3.2_Figures

Florian van Leeuwen

2023-02-15

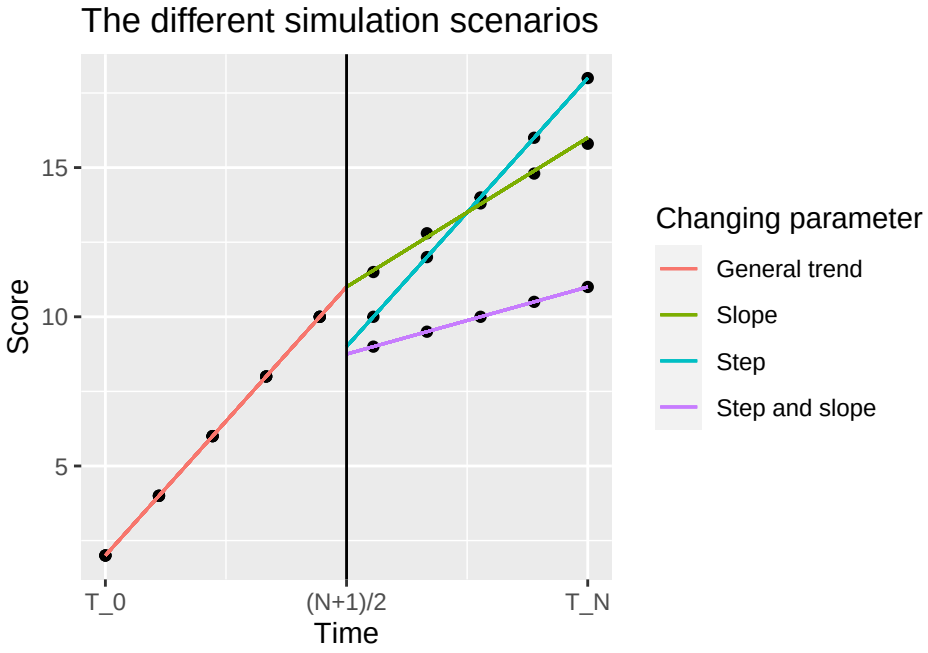
First results simulation study

The following parameters were used for the simulation study:

- Number of person: 100, 300, 500, 700, 900, 1200
- Number of time points: 6, 8, 10, 12, 14, 16, 18
- Number of simulations: 100
- Intercept: 170
- Variance of the intercept: N(0,25)
- Slope: 12.7
- Variance added after data generation: N(0,20)
- Effect sizes as % of the slope: 0.01, 0.02, 0.03, 0.04, 0.05, 0.06

The simulation was run for three conditions, see Figure below:

- Only a step change
- Only a slope change
- A step and slope change



Each took about 30 minutes to compute (1.5 hour in total) using the following OLS model:

$$Y_i = \beta_0 + \beta_1 * Time + \beta_2 * Intervention + \beta_3 * Time * Interventios$$

TOTAL NUMBER OF CONDITIONS: 676*3 = 756

The output of the simulation was assessed on three criteria:

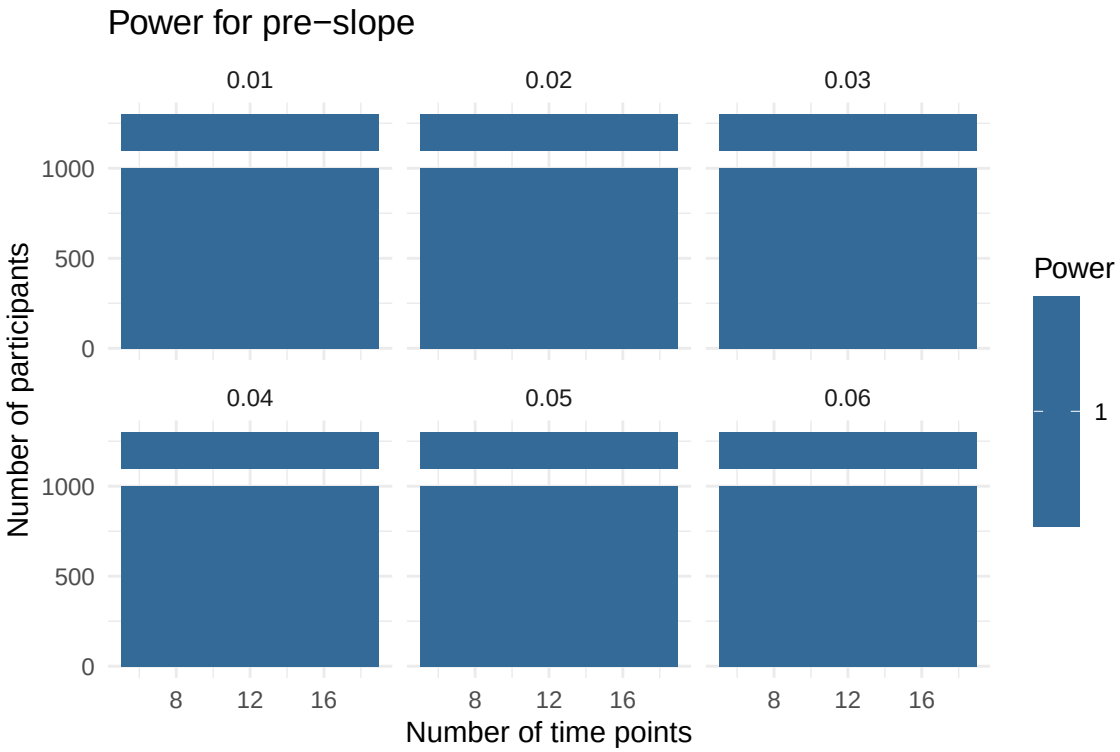
- The average power
- The average bias
- The precision (number of times bias was > 5%)

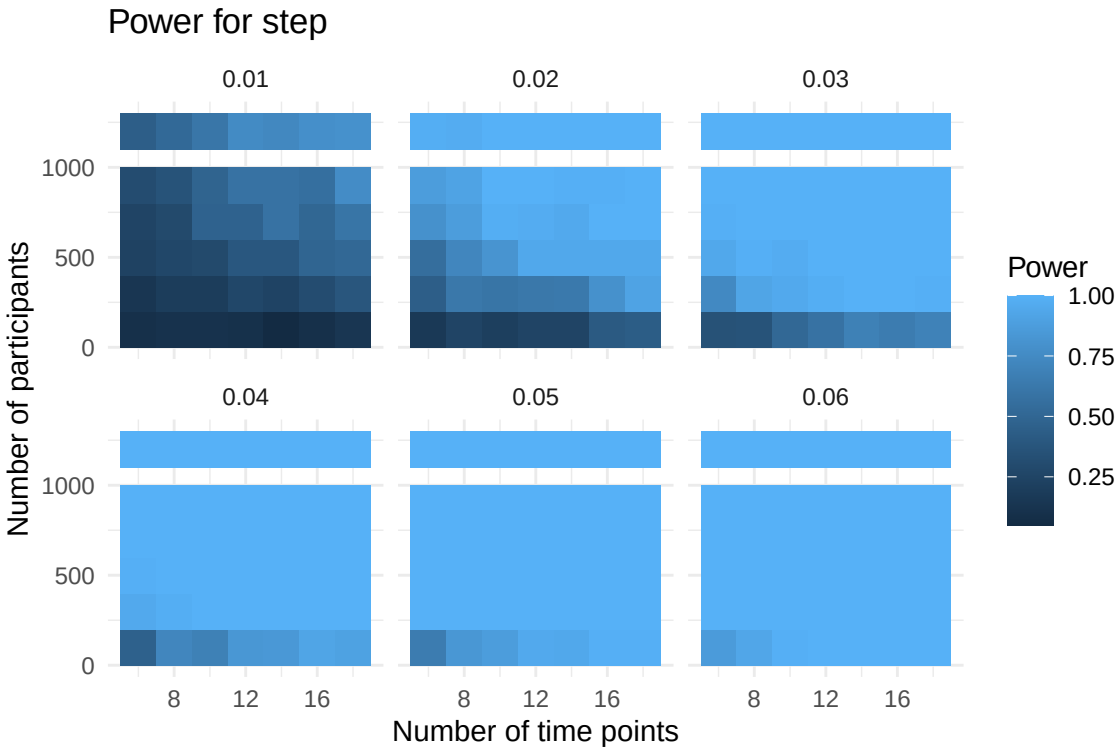
The bias/precision was not estimated is the step/slope change was set to zero.

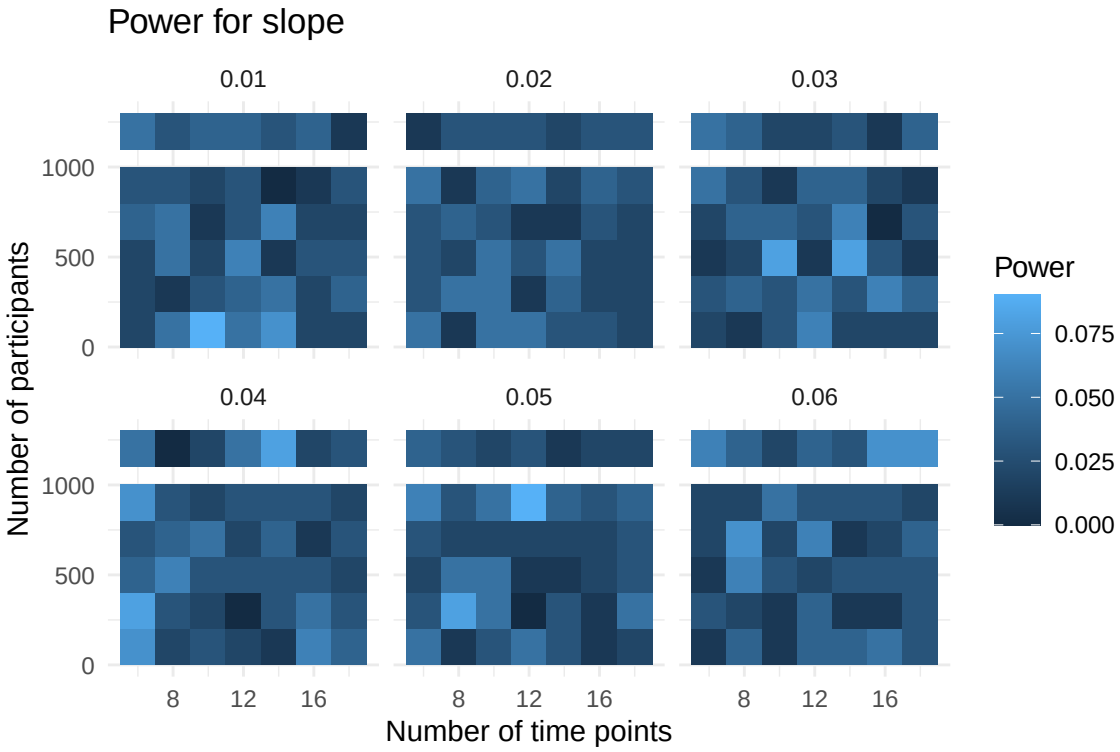
```
# import the data
out10 <- read.csv("results/sim10.csv")
out01 <- read.csv("results/sim01.csv")
out11 <- read.csv("results/sim11.csv")
```

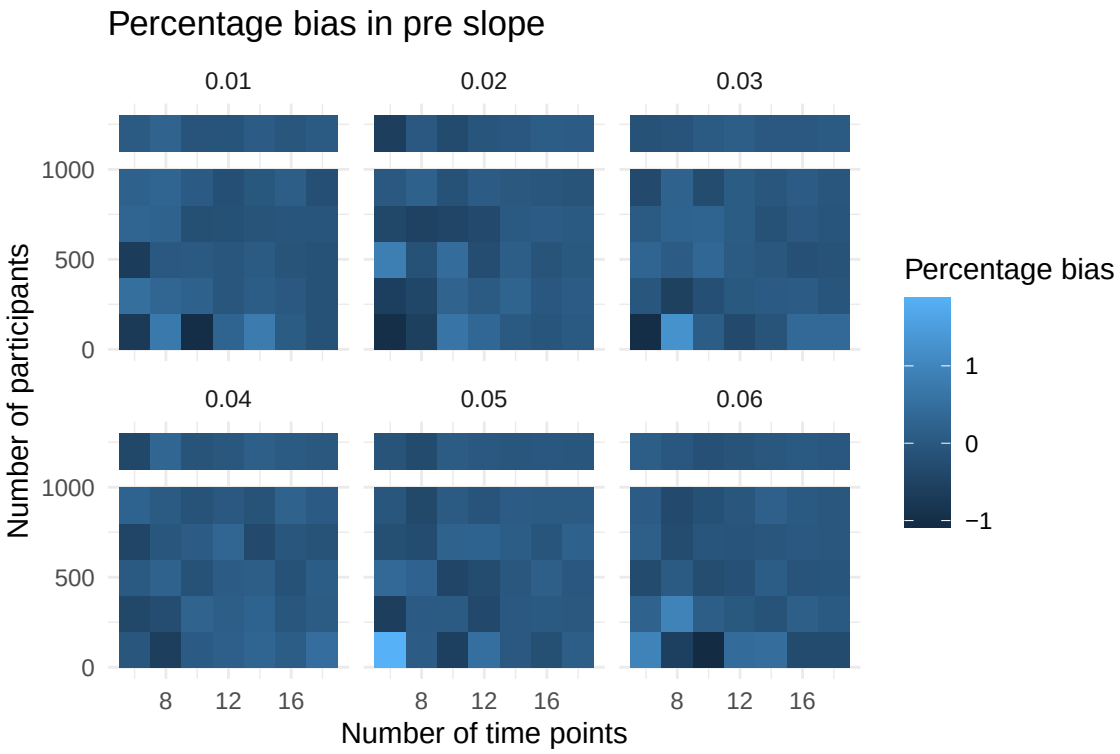
Scenario 1: Only a step change

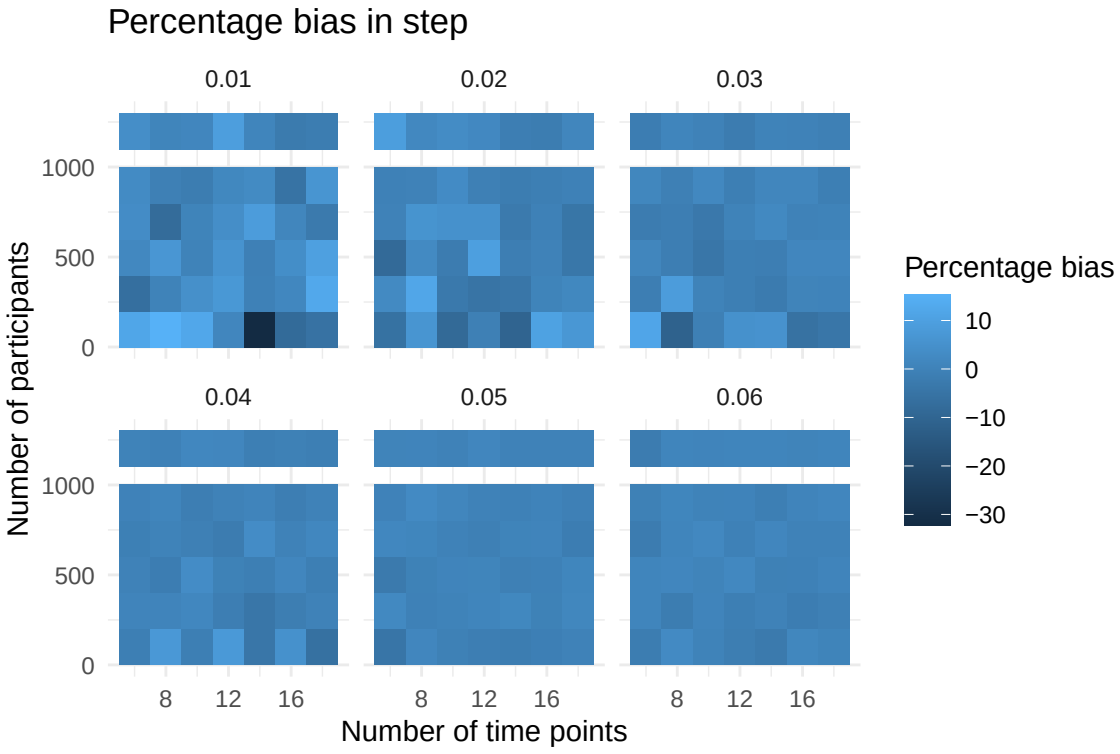
```
out10 %>%
  ggplot(aes(x = N_t, y = N_pers, fill = pre_slope)) +
  geom_tile() +
  labs(title = "Power for pre-slope",x = "Number of time points",
       y = "Number of participants", fill="Power") +
  facet_wrap(~effect_sizes) +
  theme_minimal()
```

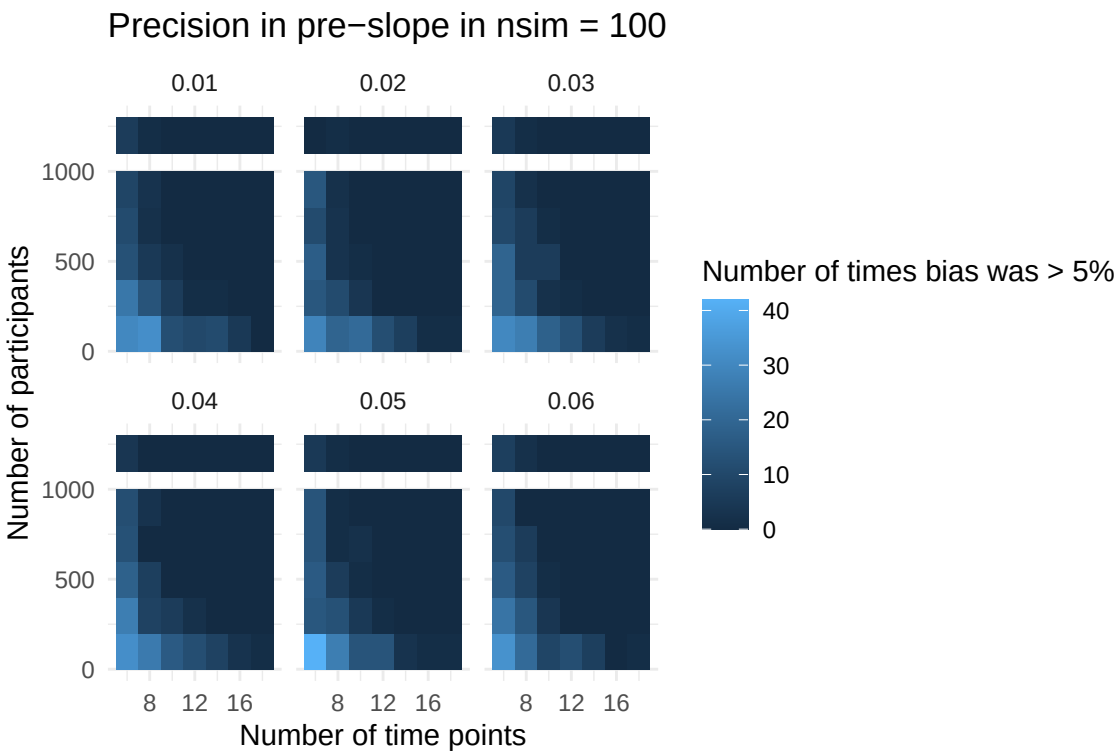


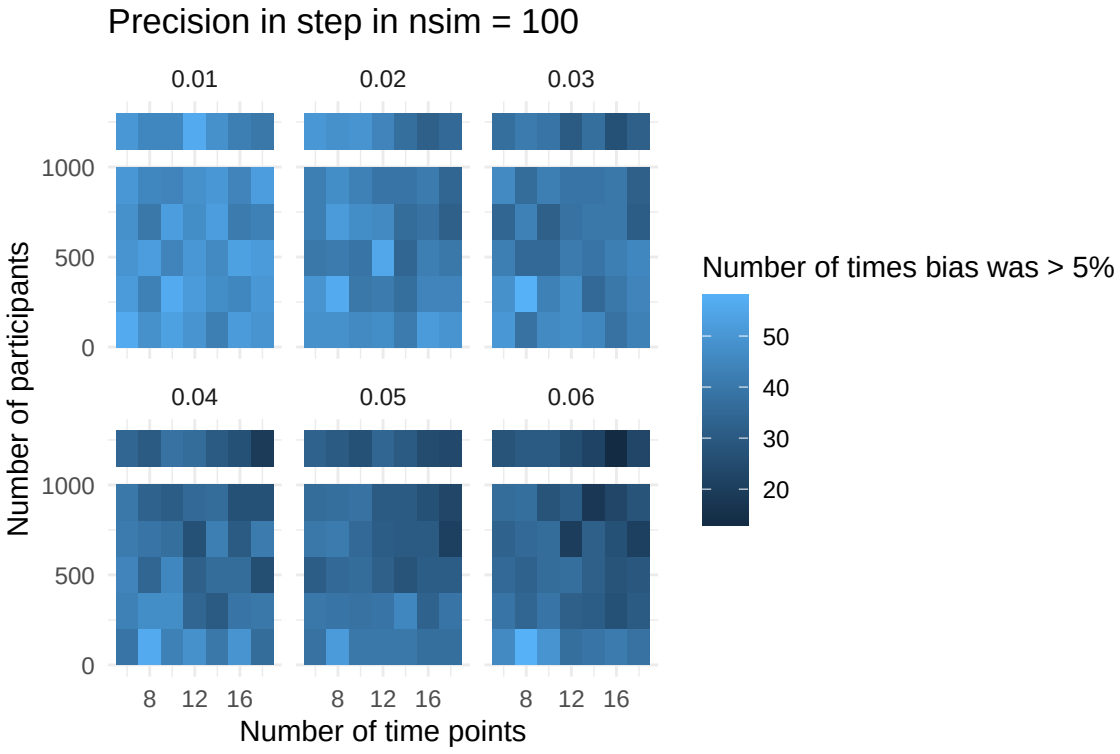

Power for step
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
Number of participants
8
12
16
Number of time points
Power
1.00
0.75
0.50
0.25


Power for slope
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
Number of participants
8
12
16
Number of time points
Power
0.075
0.050
0.025
0.000


Percentage bias in pre slope
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Percentage bias
1
0
−1

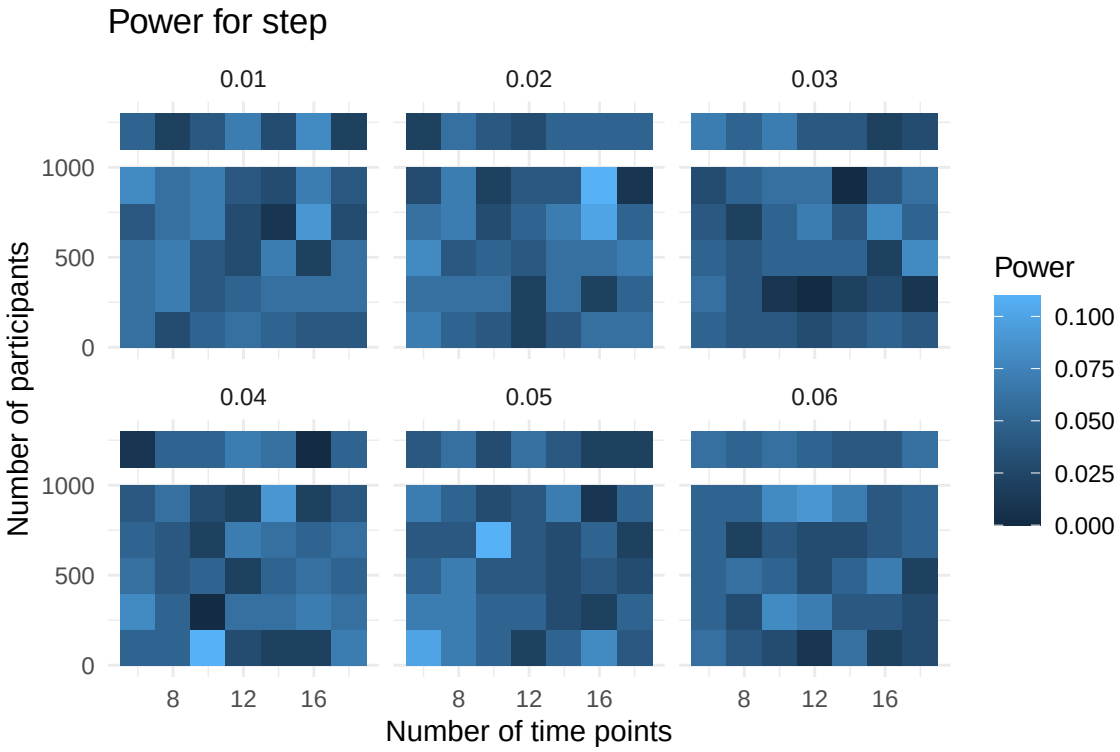

Percentage bias in step
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Percentage bias
10
0
−10
−20
−30

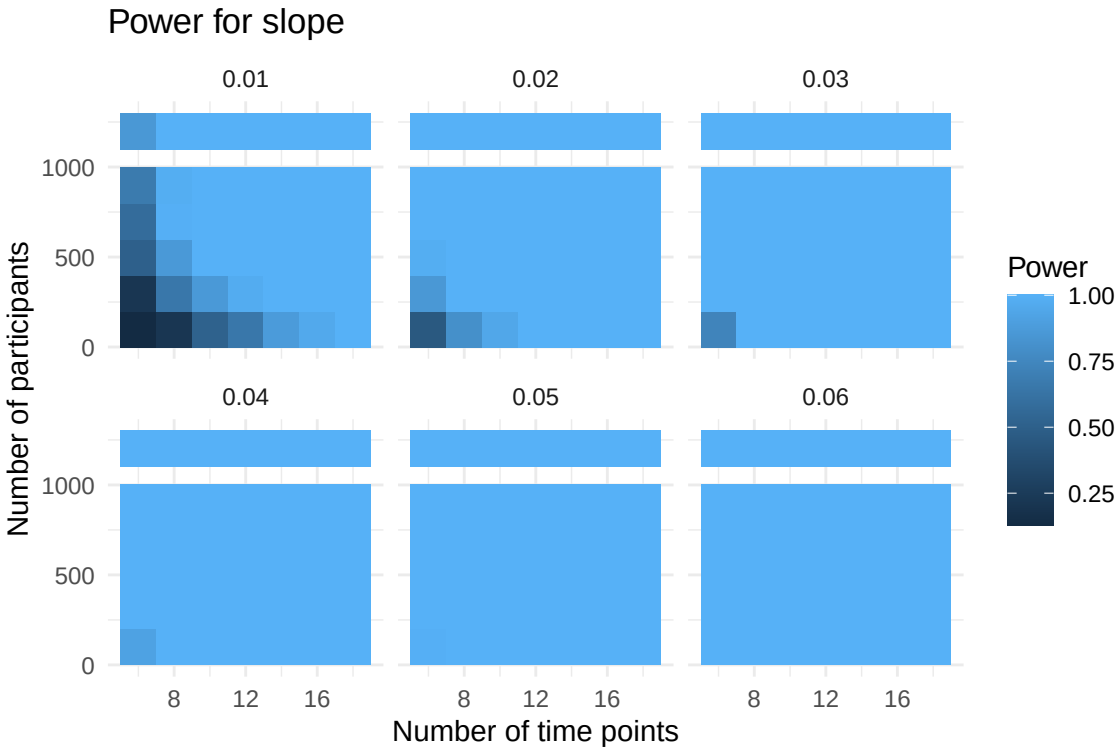


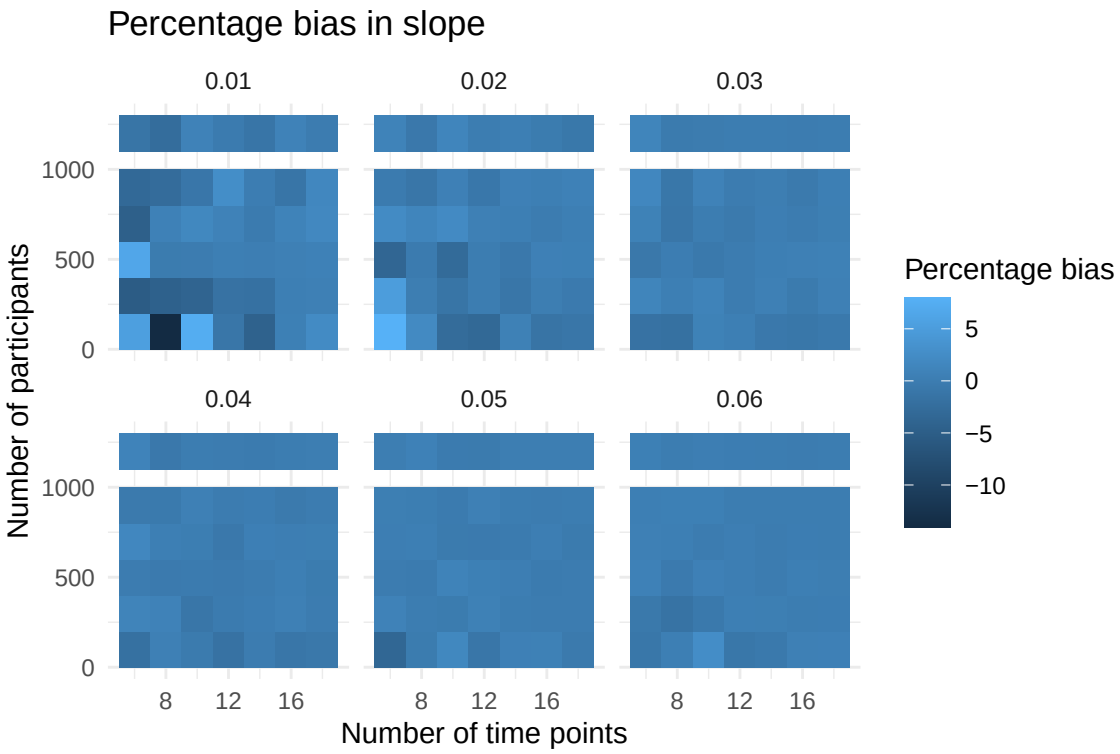


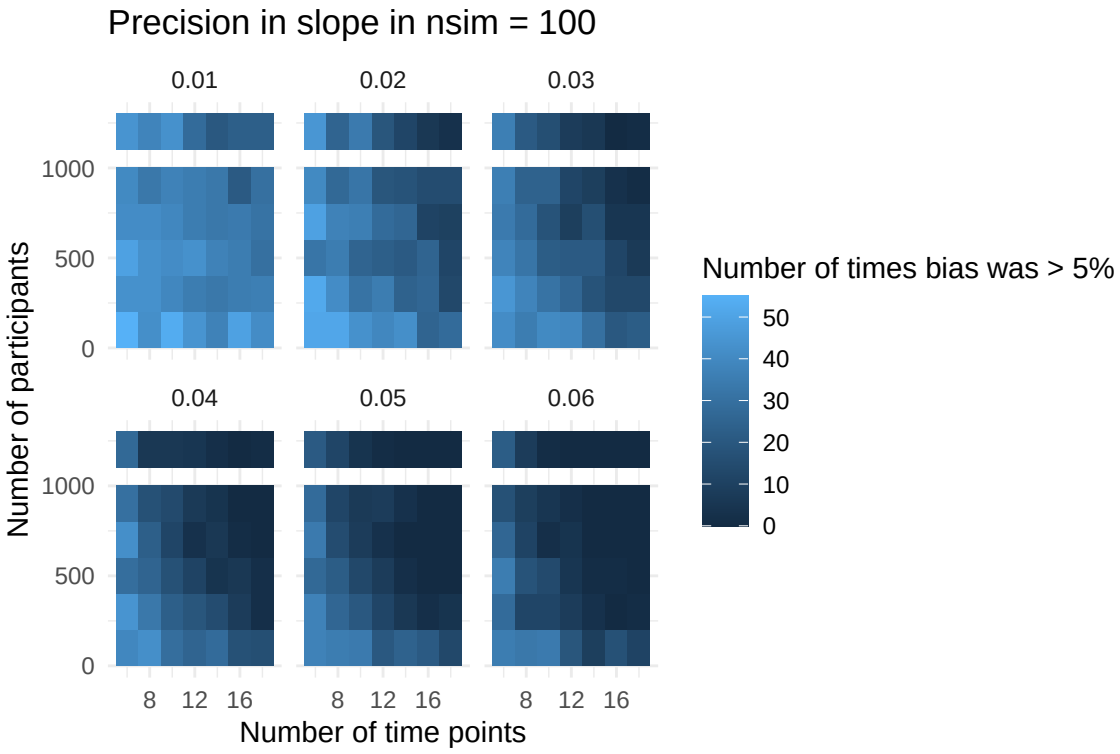
Scenario 2: Only a slope change

The pre-slope seems to be estimated well, so i will leave it out of the rest of the figures.

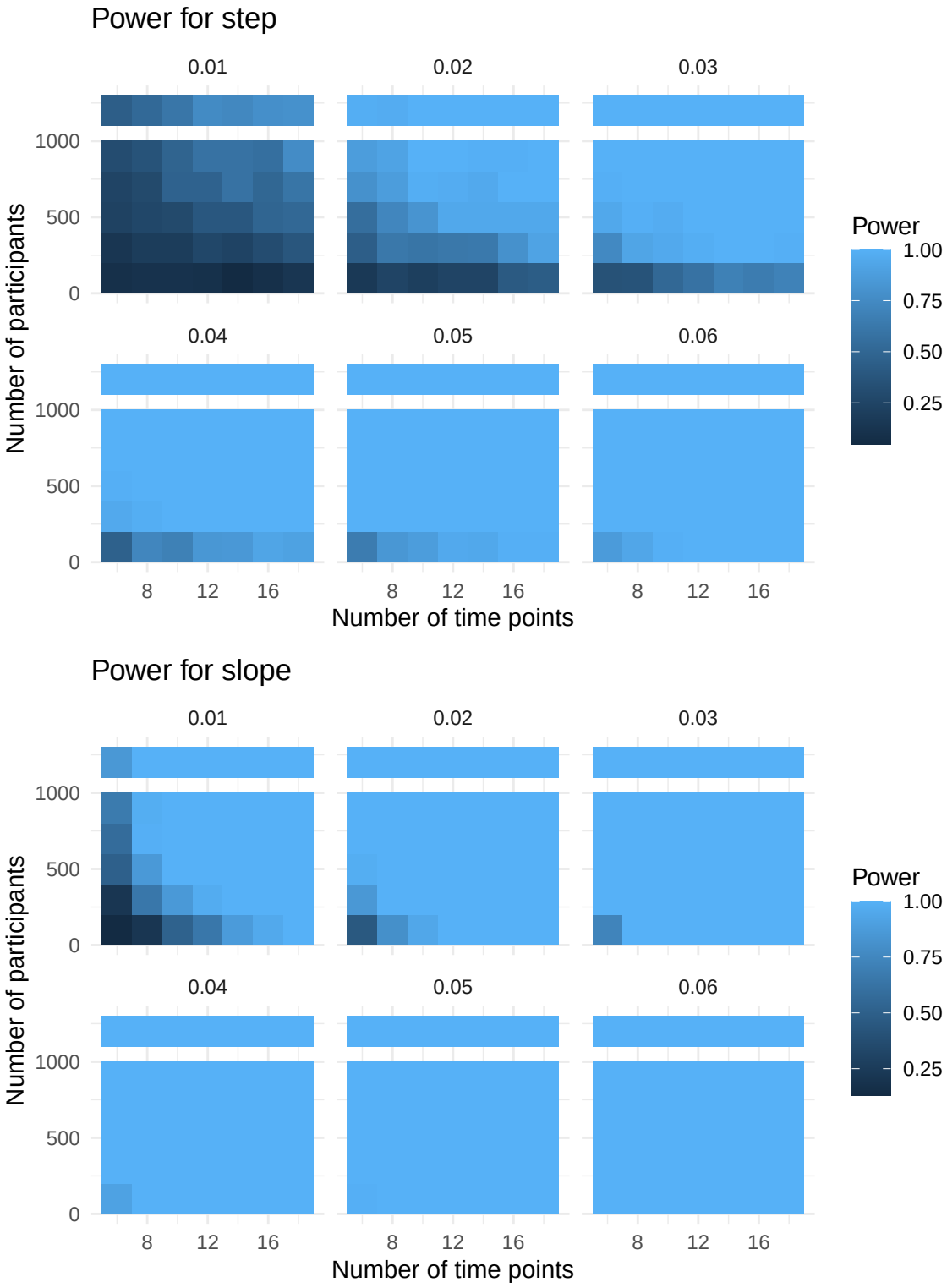

Power for step
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
Number of participants
8
12
16
Number of time points
Power
0.100
0.075
0.050
0.025
0.000

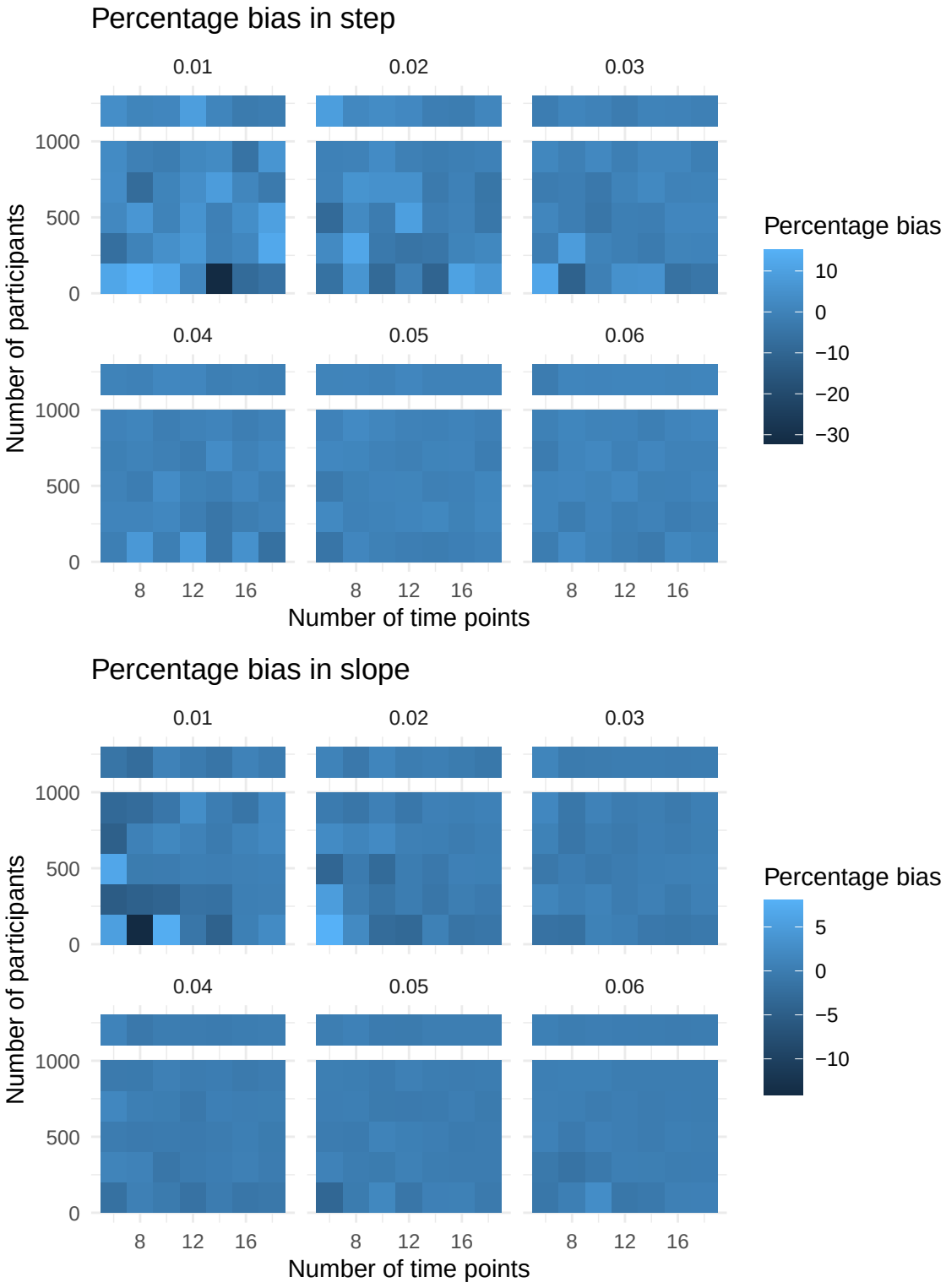

Power for slope
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
Number of participants
8
12
16
Number of time points
Power
1.00
0.75
0.50
0.25

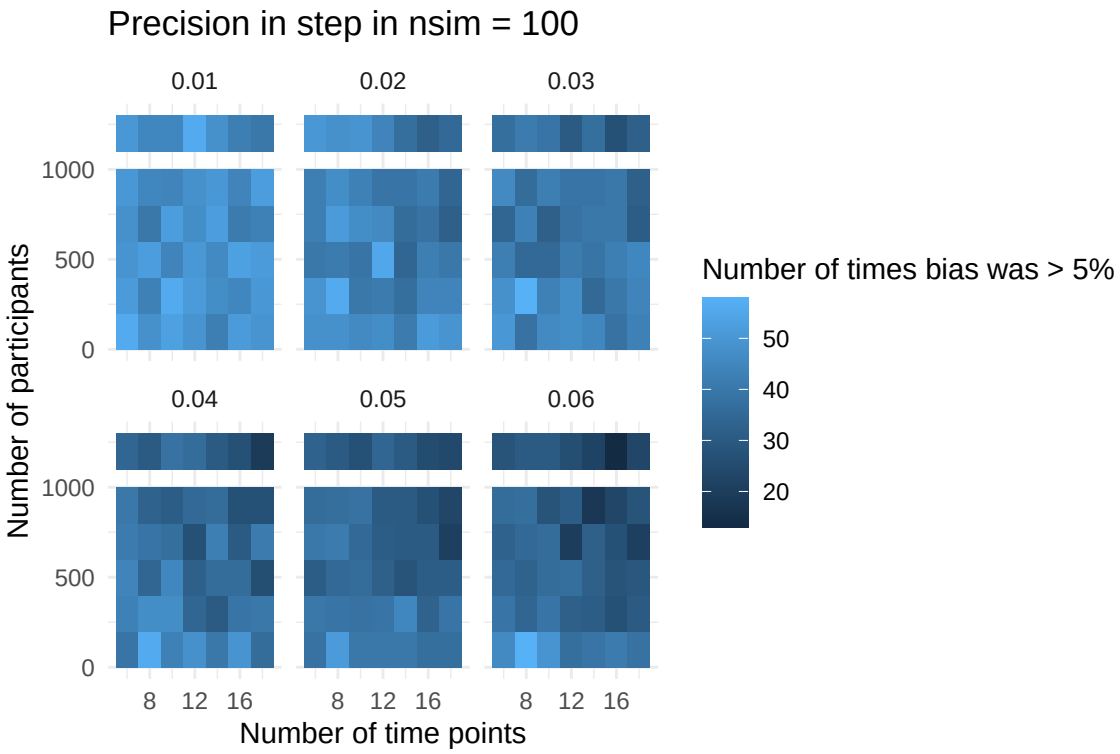

Percentage bias in slope
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Percentage bias
5
0
−5
−10

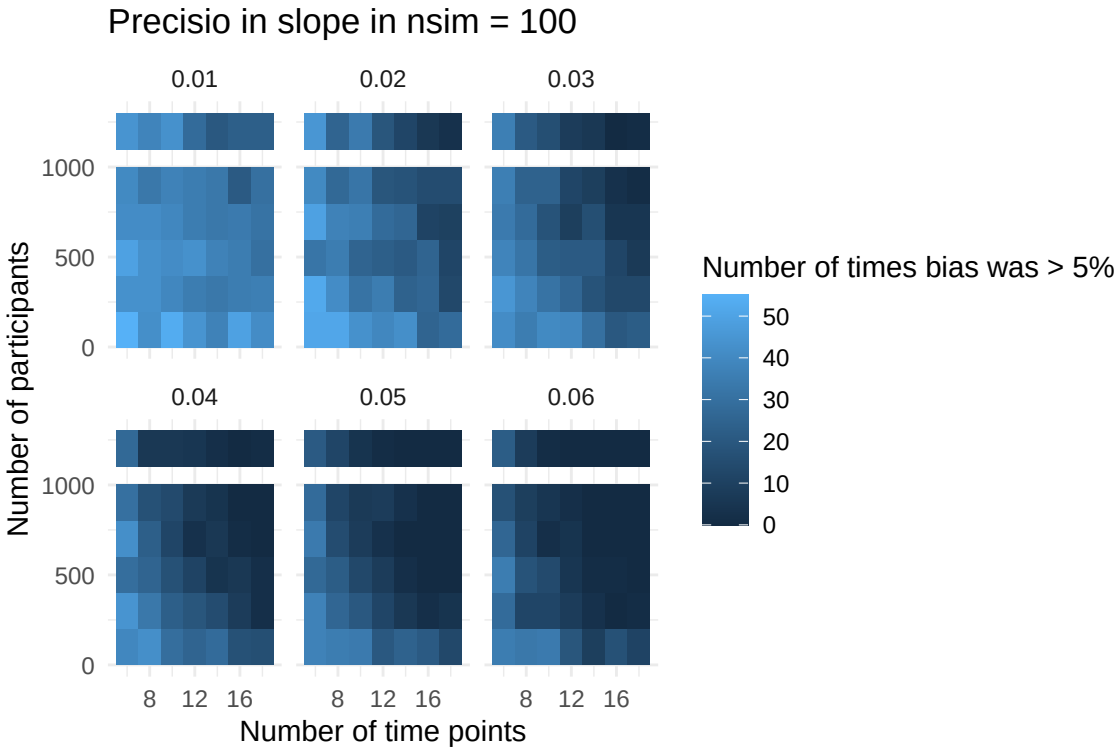

Precision in slope in nsim = 100
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Number of times bias was > 5%
50
40
30
20
10
0

Scenario 3: A step and slope change




Percentage bias in step
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
Number of participants
8
12
16
Number of time points
Percentage bias
10
0
−10
−20
−30
Percentage bias in slope
5
0
−5
−10


Precision in step in nsim = 100
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Number of times bias was > 5%
50
40
30
20


Precisio in slope in nsim = 100
0.01
0.02
0.03
0.04
0.05
0.06
1000
500
0
8
12
16
Number of participants
Number of time points
Number of times bias was > 5%
50
40
30
20
10
0

Another option for the simulation plot