```
MSE:[[1.52, 1.38, 0.84]][[0.72, 69.4, 7.17]]
MSE(-DR):[[0.0, -0.14, -0.68]][[-0.8, 67.88, 5.65]]
==============
O_threshold = 120
MC for this TARGET:[76.603, 0.064]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-11.06, -11.09, -10.45]][[-14.94, -76.6, -14.37]]
std:[[0.95, 0.99, 0.53]][[0.53, 0.0, 0.2]]
MSE:[[11.1, 11.13, 10.46]][[14.95, 76.6, 14.37]]
MSE(-DR):[[0.0, 0.03, -0.64]][[3.85, 65.5, 3.27]]
**
==============
[[ 1.01  1.17  1.82  1.23 78.7  16.47]
 [ 1.46  1.72  3.93  0.74 78.96 16.73]
 [ 1.52  1.38  0.84  0.72 69.4   7.17]
 [11.1  11.13 10.46 14.95 76.6  14.37]]


time spent until now: 38.7 mins

13:07, 04/12

--------------------------------------
[pattern_seed, day, sd_R] = [0, 7, 10]

max(u_O) =  145.4
O_threshold = 90
number of reward locations:  21
O_threshold = 100
number of reward locations:  18
O_threshold = 110
number of reward locations:  11
O_threshold = 120
number of reward locations:  6
^CProcess Process-28:
Process Process-18:
Traceback (most recent call last):
  File "EC2.py", line 84, in <module>
Process Process-24:
Process Process-17:
Process Process-32:
Process Process-27:
Process Process-19:
Process Process-21:
    batch_size = batch_size, max_iteration = max_iteration, Learning_rate = Learning_rate,  # NN training
  File "/home/ubuntu/simu_funs.py", line 63, in simu
    value_reps = parmap(once, range(OPE_rep_times), n_cores)
  File "/home/ubuntu/_uti_basic.py", line 80, in parmap
    p.start(initializer=mute)
  File "/home/ubuntu/_uti_basic.py", line 80, in <listcomp>
Process Process-25:
    p.start(initializer=mute)
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/queues.py", line 82, in put
Process Process-31:
Process Process-29:
Process Process-20:
Process Process-26:
    if not self._sem.acquire(block, timeout):
KeyboardInterrupt
ubuntu@ip-172-31-5-25:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
13:11, 04/12; num of cores:16
2_u_O_u_D_20

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, t_func] = [16, None, None, 20, 0.5, 1.5, 20, None]

thre_range, sd_R_range, day_range:  [[105, 115], [0, 20], [7]]

--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 0]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
Traceback (most recent call last):
  File "EC2.py", line 86, in <module>
    with_MF = with_MF, with_NO_MARL = with_NO_MARL, with_IS = with_IS,
  File "/home/ubuntu/simu_funs.py", line 63, in simu
    value_reps = parmap(once, range(OPE_rep_times), n_cores)
  File "/home/ubuntu/_uti_basic.py", line 80, in parmap
    p.start(initializer=mute)
TypeError: start() got an unexpected keyword argument 'initializer'
ubuntu@ip-172-31-5-25:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
13:13, 04/12; num of cores:16
2_u_O_u_D_20

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, t_func] = [16, None, None, 20, 0.5, 1.5, 20, None]
```

```
thre_range, sd_R_range, day_range:  [[105, 115], [0, 20], [7]]

--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 0]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
target 1 in 2 DONE!
target 2 in 2 DONE!

--------------------------------------
Value of Behaviour policy:49.429
O_threshold = 105
MC for this TARGET:[53.573, 0.07]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.02, -3.09, -3.53]][[-5.37, -53.57, -4.14]]
std:[[0.66, 0.64, 0.41]][[0.32, 0.0, 0.2]]
MSE:[[3.09, 3.16, 3.55]][[5.38, 53.57, 4.14]]
MSE(-DR):[[0.0, 0.07, 0.46]][[2.29, 50.48, 1.05]]
***
==============
O_threshold = 115
MC for this TARGET:[53.11, 0.049]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.67, -6.65, -7.2]][[-13.01, -53.11, -3.68]]
std:[[0.69, 0.7, 0.43]][[0.29, 0.0, 0.2]]
MSE:[[6.71, 6.69, 7.21]][[13.01, 53.11, 3.69]]
MSE(-DR):[[0.0, -0.02, 0.5]][[6.3, 46.4, -3.02]]
***
==============
******************** THIS SETTING IS GOOD ********************
[[ 3.09  3.16  3.55  5.38 53.57  4.14]
 [ 6.71  6.69  7.21 13.01 53.11  3.69]]


time spent until now: 19.4 mins

13:32, 04/12

--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 20]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
target 1 in 2 DONE!
target 2 in 2 DONE!

--------------------------------------
Value of Behaviour policy:49.401
O_threshold = 105
MC for this TARGET:[53.605, 0.236]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-2.72, -2.83, -3.71]][[-5.5, -53.6, -4.2]]
std:[[1.22, 1.23, 0.68]][[0.37, 0.0, 0.23]]
MSE:[[2.98, 3.09, 3.77]][[5.51, 53.6, 4.21]]
MSE(-DR):[[0.0, 0.11, 0.79]][[2.53, 50.62, 1.23]]
***
==============
O_threshold = 115
MC for this TARGET:[53.142, 0.238]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.69, -6.71, -7.25]][[-13.07, -53.14, -3.74]]
std:[[1.26, 1.28, 0.84]][[0.45, 0.0, 0.23]]
MSE:[[6.81, 6.83, 7.3]][[13.08, 53.14, 3.75]]
MSE(-DR):[[0.0, 0.02, 0.49]][[6.27, 46.33, -3.06]]
***
==============
******************** THIS SETTING IS GOOD ********************
[[ 3.09  3.16  3.55  5.38 53.57  4.14]
 [ 6.71  6.69  7.21 13.01 53.11  3.69]]


[[ 2.98  3.09  3.77  5.51 53.6   4.21]
 [ 6.81  6.83  7.3  13.08 53.14  3.75]]


time spent until now: 38.9 mins

13:52, 04/12
ubuntu@ip-172-31-5-25:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
14:11, 04/12; num of cores:16
QV_tuning
```

```
Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, t_func] = [16, None, None, 20, 0.5, 1.5, 20, None]

thre_range, sd_R_range, day_range:  [[105, 115], [0, 20], [7]]

--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 0]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
True True [0.001, 0.001] 1036.4613943714226
True True [0.0001, 0.0001] 1119.5877099408754
True True [0.001, 0.001] 610.6050164184829
True True [0.001, 0.001] 484.00879514455426
True True [0.001, 0.001] 791.7384392137392
True True [0.001, 0.001] 1133.6589622267745
True True [0.001, 0.001] 699.3703075076833
True True [0.001, 1e-05] 600.042326389494
True True [1e-05, 1e-05] 322.03813509236403
True True [1e-05, 0.0001] 376.78448189712987
True True [0.001, 0.001] 857.1773378057889
True True [0.001, 0.001] 797.6623819390691
True True [0.001, 0.001] 1504.155719536461
True True [1e-05, 1e-05] 628.2896820679914
True True [0.001, 0.001] 934.1745840714173
True True [0.001, 0.001] 680.1896850177416
False True [0.001, 0.0001] 591.163510169073
False True [0.0001, 1e-05] 433.7187347878215
False True [0.001, 0.001] 688.9414388377993
False True [0.001, 0.001] 664.9696442924969
False True [0.001, 1e-05] 340.2167760356295
False True [1e-05, 1e-05] 273.2925797190231
False True [0.001, 1e-05] 359.80055828318683
False True [0.0001, 1e-05] 536.6075663171262
False True [0.0001, 1e-05] 237.84780181772362
False True [0.001, 0.0001] 597.5184725789817
False True [0.001, 0.0001] 360.6333885513674
False True [1e-05, 1e-05] 8.92859897515038
False True [1e-05, 1e-05] 170.18964268966326
False True [0.001, 0.0001] 592.0129203470199
False True [0.001, 1e-05] 495.4585782970473
False True [0.001, 1e-05] 267.16361881259036
True True [0.001, 0.001] 147.34177261735533
True True [1e-05, 0.001] 356.17965849334826
True True [0.001, 1e-05] 125.51762359881374
True True [0.001, 0.001] 468.6283622387393
True True [0.001, 0.001] 450.7136693533355
True True [0.001, 0.001] 464.65263441147863
True True [1e-05, 0.001] 184.33768554172957
True True [1e-05, 0.001] 673.9856727243914
True True [1e-05, 0.001] 940.1210220705033
True True [1e-05, 1e-05] 145.4634578169168
True True [0.001, 0.001] 200.39384534840696
True True [0.001, 0.001] 307.03380953316065
True True [1e-05, 0.001] 318.4528930341621
True True [1e-05, 0.001] 114.93242811526721
True True [0.001, 0.001] 284.6768965974267
True True [1e-05, 0.001] 337.9119606077031
False True [0.0001, 1e-05] 579.8718867885702
False True [0.0001, 1e-05] 701.1635613986113
False True [0.001, 1e-05] 871.0280605904727
False True [0.001, 0.001] 1335.9804044985822
False True [0.001, 0.0001] 900.7917784568253
False True [0.001, 0.001] 1549.362710232257
False True [0.001, 0.001] 1503.7521647247052
False True [0.001, 0.0001] 1297.8059345684826
False True [0.0001, 0.0001] 647.1717958380959
False True [1e-05, 1e-05] 1018.9912131717119
False True [0.001, 1e-05] 690.8872010157513
False True [0.001, 0.001] 1137.3053129217774
False True [0.001, 0.0001] 1188.7764747609945
False True [1e-05, 1e-05] 90.00826120214418
False True [0.0001, 1e-05] 617.9187402487619
False True [0.001, 1e-05] 995.0184308584005
True True [0.001, 0.0001] 117.1506194824545
True True [0.001, 0.001] 462.3732070111504
True True [0.001, 0.001] 210.7422832453268
True True [0.001, 0.001] 321.59582547318166
True True [0.001, 0.001] 276.9517119528501
True True [0.001, 0.001] 50.022292172157925
True True [1e-05, 0.001] 376.9102519165167
True True [1e-05, 0.001] 151.00329615241998
True True [0.001, 1e-05] 196.40689522709158
True True [0.0001, 1e-05] 66.89626975837513
True True [0.001, 0.001] 105.91812133089093
True True [0.0001, 1e-05] 169.56911470349402
True True [0.001, 0.0001] 123.8947810439077
```

```
False True [0.001, 0.001] 719.9276714760085
False True [0.0001, 1e-05] 198.77149378310156
False True [0.001, 1e-05] 494.6826874682188
True True [1e-05, 0.001] 280.9262217778146
False True [0.001, 0.0001] 433.5704138870526
False True [1e-05, 0.0001] 46.35223367861758
True True [1e-05, 0.0001] 148.3991791822466
False True [1e-05, 1e-05] 32.50801414891395
target 2 in 2 DONE!
False True [0.0001, 1e-05] 459.26544136746367
False True [0.001, 1e-05] 161.402235148568
False True [1e-05, 1e-05] 473.0022881172513

---------------------------------------
Value of Behaviour policy:49.429
O_threshold = 105
MC for this TARGET:[53.573, 0.07]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.29, -3.61, -3.53]][[-5.33, -53.57, -4.14]]
std:[[0.69, 0.74, 0.42]][[0.32, 0.0, 0.2]]
MSE:[[3.36, 3.69, 3.55]][[5.34, 53.57, 4.14]]
MSE(-DR):[[0.0, 0.33, 0.19]][[1.98, 50.21, 0.78]]
***
==============
O_threshold = 115
MC for this TARGET:[53.11, 0.049]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.09, -6.12, -7.21]][[-12.93, -53.11, -3.68]]
std:[[0.6, 0.61, 0.45]][[0.3, 0.0, 0.2]]
MSE:[[6.12, 6.15, 7.22]][[12.93, 53.11, 3.69]]
MSE(-DR):[[0.0, 0.03, 1.1]][[6.81, 46.99, -2.43]]
***
==============
******************** THIS SETTING IS GOOD ********************
[[ 3.36  3.69  3.55  5.34 53.57  4.14]
 [ 6.12  6.15  7.22 12.93 53.11  3.69]]


time spent until now: 23.5 mins

14:34, 04/12

---------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 20]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
True True [0.001, 0.001] 931.6492766987039
True True [0.0001, 1e-05] 984.7230819535064
True True [0.001, 0.001] 1179.0312477149
True True [0.001, 0.001] 2789.705836755872
True True [0.001, 0.001] 2475.9320066723185
True True [0.001, 0.001] 904.4087276953209
True True [0.001, 0.001] 1850.286666619258
True True [0.001, 0.001] 962.8668074158305
True True [0.001, 0.001] 932.9737973257554
True True [0.0001, 0.001] 998.2006504325611
True True [0.001, 0.001] 364.6843139377944
True True [1e-05, 0.0001] 442.6318566381075
True True [1e-05, 0.0001] 627.182402058225
True True [0.001, 0.001] 1019.0318340990196
True True [0.001, 0.001] 2045.0268359006577
True True [0.001, 0.001] 1006.5775762739928
False True [0.001, 0.001] 996.9909081756464
False True [0.001, 1e-05] 59.46788909221137
False True [1e-05, 0.0001] 1058.4505664512185
False True [1e-05, 1e-05] 357.63591479261936
False True [0.0001, 0.0001] 707.7912038798854
False True [0.001, 0.001] 786.1143384950645
False True [0.0001, 1e-05] 136.15837390711823
False True [0.0001, 0.001] 1220.3892525338288
False True [0.001, 0.001] 578.1220141822513
False True [1e-05, 0.0001] 206.6358663340377
False True [0.001, 0.001] 1064.5300632074047
False True [0.0001, 0.0001] 335.92755551330794
False True [0.001, 1e-05] 190.04733272195878
False True [0.001, 1e-05] 97.84590372284583
False True [0.001, 0.0001] 425.3943124421707
False True [0.0001, 1e-05] 547.361039826171
True True [0.001, 0.001] 152.56000479400294
True True [0.001, 0.001] 958.6824085777023
True True [1e-05, 0.001] 614.8439176120926
True True [0.001, 0.001] 1795.3148743813422
True True [0.001, 0.001] 824.1495384882046
True True [0.0001, 0.001] 176.02336135557897
True True [0.001, 0.001] 175.25856570500522
```

```
False True [0.0001, 0.001] 714.3134343271824
False True [1e-05, 1e-05] 760.7477070926194
False True [0.0001, 1e-05] 270.95923617870494
False True [1e-05, 1e-05] 386.2598113935649
True True [1e-05, 0.001] 99.3703130734111
False True [0.0001, 0.001] 433.921281855732
True True [0.001, 0.001] 922.1452117815311
False True [1e-05, 0.001] 869.2876962611141
False True [0.001, 0.001] 928.180139943634
False True [0.001, 1e-05] 1038.2194072819486
True True [0.001, 0.001] 558.0674572753201
False True [0.001, 0.001] 1159.5288123637886
False True [0.001, 0.0001] 420.5917104098501
False True [0.001, 1e-05] 347.67773805074285
False True [0.001, 1e-05] 163.80227421909038
True True [1e-05, 0.001] 609.6530427894634
False True [0.0001, 0.001] 896.4802722383637
True True [0.001, 0.001] 758.7666514253319
True True [0.0001, 0.0001] 2032.8459016968654
False True [0.001, 0.001] 655.9521279774315
True True [1e-05, 0.001] 645.8849782480447
True True [0.0001, 0.001] 742.7179469237885
False True [0.001, 0.0001] 221.406374465273
True True [1e-05, 0.001] 207.31704064929284
True True [1e-05, 0.001] 281.4623606841873
False True [0.001, 0.001] 497.91943817667186
True True [0.0001, 0.0001] 140.88995657769016
True True [0.001, 0.001] 1028.0802326578355
True True [0.001, 0.001] 251.39691451043672
True True [0.0001, 0.001] 2059.211385715491
True True [0.0001, 1e-05] 1408.0858509443444
True True [0.0001, 0.001] 374.2898289732207
False True [0.001, 1e-05] 239.9970869559323
False True [0.001, 0.001] 990.1885442611799
True True [0.0001, 0.0001] 384.0111903676121
False True [1e-05, 0.0001] 139.4849356080067
False True [0.001, 0.0001] 114.96921483400408
False True [1e-05, 1e-05] 163.38812569303133
True True [0.001, 0.001] 212.82759176395683
False True [0.001, 0.001] 867.4626630171601
target 2 in 2 DONE!
False True [0.001, 1e-05] 136.60432910339435
False True [0.001, 0.0001] 80.23377329053747
False True [0.001, 1e-05] 94.16294266106986
False True [0.001, 0.0001] 43.810594565127985
False True [1e-05, 1e-05] 515.7842753592273
False True [0.001, 0.0001] 248.20066650300308
False True [0.0001, 0.0001] 440.39316002092227
False True [0.0001, 0.001] 239.67750285953298
False True [1e-05, 0.0001] 427.00801650931106

----------------------------------------
Value of Behaviour policy:49.401
O_threshold = 105
MC for this TARGET:[53.605, 0.236]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.35, -3.67, -3.72]][[-5.44, -53.6, -4.2]]
std:[[0.72, 0.76, 0.66]][[0.4, 0.0, 0.23]]
MSE:[[3.43, 3.75, 3.78]][[5.45, 53.6, 4.21]]
MSE(-DR):[[0.0, 0.32, 0.35]][[2.02, 50.17, 0.78]]
***
==============
O_threshold = 115
MC for this TARGET:[53.142, 0.238]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.18, -6.18, -7.22]][[-12.96, -53.14, -3.74]]
std:[[1.26, 1.22, 0.88]][[0.49, 0.0, 0.23]]
MSE:[[6.31, 6.3, 7.27]][[12.97, 53.14, 3.75]]
MSE(-DR):[[0.0, -0.01, 0.96]][[6.66, 46.83, -2.56]]
***
==============
******************** THIS SETTING IS GOOD ********************
[[ 3.36  3.69  3.55  5.34 53.57  4.14]
 [ 6.12  6.15  7.22 12.93 53.11  3.69]]


[[ 3.43  3.75  3.78  5.45 53.6   4.21]
 [ 6.31  6.3   7.27 12.97 53.14  3.75]]


time spent until now: 47.1 mins

14:58, 04/12
ubuntu@ip-172-31-5-25:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
15:02, 04/12; num of cores:16
QV_tuning

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, t_func] = [16, None, None, 20, 0.5, 1.5, 20, None]
```

```
thre_range, sd_R_range, day_range:  [[105, 115], [0, 20], [7]]

---------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 0]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
True True [0.01, 0.01] 680.8029368514186
True True [0.0001, 0.01] 408.68299740119903
True True [0.001, 0.01] 526.8510577368103
True True [0.01, 0.01] 630.5566880942781
True True [0.01, 0.01] 485.7765241566265
True True [0.001, 0.01] 314.7110697526123
True True [0.0001, 0.01] 613.5907117160161
True True [0.01, 0.01] 773.2802406723536
True True [0.01, 0.01] 362.20174424299694
True True [0.0001, 0.01] 635.5515302989786
True True [0.0001, 0.01] 462.1945160990068
True True [0.0001, 0.01] 487.28676940216315
True True [0.0001, 0.01] 528.0522345260997
True True [0.0001, 0.01] 517.6544627234454
True True [0.0001, 0.01] 457.2685704289494
True True [0.01, 0.01] 483.53281867670455
False True [0.01, 0.01] 530.5259507273846
False True [0.01, 0.01] 514.8082372063474
False True [0.01, 0.01] 541.3116324007207
False True [0.001, 0.0001] 591.163510169073
False True [0.01, 0.01] 363.82810184714253
False True [0.0001, 0.0001] 388.97219489963095
False True [0.0001, 0.0001] 307.0803166981357
False True [0.0001, 0.0001] 384.816390010147
False True [0.01, 0.01] 443.86444018528323
False True [0.0001, 0.0001] 113.11460535389368
False True [0.001, 0.0001] 360.6333885513674
False True [0.01, 0.01] 451.4223921302238
False True [0.001, 0.0001] 428.66578664900567
False True [0.01, 0.01] 559.2313378230538
False True [0.01, 0.01] 565.9681630638954
False True [0.0001, 0.0001] 296.379311099651
True True [0.01, 0.0001] 136.671477217494
True True [0.0001, 0.0001] 152.66619603885476
True True [0.01, 0.01] 162.3110523035217
True True [0.01, 0.01] 189.11912767975284
True True [0.01, 0.01] 223.8501961023213
True True [0.01, 0.01] 189.44115486719164
True True [0.0001, 0.001] 139.99818485141495
True True [0.01, 0.01] 185.46704628278005
True True [0.01, 0.01] 77.0966436526692
True True [0.01, 0.01] 229.49056181290632
True True [0.01, 0.01] 146.4367768395687
True True [0.0001, 0.01] 207.36674647178052
True True [0.001, 0.01] 173.97958336143412
True True [0.01, 0.01] 98.05598019570596
True True [0.01, 0.01] 123.51211994286655
True True [0.01, 0.01] 258.56947778219694
False True [0.0001, 0.0001] 774.4028646807664
False True [0.0001, 0.0001] 689.1203230943308
False True [0.001, 0.0001] 979.582568453472
False True [0.001, 0.0001] 900.7917784568253
False True [0.0001, 0.01] 1183.2263689147055
False True [0.01, 0.01] 944.8459267413921
False True [0.0001, 0.0001] 647.1717958380959
False True [0.001, 0.0001] 731.2369791927656
False True [0.0001, 0.01] 983.265766398498
False True [0.01, 0.01] 1035.5649366596556
False True [0.01, 0.01] 944.5534722554947
False True [0.01, 0.01] 1054.9136863872384
False True [0.0001, 0.0001] 949.8791193956948
False True [0.0001, 0.0001] 680.6078631094061
False True [0.01, 0.01] 1116.2156671026655
False True [0.01, 0.01] 1060.461183023766
True True [0.01, 0.01] 156.0445955490813
True True [0.001, 0.001] 50.022292172157925
True True [0.01, 0.01] 54.93494038989262
True True [0.01, 0.01] 91.10019513738547
True True [0.01, 0.0001] 96.29498467827719
True True [0.01, 0.01] 161.27383846451727
True True [0.0001, 0.01] 178.1076459536986
True True [0.01, 0.01] 147.0749464532767
True True [0.0001, 0.0001] 87.32169791817194
True True [0.01, 0.01] 119.68684503798289
True True [0.01, 0.01] 119.260464506175
True True [0.01, 0.01] 132.13894568980078
True True [0.01, 0.01] 88.36089461592994
True True [0.01, 0.01] 126.76485962677245
True True [0.01, 0.01] 113.66969895155135
```

```
False True [0.0001, 0.0001] 214.72747279927745
False True [0.01, 0.01] 540.9102720434602
False True [0.0001, 0.0001] 87.69376057805265
False True [0.0001, 0.01] 380.3304132618996
False True [0.0001, 0.0001] 268.08345899468856
False True [0.01, 0.01] 364.08713496149375
False True [0.0001, 0.0001] 287.763460926935
target 2 in 2 DONE!
False True [0.0001, 0.0001] 188.8396097107634
False True [0.0001, 0.0001] 222.53448244919252

----------------------------------------
Value of Behaviour policy:49.429
O_threshold = 105
MC for this TARGET:[53.573, 0.07]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.97, -5.12, -3.54]][[-4.98, -53.57, -4.14]]
std:[[0.47, 0.56, 0.42]][[0.31, 0.0, 0.2]]
MSE:[[4.0, 5.15, 3.56]][[4.99, 53.57, 4.14]]
MSE(-DR):[[0.0, 1.15, -0.44]][[0.99, 49.57, 0.14]]
**
==============
O_threshold = 115
MC for this TARGET:[53.11, 0.049]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-4.84, -4.89, -7.24]][[-12.33, -53.11, -3.68]]
std:[[0.46, 0.39, 0.43]][[0.27, 0.0, 0.2]]
MSE:[[4.86, 4.91, 7.25]][[12.33, 53.11, 3.69]]
MSE(-DR):[[0.0, 0.05, 2.39]][[7.47, 48.25, -1.17]]
***
==============
[[ 4.    5.15  3.56  4.99 53.57  4.14]
 [ 4.86  4.91  7.25 12.33 53.11  3.69]]


time spent until now: 23.4 mins

15:26, 04/12

----------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 20]

max(u_O) =  145.8
O_threshold = 105
number of reward locations:  7
O_threshold = 115
number of reward locations:  3
True True [0.01, 0.01] 525.5347741552695
True True [0.01, 0.01] 624.7862150544042
True True [0.01, 0.01] 631.932699504631
True True [0.01, 0.01] 689.160617154415
True True [0.01, 0.01] 880.7806618012767
True True [0.001, 0.0001] 635.7852512767427
True True [0.01, 0.01] 593.603826268494
True True [0.01, 0.01] 404.2415733298936
True True [0.01, 0.01] 161.7343207439318
True True [0.01, 0.01] 408.3613410768038
True True [0.01, 0.01] 831.472918888381
True True [0.0001, 0.01] 774.7815616747572
True True [0.01, 0.01] 597.079497183111
True True [0.0001, 0.01] 445.86371701401
True True [0.01, 0.01] 333.71996981979134
True True [0.01, 0.01] 283.3745796352207
False True [0.01, 0.01] 831.0179395135709
False True [0.01, 0.01] 580.8384292507985
False True [0.01, 0.01] 481.830104019601
False True [0.001, 0.0001] 62.58139965487662
False True [0.0001, 0.0001] 192.3304215334818
False True [0.001, 0.0001] 235.27747411857803
False True [0.0001, 0.0001] 442.7416665564586
False True [0.01, 0.0001] 573.0479128785066
False True [0.0001, 0.0001] 335.92755551330794
False True [0.01, 0.01] 716.5217253694146
False True [0.01, 0.01] 678.0900554057064
False True [0.0001, 0.01] 646.8526476226743
False True [0.01, 0.0001] 417.30159975617227
False True [0.01, 0.01] 690.6910010577974
False True [0.01, 0.01] 514.9479914589234
False True [0.0001, 0.0001] 98.9508422462438
True True [0.01, 0.01] 448.514921986943
True True [0.0001, 0.001] 176.02336135557897
True True [0.01, 0.01] 266.9461336261806
True True [0.0001, 0.001] 162.4043011732272
True True [0.01, 0.01] 169.4387910885576
True True [0.001, 0.01] 144.66641906775112
True True [0.01, 0.01] 232.28934689659633
True True [0.01, 0.001] 95.99938165290132
True True [0.0001, 0.01] 161.01274059670627
True True [0.01, 0.01] 395.556786525591
```

False True [0.0001, 0.01] 1607.2664836288009
True True [0.0001, 0.001] 122.26237677621435
True True [0.0001, 0.01] 427.5746842299543
True True [0.01, 0.01] 467.86624214591444
True True [0.01, 0.01] 388.86083469441286
True True [0.01, 0.01] 666.9690513485316
False True [0.0001, 0.01] 458.84447170769533
True True [0.01, 0.01] 367.80515201092413
True True [0.0001, 0.01] 355.1409697545363
True True [0.01, 0.01] 209.41944611857036
True True [0.01, 0.01] 275.87990749801577
False True [0.0001, 0.0001] 210.2497853689831
True True [0.01, 0.01] 371.14286601964125
False True [0.01, 0.01] 423.6573903422702
True True [0.01, 0.01] 244.29749359319726
False True [0.0001, 0.0001] 287.76829158777855
True True [0.01, 0.01] 177.559223308147
False True [0.01, 0.0001] 318.2086509645804
False True [0.001, 0.0001] 253.39191147256122
False True [0.01, 0.01] 450.76591445491
False True [0.01, 0.01] 374.60276856652195
False True [0.0001, 0.0001] 404.36588028344755
False True [0.0001, 0.0001] 515.9891471854594
True True [0.01, 0.01] 94.72138467395806
False True [0.001, 0.0001] 221.48312158734865
False True [0.01, 0.01] 620.988322786936
False True [0.01, 0.01] 471.68670191068406
False True [0.01, 0.01] 509.6290040456176
True True [0.01, 0.01] 308.5247094849542
False True [0.001, 0.0001] 88.39345123723524
True True [0.0001, 0.01] 97.15924371155667
False True [0.01, 0.0001] 536.7589511228847
True True [0.001, 0.01] 141.64340608239024
True True [0.01, 0.01] 306.5837251106444
True True [0.01, 0.01] 277.12526548243005
True True [0.0001, 0.01] 434.6259108526416
True True [0.01, 0.01] 108.62736307933191
True True [0.01, 0.01] 254.39553593078716
True True [0.0001, 0.01] 85.28616730104952
False True [0.01, 0.01] 626.6862313773054
True True [0.01, 0.01] 275.0409590388395
True True [0.01, 0.01] 338.94542228713533
True True [0.01, 0.01] 34.7606331830518
False True [0.0001, 0.0001] 603.7592719761708
True True [0.01, 0.01] 262.73321911171354
True True [0.01, 0.01] 338.0477910564344
False True [0.0001, 0.01] 504.6883214458069
True True [0.001, 0.01] 67.57067884304702
False True [0.001, 0.0001] 153.22449211102546
False True [0.0001, 0.0001] 458.2096363001167
False True [0.0001, 0.0001] 279.48364975797756
False True [0.0001, 0.01] 662.3748195987616
False True [0.01, 0.01] 510.65683617347645
False True [0.001, 0.001] 477.36229929810236
False True [0.001, 0.0001] 137.72498422232832
True True [0.01, 0.01] 77.03197936463502
False True [0.001, 0.0001] 936.0922432126708
False True [0.0001, 0.0001] 497.2281231953971
False True [0.0001, 0.0001] 122.54541477935382
True True [0.01, 0.01] 59.855626731294535
False True [0.0001, 0.01] 515.9670478916212
False True [0.01, 0.01] 906.5005077516277
False True [0.0001, 0.0001] 112.35649241791529
True True [0.01, 0.01] 191.68736018431156
True True [0.01, 0.01] 144.07375778800463
True True [0.01, 0.01] 160.784498963766
True True [0.01, 0.01] 256.37656240299685
True True [0.01, 0.01] 96.26239192653799
True True [0.01, 0.01] 312.04508716631426
True True [0.01, 0.01] 192.4838358690916
True True [0.01, 0.01] 121.34684820517388
True True [0.01, 0.01] 34.498212931319074
False True [0.0001, 0.0001] 820.3906509323945
True True [0.001, 0.01] 221.09569999484353
True True [0.01, 0.01] 60.75891040232517
False True [0.01, 0.01] 811.277731774367
True True [0.01, 0.01] 272.0318930315126
True True [0.01, 0.01] 238.3695162858023
False True [0.01, 0.01] 975.1588621604856
False True [0.001, 0.0001] 669.8628869306385
True True [0.01, 0.01] 112.30199187656747
False True [0.01, 0.01] 884.2251753599003
False True [0.001, 0.0001] 462.38177503894855
False True [0.01, 0.01] 823.1802839363893
False True [0.0001, 0.0001] 842.4072502102349
False True [0.001, 0.0001] 724.9282623854657
False True [0.01, 0.01] 1070.7790652438912
True True [0.01, 0.01] 69.53672876423283
False True [0.01, 0.01] 816.5246173422493

```
False True [0.001, 0.0001] 420.5917104098501
False True [0.0001, 0.01] 571.6956105791133
True True [0.01, 0.01] 148.38284807604305
False True [0.01, 0.01] 625.6172775264018
False True [0.01, 0.01] 678.101522601372
False True [0.01, 0.01] 724.9946746495675
False True [0.01, 0.01] 591.5404994629027
False True [0.01, 0.01] 584.3743578103268
True True [0.01, 0.01] 352.39063908904296
False True [0.01, 0.01] 714.1157034930482
False True [0.01, 0.01] 770.372990303411
False True [0.01, 0.01] 609.1636876893295
False True [0.01, 0.01] 566.3175293319921
True True [0.01, 0.01] 493.3032951708805
True True [0.01, 0.01] 96.5944247400873
False True [0.0001, 0.0001] 206.90078387959184
True True [0.01, 0.01] 135.7185325503399
True True [0.01, 0.01] 108.21524890632905
False True [0.0001, 0.01] 736.6308355160047
True True [0.0001, 0.01] 189.9325656084826
True True [0.0001, 0.01] 126.42984651714761
True True [0.01, 0.01] 221.70828909882292
True True [0.01, 0.01] 146.44590685931684
True True [0.01, 0.01] 83.53251062122702
True True [0.01, 0.01] 389.3239877248638
False True [0.001, 0.0001] 330.72936378386044
True True [0.01, 0.01] 108.92337866517454
True True [0.01, 0.01] 147.6903658550621
True True [0.01, 0.01] 299.49000737050034
False True [0.01, 0.01] 231.5218876945987
False True [0.001, 0.0001] 43.810594565127985
True True [0.01, 0.01] 600.1413168692854
False True [0.01, 0.0001] 229.64668050185253
True True [0.01, 0.01] 366.4366849034996
False True [0.0001, 0.01] 662.3561245838342
False True [0.01, 0.01] 512.8871514664368
False True [0.0001, 0.0001] 440.39316002092227
False True [0.0001, 0.0001] 182.55022979605894
False True [0.0001, 0.0001] 233.2945523518328
False True [0.001, 0.0001] 114.96921483400408
False True [0.001, 0.0001] 107.3299076292994
False True [0.001, 0.0001] 80.23377329053747
False True [0.01, 0.01] 387.30165661745957
False True [0.0001, 0.0001] 242.01233728193756
False True [0.001, 0.0001] 248.20066650300308
False True [0.01, 0.01] 695.6776941615094
target 2 in 2 DONE!

----------------------------------------
Value of Behaviour policy:49.401
O_threshold = 105
MC for this TARGET:[53.605, 0.236]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-4.08, -5.26, -3.71]][[-5.27, -53.6, -4.2]]
std:[[0.62, 0.59, 0.69]][[0.42, 0.0, 0.23]]
MSE:[[4.13, 5.29, 3.77]][[5.29, 53.6, 4.21]]
MSE(-DR):[[0.0, 1.16, -0.36]][[1.16, 49.47, 0.08]]
**
==============
O_threshold = 115
MC for this TARGET:[53.142, 0.238]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-4.85, -4.92, -7.23]][[-12.53, -53.14, -3.74]]
std:[[1.0, 0.86, 0.83]][[0.49, 0.0, 0.23]]
MSE:[[4.95, 4.99, 7.28]][[12.54, 53.14, 3.75]]
MSE(-DR):[[0.0, 0.04, 2.33]][[7.59, 48.19, -1.2]]
***
==============
[[ 4.    5.15  3.56  4.99 53.57  4.14]
 [ 4.86  4.91  7.25 12.33 53.11  3.69]]


[[ 4.13  5.29  3.77  5.29 53.6   4.21]
 [ 4.95  4.99  7.28 12.54 53.14  3.75]]


time spent until now: 46.9 mins

15:49, 04/12
ubuntu@ip-172-31-5-25:~$
```