New Experiments

July 24, 2018

Vary Warm Start + Effective end of game

Here we vary the size of the warm start (the number of observations given to the principals before the competing bandits game begins). We also track a new quantity - the "effective end of game" which we define as the last round where there is a "switch" in the decision of the agent. So, for instance, if in $t-1$ the agent picks principal 1 and in t the agent picks principal 2 then this is a "switch." The last time this happens in a simulation is defined as effective end of game (EEOG).

Below we report the results of running on the same priors we have been considering, but varying the warm start and recording market share + EEOG.

Results for Needle In Haystack - 0.5 HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.54** (0.02) eeog avg: 49 med: 0	**0.62** (0.02) eeog avg: 140 med: 1	**0.64** (0.02) eeog avg: 180 med: 7	**0.66** (0.02) eeog avg: 190 med: 15	**0.64** (0.02) eeog avg: 210 med: 24	**0.64** (0.02) eeog avg: 240 med: 62.5	**0.61** (0.02) eeog avg: 250 med: 26
TS vs DEG	**0.53** (0.03) eeog avg: 37 med: 0	**0.58** (0.02) eeog avg: 80 med: 0	**0.59** (0.02) eeog avg: 100 med: 0	**0.61** (0.02) eeog avg: 130 med: 4	**0.6** (0.02) eeog avg: 150 med: 10	**0.58** (0.02) eeog avg: 180 med: 31	**0.53** (0.02) eeog avg: 240 med: 17
DG vs DEG	**0.5** (0.02) eeog avg: 130 med: 3	**0.47** (0.02) eeog avg: 240 med: 10	**0.47** (0.02) eeog avg: 300 med: 47	**0.44** (0.02) eeog avg: 300 med: 61	**0.46** (0.02) eeog avg: 350 med: 114	**0.44** (0.02) eeog avg: 470 med: 194	**0.45** (0.02) eeog avg: 570 med: 303.5

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Results for Heavy Tail HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.46** (0.03) eeog avg: 11 med: 0	**0.37** (0.02) eeog avg: 40 med: 0	**0.32** (0.02) eeog avg: 44 med: 0	**0.31** (0.02) eeog avg: 53 med: 0	**0.33** (0.02) eeog avg: 57 med: 0	**0.43** (0.02) eeog avg: 85 med: 0	**0.51** (0.02) eeog avg: 120 med: 0
TS vs DEG	**0.45** (0.03) eeog avg: 6.2 med: 0	**0.35** (0.02) eeog avg: 12 med: 0	**0.32** (0.02) eeog avg: 23 med: 0	**0.3** (0.02) eeog avg: 23 med: 0	**0.32** (0.02) eeog avg: 44 med: 0	**0.44** (0.02) eeog avg: 83 med: 0	**0.6** (0.02) eeog avg: 170 med: 0
DG vs DEG	**0.53** (0.02) eeog avg: 130 med: 2	**0.56** (0.02) eeog avg: 200 med: 1	**0.57** (0.02) eeog avg: 270 med: 2	**0.61** (0.02) eeog avg: 330 med: 3	**0.6** (0.02) eeog avg: 400 med: 7	**0.64** (0.02) eeog avg: 540 med: 181.5	**0.62** (0.02) eeog avg: 650 med: 390

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Results for Uniform HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.5** (0.03) eeog avg: 48 med: 0	**0.47** (0.02) eeog avg: 120 med: 0	**0.45** (0.02) eeog avg: 180 med: 0	**0.44** (0.02) eeog avg: 220 med: 0	**0.42** (0.02) eeog avg: 270 med: 0	**0.4** (0.02) eeog avg: 410 med: 26.5	**0.42** (0.02) eeog avg: 550 med: 260
TS vs DEG	**0.48** (0.03) eeog avg: 33 med: 0	**0.46** (0.02) eeog avg: 94 med: 0	**0.44** (0.02) eeog avg: 140 med: 0	**0.41** (0.02) eeog avg: 170 med: 0	**0.43** (0.02) eeog avg: 220 med: 0	**0.38** (0.02) eeog avg: 390 med: 11.5	**0.39** (0.02) eeog avg: 530 med: 239
DG vs DEG	**0.48** (0.02) eeog avg: 120 med: 2	**0.49** (0.02) eeog avg: 270 med: 7	**0.5** (0.02) eeog avg: 390 med: 15	**0.5** (0.02) eeog avg: 450 med: 27	**0.5** (0.02) eeog avg: 500 med: 72.5	**0.51** (0.02) eeog avg: 720 med: 584.5	**0.5** (0.02) eeog avg: 890 med: 915.5

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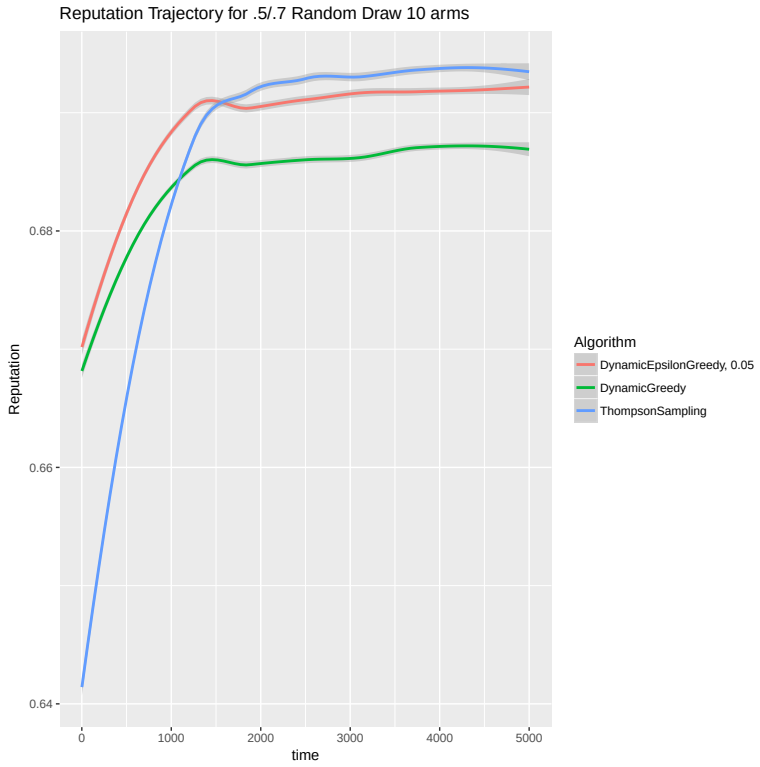
Results for .5/.7 Random Draw HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.52** (0.06) eeog avg: 600 med: 0	**0.52** (0.05) eeog avg: 1500 med: 3.5	**0.45** (0.05) eeog avg: 2200 med: 5	**0.46** (0.05) eeog avg: 3000 med: 26.5	**0.5** (0.05) eeog avg: 3800 med: 1021	**0.44** (0.05) eeog avg: 5700 med: 5800.5	**0.4** (0.04) eeog avg: 7100 med: 7655.5
TS vs DEG	**0.53** (0.06) eeog avg: 570 med: 0	**0.49** (0.06) eeog avg: 1700 med: 3	**0.42** (0.05) eeog avg: 2500 med: 3	**0.46** (0.05) eeog avg: 3100 med: 26	**0.45** (0.05) eeog avg: 4400 med: 1440.5	**0.42** (0.05) eeog avg: 5900 med: 5360	**0.43** (0.04) eeog avg: 7100 med: 7606.5
DG vs DEG	**0.47** (0.05) eeog avg: 990 med: 2	**0.48** (0.05) eeog avg: 3000 med: 67	**0.47** (0.05) eeog avg: 4000 med: 246.5	**0.46** (0.05) eeog avg: 4700 med: 1648	**0.52** (0.05) eeog avg: 4600 med: 2472.5	**0.52** (0.04) eeog avg: 6600 med: 7155	**0.49** (0.04) eeog avg: 7800 med: 9041

.5/.7 Instance

This is an instance where the arms are uniformly either 0.5 or 0.7 (as opposed to Needle in a Haystack where 9 arms have mean 0.5 and 1 arm has mean 0.7).

This is what the preliminary calibration for this instance looks like:



The results of the simulations:

Results for t= 15000 .5/.7 Random Draw Warm Start= 1 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.53** +/- 0.06 Var: 0.24 Share: 96 %	**0.53** +/- 0.06 Var: 0.24 Share: 97 %	**0.46** +/- 0.05 Var: 0.23 Share: 92 %			
HMR	**0.5** +/- 0.02 Var: 0.027 Share: 1.3 %	**0.52** +/- 0.02 Var: 0.047 Share: 11 %	**0.49** +/- 0.02 Var: 0.04 Share: 11 %			
SM	**0.5** +/- 0.007 Var: 0.0037 Share: 0 %	**0.51** +/- 0.01 Var: 0.017 Share: 0 %	**0.48** +/- 0.01 Var: 0.017 Share: 0 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 5 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.52** +/- 0.06 Var: 0.24 Share: 94 %	**0.54** +/- 0.05 Var: 0.23 Share: 91 %	**0.49** +/- 0.05 Var: 0.21 Share: 81 %			
HMR	**0.53** +/- 0.02 Var: 0.032 Share: 4.3 %	**0.51** +/- 0.02 Var: 0.043 Share: 9 %	**0.49** +/- 0.02 Var: 0.038 Share: 9.3 %			
SM	**0.5** +/- 0.007 Var: 0.0034 Share: 0 %	**0.5** +/- 0.01 Var: 0.011 Share: 0 %	**0.5** +/- 0.01 Var: 0.014 Share: 0 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 10 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.43** +/- 0.05 Var: 0.21 Share: 86 %	**0.48** +/- 0.05 Var: 0.22 Share: 88 %	**0.46** +/- 0.05 Var: 0.18 Share: 66 %			
HMR	**0.52** +/- 0.02 Var: 0.029 Share: 2.3 %	**0.49** +/- 0.02 Var: 0.043 Share: 9.7 %	**0.51** +/- 0.02 Var: 0.036 Share: 7.3 %			
SM	**0.5** +/- 0.006 Var: 0.0032 Share: 0 %	**0.5** +/- 0.01 Var: 0.014 Share: 0.33 %	**0.5** +/- 0.01 Var: 0.011 Share: 0 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 15 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.49** +/- 0.05 Var: 0.21 Share: 78 %	**0.47** +/- 0.05 Var: 0.21 Share: 81 %	**0.42** +/- 0.05 Var: 0.17 Share: 67 %			
HMR	**0.5** +/- 0.02 Var: 0.031 Share: 2.7 %	**0.51** +/- 0.02 Var: 0.042 Share: 9.3 %	**0.48** +/- 0.02 Var: 0.035 Share: 7.7 %			
SM	**0.5** +/- 0.008 Var: 0.0045 Share: 0 %	**0.5** +/- 0.01 Var: 0.014 Share: 0 %	**0.49** +/- 0.01 Var: 0.013 Share: 0.33 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 20 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.48** +/- 0.05 Var: 0.19 Share: 72 %	**0.53** +/- 0.05 Var: 0.2 Share: 76 %	**0.51** +/- 0.05 Var: 0.17 Share: 61 %			
HMR	**0.5** +/- 0.02 Var: 0.025 Share: 2 %	**0.5** +/- 0.02 Var: 0.042 Share: 9.7 %	**0.49** +/- 0.02 Var: 0.036 Share: 9.3 %			
SM	**0.5** +/- 0.007 Var: 0.0033 Share: 0 %	**0.5** +/- 0.01 Var: 0.013 Share: 0.33 %	**0.51** +/- 0.01 Var: 0.01 Share: 0 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 50 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.47** +/- 0.04 Var: 0.16 Share: 53 %	**0.51** +/- 0.05 Var: 0.16 Share: 59 %	**0.48** +/- 0.04 Var: 0.14 Share: 46 %			
HMR	**0.51** +/- 0.02 Var: 0.024 Share: 2.7 %	**0.51** +/- 0.02 Var: 0.044 Share: 11 %	**0.49** +/- 0.02 Var: 0.04 Share: 10 %			
SM	**0.5** +/- 0.008 Var: 0.0047 Share: 0 %	**0.49** +/- 0.01 Var: 0.012 Share: 0 %	**0.48** +/- 0.01 Var: 0.016 Share: 0 %			

Results for t= 15000 .5/.7 Random Draw Warm Start= 100 K= 10

	TS vs DEG	TS vs DG	DG vs DEG	TS vs TS	DEG vs DEG	DG vs DG
HM	**0.49** +/- 0.04 Var: 0.14 Share: 47 %	**0.47** +/- 0.04 Var: 0.14 Share: 50 %	**0.5** +/- 0.04 Var: 0.13 Share: 41 %			
HMR	**0.5** +/- 0.02 Var: 0.024 Share: 2.3 %	**0.5** +/- 0.02 Var: 0.035 Share: 7.3 %	**0.5** +/- 0.02 Var: 0.037 Share: 9.7 %			
SM	**0.5** +/- 0.007 Var: 0.0042 Share: 0 %	**0.5** +/- 0.01 Var: 0.014 Share: 0.67 %	**0.5** +/- 0.01 Var: 0.012 Share: 0 %			

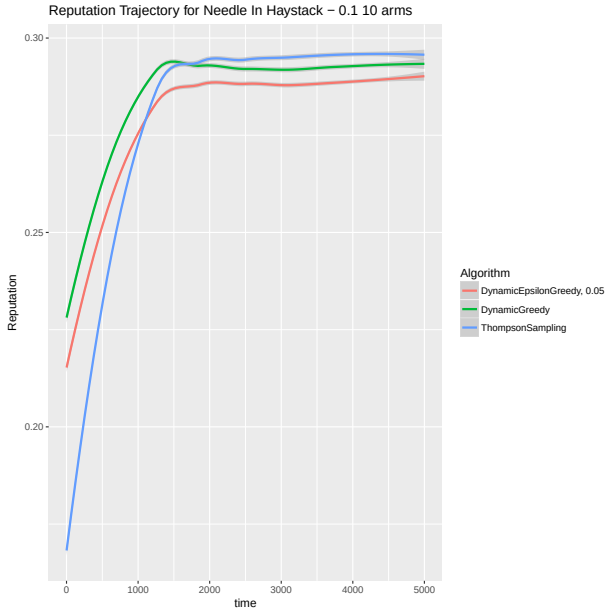
Various Needles in a Haystack

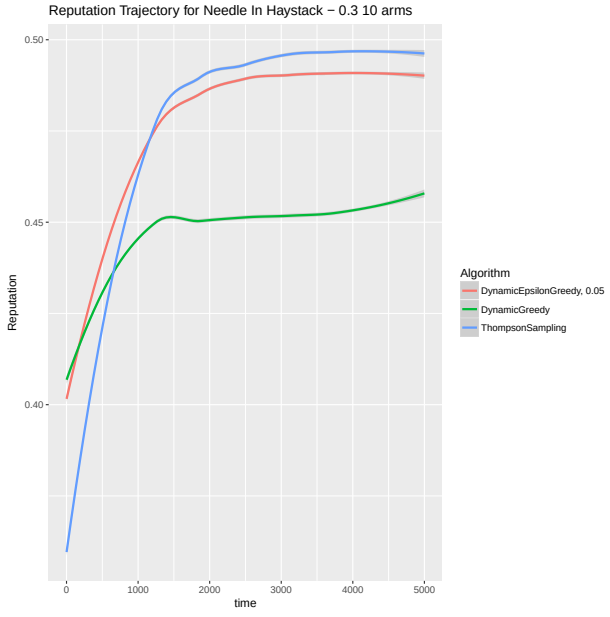
In this set of experiments we simply shift the needle in a haystack distribution.

We consider the following instances:

1. Needle In Haystack 0.1 - 9 arms with mean 0.1, 1 arm with mean 0.3
2. Needle In Haystack 0.3 - 9 arms with mean 0.3, 1 arm with mean 0.5
3. Needle In Haystack 0.5 - 9 arms with mean 0.5, 1 arm with mean 0.7
4. Needle In Haystack 0.7 - 9 arms with mean 0.5, 1 arm with mean 0.7

Preliminary plots for 0.1 and 0.3:





Results for Needle In Haystack - 0.7 HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.58** (0.02) eeog avg: 50 med: 1	**0.66** (0.02) eeog avg: 170 med: 4	**0.75** (0.02) eeog avg: 170 med: 9	**0.79** (0.02) eeog avg: 170 med: 9	**0.82** (0.02) eeog avg: 190 med: 9.5	**0.93** (0.01) eeog avg: 120 med: 0	**0.96** (0.007) eeog avg: 75 med: 0
TS vs DEG	**0.56** (0.02) eeog avg: 32 med: 1	**0.63** (0.02) eeog avg: 74 med: 1	**0.67** (0.02) eeog avg: 79 med: 1.5	**0.73** (0.02) eeog avg: 93 med: 2	**0.73** (0.02) eeog avg: 93 med: 2	**0.83** (0.02) eeog avg: 86 med: 0	**0.81** (0.02) eeog avg: 82 med: 0
DG vs DEG	**0.46** (0.02) eeog avg: 160 med: 2	**0.44** (0.02) eeog avg: 390 med: 39	**0.42** (0.02) eeog avg: 500 med: 244	**0.37** (0.02) eeog avg: 530 med: 279.5	**0.36** (0.02) eeog avg: 560 med: 335.5	**0.34** (0.02) eeog avg: 660 med: 495	**0.29** (0.02) eeog avg: 650 med: 464

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Results for Needle In Haystack - 0.5 HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.55** (0.02) eeog avg: 50 med: 0	**0.62** (0.02) eeog avg: 130 med: 1	**0.63** (0.02) eeog avg: 170 med: 5	**0.66** (0.02) eeog avg: 180 med: 11	**0.64** (0.02) eeog avg: 200 med: 26	**0.63** (0.02) eeog avg: 220 med: 64	**0.61** (0.02) eeog avg: 240 med: 29
TS vs DEG	**0.53** (0.03) eeog avg: 33 med: 0	**0.56** (0.02) eeog avg: 76 med: 0	**0.59** (0.02) eeog avg: 120 med: 1	**0.6** (0.02) eeog avg: 130 med: 7	**0.6** (0.02) eeog avg: 140 med: 7	**0.56** (0.02) eeog avg: 200 med: 18.5	**0.53** (0.02) eeog avg: 230 med: 15
DG vs DEG	**0.49** (0.02) eeog avg: 100 med: 3	**0.44** (0.02) eeog avg: 240 med: 12	**0.47** (0.02) eeog avg: 290 med: 36	**0.45** (0.02) eeog avg: 340 med: 89	**0.45** (0.02) eeog avg: 360 med: 130.5	**0.44** (0.02) eeog avg: 470 med: 174	**0.44** (0.02) eeog avg: 540 med: 235.5

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Results for Needle In Haystack - 0.3 HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.53** (0.03) eeog avg: 22 med: 0	**0.56** (0.02) eeog avg: 110 med: 0	**0.49** (0.02) eeog avg: 120 med: 2	**0.49** (0.02) eeog avg: 170 med: 1	**0.5** (0.02) eeog avg: 210 med: 8	**0.45** (0.02) eeog avg: 240 med: 13.5	**0.45** (0.02) eeog avg: 250 med: 4.5
TS vs DEG	**0.54** (0.03) eeog avg: 21 med: 0	**0.53** (0.02) eeog avg: 77 med: 0	**0.48** (0.02) eeog avg: 90 med: 1	**0.48** (0.02) eeog avg: 140 med: 2.5	**0.49** (0.02) eeog avg: 170 med: 2.5	**0.43** (0.02) eeog avg: 220 med: 15	**0.41** (0.02) eeog avg: 280 med: 17
DG vs DEG	**0.47** (0.02) eeog avg: 62 med: 2	**0.5** (0.02) eeog avg: 150 med: 6	**0.47** (0.02) eeog avg: 170 med: 9	**0.5** (0.02) eeog avg: 300 med: 27	**0.5** (0.02) eeog avg: 380 med: 65	**0.5** (0.02) eeog avg: 460 med: 152.5	**0.5** (0.02) eeog avg: 570 med: 197

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Results for Needle In Haystack - 0.1 HardMax K=10

	WS = 1	WS = 5	WS = 10	WS = 15	WS = 20	WS = 50	WS = 100
TS vs DG	**0.53** (0.03) eeog avg: 10 med: 3	**0.53** (0.03) eeog avg: 26 med: 0	**0.47** (0.02) eeog avg: 60 med: 0	**0.48** (0.02) eeog avg: 75 med: 0	**0.46** (0.02) eeog avg: 69 med: 0	**0.37** (0.02) eeog avg: 110 med: 0	**0.28** (0.02) eeog avg: 130 med: 0
TS vs DEG	**0.52** (0.03) eeog avg: 8.5 med: 3	**0.53** (0.03) eeog avg: 30 med: 0	**0.47** (0.02) eeog avg: 56 med: 0	**0.48** (0.02) eeog avg: 62 med: 0	**0.43** (0.02) eeog avg: 81 med: 0	**0.37** (0.02) eeog avg: 120 med: 0	**0.31** (0.02) eeog avg: 170 med: 0
DG vs DEG	**0.49** (0.03) eeog avg: 23 med: 5	**0.49** (0.02) eeog avg: 46 med: 5	**0.52** (0.02) eeog avg: 120 med: 14.5	**0.52** (0.02) eeog avg: 140 med: 12	**0.5** (0.02) eeog avg: 150 med: 11	**0.51** (0.02) eeog avg: 280 med: 9	**0.53** (0.02) eeog avg: 460 med: 12.5

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