3.87363E+00 | 2.62762E+05 | 1.08270E-03 | 6.81281E+00 | 1.09933E+04 | 6.38884E+01 | 1.68412E-03 | 5.32427E-01 |
| IQR | 1.62475E-05 | 1.06716E+00 | 5.52351E+03 | 5.72239E-05 | 3.63839E+00 | 2.55027E+02 | 3.17248E+01 | 1.34534E-04 | 7.99543E-01 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.05581E-05 | 4.98028E+00 | 1.49162E+04 | 8.47970E-04 | 5.32265E+00 | 1.73528E+03 | 7.46422E+01 | 1.13665E-03 | 3.43734E-01 |
| MEDIAN | 8.92925E-06 | 4.37730E+00 | 2.39072E+03 | 6.82367E-04 | 2.24432E+00 | 4.00197E+02 | 4.31606E+01 | 1.10525E-03 | 1.92311E-01 |
| STD | 7.52263E-05 | 2.99108E+00 | 5.44402E+04 | 8.74395E-04 | 6.76070E+00 | 4.91942E+03 | 7.94419E+01 | 1.22484E-04 | 2.88013E-01 |
| IQR | 2.23641E-05 | 2.59100E+00 | 2.86691E+03 | 7.54359E-04 | 5.55762E+00 | 9.20921E+02 | 1.24436E+02 | 1.28490E-04 | 3.67714E-01 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.53838E-05 | 4.89280E+00 | 1.25704E+04 | 6.15385E-04 | 2.64219E+00 | 6.40423E+02 | 8.70706E+01 | 1.03980E-03 | 9.95045E-02 |
| MEDIAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| STD | 2.68729E-06 | 1.57238E-01 | 1.84404E+04 | 1.16517E-04 | 9.77835E-01 | 9.97852E+02 | 1.74971E+01 | 1.61384E-06 | 4.14976E-06 |
| IQR | 3.50000E-14 | 2.50000E-09 | 2.85000E-05 | 2.50000E-13 | 3.00000E-09 | 4.00000E-07 | 1.35000E-07 | 0.00000E+00 | 0.00000E+00 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 7.05291E-05 | 6.29116E+00 | 6.24839E+04 | 1.21424E-03 | 1.05849E+01 | 1.63539E+03 | 5.38159E+01 | 1.14769E-03 | 4.18351E-01 |
| MEDIAN | 1.10034E-05 | 4.66909E+00 | 5.15583E+03 | 1.66807E-04 | 1.03613E+01 | 2.55793E+02 | 1.07162E+01 | 1.11812E-03 | 3.34591E-01 |
| STD | 1.20510E-04 | 4.33286E+00 | 1.66931E+05 | 2.15218E-03 | 7.87951E+00 | 4.68805E+03 | 8.00930E+01 | 1.49792E-04 | 2.63800E-01 |
| IQR | 9.38915E-05 | 6.34208E+00 | 1.31582E+04 | 1.05895E-03 | 1.27241E+01 | 2.87702E+02 | 7.69059E+01 | 1.25037E-04 | 4.79425E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| MEDIAN | 1.49976E-05 | 4.87135E+00 | 9.99775E+03 | 5.95786E-04 | 2.47050E+00 | 4.93562E+02 | 9.00067E+01 | 1.04000E-03 | 9.95037E-02 |
| STD | 2.36013E-14 | 1.58745E-09 | 1.95492E-05 | 1.84008E-13 | 2.30617E-09 | 2.92226E-07 | 9.85905E-08 | 4.37996E-19 | 2.80318E-17 |
| IQR | 3.00000E-14 | 2.00000E-09 | 2.80000E-05 | 2.00000E-13 | 3.00000E-09 | 3.50000E-07 | 1.60000E-07 | 0.00000E+00 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.21654E-04 | 7.60539E+00 | 6.08521E+05 | 2.63718E-03 | 1.83391E+01 | 8.99448E+03 | 1.20009E+02 | 8.55564E-03 | 3.69785E-01 |
| MEDIAN | 4.95093E-07 | 2.72447E+00 | 1.00000E+06 | 1.00000E-10 | 3.00000E+01 | 2.84474E+02 | 5.91392E+00 | 1.06647E-03 | 1.37158E-01 |
| STD | 4.12710E-04 | 1.00243E+01 | 4.92238E+05 | 4.19354E-03 | 1.41426E+01 | 1.91723E+04 | 1.47369E+02 | 2.37014E-02 | 4.72023E-01 |
| IQR | 5.71259E-05 | 3.98140E+00 | 9.98330E+05 | 3.14477E-03 | 2.95000E+01 | 4.15526E+02 | 2.85662E+02 | 1.83505E-04 | 7.52508E-02 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.54049E-05 | 4.63641E+00 | 5.41300E+04 | 8.56276E-04 | 5.61286E+00 | 1.57011E+03 | 3.83416E+01 | 1.05076E-03 | 1.06501E-01 |
| MEDIAN | 1.25971E-05 | 4.70015E+00 | 6.57438E+03 | 7.77851E-04 | 5.26519E+00 | 8.15414E+02 | 9.49987E+00 | 1.04056E-03 | 1.01111E-01 |
| STD | 1.20534E-05 | 1.01749E+00 | 1.20224E+05 | 2.73197E-04 | 2.51098E+00 | 2.81445E+03 | 4.94703E+01 | 2.19246E-05 | 1.32839E-02 |
| IQR | 2.32307E-05 | 1.92994E+00 | 2.01415E+04 | 2.51877E-04 | 3.19813E+00 | 4.57840E+02 | 6.33788E+01 | 3.31586E-05 | 7.69143E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.55178E-04 | 1.16722E+01 | 6.74738E+04 | 1.70713E-03 | 1.36118E+01 | 1.13345E+03 | 2.73746E+01 | 1.19290E-03 | 6.60133E-01 |
| MEDIAN | 2.14839E-04 | 1.18740E+01 | 1.28698E+04 | 2.07337E-04 | 1.32083E+01 | 1.60565E+02 | 3.69136E+00 | 1.15263E-03 | 6.57795E-01 |
| STD | 2.28558E-04 | 5.81717E+00 | 1.81817E+05 | 2.46664E-03 | 8.85857E+00 | 3.92061E+03 | 5.34016E+01 | 1.62653E-04 | 2.62856E-01 |
| IQR | 3.65748E-04 | 9.65155E+00 | 3.88236E+04 | 2.85296E-03 | 1.51416E+01 | 2.29861E+02 | 2.17020E+01 | 1.37760E-04 | 3.71118E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.96823E-04 | 1.25891E+01 | 3.25799E+04 | 1.24805E-03 | 1.50060E+01 | 8.16217E+02 | 2.41474E+01 | 1.56126E-03 | 1.02250E+00 |
| MEDIAN | 2.77596E-05 | 1.03837E+01 | 1.53188E+03 | 1.28826E-06 | 1.46694E+01 | 1.03892E+02 | 1.15011E+00 | 1.25925E-03 | 1.00020E+00 |
| STD | 2.85104E-04 | 9.20725E+00 | 1.34996E+05 | 2.47821E-03 | 9.64705E+00 | 2.69099E+03 | 5.58393E+01 | 9.32773E-04 | 4.15987E-01 |
| IQR | 3.10832E-04 | 1.69993E+01 | 7.93101E+03 | 5.60656E-04 | 1.77378E+01 | 2.84312E+02 | 1.43782E+01 | 5.05524E-04 | 8.02560E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.35026E-04 | 9.96170E+00 | 1.19886E+05 | 2.12417E-03 | 1.51872E+01 | 4.68752E+03 | 1.09268E+02 | 1.63127E-02 | 9.94650E-01 |
| MEDIAN | 2.98697E-07 | 5.01116E+00 | 1.19836E+03 | 1.77957E-07 | 1.55980E+01 | 2.90983E+02 | 1.69384E+01 | 1.44070E-03 | 1.10043E+00 |
| STD | 3.84494E-04 | 9.69983E+00 | 3.22577E+05 | 3.65337E-03 | 9.89640E+00 | 1.34771E+04 | 1.47383E+02 | 2.88413E-02 | 6.49101E-01 |
| IQR | 2.84441E-04 | 1.39057E+01 | 5.93316E+03 | 3.66564E-03 | 1.72990E+01 | 3.30445E+02 | 2.38480E+02 | 9.50611E-03 | 1.40045E+00 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.48175E-04 | 1.06628E+01 | 1.96112E+05 | 1.58121E-03 | 1.20454E+01 | 3.56004E+03 | 3.25340E+01 | 2.31363E-03 | 7.41655E-01 |
| MEDIAN | 4.99052E-05 | 7.05898E+00 | 4.60904E+03 | 1.29376E-04 | 6.28470E+00 | 2.23731E+02 | 6.46792E+00 | 1.18070E-03 | 8.16433E-01 |
| STD | 3.37471E-04 | 8.26648E+00 | 3.79195E+05 | 2.87210E-03 | 1.11226E+01 | 1.17953E+04 | 5.64323E+01 | 7.62385E-03 | 4.03780E-01 |
| IQR | 4.75198E-04 | 1.34104E+01 | 6.21178E+04 | 1.35656E-03 | 1.99688E+01 | 2.49973E+02 | 2.49406E+01 | 2.18951E-04 | 6.19593E-01 |
|  |  |  |  |  | ***T* = 350 K** |  |  |  |  |
| true value | 1.50000E-05 | 4.73233E+00 | 1.00000E+04 | 8.79718E-04 | 2.42857E+00 | 3.61363E+02 | 1.00000E+02 | 1.05000E-03 | 5.55000E+02 |
| **DE** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.69397E-06 | 3.43654E+00 | 2.58081E+04 | 1.14107E-03 | 6.15066E+00 | 1.49222E+03 | 9.12705E+01 | 1.09968E-03 | 1.22682E-01 |
| MEDIAN | 5.41709E-07 | 2.70681E+00 | 2.17421E+03 | 9.53584E-04 | 4.58884E+00 | 3.40978E+02 | 8.89378E+01 | 1.10859E-03 | 1.17118E-01 |
| STD | 1.31687E-05 | 1.42887E+00 | 9.42210E+04 | 7.70324E-04 | 5.19901E+00 | 2.84500E+03 | 7.64629E+01 | 4.34113E-05 | 2.12294E-02 |
| IQR | 1.53139E-05 | 2.52440E+00 | 3.81052E+03 | 8.76618E-04 | 6.50400E+00 | 5.64781E+02 | 1.40120E+02 | 8.01679E-05 | 2.92000E-02 |
| **EBLSHADE** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.76605E-05 | 4.88026E+00 | 3.82528E+04 | 8.62261E-04 | 2.66469E+00 | 4.13813E+02 | 8.96591E+01 | 1.04911E-03 | 1.00169E-01 |
| MEDIAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| STD | 6.78709E-06 | 3.72693E-01 | 1.43101E+05 | 2.07871E-04 | 1.03168E+00 | 3.40682E+02 | 2.82531E+01 | 3.18981E-06 | 1.90530E-03 |
| IQR | 3.00000E-14 | 2.00000E-09 | 2.00000E-05 | 1.35000E-12 | 5.00000E-09 | 9.50000E-07 | 1.75000E-07 | 0.00000E+00 | 0.00000E+00 |
| **ADELI** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| MEDIAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| STD | 1.76302E-14 | 1.29645E-09 | 1.54869E-05 | 8.07922E-13 | 4.86000E-09 | 5.93461E-07 | 1.07962E-07 | 6.56994E-19 | 4.20476E-17 |
| IQR | 3.00000E-14 | 2.00000E-09 | 2.00000E-05 | 1.25000E-12 | 7.50000E-09 | 9.00000E-07 | 1.55000E-07 | 0.00000E+00 | 0.00000E+00 |
| **NDE** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.14512E-05 | 4.81662E+00 | 1.04285E+04 | 1.14885E-03 | 6.32159E+00 | 1.36983E+03 | 7.88813E+01 | 1.10430E-03 | 2.34604E-01 |
| MEDIAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42932E+00 | 3.61374E+02 | 9.99893E+01 | 1.05000E-03 | 9.95046E-02 |
| STD | 3.70972E-05 | 1.67544E+00 | 6.54716E+03 | 1.22991E-03 | 6.91420E+00 | 3.79787E+03 | 3.39401E+01 | 1.54948E-04 | 3.51097E-01 |
| IQR | 4.48012E-06 | 3.07542E-01 | 3.79454E+03 | 3.58447E-04 | 4.86176E+00 | 2.12881E+02 | 4.00536E+01 | 4.36090E-06 | 2.15188E-05 |
| **MABC** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.30593E-05 | 4.20685E+00 | 5.03637E+04 | 9.30677E-04 | 7.43217E+00 | 9.34217E+02 | 6.84413E+01 | 1.15569E-03 | 2.03232E-01 |
| MEDIAN | 3.56101E-06 | 3.58582E+00 | 3.21006E+03 | 4.51102E-04 | 3.12914E+00 | 2.41633E+02 | 2.99907E+01 | 1.07626E-03 | 1.16524E-01 |
| STD | 5.84140E-05 | 2.65468E+00 | 1.56967E+05 | 1.44826E-03 | 8.28260E+00 | 2.76505E+03 | 7.66201E+01 | 4.11432E-04 | 2.55094E-01 |
| IQR | 2.23295E-05 | 3.10343E+00 | 1.00377E+04 | 1.06199E-03 | 9.60657E+00 | 1.87791E+02 | 1.19346E+02 | 9.81028E-05 | 4.82567E-02 |
| **TLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.56730E-05 | 4.76234E+00 | 1.08441E+04 | 1.03596E-03 | 3.20617E+00 | 3.32055E+03 | 9.26285E+01 | 1.04986E-03 | 9.95092E-02 |
| MEDIAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| STD | 3.25043E-06 | 2.51594E-01 | 2.68810E+03 | 3.74343E-04 | 1.95642E+00 | 9.48578E+03 | 2.73570E+01 | 3.85660E-06 | 2.34852E-05 |
| IQR | 6.50000E-14 | 4.50000E-09 | 5.00000E-05 | 2.55000E-12 | 1.40000E-08 | 1.95000E-06 | 3.90000E-07 | 1.00000E-12 | 5.79900E-08 |
| **GOTLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 8.54154E-05 | 6.75483E+00 | 7.62391E+04 | 9.60102E-04 | 1.30100E+01 | 8.50839E+02 | 3.61071E+01 | 1.12442E-03 | 3.83567E-01 |
| MEDIAN | 1.65454E-05 | 5.07993E+00 | 7.12981E+03 | 5.27489E-05 | 1.21436E+01 | 1.72948E+02 | 4.66429E+00 | 1.10108E-03 | 3.10471E-01 |
| STD | 1.20562E-04 | 4.04633E+00 | 2.03734E+05 | 1.92009E-03 | 9.04385E+00 | 2.68740E+03 | 5.87908E+01 | 1.02163E-04 | 2.63264E-01 |
| IQR | 1.53143E-04 | 6.63110E+00 | 3.53413E+04 | 1.08914E-03 | 1.34751E+01 | 1.86087E+02 | 4.67860E+01 | 6.56280E-05 | 4.41560E-01 |
| **STLBO** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| MEDIAN | 1.50032E-05 | 4.73254E+00 | 1.00036E+04 | 8.79718E-04 | 2.42874E+00 | 3.61374E+02 | 9.99915E+01 | 1.05000E-03 | 9.95037E-02 |
| STD | 2.22781E-14 | 1.63515E-09 | 2.00841E-05 | 1.16780E-12 | 6.68085E-09 | 8.41544E-07 | 1.40198E-07 | 2.37635E-13 | 4.20476E-17 |
| IQR | 3.00000E-14 | 2.50000E-09 | 3.00000E-05 | 1.65000E-12 | 1.00000E-08 | 1.25000E-06 | 2.00000E-07 | 0.00000E+00 | 0.00000E+00 |
| **PSO** |  |  |  |  |  |  |  |  |  |
| MEAN | 7.25675E-05 | 5.02539E+00 | 5.11025E+05 | 3.33443E-03 | 1.95109E+01 | 1.39492E+04 | 1.45821E+02 | 1.28303E-02 | 4.38373E-01 |
| MEDIAN | 3.23114E-06 | 3.46955E+00 | 5.06623E+05 | 2.10611E-04 | 3.00000E+01 | 1.24223E+02 | 1.35643E+02 | 1.04811E-03 | 1.28175E-01 |
| STD | 2.41560E-04 | 6.45878E+00 | 5.03626E+05 | 4.30218E-03 | 1.29049E+01 | 2.24223E+04 | 1.40544E+02 | 2.67301E-02 | 6.33459E-01 |
| IQR | 9.41973E-06 | 2.62292E+00 | 9.98589E+05 | 1.00000E-02 | 2.78744E+01 | 4.99897E+04 | 2.34377E+02 | 1.68255E-04 | 3.61187E-02 |
| **IJAYA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.43859E-05 | 4.46263E+00 | 3.48681E+04 | 1.30829E-03 | 7.82133E+00 | 1.91100E+03 | 3.77466E+01 | 1.06194E-03 | 1.05522E-01 |
| MEDIAN | 1.24540E-05 | 4.57213E+00 | 5.25571E+03 | 1.14765E-03 | 7.56814E+00 | 6.10271E+02 | 7.61560E+00 | 1.05579E-03 | 1.01940E-01 |
| STD | 1.05876E-05 | 9.28048E-01 | 1.24185E+05 | 5.39619E-04 | 4.34077E+00 | 5.55987E+03 | 5.83388E+01 | 2.29665E-05 | 8.17914E-03 |
| IQR | 1.75718E-05 | 1.44702E+00 | 1.39039E+04 | 8.14092E-04 | 6.11684E+00 | 6.08394E+02 | 4.41557E+01 | 3.08393E-05 | 7.09278E-03 |
| **ISCA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.50131E-04 | 8.89807E+00 | 1.05563E+05 | 1.66180E-03 | 1.26885E+01 | 1.02562E+03 | 1.85482E+01 | 1.16642E-03 | 6.40744E-01 |
| MEDIAN | 1.02769E-04 | 8.64490E+00 | 8.75361E+03 | 2.95090E-04 | 1.20682E+01 | 1.60420E+02 | 3.87085E+00 | 1.13401E-03 | 6.56746E-01 |
| STD | 1.46524E-04 | 4.20787E+00 | 2.05815E+05 | 2.57694E-03 | 7.86932E+00 | 2.84644E+03 | 2.83567E+01 | 1.02773E-04 | 2.73669E-01 |
| IQR | 2.03003E-04 | 6.41871E+00 | 9.58805E+04 | 2.42769E-03 | 1.25917E+01 | 2.60129E+02 | 1.85336E+01 | 1.35898E-04 | 4.19912E-01 |
| **NNA** |  |  |  |  |  |  |  |  |  |
| MEAN | 1.26054E-04 | 9.98644E+00 | 3.29076E+04 | 7.01347E-04 | 1.53889E+01 | 3.75533E+02 | 2.62488E+01 | 1.82813E-03 | 8.34411E-01 |
| MEDIAN | 2.01088E-05 | 7.29681E+00 | 2.34230E+03 | 1.62772E-06 | 1.44230E+01 | 1.02973E+02 | 1.74503E+00 | 1.16825E-03 | 7.94328E-01 |
| STD | 1.96453E-04 | 7.54130E+00 | 1.04300E+05 | 2.00796E-03 | 8.35224E+00 | 1.19007E+03 | 5.34795E+01 | 3.35504E-03 | 4.65190E-01 |
| IQR | 2.19288E-04 | 1.02398E+01 | 1.93101E+04 | 7.10653E-05 | 1.34784E+01 | 1.88704E+02 | 2.92703E+01 | 3.06791E-04 | 5.98379E-01 |
| **CWOA** |  |  |  |  |  |  |  |  |  |
| MEAN | 3.07406E-04 | 1.16799E+01 | 8.55418E+04 | 2.30518E-03 | 1.55286E+01 | 3.57714E+03 | 8.52064E+01 | 1.13903E-02 | 9.48378E-01 |
| MEDIAN | 2.08594E-05 | 5.76655E+00 | 1.40068E+03 | 1.47191E-05 | 1.56516E+01 | 2.52279E+02 | 8.12653E+00 | 1.26817E-03 | 9.98901E-01 |
| STD | 4.19368E-04 | 1.02479E+01 | 2.70365E+05 | 3.71354E-03 | 1.05186E+01 | 1.18680E+04 | 1.22897E+02 | 2.46765E-02 | 7.48635E-01 |
| IQR | 6.88717E-04 | 1.71049E+01 | 4.39332E+03 | 2.28832E-03 | 2.06732E+01 | 3.39655E+02 | 1.50975E+02 | 5.18315E-03 | 1.65244E+00 |
| **WW** |  |  |  |  |  |  |  |  |  |
| MEAN | 2.75714E-04 | 1.09139E+01 | 2.74259E+05 | 4.00199E-03 | 1.03581E+01 | 5.08693E+03 | 5.04411E+01 | 1.38793E-03 | 8.71434E-01 |
| MEDIAN | 9.77243E-05 | 8.34191E+00 | 7.01043E+03 | 1.64437E-03 | 7.66904E+00 | 1.07109E+02 | 1.62179E+01 | 1.18914E-03 | 8.46548E-01 |
| STD | 3.45977E-04 | 7.80210E+00 | 4.31976E+05 | 4.22991E-03 | 1.00880E+01 | 1.49616E+04 | 6.79048E+01 | 9.43810E-04 | 4.00295E-01 |
| IQR | 4.33127E-04 | 1.11635E+01 | 6.58580E+05 | 9.77137E-03 | 1.61542E+01 | 1.93634E+02 | 9.05761E+01 | 2.32756E-04 | 6.04344E-01 |

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| --- | --- | --- | --- | --- | --- |
| **Table S155.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (DE is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 2.29810E-08 | 2.29810E-08 | 2.29810E-08 | 2.29810E-08 |
|  | Friedman Aligned | 8.47789E-11 | 1.56515E-10 | 1.55951E-10 | 1.56515E-10 |
|  | Quade | 3.76631E-01 | 1.0 | 1.0 | 6.58260E-01 |
| CWOA | Friedman | 1.05597E-07 | 1.94949E-07 | 1.94949E-07 | 1.94949E-07 |
|  | Friedman Aligned | 1.54745E-10 | 4.76139E-10 | 4.58363E-10 | 4.76139E-10 |
|  | Quade | 3.76631E-01 | 7.78425E-01 | 7.78425E-01 | 5.52832E-01 |
| PSO | Friedman | 2.13595E-07 | 5.42203E-07 | 5.42203E-07 | 5.42202E-07 |
|  | Friedman Aligned | 2.39185E-10 | 8.83146E-10 | 8.83146E-10 | 8.83146E-10 |
|  | Quade | 3.76631E-01 | 4.64129E-01 | 4.64129E-01 | 3.76631E-01 |
| ISCA | Friedman | 1.19223E-06 | 3.66839E-06 | 3.66839E-06 | 3.66838E-06 |
|  | Friedman Aligned | 1.54745E-10 | 4.76139E-10 | 4.58363E-10 | 4.76139E-10 |
|  | Quade | 4.25757E-01 | 1.0 | 1.0 | 8.18550E-01 |
| WW | Friedman | 6.91165E-06 | 2.39250E-05 | 2.39250E-05 | 2.39247E-05 |
|  | Friedman Aligned | 8.47789E-11 | 1.56515E-10 | 1.55951E-10 | 1.56515E-10 |
|  | Quade | 4.84274E-01 | 1.0 | 1.0 | 8.98952E-01 |
| GOTLBO | Friedman | 1.16713E-02 | 4.32304E-02 | 4.32304E-02 | 4.24216E-02 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.25712E-01 | 1.0 | 1.0 | 9.98420E-01 |
| MABC | Friedman | 1.64623E-01 | 6.46181E-01 | 6.46181E-01 | 4.92358E-01 |
|  | Friedman Aligned | 2.85170E-09 | 1.07487E-08 | 1.07487E-08 | 1.07487E-08 |
|  | Quade | 8.53843E-01 | 1.0 | 1.0 | 9.99289E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S155** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S156.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (EBLSHADE is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.30617E-03 | 4.52317E-03 | 4.52317E-03 | 4.51409E-03 |
| MABC | Friedman | 2.68452E-13 | 4.95604E-13 | 4.95604E-13 | 4.95604E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.18584E-02 | 4.48199E-02 | 4.48199E-02 | 4.39681E-02 |
| GOTLBO | Friedman | 1.68209E-10 | 4.26991E-10 | 4.26991E-10 | 4.26991E-10 |
|  | Friedman Aligned | 5.52549E-11 | 2.04018E-10 | 2.04018E-10 | 2.04018E-10 |
|  | Quade | 9.21013E-03 | 3.40914E-02 | 3.40914E-02 | 3.35872E-02 |
| DE | Friedman | 6.52150E-10 | 2.00661E-09 | 1.86258E-09 | 2.00661E-09 |
|  | Friedman Aligned | 1.86733E-09 | 6.46383E-09 | 6.46383E-09 | 6.46383E-09 |
|  | Quade | 3.78658E-02 | 1.40848E-01 | 1.40848E-01 | 1.32837E-01 |
| ISCA | Friedman | 6.52150E-10 | 2.00661E-09 | 1.86258E-09 | 2.00661E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 7.54340E-04 | 2.32165E-03 | 2.32165E-03 | 2.31923E-03 |
| PSO | Friedman | 1.13825E-09 | 4.20278E-09 | 4.20278E-09 | 4.20278E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.64554E-04 | 1.64567E-04 | 1.64567E-04 | 1.64554E-04 |
| CWOA | Friedman | 1.53596E-09 | 5.78937E-09 | 5.78937E-09 | 5.78937E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 2.55177E-04 | 4.71146E-04 | 4.71146E-04 | 4.71045E-04 |
| NNA | Friedman | 3.01406E-09 | 1.11288E-08 | 1.11288E-08 | 1.11288E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 3.45157E-04 | 8.76285E-04 | 8.76285E-04 | 8.75936E-04 |
| **Table S156** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 4.00976E-06 | 1.38799E-05 | 1.38799E-05 | 1.38799E-05 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.52655E-01 | 5.41737E-01 | 5.41737E-01 | 4.36390E-01 |
| NDE | Friedman | 1.44050E-01 | 4.51073E-01 | 4.51073E-01 | 3.80347E-01 |
|  | Friedman Aligned | 4.74587E-01 | 1.0 | 1.0 | 8.61961E-01 |
|  | Quade | 6.69739E-01 | 1.0 | 1.0 | 9.66920E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S157.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (ADELI is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 5.85354E-04 | 2.20663E-03 | 2.20663E-03 | 2.20455E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 2.06564E-06 | 2.06565E-06 | 2.06565E-06 | 2.06564E-06 |
| ISCA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.68471E-05 | 5.18374E-05 | 5.18374E-05 | 5.18362E-05 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 6.17579E-06 | 1.56771E-05 | 1.56771E-05 | 1.56769E-05 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 3.96937E-06 | 7.32807E-06 | 7.32807E-06 | 7.32805E-06 |
| WW | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 3.45304E-05 | 1.19530E-04 | 1.19530E-04 | 1.19523E-04 |
| IJAYA | Friedman | 3.39792E-13 | 1.28075E-12 | 1.28075E-12 | 1.28075E-12 |
|  | Friedman Aligned | 5.86654E-11 | 2.16611E-10 | 2.16611E-10 | 2.16611E-10 |
|  | Quade | 1.88316E-02 | 6.53767E-02 | 6.53767E-02 | 6.36893E-02 |
| DE | Friedman | 3.97017E-11 | 1.46591E-10 | 1.46591E-10 | 1.46591E-10 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 2.72842E-03 | 1.00795E-02 | 1.00795E-02 | 1.00372E-02 |
| **Table S157** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 7.91529E-10 | 2.73991E-09 | 2.73991E-09 | 2.73991E-09 |
|  | Friedman Aligned | 7.86484E-11 | 2.72244E-10 | 2.72244E-10 | 2.72244E-10 |
|  | Quade | 4.08003E-04 | 1.50664E-03 | 1.50664E-03 | 1.50565E-03 |
| NDE | Friedman | 2.43840E-05 | 7.50278E-05 | 7.50278E-05 | 7.50257E-05 |
|  | Friedman Aligned | 4.29787E-02 | 1.32910E-01 | 1.32910E-01 | 1.26431E-01 |
|  | Quade | 1.90667E-01 | 6.00708E-01 | 6.00708E-01 | 4.78428E-01 |
| EBLSHADE | Friedman | 8.35516E-03 | 2.12229E-02 | 2.12229E-02 | 2.10732E-02 |
|  | Friedman Aligned | 2.36221E-01 | 6.11673E-01 | 6.11673E-01 | 4.95434E-01 |
|  | Quade | 4.32702E-01 | 1.0 | 8.37312E-01 | 7.62830E-01 |
| STLBO | Friedman | 3.89796E-01 | 7.32328E-01 | 5.00736E-01 | 5.98252E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 8.19430E-01 | 1.0 | 8.37312E-01 | 9.57572E-01 |
| TLBO | Friedman | 5.00736E-01 | 7.32328E-01 | 5.00736E-01 | 5.98252E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 8.37312E-01 | 1.0 | 8.37312E-01 | 9.57572E-01 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S158.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (NDE is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | 5.41163E-11 | 1.87326E-10 | 1.87326E-10 | 1.87326E-10 |
|  | Quade | 3.10829E-03 | 7.89971E-03 | 7.89971E-03 | 7.87141E-03 |
| GOTLBO | Friedman | 3.00204E-13 | 5.54223E-13 | 5.54223E-13 | 5.54223E-13 |
|  | Friedman Aligned | 4.81828E-11 | 1.77906E-10 | 1.44500E-10 | 1.77906E-10 |
|  | Quade | 4.64595E-02 | 1.73741E-01 | 1.73741E-01 | 1.61093E-01 |
| MABC | Friedman | 4.61314E-10 | 1.17103E-09 | 1.17103E-09 | 1.17103E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 5.59004E-02 | 2.13496E-01 | 2.13496E-01 | 1.94925E-01 |
| WW | Friedman | 6.25900E-10 | 1.92585E-09 | 1.92585E-09 | 1.92585E-09 |
|  | Friedman Aligned | 4.81828E-11 | 1.77906E-10 | 1.44500E-10 | 1.77906E-10 |
|  | Quade | 9.17697E-03 | 3.18566E-02 | 3.18566E-02 | 3.14092E-02 |
| ISCA | Friedman | 2.74325E-09 | 9.49587E-09 | 9.49587E-09 | 9.49587E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 5.89940E-03 | 1.81892E-02 | 1.81892E-02 | 1.80410E-02 |
| PSO | Friedman | 9.70417E-09 | 3.58308E-08 | 3.58308E-08 | 3.58308E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.85637E-03 | 1.85796E-03 | 1.85796E-03 | 1.85637E-03 |
| CWOA | Friedman | 1.66888E-08 | 6.29039E-08 | 6.29039E-08 | 6.29039E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 2.51164E-03 | 4.64181E-03 | 4.64181E-03 | 4.63194E-03 |
| DE | Friedman | 2.78979E-06 | 1.03008E-05 | 1.03008E-05 | 1.03007E-05 |
|  | Friedman Aligned | 4.81828E-11 | 1.77906E-10 | 1.44500E-10 | 1.77906E-10 |
|  | Quade | 1.39964E-01 | 5.31682E-01 | 5.31682E-01 | 4.26920E-01 |
| **Table S158** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| IJAYA | Friedman | 2.78592E-03 | 9.64770E-03 | 9.64770E-03 | 9.61054E-03 |
|  | Friedman Aligned | 6.97744E-12 | 2.41527E-11 | 2.41527E-11 | 2.41527E-11 |
|  | Quade | 3.98964E-01 | 1.0 | 1.0 | 8.28345E-01 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S159.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (MABC is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 1.84192E-04 | 1.84208E-04 | 1.84208E-04 | 1.84192E-04 |
|  | Friedman Aligned | 2.16462E-08 | 7.49292E-08 | 7.49292E-08 | 7.49292E-08 |
|  | Quade | 7.49843E-01 | 1.0 | 1.0 | 9.37539E-01 |
| CWOA | Friedman | 4.68826E-04 | 8.65696E-04 | 8.65696E-04 | 8.65353E-04 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 7.49843E-01 | 1.0 | 1.0 | 8.86660E-01 |
| PSO | Friedman | 6.95410E-04 | 1.76574E-03 | 1.76574E-03 | 1.76433E-03 |
|  | Friedman Aligned | 9.16590E-11 | 2.82028E-10 | 2.82028E-10 | 2.82028E-10 |
|  | Quade | 7.49843E-01 | 1.0 | 1.0 | 7.49843E-01 |
| ISCA | Friedman | 2.17168E-03 | 6.68712E-03 | 6.68712E-03 | 6.66704E-03 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 7.49843E-01 | 1.0 | 1.0 | 9.84244E-01 |
| WW | Friedman | 6.72782E-03 | 2.33370E-02 | 2.33370E-02 | 2.30964E-02 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 7.90139E-01 | 1.0 | 1.0 | 9.95504E-01 |
| GOTLBO | Friedman | 4.97246E-01 | 1.0 | 1.0 | 9.21057E-01 |
|  | Friedman Aligned | 2.83114E-07 | 1.04534E-06 | 1.04534E-06 | 1.04534E-06 |
|  | Quade | 9.92459E-01 | 1.0 | 1.0 | 1.00000E+00 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S159** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S160.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (TLBO is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | 7.88357E-11 | 2.72893E-10 | 2.72893E-10 | 2.72893E-10 |
|  | Quade | 9.04101E-04 | 3.33903E-03 | 3.33903E-03 | 3.33416E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 6.15979E-06 | 6.15981E-06 | 6.15981E-06 | 6.15979E-06 |
| ISCA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 4.38663E-05 | 1.34975E-04 | 1.34975E-04 | 1.34967E-04 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.69424E-05 | 4.30078E-05 | 4.30078E-05 | 4.30070E-05 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.12542E-05 | 2.07771E-05 | 2.07771E-05 | 2.07769E-05 |
| DE | Friedman | 9.58345E-13 | 3.53850E-12 | 3.53850E-12 | 3.53850E-12 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 5.39136E-03 | 1.99273E-02 | 1.99273E-02 | 1.97625E-02 |
| IJAYA | Friedman | 4.01779E-11 | 1.51440E-10 | 1.51440E-10 | 1.51440E-10 |
|  | Friedman Aligned | 6.08664E-11 | 2.24738E-10 | 2.24738E-10 | 2.24738E-10 |
|  | Quade | 3.27993E-02 | 1.14117E-01 | 1.14117E-01 | 1.09026E-01 |
| MABC | Friedman | 3.86006E-09 | 1.42525E-08 | 1.42525E-08 | 1.42525E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.26435E-03 | 4.76701E-03 | 4.76701E-03 | 4.75728E-03 |
| **Table S160** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| WW | Friedman | 1.00418E-08 | 3.47602E-08 | 3.47602E-08 | 3.47602E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.64072E-05 | 2.99110E-04 | 2.99110E-04 | 2.99070E-04 |
| NDE | Friedman | 4.04427E-04 | 1.24445E-03 | 1.24445E-03 | 1.24387E-03 |
|  | Friedman Aligned | 4.22263E-02 | 1.30571E-01 | 1.30571E-01 | 1.24316E-01 |
|  | Quade | 2.72841E-01 | 8.69448E-01 | 8.69448E-01 | 6.24816E-01 |
| EBLSHADE | Friedman | 5.10673E-02 | 1.30152E-01 | 1.30152E-01 | 1.24587E-01 |
|  | Friedman Aligned | 2.33358E-01 | 6.04098E-01 | 6.04098E-01 | 4.90618E-01 |
|  | Quade | 5.61708E-01 | 1.0 | 1.0 | 8.76795E-01 |
| STLBO | Friedman | 8.41920E-01 | 1.0 | 1.0 | 9.66810E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 9.65693E-01 | 1.0 | 1.0 | 9.98023E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 9.96305E-01 | 1.0 | 1.0 | 9.99968E-01 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

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| --- | --- | --- | --- | --- | --- |
| **Table S161.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (GOTLBO is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 1.52876E-02 | 1.53966E-02 | 1.53966E-02 | 1.52876E-02 |
|  | Friedman Aligned | <1E-13 | 1.64313E-13 | 1.64313E-13 | 1.64313E-13 |
|  | Quade | 8.40301E-01 | 1.0 | 1.0 | 9.71745E-01 |
| CWOA | Friedman | 2.63386E-02 | 4.91760E-02 | 4.91760E-02 | 4.80826E-02 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.40301E-01 | 1.0 | 1.0 | 9.40882E-01 |
| PSO | Friedman | 3.19246E-02 | 8.20536E-02 | 8.20536E-02 | 7.90607E-02 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.40301E-01 | 1.0 | 1.0 | 8.40301E-01 |
| ISCA | Friedman | 6.74279E-02 | 2.12506E-01 | 2.12506E-01 | 1.93294E-01 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.40301E-01 | 1.0 | 1.0 | 9.94931E-01 |
| WW | Friedman | 1.38347E-01 | 5.00951E-01 | 5.00951E-01 | 4.02758E-01 |
|  | Friedman Aligned | 1.15463E-13 | 3.99680E-13 | 3.99680E-13 | 3.99680E-13 |
|  | Quade | 8.62992E-01 | 1.0 | 1.0 | 9.98972E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S161** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S162.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (STLBO is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | 1.35278E-10 | 5.09895E-10 | 5.09895E-10 | 5.09895E-10 |
|  | Quade | 1.11445E-03 | 4.11614E-03 | 4.11614E-03 | 4.10873E-03 |
| PSO | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 8.22938E-06 | 8.22941E-06 | 8.22941E-06 | 8.22938E-06 |
| NNA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 2.21284E-05 | 5.61727E-05 | 5.61727E-05 | 5.61713E-05 |
| CWOA | Friedman | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.48311E-05 | 2.73807E-05 | 2.73807E-05 | 2.73803E-05 |
| DE | Friedman | 2.32081E-13 | 8.03357E-13 | 8.03357E-13 | 8.03357E-13 |
|  | Friedman Aligned | 1.74950E-09 | 6.45968E-09 | 6.45968E-09 | 6.45968E-09 |
|  | Quade | 6.44257E-03 | 2.38175E-02 | 2.38175E-02 | 2.35824E-02 |
| IJAYA | Friedman | 2.17645E-10 | 8.03613E-10 | 8.03613E-10 | 8.03613E-10 |
|  | Friedman Aligned | 3.63299E-09 | 1.25757E-08 | 1.25757E-08 | 1.25757E-08 |
|  | Quade | 3.78757E-02 | 1.31885E-01 | 1.31885E-01 | 1.25109E-01 |
| MABC | Friedman | 1.75608E-09 | 6.61909E-09 | 6.61909E-09 | 6.61909E-09 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.54776E-03 | 5.83595E-03 | 5.83595E-03 | 5.82137E-03 |
| WW | Friedman | 7.44635E-09 | 2.74942E-08 | 2.74942E-08 | 2.74942E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 1.10078E-04 | 3.81053E-04 | 3.81053E-04 | 3.80989E-04 |
| **Table S162** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| ISCA | Friedman | 1.32325E-08 | 4.58048E-08 | 4.58048E-08 | 4.58048E-08 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 5.64886E-05 | 1.73815E-04 | 1.73815E-04 | 1.73801E-04 |
| NDE | Friedman | 9.57698E-04 | 2.94709E-03 | 2.94709E-03 | 2.94383E-03 |
|  | Friedman Aligned | 2.69373E-03 | 8.29097E-03 | 8.29097E-03 | 8.26522E-03 |
|  | Quade | 2.98714E-01 | 9.55486E-01 | 9.55486E-01 | 6.64392E-01 |
| EBLSHADE | Friedman | 8.62842E-02 | 2.20533E-01 | 2.20533E-01 | 2.04719E-01 |
|  | Friedman Aligned | 3.10807E-02 | 7.90881E-02 | 7.90881E-02 | 7.70214E-02 |
|  | Quade | 5.99120E-01 | 1.0 | 1.0 | 9.01765E-01 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 3.64522E-01 | 6.83937E-01 | 3.45600E-01 | 5.66995E-01 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 3.64522E-01 | 6.83937E-01 | 3.45600E-01 | 5.66995E-01 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S163.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (PSO is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 9.99983E-01 | 1.0 | 1.0 | 9.99983E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 9.99995E-01 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S163** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S164.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (IJAYA is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 | 2.30926E-13 |
|  | Friedman Aligned | 1.12499E-10 | 3.46150E-10 | 3.31155E-10 | 3.46150E-10 |
|  | Quade | 8.09700E-02 | 2.12264E-01 | 2.12264E-01 | 1.92925E-01 |
| CWOA | Friedman | 1.65112E-12 | 3.04823E-12 | 3.04823E-12 | 3.04823E-12 |
|  | Friedman Aligned | 1.89312E-10 | 6.98998E-10 | 6.38521E-10 | 6.98998E-10 |
|  | Quade | 7.67278E-02 | 1.46479E-01 | 1.46479E-01 | 1.37035E-01 |
| PSO | Friedman | 4.53770E-12 | 1.15188E-11 | 1.15188E-11 | 1.15188E-11 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 7.25355E-02 | 7.50831E-02 | 7.50831E-02 | 7.25355E-02 |
| ISCA | Friedman | 4.61124E-11 | 1.41884E-10 | 1.41884E-10 | 1.41884E-10 |
|  | Friedman Aligned | 1.89312E-10 | 6.98998E-10 | 6.38521E-10 | 6.98998E-10 |
|  | Quade | 1.18124E-01 | 3.79398E-01 | 3.79398E-01 | 3.20761E-01 |
| WW | Friedman | 4.92686E-10 | 1.70545E-09 | 1.70545E-09 | 1.70545E-09 |
|  | Friedman Aligned | 1.12499E-10 | 3.46150E-10 | 3.31155E-10 | 3.46150E-10 |
|  | Quade | 1.50884E-01 | 5.48728E-01 | 5.48728E-01 | 4.32304E-01 |
| GOTLBO | Friedman | 1.73282E-05 | 6.39812E-05 | 6.39812E-05 | 6.39794E-05 |
|  | Friedman Aligned | <1E-13 | <1E-13 | <1E-13 | <1E-13 |
|  | Quade | 4.00601E-01 | 1.0 | 1.0 | 8.48902E-01 |
| MABC | Friedman | 1.41255E-03 | 5.32597E-03 | 5.32597E-03 | 5.31383E-03 |
|  | Friedman Aligned | 2.50170E-13 | 6.35048E-13 | 6.35048E-13 | 6.35048E-13 |
|  | Quade | 4.31768E-01 | 1.0 | 1.0 | 8.81218E-01 |
| DE | Friedman | 1.45627E-01 | 5.53869E-01 | 5.53869E-01 | 4.40731E-01 |
|  | Friedman Aligned | 6.44412E-02 | 2.40977E-01 | 2.40977E-01 | 2.18038E-01 |
|  | Quade | 6.85516E-01 | 1.0 | 1.0 | 9.86037E-01 |
| **Table S164** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S165.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (ISCA is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 9.96127E-01 | 1.0 | 1.0 | 9.99999E-01 |
|  | Friedman Aligned | 7.63492E-05 | 7.63519E-05 | 7.63519E-05 | 7.63492E-05 |
|  | Quade | 9.99856E-01 | 1.0 | 1.0 | 9.99856E-01 |
| NNA | Friedman | 9.96127E-01 | 1.0 | 1.0 | 9.96127E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 9.99856E-01 | 1.0 | 1.0 | 1.00000E+00 |
| CWOA | Friedman | 9.96127E-01 | 1.0 | 1.0 | 9.99961E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 9.99856E-01 | 1.0 | 1.0 | 9.99998E-01 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S165** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S166.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (NNA is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S166** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 4.32987E-13 | 4.32987E-13 | 4.32987E-13 | 4.32987E-13 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.32960E-02 | 2.46857E-02 | 2.46857E-02 | 2.44083E-02 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| CWOA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.65948E-02 | 4.23968E-02 | 4.23968E-02 | 4.15892E-02 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 9.98955E-01 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S167.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (CWOA is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S167** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| PSO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 3.02243E-05 | 3.02247E-05 | 3.02247E-05 | 3.02243E-05 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ISCA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 9.99995E-01 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| WW | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table S168.** Adjusted *p*-values for multiple comparisons 1×*N* tests in IV-set case (WW is the control algorithm). | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| NNA | Friedman | 9.28732E-01 | 1.0 | 1.0 | 9.28732E-01 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 9.97795E-01 | 1.0 | 1.0 | 9.99987E-01 |
| PSO | Friedman | 9.31953E-01 | 1.0 | 1.0 | 9.98494E-01 |
|  | Friedman Aligned | 1.31051E-12 | 1.31051E-12 | 1.31051E-12 | 1.31051E-12 |
|  | Quade | 9.97795E-01 | 1.0 | 1.0 | 9.97795E-01 |
| CWOA | Friedman | 9.31953E-01 | 1.0 | 1.0 | 9.92999E-01 |
|  | Friedman Aligned | 2.65438E-02 | 6.80793E-02 | 6.80793E-02 | 6.60112E-02 |
|  | Quade | 9.97795E-01 | 1.0 | 1.0 | 9.99875E-01 |
| ISCA | Friedman | 9.79287E-01 | 1.0 | 1.0 | 9.99993E-01 |
|  | Friedman Aligned | 2.18559E-02 | 4.07276E-02 | 4.07276E-02 | 3.99759E-02 |
|  | Quade | 9.97795E-01 | 1.0 | 1.0 | 1.0 |
| DE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| EBLSHADE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| ADELI | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| NDE | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| **Table S168** (*continued*) | | | | | |
| Algorithm | Test | post-hoc procedure | | | |
| Finner | Holm | Hochberg | Holland |
| MABC | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| TLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| GOTLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| STLBO | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |
| IJAYA | Friedman | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Friedman Aligned | 1.0 | 1.0 | 1.0 | 1.0 |
|  | Quade | 1.0 | 1.0 | 1.0 | 1.0 |

**Table S169.** Adjusted *p*-values for tests for multiple comparisons among all methods in the IV-set case.

| Hypothesis | post-hoc procedure | | |
| --- | --- | --- | --- |
| Nemenyi | Holm | Shaffer |
| EBLSHADE versus WW | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus MABC | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus PSO | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus ISCA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus NNA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| ADELI versus WW | <1E-13 | <1E-13 | <1E-13 |
| NDE versus NNA | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus ISCA | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus NNA | <1E-13 | <1E-13 | <1E-13 |
| TLBO versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus GOTLBO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus PSO | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus NNA | <1E-13 | <1E-13 | <1E-13 |
| STLBO versus CWOA | <1E-13 | <1E-13 | <1E-13 |
| IJAYA versus NNA | 1.61648E-12 | 1.31450E-12 | 1.19016E-12 |
| EBLSHADE versus MABC | 3.75833E-12 | 3.01492E-12 | 2.76712E-12 |
| NDE versus GOTLBO | 4.20286E-12 | 3.32534E-12 | 3.09441E-12 |
| STLBO versus DE | 8.12284E-12 | 6.33760E-12 | 5.98055E-12 |
| IJAYA versus CWOA | 2.31157E-11 | 1.75273E-11 | 1.70193E-11 |
| TLBO versus DE | 4.02505E-11 | 3.00773E-11 | 2.96350E-11 |
| IJAYA versus PSO | 9.52918E-11 | 7.01599E-11 | 7.01599E-11 |
| IJAYA versus ISCA | 1.29115E-09 | 9.36436E-10 | 9.36436E-10 |
| ADELI versus DE | 2.22329E-09 | 1.56363E-09 | 1.41704E-09 |
| EBLSHADE versus GOTLBO | 3.53238E-09 | 2.44550E-09 | 2.25141E-09 |
| NDE versus MABC | 9.68759E-09 | 6.49388E-09 | 6.17451E-09 |
| IJAYA versus WW | 1.72440E-08 | 1.13697E-08 | 1.09907E-08 |
| NDE versus WW | 1.75252E-08 | 1.13697E-08 | 1.11699E-08 |
| EBLSHADE versus DE | 1.82602E-08 | 1.16384E-08 | 1.16384E-08 |
| EBLSHADE versus ISCA | 1.88327E-08 | 1.17963E-08 | 1.16384E-08 |
| EBLSHADE versus PSO | 4.78066E-08 | 2.94194E-08 | 2.94194E-08 |
| ADELI versus GOTLBO | 4.98663E-08 | 3.01390E-08 | 3.01390E-08 |
| EBLSHADE versus CWOA | 7.52618E-08 | 4.46609E-08 | 4.21797E-08 |
| STLBO versus MABC | 8.60481E-08 | 5.01159E-08 | 4.82248E-08 |
| NDE versus ISCA | 9.60138E-08 | 5.48650E-08 | 5.38099E-08 |
| DE versus NNA | 1.60867E-07 | 9.01562E-08 | 9.01562E-08 |
| EBLSHADE versus NNA | 1.68788E-07 | 9.27404E-08 | 9.01562E-08 |
| TLBO versus MABC | 2.16163E-07 | 1.16396E-07 | 1.14020E-07 |
| NDE versus PSO | 4.07575E-07 | 2.14985E-07 | 2.14985E-07 |
| STLBO versus WW | 4.16995E-07 | 2.15371E-07 | 2.15371E-07 |
| TLBO versus WW | 6.32636E-07 | 3.19794E-07 | 3.19794E-07 |
| NDE versus CWOA | 8.17751E-07 | 4.04382E-07 | 4.04382E-07 |
| STLBO versus ISCA | 8.33647E-07 | 4.04382E-07 | 4.04382E-07 |
| DE versus CWOA | 1.47836E-06 | 6.98567E-07 | 6.98567E-07 |
| DE versus PSO | 4.48549E-06 | 2.07023E-06 | 2.07023E-06 |
| DE versus ISCA | 3.33823E-05 | 1.50404E-05 | 1.46735E-05 |
| NDE versus DE | 1.56228E-04 | 6.86718E-05 | 6.86718E-05 |
| DE versus WW | 2.41908E-04 | 1.03675E-04 | 1.03675E-04 |
| IJAYA versus GOTLBO | 7.27786E-04 | 2.95913E-04 | 2.95913E-04 |
| MABC versus NNA | 1.28945E-03 | 5.10114E-04 | 5.10114E-04 |
| ADELI versus NDE | 1.70688E-03 | 6.56493E-04 | 6.56493E-04 |
| MABC versus CWOA | 6.56486E-03 | 2.45281E-03 | 2.45281E-03 |
| MABC versus PSO | 1.46075E-02 | 5.29723E-03 | 5.13671E-03 |
| TLBO versus NDE | 2.83112E-02 | 9.95560E-03 | 9.95560E-03 |
| MABC versus ISCA | 6.08528E-02 | 2.07301E-02 | 2.07301E-02 |
| STLBO versus NDE | 6.70463E-02 | 2.21032E-02 | 2.21032E-02 |
| IJAYA versus MABC | 6.92376E-02 | 2.21032E-02 | 2.21032E-02 |
| GOTLBO versus NNA | 1.07776E-01 | 3.31618E-02 | 3.31618E-02 |
| MABC versus WW | 2.35963E-01 | 6.74180E-02 | 6.74180E-02 |
| GOTLBO versus CWOA | 3.72918E-01 | 1.02450E-01 | 1.02450E-01 |
| DE versus GOTLBO | 4.91746E-01 | 1.29691E-01 | 1.29691E-01 |
| ADELI versus EBLSHADE | 6.43762E-01 | 1.62709E-01 | 1.62709E-01 |
| GOTLBO versus PSO | 6.78807E-01 | 1.64107E-01 | 1.64107E-01 |
| GOTLBO versus ISCA | 1.0 | 4.46263E-01 | 4.46263E-01 |
| TLBO versus EBLSHADE | 1.0 | 8.67680E-01 | 8.67680E-01 |
| DE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| DE versus ADELI | 1.0 | 1.0 | 1.0 |
| DE versus NDE | 1.0 | 1.0 | 1.0 |
| DE versus MABC | 1.0 | 1.0 | 1.0 |
| DE versus TLBO | 1.0 | 1.0 | 1.0 |
| DE versus STLBO | 1.0 | 1.0 | 1.0 |
| DE versus IJAYA | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus ADELI | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus NDE | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus TLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus STLBO | 1.0 | 1.0 | 1.0 |
| EBLSHADE versus IJAYA | 1.0 | 1.0 | 1.0 |
| ADELI versus TLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus STLBO | 1.0 | 1.0 | 1.0 |
| ADELI versus IJAYA | 1.0 | 1.0 | 1.0 |
| NDE versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NDE versus ADELI | 1.0 | 1.0 | 1.0 |
| NDE versus TLBO | 1.0 | 1.0 | 1.0 |
| NDE versus STLBO | 1.0 | 1.0 | 1.0 |
| NDE versus IJAYA | 1.0 | 1.0 | 1.0 |
| MABC versus DE | 1.0 | 1.0 | 1.0 |
| MABC versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| MABC versus ADELI | 1.0 | 1.0 | 1.0 |
| MABC versus NDE | 1.0 | 1.0 | 1.0 |
| MABC versus TLBO | 1.0 | 1.0 | 1.0 |
| MABC versus GOTLBO | 1.0 | 1.0 | 1.0 |
| MABC versus STLBO | 1.0 | 1.0 | 1.0 |
| MABC versus IJAYA | 1.0 | 1.0 | 1.0 |
| TLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| TLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| TLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus DE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| GOTLBO versus NDE | 1.0 | 1.0 | 1.0 |
| GOTLBO versus MABC | 1.0 | 1.0 | 1.0 |
| GOTLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus STLBO | 1.0 | 1.0 | 1.0 |
| GOTLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| GOTLBO versus WW | 1.0 | 1.0 | 1.0 |
| STLBO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| STLBO versus ADELI | 1.0 | 1.0 | 1.0 |
| STLBO versus TLBO | 1.0 | 1.0 | 1.0 |
| STLBO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus DE | 1.0 | 1.0 | 1.0 |
| PSO versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| PSO versus ADELI | 1.0 | 1.0 | 1.0 |
| PSO versus NDE | 1.0 | 1.0 | 1.0 |
| PSO versus MABC | 1.0 | 1.0 | 1.0 |
| PSO versus TLBO | 1.0 | 1.0 | 1.0 |
| PSO versus GOTLBO | 1.0 | 1.0 | 1.0 |
| PSO versus STLBO | 1.0 | 1.0 | 1.0 |
| PSO versus IJAYA | 1.0 | 1.0 | 1.0 |
| PSO versus ISCA | 1.0 | 1.0 | 1.0 |
| PSO versus NNA | 1.0 | 1.0 | 1.0 |
| PSO versus CWOA | 1.0 | 1.0 | 1.0 |
| PSO versus WW | 1.0 | 1.0 | 1.0 |
| IJAYA versus DE | 1.0 | 1.0 | 1.0 |
| IJAYA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| IJAYA versus ADELI | 1.0 | 1.0 | 1.0 |
| IJAYA versus NDE | 1.0 | 1.0 | 1.0 |
| IJAYA versus TLBO | 1.0 | 1.0 | 1.0 |
| IJAYA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus DE | 1.0 | 1.0 | 1.0 |
| ISCA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| ISCA versus ADELI | 1.0 | 1.0 | 1.0 |
| ISCA versus NDE | 1.0 | 1.0 | 1.0 |
| ISCA versus MABC | 1.0 | 1.0 | 1.0 |
| ISCA versus TLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus STLBO | 1.0 | 1.0 | 1.0 |
| ISCA versus PSO | 1.0 | 1.0 | 1.0 |
| ISCA versus IJAYA | 1.0 | 1.0 | 1.0 |
| ISCA versus NNA | 1.0 | 1.0 | 1.0 |
| ISCA versus CWOA | 1.0 | 1.0 | 1.0 |
| ISCA versus WW | 1.0 | 1.0 | 1.0 |
| NNA versus DE | 1.0 | 1.0 | 1.0 |
| NNA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| NNA versus ADELI | 1.0 | 1.0 | 1.0 |
| NNA versus NDE | 1.0 | 1.0 | 1.0 |
| NNA versus MABC | 1.0 | 1.0 | 1.0 |
| NNA versus TLBO | 1.0 | 1.0 | 1.0 |
| NNA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| NNA versus STLBO | 1.0 | 1.0 | 1.0 |
| NNA versus PSO | 1.0 | 1.0 | 1.0 |
| NNA versus IJAYA | 1.0 | 1.0 | 1.0 |
| NNA versus ISCA | 1.0 | 1.0 | 1.0 |
| NNA versus CWOA | 1.0 | 1.0 | 1.0 |
| NNA versus WW | 1.0 | 1.0 | 1.0 |
| CWOA versus DE | 1.0 | 1.0 | 1.0 |
| CWOA versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| CWOA versus ADELI | 1.0 | 1.0 | 1.0 |
| CWOA versus NDE | 1.0 | 1.0 | 1.0 |
| CWOA versus MABC | 1.0 | 1.0 | 1.0 |
| CWOA versus TLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus GOTLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus STLBO | 1.0 | 1.0 | 1.0 |
| CWOA versus PSO | 1.0 | 1.0 | 1.0 |
| CWOA versus IJAYA | 1.0 | 1.0 | 1.0 |
| CWOA versus ISCA | 1.0 | 1.0 | 1.0 |
| CWOA versus NNA | 1.0 | 1.0 | 1.0 |
| CWOA versus WW | 1.0 | 1.0 | 1.0 |
| WW versus DE | 1.0 | 1.0 | 1.0 |
| WW versus EBLSHADE | 1.0 | 1.0 | 1.0 |
| WW versus ADELI | 1.0 | 1.0 | 1.0 |
| WW versus NDE | 1.0 | 1.0 | 1.0 |
| WW versus MABC | 1.0 | 1.0 | 1.0 |
| WW versus TLBO | 1.0 | 1.0 | 1.0 |
| WW versus GOTLBO | 1.0 | 1.0 | 1.0 |
| WW versus STLBO | 1.0 | 1.0 | 1.0 |
| WW versus PSO | 1.0 | 1.0 | 1.0 |
| WW versus IJAYA | 1.0 | 1.0 | 1.0 |
| WW versus ISCA | 1.0 | 1.0 | 1.0 |
| WW versus NNA | 1.0 | 1.0 | 1.0 |
| WW versus CWOA | 1.0 | 1.0 | 1.0 |