# Explorations

Using s1\_2i.R – sim based on 1.2

## Code of 16/07/2021

100 reps unless otherwise stated. SE is 0.05 on probs around 0.5.

### Reverse alpha’s and multiply phi’s by 0.001

Expect better\_treatment = 0.5 and best\_treatment = 1 / #treatments in pattern

1st run

$better\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.57 0.41 0.69 0.39 0.48 0.53 0.54 0.54

method\_B1 0.67 0.66 0.78 0.52 0.72 0.60 0.54 0.63

method\_B2 0.68 0.57 0.68 0.57 0.61 0.54 0.52 0.54

method\_B3 0.71 0.52 0.70 0.51 0.55 0.55 0.55 0.61

method\_C 0.55 0.28 0.58 0.32 0.35 0.29 0.33 0.42

method\_D 0.51 0.27 0.48 0.36 0.33 0.30 0.33 0.38

$best\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.18 0.13 0.18 0.12 0.12 0.14 0.17 0.17

method\_B1 0.41 0.52 0.42 0.31 0.56 0.29 0.17 0.32

method\_B2 0.45 0.46 0.51 0.48 0.47 0.41 0.44 0.45

method\_B3 0.45 0.41 0.50 0.42 0.44 0.43 0.42 0.44

method\_C 0.21 0.12 0.18 0.15 0.14 0.06 0.08 0.04

method\_D 0.23 0.07 0.11 0.11 0.09 0.07 0.05 0.09

2nd run

$better\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.61 0.39 0.56 0.52 0.54 0.45 0.56 0.52

method\_B1 0.80 0.69 0.72 0.65 0.71 0.63 0.56 0.58

method\_B2 0.70 0.59 0.60 0.59 0.63 0.59 0.57 0.59

method\_B3 0.68 0.63 0.67 0.62 0.70 0.53 0.61 0.59

method\_C 0.51 0.37 0.45 0.31 0.49 0.23 0.30 0.33

method\_D 0.54 0.39 0.44 0.40 0.45 0.26 0.31 0.30

$best\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.30 0.14 0.21 0.18 0.21 0.14 0.14 0.17

method\_B1 0.56 0.52 0.49 0.43 0.53 0.35 0.14 0.41

method\_B2 0.49 0.46 0.47 0.48 0.46 0.46 0.47 0.41

method\_B3 0.47 0.53 0.50 0.53 0.50 0.40 0.50 0.43

method\_C 0.14 0.17 0.20 0.18 0.21 0.04 0.08 0.01

method\_D 0.17 0.17 0.25 0.19 0.18 0.06 0.11 0.06

### Reverse alpha’s and multiply phi’s by -0.001

Seed=1

$better\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.46 0.55 0.35 0.59 0.58 0.56 0.50 0.48

method\_B1 0.29 0.34 0.25 0.35 0.26 0.44 0.50 0.31

method\_B2 0.30 0.36 0.35 0.47 0.30 0.44 0.40 0.45

method\_B3 0.25 0.32 0.33 0.34 0.25 0.46 0.38 0.41

method\_C 0.40 0.57 0.47 0.55 0.50 0.69 0.64 0.63

method\_D 0.43 0.60 0.45 0.62 0.56 0.72 0.67 0.63

$best\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.21 0.15 0.19 0.09 0.16 0.11 0.04 0.08

method\_B1 0.18 0.09 0.12 0.04 0.11 0.10 0.04 0.06

method\_B2 0.12 0.08 0.18 0.06 0.12 0.05 0.08 0.03

method\_B3 0.10 0.13 0.10 0.05 0.14 0.05 0.04 0.06

method\_C 0.20 0.19 0.14 0.12 0.22 0.07 0.07 0.09

method\_D 0.19 0.14 0.12 0.10 0.18 0.05 0.04 0.07

Seed=2

$better\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.37 0.56 0.48 0.62 0.60 0.49 0.46 0.40

method\_B1 0.27 0.32 0.30 0.37 0.29 0.47 0.46 0.34

method\_B2 0.25 0.41 0.35 0.46 0.36 0.40 0.38 0.42

method\_B3 0.28 0.44 0.31 0.48 0.38 0.37 0.41 0.39

method\_C 0.42 0.69 0.48 0.64 0.62 0.68 0.63 0.56

method\_D 0.51 0.65 0.49 0.72 0.60 0.67 0.61 0.57

$best\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.20 0.16 0.28 0.14 0.19 0.07 0.11 0.11

method\_B1 0.14 0.06 0.19 0.08 0.09 0.10 0.11 0.12

method\_B2 0.15 0.09 0.18 0.15 0.12 0.03 0.08 0.09

method\_B3 0.17 0.10 0.15 0.15 0.10 0.07 0.07 0.07

method\_C 0.27 0.20 0.22 0.20 0.21 0.12 0.12 0.13

method\_D 0.29 0.13 0.22 0.25 0.16 0.12 0.11 0.12

### Conclusion

Method B is biased towards earlier treatments in list. I can see this in Kim’s code that she has now corrected.

## Code of 22/07/2021

### Reverse alpha’s and multiply phi’s by 0.001

Seed = 1, 5000 reps. MC errors <=0.007

# Better treatment by pattern

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.5966 0.4392 0.6004 0.4198 0.4932 0.4634 0.5594 0.5454

method\_B1 0.6006 0.4342 0.5994 0.4230 0.5056 0.4554 0.5594 0.5080

method\_B2 0.5600 0.3758 0.5022 0.3010 0.4570 0.3090 0.3188 0.3548

method\_B3 0.5580 0.3726 0.5424 0.3766 0.4504 0.3132 0.3694 0.4004

method\_C 0.5650 0.3696 0.5402 0.3766 0.4448 0.3144 0.3694 0.4022

method\_D 0.5460 0.3924 0.5178 0.3742 0.4668 0.3130 0.3656 0.3814

# Best treatment by pattern

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.1982 0.1512 0.2006 0.1394 0.1680 0.1340 0.1784 0.1780

method\_B1 0.1978 0.1434 0.2000 0.1444 0.1662 0.1084 0.1784 0.1276

method\_B2 0.1684 0.1174 0.1650 0.0900 0.1436 0.0514 0.0472 0.0592

method\_B3 0.1712 0.1492 0.2008 0.1586 0.1716 0.0550 0.0924 0.0798

method\_C 0.1728 0.1476 0.1954 0.1608 0.1706 0.0562 0.0924 0.0820

method\_D 0.1724 0.1564 0.1882 0.1558 0.1822 0.0628 0.0890 0.0826

### Reverse alpha’s and multiply phi’s by -0.001

Seed = 1, 5000 reps. MC errors <=0.007

$better\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.4048 0.5622 0.4022 0.5828 0.5080 0.5388 0.4402 0.4542

method\_B1 0.4014 0.5674 0.4032 0.5778 0.4964 0.5452 0.4402 0.4926

method\_B2 0.4424 0.6282 0.5014 0.7020 0.5456 0.6926 0.6834 0.6458

method\_B3 0.4436 0.6292 0.4608 0.6236 0.5510 0.6878 0.6334 0.6008

method\_C 0.4366 0.6320 0.4620 0.6244 0.5566 0.6876 0.6334 0.5986

method\_D 0.4576 0.6084 0.4850 0.6284 0.5340 0.6884 0.6370 0.6194

$best\_treatment\_I

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]

method\_A 0.2022 0.1474 0.2076 0.1484 0.1686 0.1064 0.0958 0.1164

method\_B1 0.2038 0.1474 0.2054 0.1472 0.1742 0.1050 0.0958 0.1198

method\_B2 0.2090 0.1772 0.2374 0.1698 0.2110 0.0890 0.1130 0.1044

method\_B3 0.2096 0.1920 0.1882 0.1416 0.2106 0.0958 0.0842 0.0964

method\_C 0.2046 0.1944 0.1828 0.1388 0.2136 0.0954 0.0842 0.1016

method\_D 0.2090 0.1772 0.1898 0.1474 0.2004 0.0966 0.0872 0.1038

### Conclusion

Looks better than before. But still seeing some departures from expected, e.g. all methods do too well in pattern 1 when treatments are ranked 1 best – 10 worst (yellow highlight). This could be because the first pattern is selected in the case of ties: this is supported by the almost exact opposite results achieved when the treatments get the opposite ordering, but wouldn’t explain why pattern 2 goes in the opposite direction (green highlight).

[19aug2021] Perhaps there is an unpredictable tie-breaking for patterns with odd #treatments. For each such pattern the prob of better treatment is either (p-1)/2p (patterns 1,3 with p=5) or (p+1)/2p (patterns 2,4,6 with p=7 or 9). Now we’d expect the patterns with even #treatments to give 0.5 and this is true for pattern 5 with p=6 but not for patterns 7 and 8 with p=10 and 8 (blue).

In red: some of the really strange findings, with B2 and B3 doing much worse than B1.

For analysis of best treatment see s1\_2i\_summary.xlsx.

## Note

Check all Kim’s code for abs() function – correct!

Is B3 usually very similar to C?