繰り返し囚人のジレンマゲーム実験
Appendix2　自分との対戦を許した場合の実験結果

2016 年 1 月 19 日
尾山ゼミ

目次

1. 概要

　本編資料に載せているデータ・図を、自分自身との対戦を無し / 有りの場合で比較する。実験そのものの説明や、戦略のオートマトン等は本編資料を参照。

　この資料の最新版は https://github.com/myuuuuun/RepeatedMatrixGame/tree/master/PrisonersDilemma/experiment3 で公開する。実験で使用したプログラム及び関連資料も同ページで公開する。
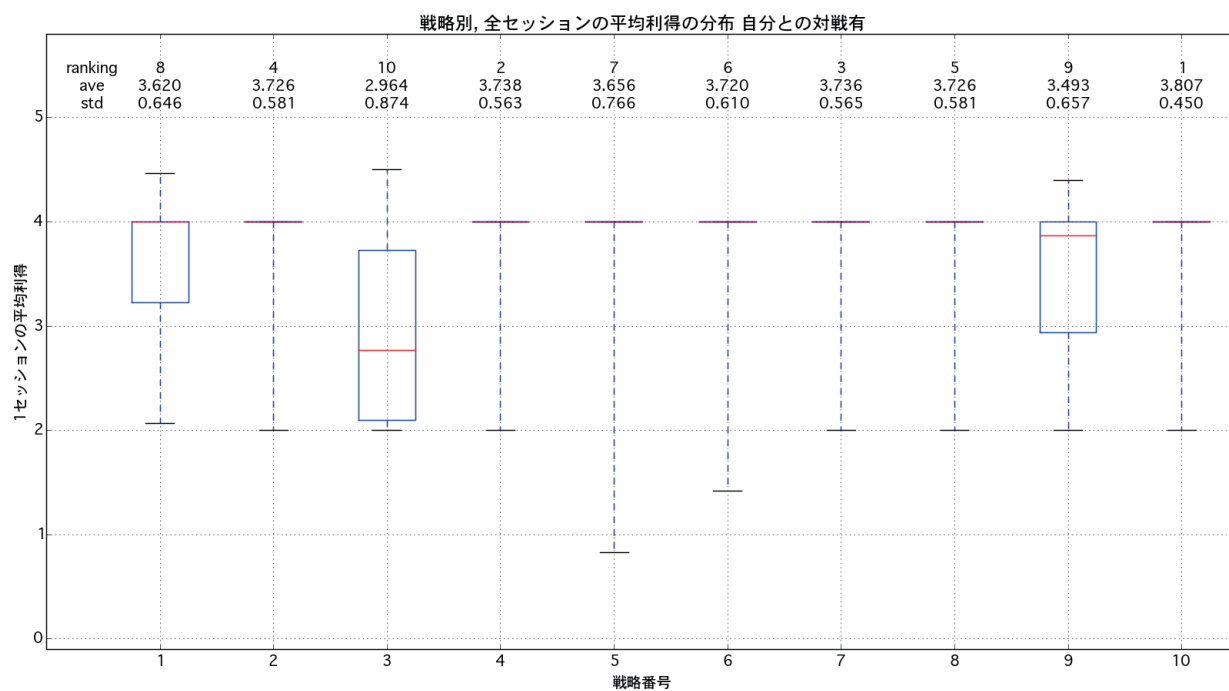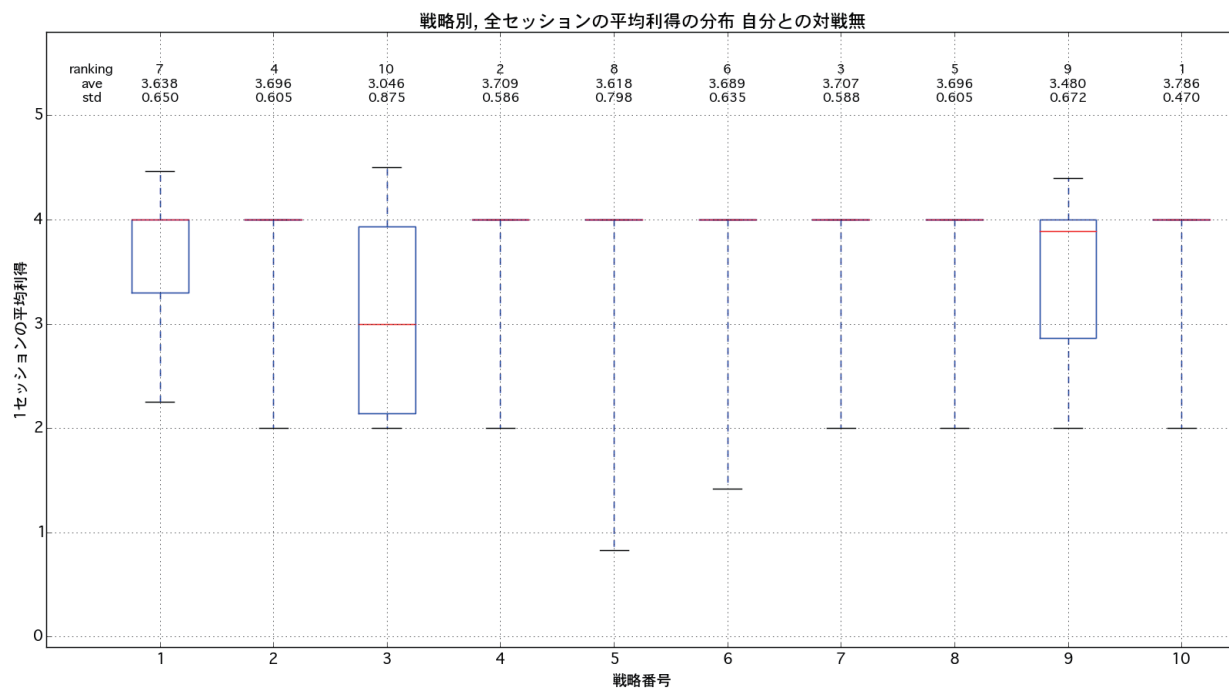
2. 実験 1 完全観測下の繰り返し囚人のジレンマゲーム

実験結果

自分との対戦無						
Datetime	2015-12-04-18-23-58					
Monitoring type	perfect					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	備考
1	lida_perfect_monitoring.lida_pm	3.638	7	3.387	8	
2	mhanami_Public_Strategy.PubStrategy	3.696	4	3.561	4	TFT'
3	kato.KatoStrategy	3.046	10	2.714	10	
4	ikegami_perfect.Self_Centered_perfect	3.709	2	3.570	2	30%
5	tsuyoshi.GrimTrigger	3.618	8	3.409	7	TFT'
6	gistfile1.MyStrategy	3.689	6	3.522	6	TFT'
7	beeleb_Strategy.beeleb	3.707	3	3.569	3	
8	oyama.OyamaPerfectMonitoring	3.696	5	3.560	5	GT
9	ogawa.ogawa	3.480	9	3.135	9	
10	yamagishi_impd.yamagishi	3.786	1	3.696	1	TFT
average		3.606		3.412		

自分との対戦有						
Datetime	2015-12-28-05-37-48					
Monitoring type	perfect					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	備考
1	lida_perfect_monitoring.lida_pm	3.620	8	3.341	8	
2	mhanami_Public_Strategy.PubStrategy	3.726	4	3.605	4	TFT'
3	kato.KatoStrategy	2.964	10	2.648	10	
4	ikegami_perfect.Self_Centered_perfect	3.738	2	3.613	2	30%
5	tsuyoshi.GrimTrigger	3.656	7	3.468	7	TFT'
6	gistfile1.MyStrategy	3.720	6	3.570	6	TFT'
7	beeleb_Strategy.beeleb	3.736	3	3.612	3	
8	oyama.OyamaPerfectMonitoring	3.726	5	3.604	5	GT
9	ogawa.ogawa	3.493	9	3.140	9	
10	yamagishi_impd.yamagishi	3.807	1	3.726	1	TFT
average		3.619		3.433		

戦略別セッション平均の分布

箱ひげ図。赤い線：中央値、青い長方形：25% ～ 75%、上下の黒い線：外れ値を除いた最大値 , 最小値

戦略別, 全セッションの平均利得の分布 自分との対戦無

ranking	7	4	10	2	8	6	3	5	9	1
ave	3.638	3.696	3.046	3.709	3.618	3.689	3.707	3.696	3.480	3.786
std	0.650	0.605	0.875	0.586	0.798	0.635	0.588	0.605	0.672	0.470

戦略別, 全セッションの平均利得の分布 自分との対戦有

ranking	8	4	10	2	7	6	3	5	9	1
ave	3.620	3.726	2.964	3.738	3.656	3.720	3.736	3.726	3.493	3.807
std	0.646	0.581	0.874	0.563	0.766	0.610	0.565	0.581	0.657	0.450

戦略別セッション平均の基本統計量

自分との対戦無

Str No.	1	2	3	4	5	6	7	8	9	10
rank	7	4	10	2	8	6	3	5	9	1
count	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
mean	3.638	3.696	3.046	3.709	3.618	3.689	3.707	3.696	3.480	3.786
std	0.650	0.605	0.875	0.586	0.798	0.635	0.588	0.605	0.673	0.470
min	1.801	2.000	2.003	2.000	0.829	1.418	2.000	2.000	2.000	2.000
25%	3.300	4.000	2.143	4.000	4.000	4.000	4.000	4.000	2.867	4.000
50%	4.000	4.000	3.000	4.000	4.000	4.000	4.000	4.000	3.893	4.000
75%	4.000	4.000	3.931	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.467	4.000	4.500	4.000	4.000	4.000	4.000	4.000	4.400	4.000

自分との対戦有

Str No.	1	2	3	4	5	6	7	8	9	10
ranking	8	4	10	2	7	6	3	5	9	1
count	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
mean	3.620	3.726	2.964	3.738	3.656	3.720	3.736	3.726	3.493	3.807
std	0.646	0.581	0.874	0.563	0.766	0.610	0.565	0.581	0.657	0.450
min	1.801	2.000	2.003	2.000	0.829	1.418	2.000	2.000	2.000	2.000
25%	3.228	4.000	2.095	4.000	4.000	4.000	4.000	4.000	2.939	4.000
50%	4.000	4.000	2.767	4.000	4.000	4.000	4.000	4.000	3.865	4.000
75%	4.000	4.000	3.731	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.467	4.000	4.500	4.000	4.000	4.000	4.000	4.000	4.400	4.000

期数による平均利得の変化

平均利得の推移（自分との対戦無し）

平均利得の推移（自分との対戦有り）
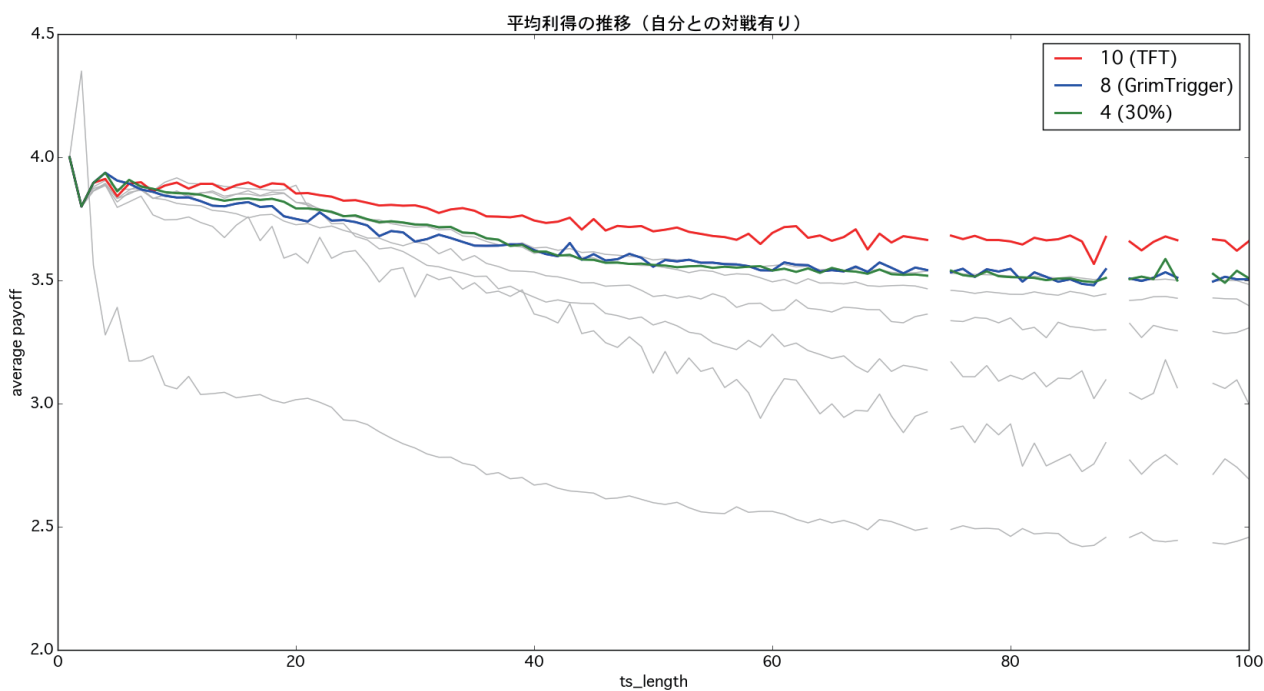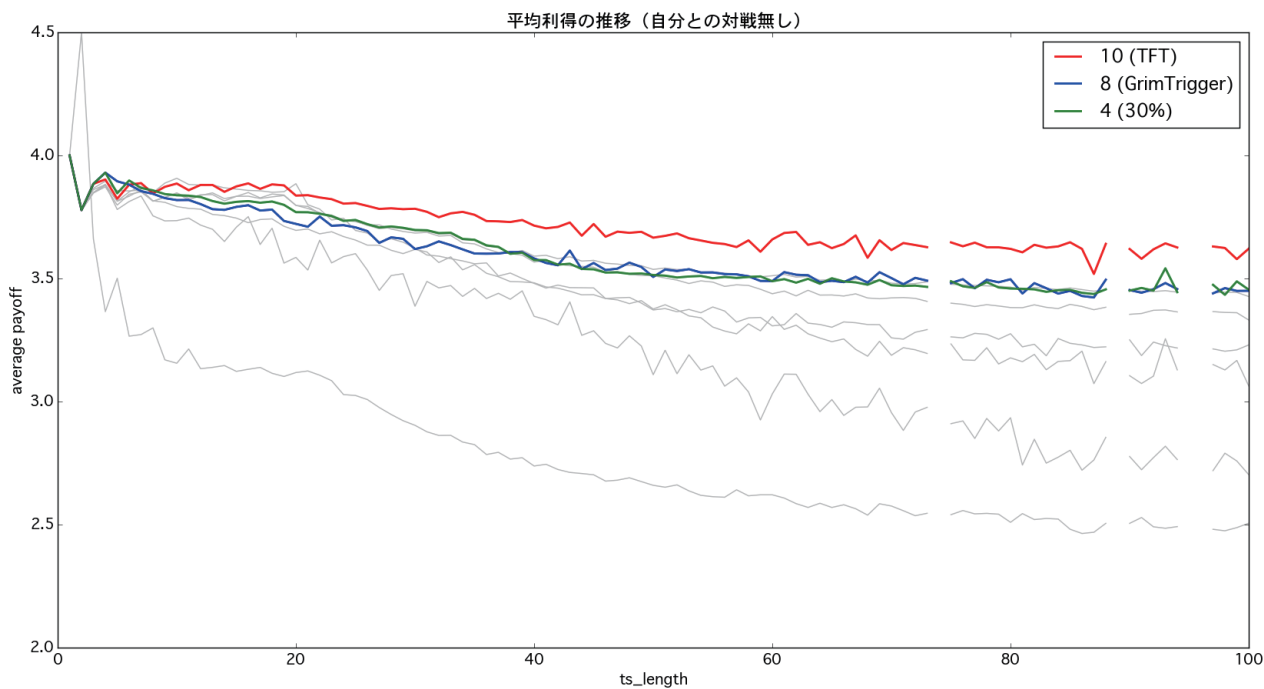
3. 実験 2 不完全・公的観測下の繰り返し囚人のジレンマゲーム

実験結果

自分との対戦無						
Datetime	2015-12-04-19-27-41					
Monitoring type	public					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	備考
1	lida_imperfect_public.lida_ipm	3.154	5	2.950	5	
2	mhanami_Imperfect_Public_Strategy.ImPubStrategy	3.427	1	3.086	1	ALLD
3	kato.KatoStrategy	3.301	2	3.083	2	
4	ikegami_imperfect_public.Self_Centered_public	3.205	3	3.025	4	0.25
5	tsuyoshi.GrimTrigger	2.874	8	2.566	8	TFT'
6	gistfile1.MyStrategy	2.781	10	2.450	10	TFT'
7	beeleb_Strategy.beeleb	2.802	9	2.545	9	
8	oyama.OyamaImperfectPublicMonitoring	3.164	4	3.069	3	GT'
9	ogawa.ogawa	3.021	7	2.911	6	
10	yamagishi_impd.yamagishi	3.060	6	2.824	7	TFT
average		3.079		2.851		

自分との対戦有						
Datetime	2015-12-28-05-40-50					
Monitoring type	public					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	備考
1	lida_imperfect_public.lida_ipm	3.146	5	2.922	6	
2	mhanami_Imperfect_Public_Strategy.ImPubStrategy	3.284	1	2.977	4	ALLD
3	kato.KatoStrategy	3.216	3	2.997	3	
4	ikegami_imperfect_public.Self_Centered_public	3.224	2	3.051	1	0.25
5	tsuyoshi.GrimTrigger	2.948	8	2.661	9	TFT'
6	gistfile1.MyStrategy	2.900	10	2.601	10	TFT'
7	beeleb_Strategy.beeleb	2.921	9	2.690	8	
8	oyama.OyamaImperfectPublicMonitoring	3.170	4	3.039	2	GT'
9	ogawa.ogawa	3.073	7	2.931	5	
10	yamagishi_impd.yamagishi	3.103	6	2.880	7	TFT
average		3.099		2.875		

戦略別セッション平均の分布

箱ひげ図。赤い線：中央値、青い長方形：25% ～ 75%、上下の黒い線：外れ値を除いた最大値 , 最小値

戦略別, 全セッションの平均利得の分布 自分との対戦無

戦略別, 全セッションの平均利得の分布 自分との対戦有
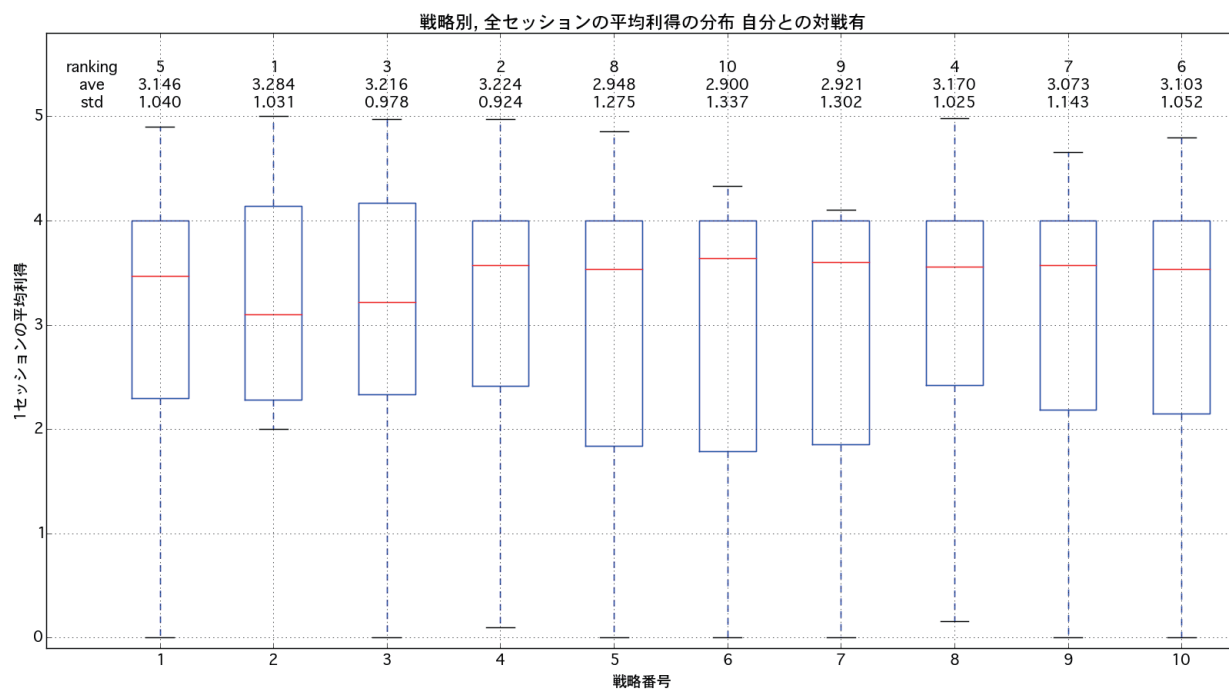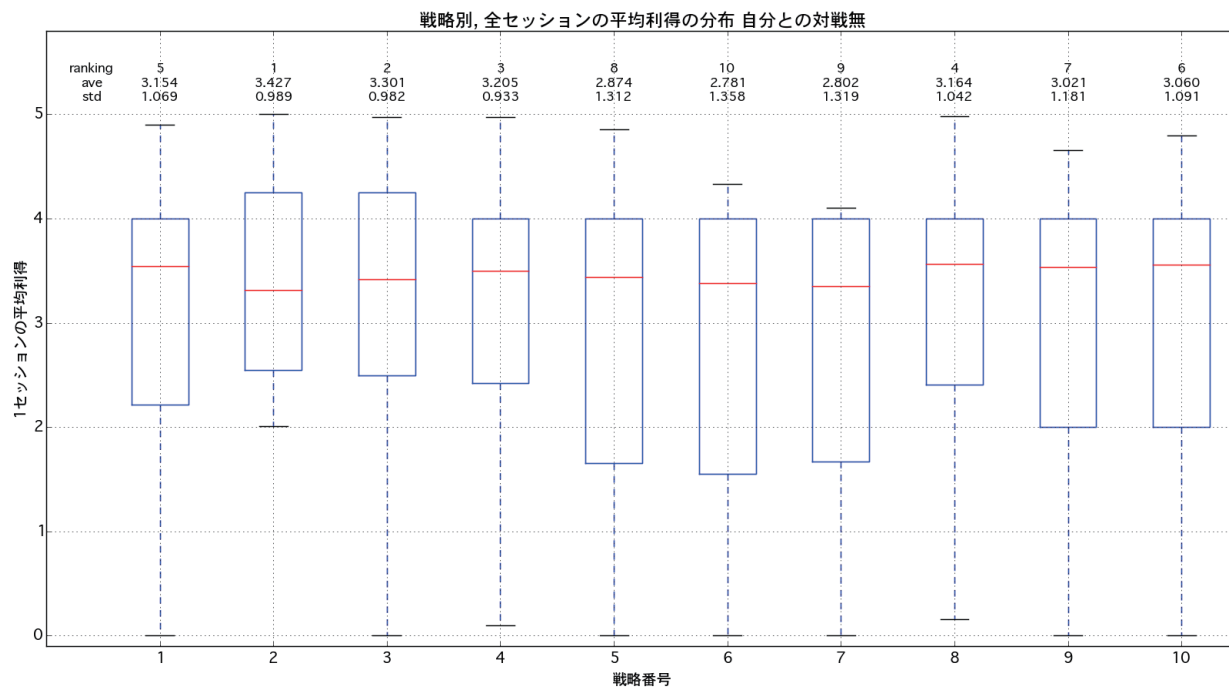
戦略別セッション平均の基本統計量

自分との対戦無										
Str No.	1	2	3	4	5	6	7	8	9	10
ranking	5	1	2	3	8	10	9	4	7	6
count	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
mean	3.154	3.427	3.301	3.205	2.874	2.781	2.802	3.164	3.021	3.060
std	1.069	0.989	0.982	0.933	1.312	1.358	1.319	1.042	1.181	1.091
min	0.000	2.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25%	2.215	2.545	2.497	2.426	1.653	1.556	1.673	2.406	2.000	2.000
50%	3.545	3.313	3.417	3.500	3.440	3.385	3.353	3.563	3.532	3.559
75%	4.000	4.250	4.250	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.900	5.000	4.976	4.976	4.857	4.333	4.103	4.981	4.660	4.800

自分との対戦有										
Str No.	1	2	3	4	5	6	7	8	9	10
ranking	5	1	3	2	8	10	9	4	7	6
count	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
mean	3.146	3.284	3.216	3.224	2.948	2.900	2.921	3.170	3.073	3.103
std	1.040	1.031	0.978	0.924	1.275	1.337	1.302	1.025	1.143	1.052
min	0.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25%	2.293	2.280	2.333	2.417	1.839	1.785	1.857	2.419	2.188	2.152
50%	3.473	3.098	3.222	3.571	3.537	3.636	3.600	3.556	3.571	3.538
75%	4.000	4.143	4.167	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.900	5.000	4.976	4.976	4.857	4.333	4.103	4.981	4.660	4.800

期数による平均利得の変化

平均利得の推移（自分との対戦無し）

平均利得の推移（自分との対戦有り）
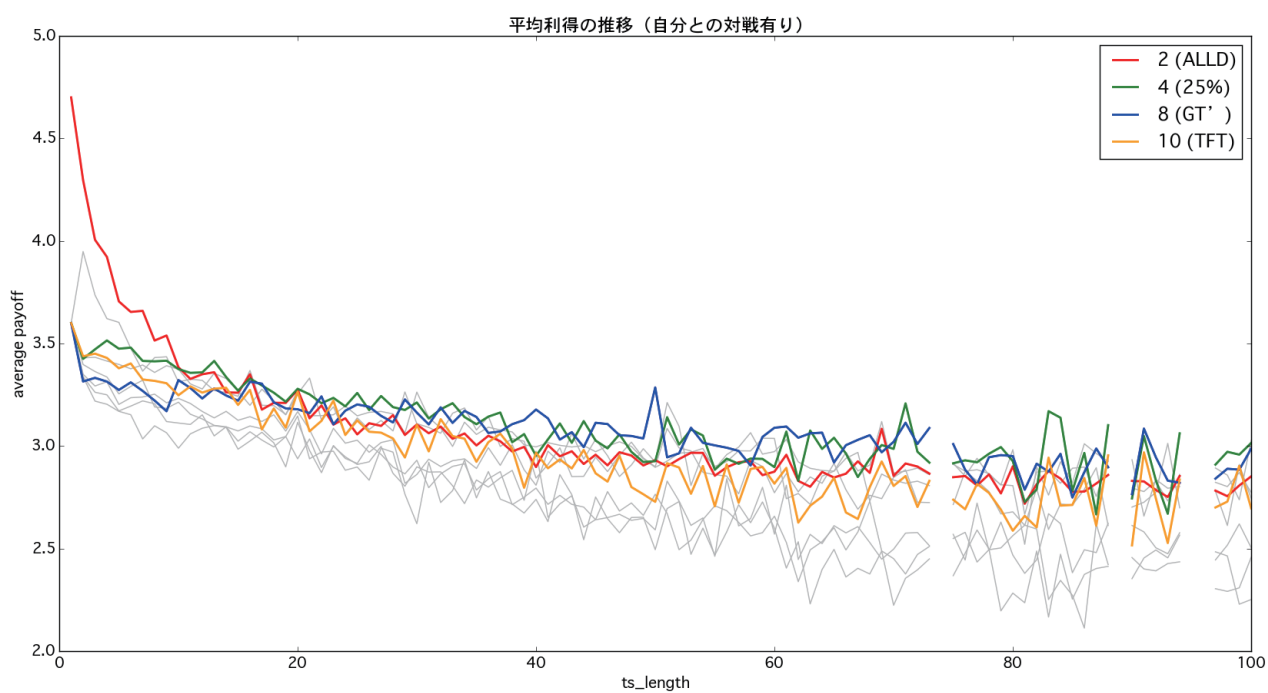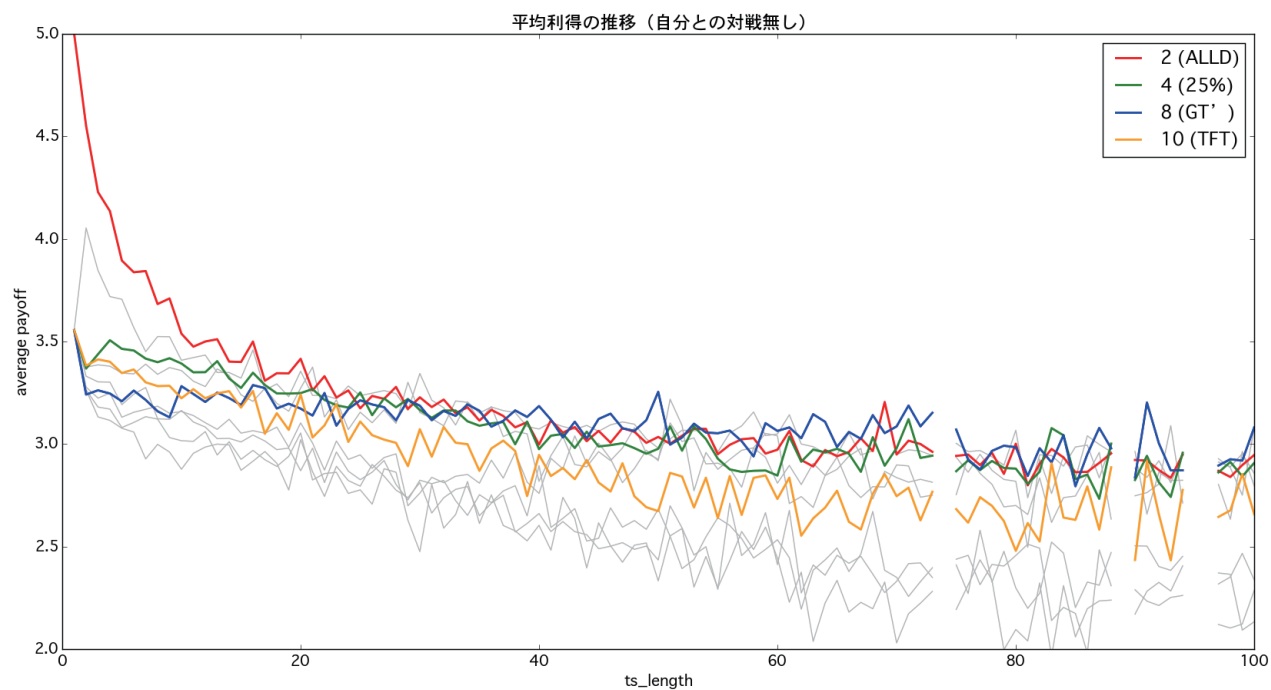
4. 実験 3 不完全・私的観測下の繰り返し囚人のジレンマゲーム（尾山ゼミの戦略のみ）

実験結果

自分との対戦無						
Datetime	2015-12-05-00-14-04					
Monitoring type	private					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	備考
1	lida_imperfect_private.lida_iprm	3.390	6	3.115	7	
2	mhanami_Imperfect_Private_Strategy.ImPrivStrategy	3.446	3	3.257	2	2T2FT
3	kato.KatoStrategy	3.241	10	2.899	10	
4	ikegami_imperfect_private.Self_Centered_private	3.375	8	3.138	6	0.2
5	tsuyoshi.GrimTrigger	3.245	9	2.928	9	TFT'
6	gistfile1.MyStrategy	3.427	4	3.213	4	TFT'
7	beeleb_Strategy.beeleb	3.458	1	3.294	1	
8	oyama.OyamaImperfectPrivateMonitoring	3.405	5	3.178	5	TFT'
9	ogawa.ogawa	3.390	7	3.095	8	
10	yamagishi_impd.yamagishi	3.446	2	3.239	3	TFT
average		3.382		3.136		

自分との対戦有						
Datetime	2015-12-28-05-44-20					
Monitoring type	private					
RandomSeed	282					
Repeats	1000					
Average ts_length	32.856					
Number of strategies	10					
Str No.	Strategy name	Avarage(session based)	Rank(session based)	Avarage(stage based)	Rank(stage based)	備考
1	lida_imperfect_private.lida_iprm	3.366	8	3.079	8	
2	mhanami_Imperfect_Private_Strategy.ImPrivStrategy	3.481	3	3.294	2	2T2FT
3	kato.KatoStrategy	3.149	10	2.822	10	
4	ikegami_imperfect_private.Self_Centered_private	3.369	7	3.141	6	20%
5	tsuyoshi.GrimTrigger	3.280	9	2.983	9	TFT'
6	gistfile1.MyStrategy	3.483	2	3.290	3	TFT'
7	beeleb_Strategy.beeleb	3.513	1	3.365	1	
8	oyama.OyamaImperfectPrivateMonitoring	3.420	5	3.194	5	TFT'
9	ogawa.ogawa	3.407	6	3.099	7	
10	yamagishi_impd.yamagishi	3.424	4	3.212	4	TFT
average		3.389		3.148		

戦略別セッション平均の分布

箱ひげ図。赤い線：中央値、青い長方形：25% 〜 75%、上下の黒い線：外れ値を除いた最大値 , 最小値

戦略別, 全セッションの平均利得の分布 自分との対戦無

戦略別, 全セッションの平均利得の分布 自分との対戦有
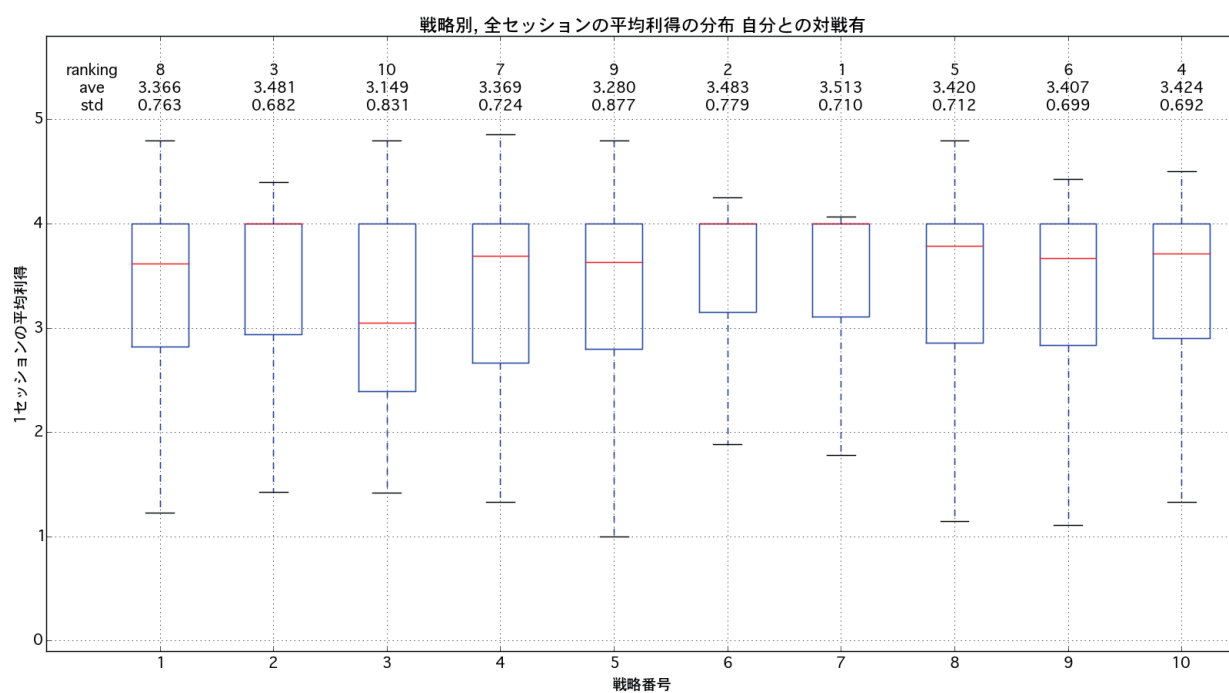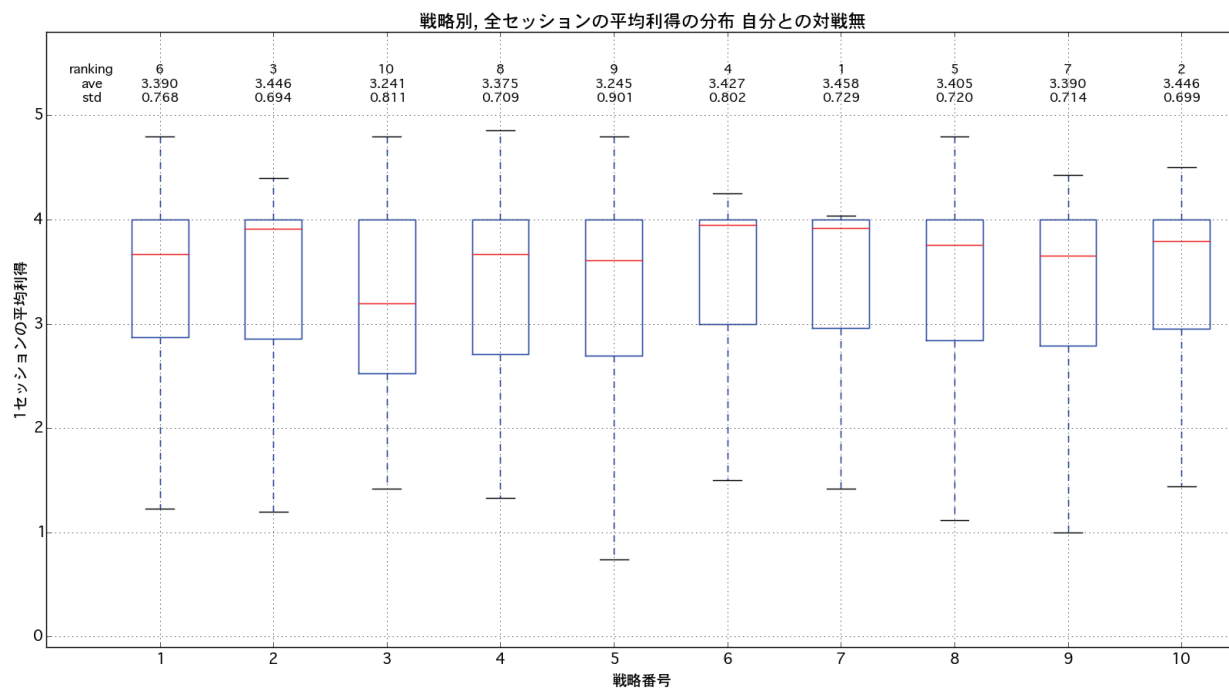
戦略別セッション平均の基本統計量

自分との対戦無

Str No.	1	2	3	4	5	6	7	8	9	10
rank	6	3	10	8	9	4	1	5	7	2
count	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
mean	3.390	3.446	3.241	3.375	3.245	3.427	3.458	3.405	3.390	3.446
std	0.768	0.694	0.811	0.709	0.901	0.802	0.729	0.720	0.714	0.699
min	1.231	1.200	1.417	1.333	0.571	0.615	0.667	0.571	0.800	1.333
25%	2.875	2.857	2.526	2.707	2.696	3.000	2.963	2.840	2.792	2.952
50%	3.667	3.911	3.195	3.667	3.607	3.947	3.918	3.759	3.653	3.793
75%	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.800	4.400	4.800	4.857	4.800	4.250	4.038	4.800	4.429	4.500

自分との対戦有

Str No.	1	2	3	4	5	6	7	8	9	10
ranking	8	3	10	7	9	2	1	5	6	4
count	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
mean	3.366	3.481	3.149	3.369	3.280	3.483	3.513	3.420	3.407	3.424
std	0.763	0.682	0.831	0.724	0.877	0.779	0.710	0.712	0.699	0.692
min	1.231	1.200	1.417	1.333	0.571	0.615	0.667	0.571	0.800	1.333
25%	2.818	2.939	2.394	2.667	2.798	3.154	3.111	2.857	2.835	2.900
50%	3.615	4.000	3.045	3.692	3.634	4.000	4.000	3.784	3.667	3.714
75%	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
max	4.800	4.400	4.800	4.857	4.800	4.250	4.069	4.800	4.429	4.500

期数による平均利得の変化

平均利得の推移（自分との対戦無し）

平均利得の推移（自分との対戦有り）
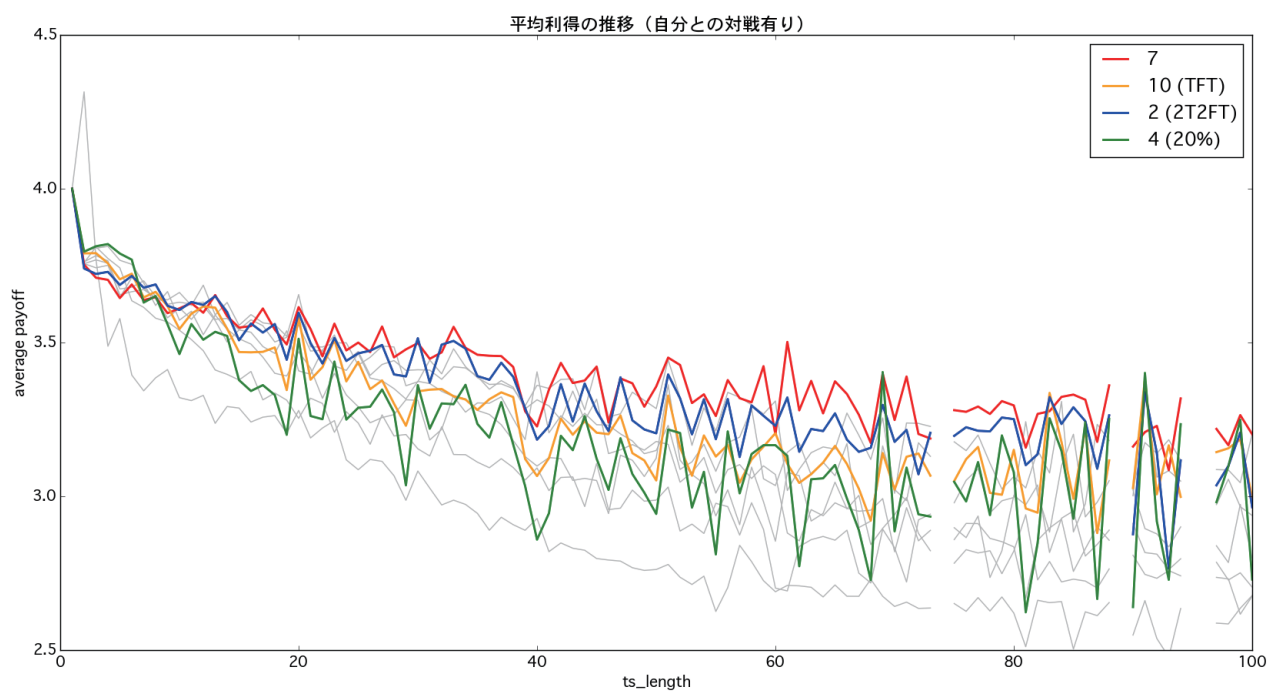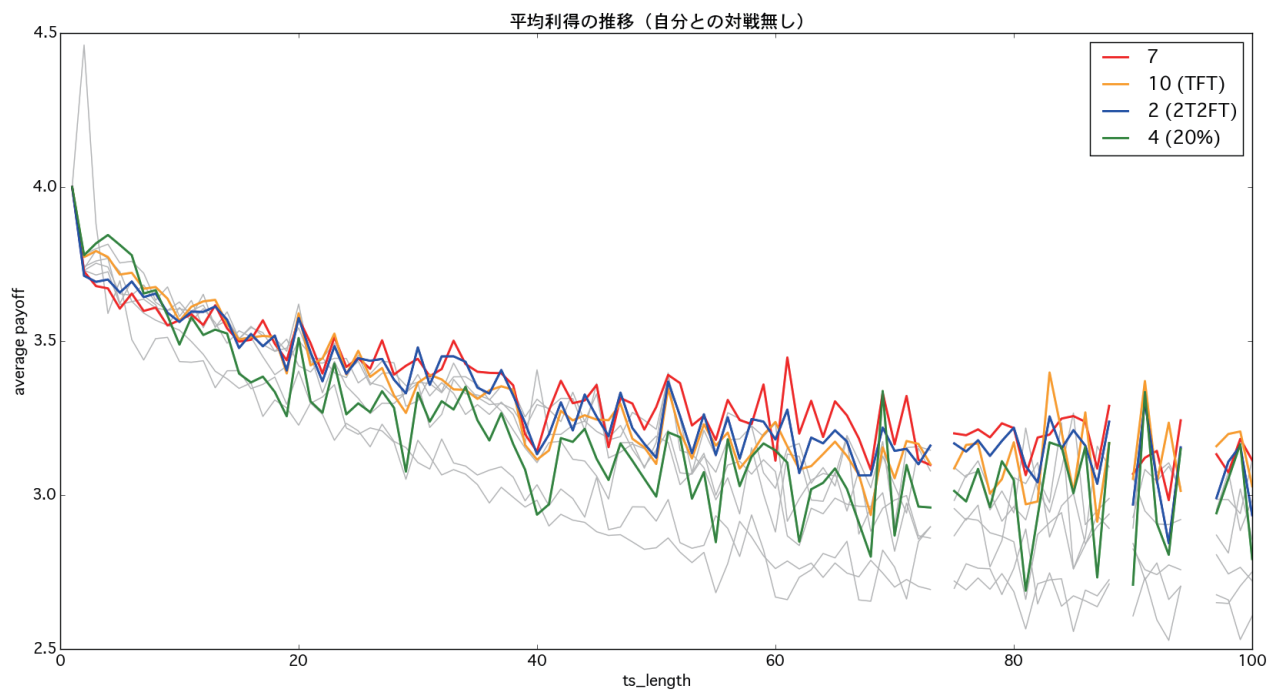
5. 実験 4 不完全・私的観測下の繰り返し囚人のジレンマゲーム（神取ゼミの戦略のみ）

実験結果

自分との対戦無								
Datetime	2015-12-05-01-07-37							
Monitoring type	private							
RandomSeed	282							
Repeats	1000							
Average ts_length	32.856							
Number of strategies	24							
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	Average (90% trimmed)	Rank (trimmed)	備考
1	kandori.Strategy1	3.256	5	3.132	3	3.250	5	
2	kandori.Strategy2	3.216	8	3.055	14	3.211	9	WSLS
3	kandori.Strategy3	3.240	6	3.082	9	3.237	6	WSLS'
4	kandori.Strategy4	3.191	15	3.086	7	3.182	14	
5	kandori.Strategy5	3.073	24	2.903	24	3.063	23	
6	kandori.Strategy6	3.198	12	3.056	13	3.193	12	WSLS'
7	kandori.Strategy7	3.167	17	3.002	19	3.159	17	TFT'
8	kandori.Strategy8	3.122	22	3.104	6	3.097	22	HIST
9	kandori.Strategy9	3.088	23	2.963	22	3.031	24	STFT
10	kandori.Strategy10	3.158	21	2.989	20	3.149	20	TFT'
11	kandori.Strategy11	3.160	19	3.004	18	3.154	18	TFT'
12	kandori.Strategy12	3.197	13	3.046	16	3.178	16	
13	kandori.Strategy13	3.326	2	3.182	2	3.328	2	CCDDDD
14	kandori.Strategy14	3.259	4	3.123	4	3.256	3	WSLS'
15	kandori.Strategy15	3.161	18	2.984	21	3.151	19	WSLS'
16	kandori.Strategy16	3.216	9	3.055	15	3.211	10	WSLS
17	kandori.Strategy17	3.216	10	3.064	11	3.213	8	TFT'
18	kandori.Strategy18	3.354	1	3.220	1	3.354	1	WSLS'
19	kandori.Strategy19	3.213	11	3.061	12	3.207	11	TFT
20	kandori.Strategy20	3.193	14	3.020	17	3.187	13	WSLS'
21	kandori.Strategy21	3.238	7	3.084	8	3.235	7	WSLS'
22	kandori.Strategy22	3.259	3	3.121	5	3.255	4	
23	kandori.Strategy23	3.189	16	3.066	10	3.181	15	
24	kandori.Strategy24	3.159	20	2.941	23	3.101	21	
average		3.202		3.056		3.191		

自分との対戦有							
Datetime	2015-12-29-07-01-49						
Monitoring type	private						
RandomSeed	282						
Repeats	1000						
Average ts_length	32.856						
Number of strategies	24						
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank(stage based)	Average (90% trimmed)	Rank (trimmed)	備考
1	kandori.Strategy1	3.260	5	3.126	6	3.255	7	
2	kandori.Strategy2	3.239	9	3.084	12	3.235	8	WSLS
3	kandori.Strategy3	3.259	7	3.106	9	3.255	6	WSLS'
4	kandori.Strategy4	3.225	12	3.124	7	3.216	12	
5	kandori.Strategy5	3.103	23	2.938	24	3.094	22	
6	kandori.Strategy6	3.227	11	3.090	11	3.223	11	WSLS'
7	kandori.Strategy7	3.163	17	2.996	19	3.154	17	TFT'
8	kandori.Strategy8	3.157	20	3.138	5	3.134	21	HIST
9	kandori.Strategy9	3.065	24	2.950	22	3.010	24	STFT
10	kandori.Strategy10	3.153	21	2.983	21	3.143	19	TFT'
11	kandori.Strategy11	3.186	16	3.034	16	3.181	16	TFT'
12	kandori.Strategy12	3.158	19	3.005	18	3.137	20	
13	kandori.Strategy13	3.287	2	3.138	4	3.286	2	CCDDDD
14	kandori.Strategy14	3.276	4	3.143	3	3.274	4	WSLS'
15	kandori.Strategy15	3.160	18	2.986	20	3.149	18	WSLS'
16	kandori.Strategy16	3.239	8	3.084	13	3.235	9	WSLS
17	kandori.Strategy17	3.228	10	3.069	14	3.226	10	TFT'
18	kandori.Strategy18	3.360	1	3.228	1	3.360	1	WSLS'
19	kandori.Strategy19	3.214	14	3.057	15	3.207	14	TFT
20	kandori.Strategy20	3.201	15	3.033	17	3.194	15	WSLS'
21	kandori.Strategy21	3.260	6	3.110	8	3.256	5	WSLS'
22	kandori.Strategy22	3.281	3	3.148	2	3.277	3	
23	kandori.Strategy23	3.222	13	3.104	10	3.214	13	
24	kandori.Strategy24	3.147	22	2.940	23	3.093	23	
average		3.211		3.067		3.200		

タイプ別平均利得

タイプ別平均（自分との対戦無）

	WSLS	TFT	ALLD	Other kandori	total average
WSLS	3.121	3.172	1.597	3.241	3.231
TFT	3.156	2.745	2.103	3.289	3.167
ALLD	3.568	2.767		3.474	3.326
Other kandori	3.282	3.260	1.614	2.850	3.181
total	3.202	3.080	1.735	3.134	3.202

タイプ別平均（自分との対戦有）

	WSLS	TFT	ALLD	Other kandori	total average
WSLS	3.485	3.172	1.597	3.241	3.247
TFT	3.156	3.202	2.103	3.289	3.168
ALLD	3.568	2.767	2.394	3.474	3.287
Other kandori	3.282	3.260	1.614	3.244	3.194
total	3.339	3.192	1.763	3.264	3.211

戦略別セッション平均の分布

箱ひげ図。赤い線：中央値、青い長方形：25% ～ 75%、上下の黒い線：外れ値を除いた最大値 , 最小値

戦略別, 全セッションの平均利得の分布 自分との対戦無

ranking	5	8	6	15	24	12	17	22	23	21	19	13	2	4	18	9	10	1	11	14	7	3	16	20
ave	3.256	3.216	3.240	3.191	3.073	3.198	3.167	3.122	3.088	3.158	3.160	3.197	3.326	3.259	3.161	3.216	3.216	3.354	3.213	3.193	3.238	3.259	3.189	3.159
std	0.838	0.880	0.851	0.855	0.974	0.940	0.765	0.953	0.818	0.770	0.845	0.690	0.714	0.847	0.874	0.880	0.753	0.743	0.749	0.879	0.870	0.896	0.964	0.937

戦略別, 全セッションの平均利得の分布 自分との対戦有

ranking	5	9	7	12	23	11	17	20	24	21	16	19	2	4	18	8	10	1	14	15	6	3	13	22
ave	3.260	3.239	3.259	3.225	3.103	3.227	3.163	3.157	3.065	3.153	3.186	3.158	3.287	3.276	3.160	3.239	3.228	3.360	3.214	3.201	3.260	3.281	3.222	3.147
std	0.837	0.870	0.840	0.853	0.965	0.931	0.757	0.949	0.815	0.761	0.839	0.707	0.731	0.837	0.862	0.870	0.748	0.732	0.743	0.865	0.860	0.885	0.957	0.920

戦略別セッション平均の基本統計量

自分との対戦無

Str No.	1	2	3	4	5	6	7	8	9	10	11	12
ranking	5	8	6	15	24	12	17	22	23	21	19	13
count	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000
mean	3.256	3.216	3.240	3.191	3.073	3.198	3.167	3.122	3.088	3.158	3.160	3.197
std	0.838	0.880	0.851	0.855	0.974	0.940	0.765	0.953	0.818	0.770	0.845	0.690
min	0	0	0	0	0	0	0	0	1	0	0	0
25%	2.694	2.706	2.705	2.659	2.667	2.865	2.6	2.6	2.4	2.6	2.515	2.7
50%	3.548	3.542	3.563	3.467	3.304	3.524	3.211	3.417	2.938	3.195	3.378	3.194
75%	4	3.964	3.970	4	4	4	3.947	4	3.778	3.923	4	3.545
max	4.923	4.917	4.909	4.167	4.25	4.778	4.75	4.105	5	4.75	4.333	4.778

Str No.	13	14	15	16	17	18	19	20	21	22	23	24
ranking	2	4	18	9	10	1	11	14	7	3	16	20
count	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000	46000
mean	3.326	3.259	3.161	3.216	3.216	3.354	3.213	3.193	3.238	3.259	3.189	3.159
std	0.714	0.847	0.874	0.880	0.753	0.743	0.749	0.879	0.870	0.896	0.964	0.937
min	0	0	0	0	0	0	0	0	0	0	0	1
25%	2.75	2.875	2.683	2.706	2.662	2.892	2.611	2.692	2.769	2.95	2.846	2.523
50%	3.467	3.55	3.375	3.542	3.333	3.571	3.333	3.483	3.556	3.588	3.533	3.326
75%	3.976	4	3.849	3.964	4	4	4	3.909	4	3.966	4	3.742
max	4.875	4.917	4.909	4.917	4.4	4.923	4.667	4.917	4.917	4.917	4.2	5

自分との対戦有

Str No.	1	2	3	4	5	6	7	8	9	10	11	12
ranking	5	9	7	12	23	11	17	20	24	21	16	19
count	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000
mean	3.260	3.239	3.259	3.225	3.103	3.227	3.163	3.157	3.065	3.153	3.186	3.158
std	0.837	0.870	0.840	0.853	0.965	0.931	0.757	0.949	0.815	0.761	0.839	0.707
min	0	0	0	0	0	0	0	0	1	0	0	0
25%	2.7	2.75	2.75	2.667	2.741	2.922	2.606	2.667	2.381	2.6	2.571	2.630
50%	3.558	3.576	3.579	3.5	3.333	3.556	3.188	3.467	2.896	3.167	3.424	3.167
75%	4	3.965	3.970	4	4	4	3.929	4	3.747	3.903	4	3.5
max	4.923	4.917	4.909	4.167	4.25	4.778	4.75	4.105	5	4.75	4.333	4.778

Str No.	13	14	15	16	17	18	19	20	21	22	23	24
ranking	2	4	18	8	10	1	14	15	6	3	13	22
count	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000	48000
mean	3.287	3.276	3.160	3.239	3.228	3.360	3.214	3.201	3.260	3.281	3.222	3.147
std	0.731	0.837	0.862	0.870	0.748	0.732	0.743	0.865	0.860	0.885	0.957	0.920
min	0	0	0	0	0	0	0	0	0	0	0	1
25%	2.669	2.913	2.697	2.75	2.667	2.929	2.621	2.726	2.809	3	2.911	2.545
50%	3.444	3.564	3.352	3.576	3.333	3.571	3.333	3.471	3.583	3.613	3.565	3.264
75%	3.947	4	3.838	3.965	4	4	4	3.9	4	3.967	4	3.714
max	4.875	4.917	4.909	4.917	4.4	4.923	4.667	4.917	4.917	4.917	4.2	5

期数による平均利得の変化

平均利得の推移（自分との対戦無し）

平均利得の推移（自分との対戦有り）
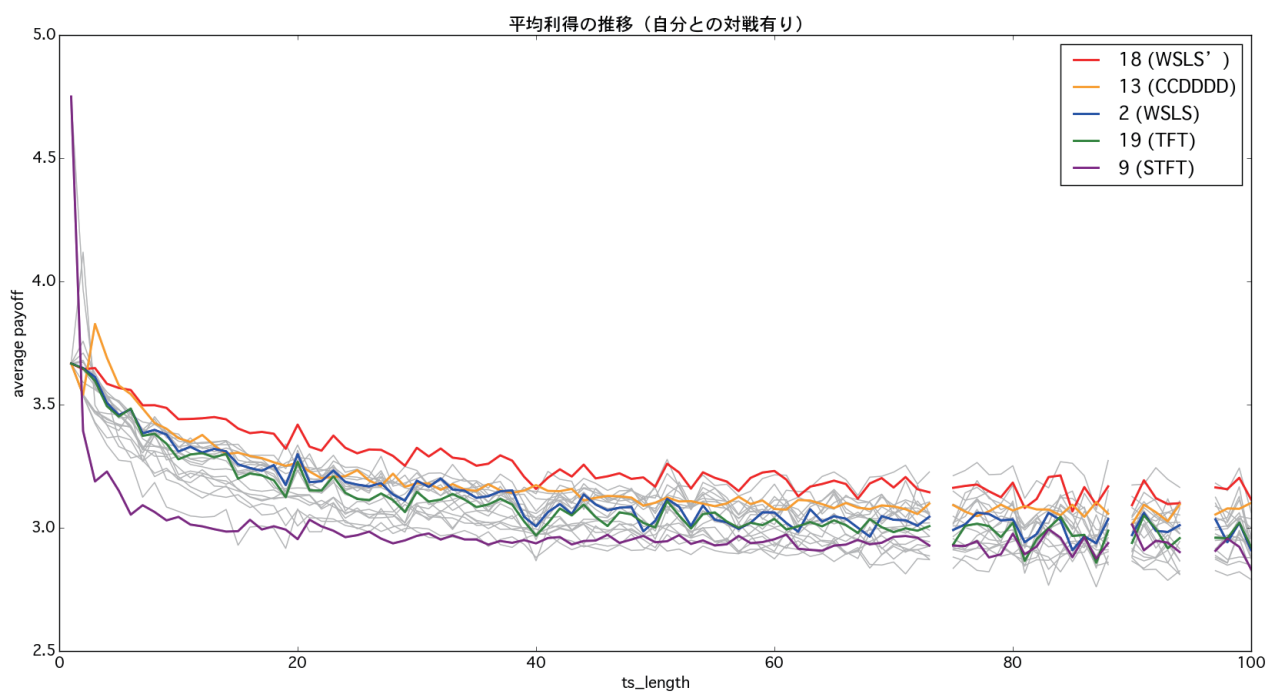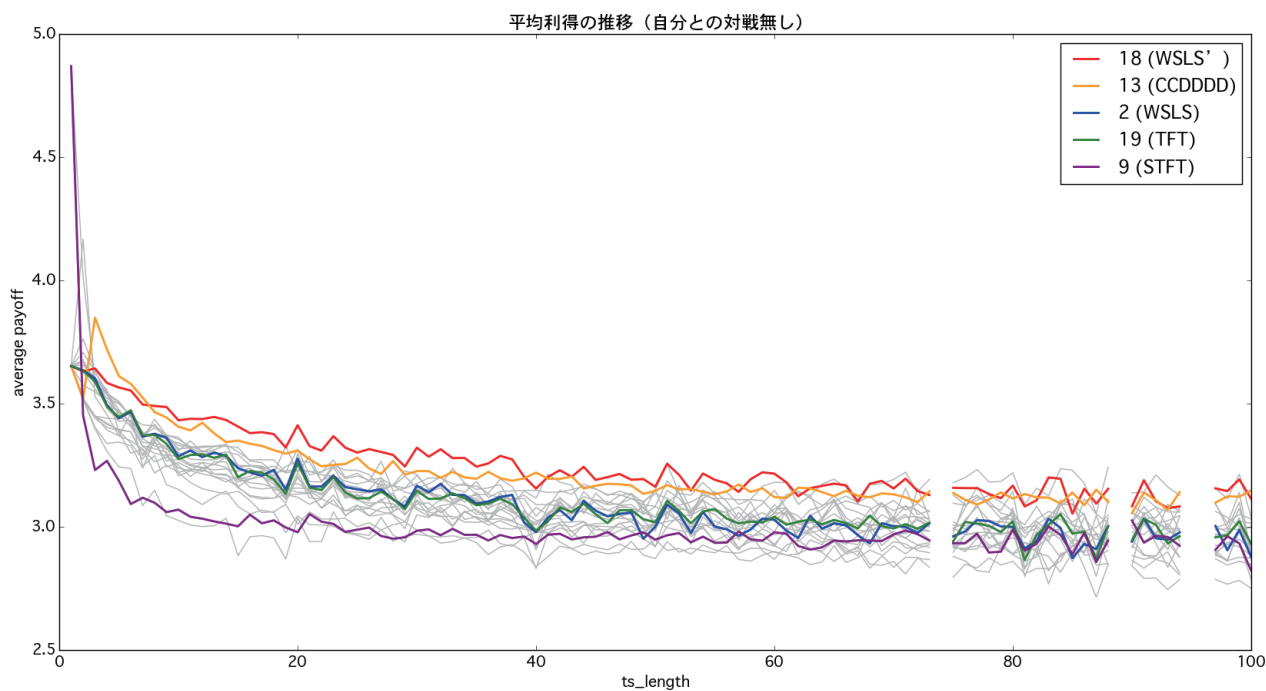
6. 実験 5 不完全・私的観測下の繰り返し囚人のジレンマゲーム（尾山＋神取ゼミの戦略）

実験結果

自分との対戦無								
Datetime	2015-11-30-18-01-45							
Monitoring type	private							
RandomSeed	282							
Repeats	1000							
Average ts_length	32.856							
Number of strategies	34							
Str No.	Strategy name	Avarage (session based)	Rank (session based)	Avarage (stage based)	Rank (stage based)	Average (90% trimmed)	Rank (trimmed)	備考
1	kandori.Strategy1	3.262	11	3.077	17	3.258	11	
2	kandori.Strategy2	3.187	28	2.962	30	3.182	26	WSLS
3	kandori.Strategy3	3.207	25	2.985	27	3.203	25	WSLS'
4	kandori.Strategy4	3.283	6	3.158	4	3.276	6	
5	kandori.Strategy5	3.152	30	2.947	31	3.146	30	
6	kandori.Strategy6	3.225	20	3.030	22	3.223	19	WSLS'
7	kandori.Strategy7	3.225	21	3.038	19	3.218	22	TFT'
8	kandori.Strategy8	3.240	18	3.180	3	3.223	20	HIST
9	kandori.Strategy9	3.132	32	2.986	26	3.076	33	STFT
10	kandori.Strategy10	3.214	24	3.022	23	3.207	24	TFT'
11	kandori.Strategy11	3.260	13	3.099	12	3.256	13	TFT'
12	kandori.Strategy12	3.182	29	2.985	28	3.162	29	
13	kandori.Strategy13	3.224	22	3.020	24	3.219	21	CCDDDD
14	kandori.Strategy14	3.253	15	3.058	18	3.252	14	WSLS'
15	kandori.Strategy15	3.118	33	2.887	33	3.106	32	WSLS'
16	kandori.Strategy16	3.187	27	2.962	29	3.182	27	WSLS
17	kandori.Strategy17	3.283	5	3.111	8	3.282	5	TFT'
18	kandori.Strategy18	3.292	4	3.085	15	3.292	4	WSLS'
19	kandori.Strategy19	3.277	7	3.107	10	3.272	8	TFT
20	kandori.Strategy20	3.149	31	2.918	32	3.141	31	WSLS'
21	kandori.Strategy21	3.216	23	3.000	25	3.214	23	WSLS'
22	kandori.Strategy22	3.231	19	3.034	20	3.227	18	
23	kandori.Strategy23	3.262	12	3.107	9	3.257	12	
24	kandori.Strategy24	3.018	34	2.755	34	2.954	34	
25	lida_imperfect_private.lida_iprm	3.330	3	3.153	5	3.331	3	
26	kato.KatoStrategy	3.194	26	3.033	21	3.173	28	
27	ikegami_imperfect_private.Self_Centered_private	3.368	1	3.220	1	3.366	1	20%
28	mhanami_Imperfect_Private_Strategy.ImPrivStrategy	3.349	2	3.216	2	3.346	2	2T2FT
29	tsuyoshi.GrimTrigger	3.264	10	3.085	14	3.261	10	TFT'
30	gistfile1.MyStrategy	3.267	9	3.116	7	3.261	9	TFT'
31	beeleb_Strategy.beeleb	3.246	17	3.117	6	3.237	17	
32	oyama.OyamaImperfectPri-vateMonitoring	3.256	14	3.087	13	3.252	15	TFT'
33	ogawa.ogawa	3.248	16	3.083	16	3.243	16	
34	yamagishi_impd.yamagishi	3.277	8	3.107	11	3.272	7	TFT
average		3.232		3.051		3.223		

	自分との対戦有							
Datetime	2015-12-29-08-02-38							
Monitoring type	private							
RandomSeed	282							
Repeats	1000							
Average ts_length	32.856							
Number of strategies	34							
Str No.	Strategy name	Average (session based)	Rank (session based)	Average (stage based)	Rank (stage based)	Average (90% trimmed)	Rank (trimmed)	備考
1	kandori.Strategy1	3.264	16	3.074	18	3.261	14	
2	kandori.Strategy2	3.204	26	2.986	28	3.200	25	WSLS
3	kandori.Strategy3	3.221	22	3.004	25	3.217	22	WSLS'
4	kandori.Strategy4	3.304	4	3.183	4	3.297	5	
5	kandori.Strategy5	3.171	28	2.971	30	3.165	28	
6	kandori.Strategy6	3.245	20	3.055	20	3.243	20	WSLS'
7	kandori.Strategy7	3.221	23	3.033	21	3.213	23	TFT'
8	kandori.Strategy8	3.261	17	3.202	3	3.246	18	HIST
9	kandori.Strategy9	3.114	33	2.977	29	3.060	33	STFT
10	kandori.Strategy10	3.209	24	3.017	23	3.201	24	TFT'
11	kandori.Strategy11	3.276	9	3.117	9	3.272	9	TFT'
12	kandori.Strategy12	3.155	31	2.958	31	3.133	31	
13	kandori.Strategy13	3.199	27	2.994	26	3.192	27	CCDDDD
14	kandori.Strategy14	3.266	14	3.075	17	3.264	13	WSLS'
15	kandori.Strategy15	3.118	32	2.891	33	3.106	32	WSLS'
16	kandori.Strategy16	3.204	25	2.986	27	3.200	26	WSLS
17	kandori.Strategy17	3.290	6	3.114	10	3.289	6	TFT'
18	kandori.Strategy18	3.299	5	3.095	14	3.298	4	WSLS'
19	kandori.Strategy19	3.276	10	3.103	11	3.270	11	TFT
20	kandori.Strategy20	3.156	30	2.930	32	3.148	29	WSLS'
21	kandori.Strategy21	3.232	21	3.021	22	3.229	21	WSLS'
22	kandori.Strategy22	3.248	19	3.056	19	3.244	19	
23	kandori.Strategy23	3.283	8	3.133	8	3.279	8	
24	kandori.Strategy24	3.014	34	2.759	34	2.952	34	
25	lida_imperfect_private.lida_iprm	3.325	3	3.142	7	3.325	3	
26	kato.KatoStrategy	3.168	29	3.006	24	3.146	30	
27	ikegami_imperfect_private. Self_Centered_private	3.367	1	3.219	2	3.364	1	20%
28	mhanami_Imperfect_Private_Strategy.ImPrivStrategy	3.362	2	3.228	1	3.360	2	2T2FT
29	tsuyoshi.GrimTrigger	3.273	12	3.097	13	3.270	10	TFT'
30	gistfile1.MyStrategy	3.288	7	3.142	6	3.283	7	TFT'
31	beeleb_Strategy.beeleb	3.268	13	3.143	5	3.259	16	
32	oyama.OyamaImperfectPrivateMonitoring	3.265	15	3.095	15	3.261	15	TFT'
33	ogawa.ogawa	3.257	18	3.085	16	3.254	17	
34	yamagishi_impd.yamagishi	3.276	11	3.103	12	3.270	12	TFT
average		3.238		3.059		3.229		

タイプ別平均利得

タイプ別平均１（自分との対戦無）						
	WSLS	TFT	ALLD	Other kandori	Other oyama	total average
WSLS	3.121	3.294	1.597	3.241	2.845	3.204
TFT	3.218	3.136	1.999	3.281	3.199	3.255
ALLD	3.568	2.948		3.474	2.810	3.224
Other kandori	3.282	3.385	1.614	2.850	2.978	3.204
Other oyama	3.291	3.369	2.085	3.356	2.612	3.277
total	3.229	3.266	1.809	3.187	2.957	3.232

タイプ別平均１（自分との対戦有）						
	WSLS	TFT	ALLD	Other kandori	Other oyama	total average
WSLS	3.485	3.294	1.597	3.241	2.845	3.216
TFT	3.218	3.419	1.999	3.281	3.199	3.259
ALLD	3.568	2.948	2.394	3.474	2.810	3.199
Other kandori	3.282	3.385	1.614	3.244	2.978	3.212
Other oyama	3.291	3.369	2.085	3.356	3.162	3.277
total	3.325	3.357	1.827	3.278	3.036	3.238

タイプ別平均２（自分との対戦無）							
	WSLS	TFT	ALLD	Prob	Other kandori	Other oyama	total average
WSLS	3.121	3.294	1.597	2.560	3.241	2.916	3.204
TFT	3.218	3.136	1.999	2.994	3.281	3.250	3.255
ALLD	3.568	2.948		2.537	3.474	2.878	3.224
Prob	3.554	3.279	2.287		3.513	3.178	3.368
Other kandori	3.282	3.385	1.614	2.728	2.850	3.040	3.204
Other oyama	3.225	3.392	2.035	2.927	3.316	2.551	3.254
total	3.229	3.266	1.809	2.789	3.187	3.020	3.232

タイプ別平均２（自分との対戦有）							
	WSLS	TFT	ALLD	Prob	Other kandori	Other oyama	total average
WSLS	3.485	3.294	1.597	2.560	3.241	2.916	3.216
TFT	3.218	3.419	1.999	2.994	3.281	3.250	3.259
ALLD	3.568	2.948	2.394	2.537	3.474	2.878	3.199
Prob	3.554	3.279	2.287	3.319	3.513	3.178	3.367
Other kandori	3.282	3.385	1.614	2.728	3.244	3.040	3.212
Other oyama	3.225	3.392	2.035	2.927	3.316	3.206	3.255
total	3.325	3.357	1.827	2.805	3.278	3.094	3.238

戦略別セッション平均の分布

箱ひげ図。赤い線：中央値、青い長方形：25% ～ 75%、上下の黒い線：外れ値を除いた最大値，最小値

戦略別, 全セッションの平均利得の分布 自分との対戦無

ranking	ave	std
11	3.262	0.821
28	3.187	0.902
25	3.207	0.872
6	3.283	0.838
30	3.152	0.972
20	3.225	0.942
21	3.225	0.764
18	3.240	0.904
32	3.132	0.848
24	3.214	0.772
13	3.260	0.816
29	3.182	0.743
22	3.224	0.734
15	3.253	0.861
33	3.118	0.900
27	3.187	0.902
5	3.283	0.741
4	3.292	0.767
7	3.277	0.738
31	3.149	0.901
23	3.216	0.887
19	3.231	0.927
12	3.262	0.946
34	3.018	1.014
3	3.330	0.746
26	3.194	0.760
1	3.368	0.690
2	3.349	0.700
10	3.264	0.858
9	3.267	0.880
17	3.246	0.857
14	3.256	0.793
16	3.248	0.779
8	3.277	0.738

戦略番号
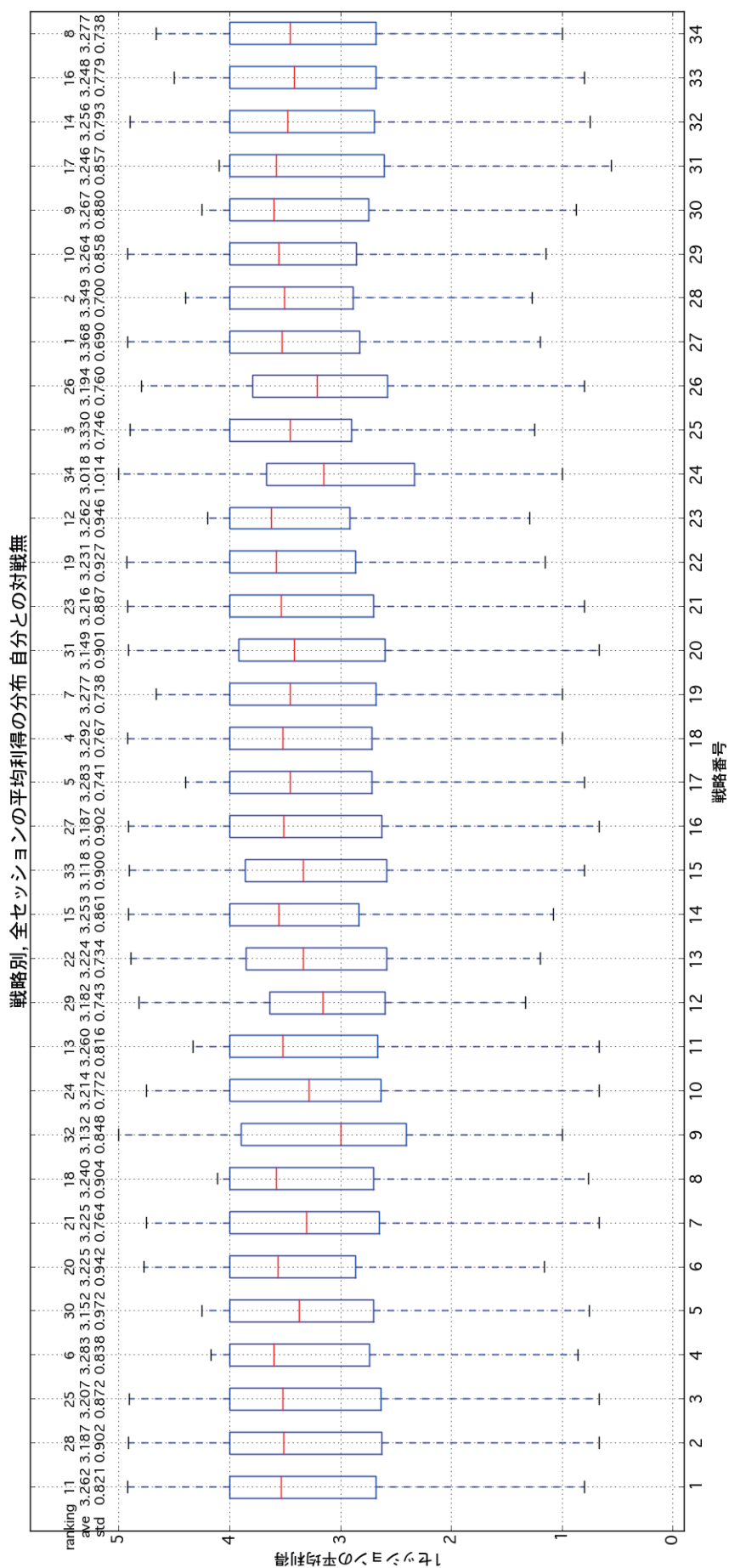
戦略別，全セッションの平均利得の分布 自分との対戦有
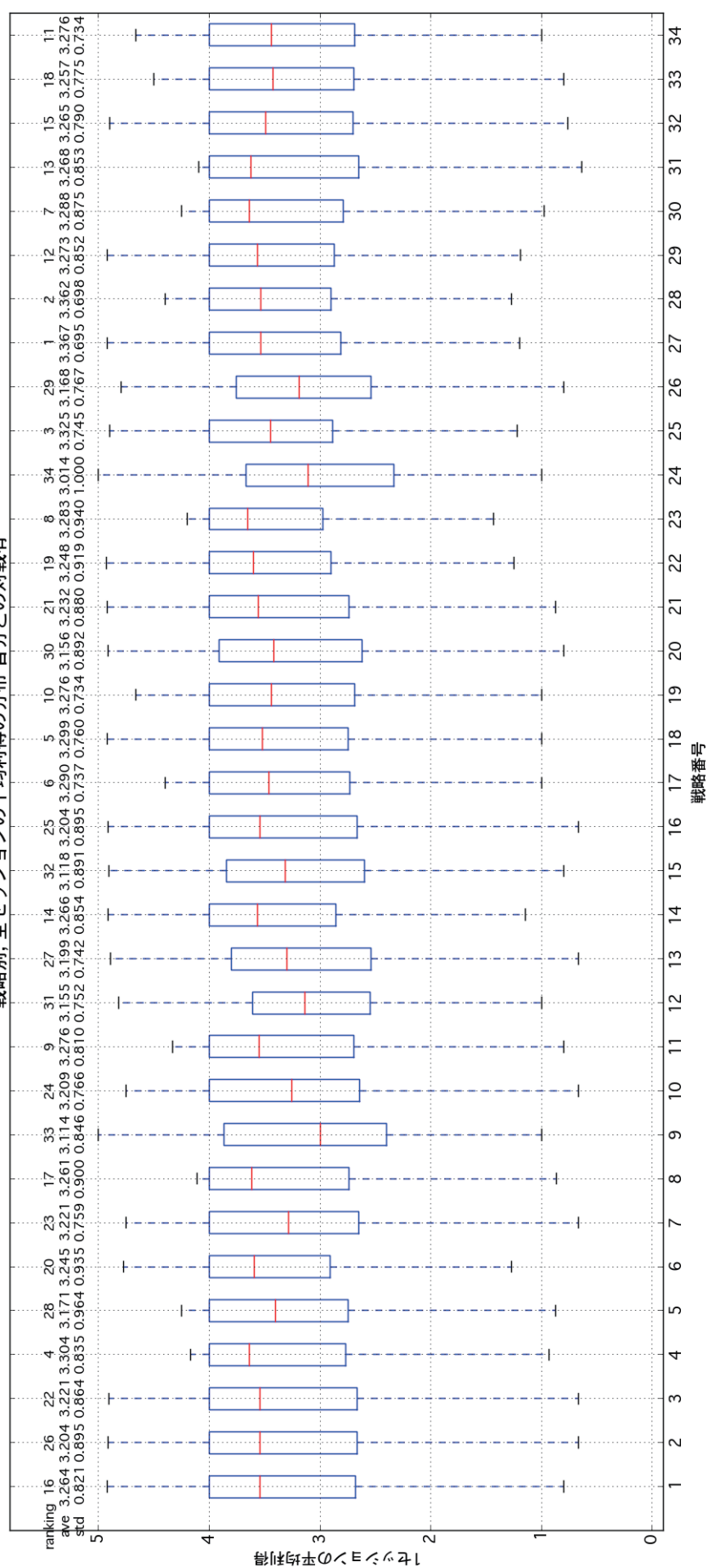
戦略別セッション平均の基本統計量

自分との対戦無											
Str No.	1	2	3	4	5	6	7	8	9	10	11	12
ranking	11	28	25	6	30	20	21	18	32	24	13	29
count	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000
mean	3.262	3.187	3.207	3.283	3.152	3.225	3.225	3.240	3.132	3.214	3.260	3.182
std	0.821	0.902	0.872	0.838	0.972	0.942	0.764	0.904	0.848	0.772	0.816	0.743
min	0	0	0	0	0	0	0	0	1	0	0	0
25%	2.677	2.627	2.639	2.737	2.7	2.863	2.650	2.702	2.407	2.639	2.667	2.6
50%	3.535	3.514	3.52	3.6	3.375	3.567	3.309	3.579	3	3.286	3.518	3.16
75%	4	4	4	4	4	4	4	4	3.895	4	4	3.641
max	4.923	4.917	4.909	4.167	4.25	4.778	4.75	4.111	5	4.75	4.333	4.818

Str No.	13	14	15	16	17	18	19	20	21	22	23	24
ranking	22	15	33	27	5	4	7	31	23	19	12	34
count	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000
mean	3.224	3.253	3.118	3.187	3.283	3.292	3.277	3.149	3.216	3.231	3.262	3.018
std	0.734	0.861	0.900	0.902	0.741	0.767	0.738	0.901	0.887	0.927	0.946	1.014
min	0	0	0	0	0	0	0	0	0	0	0	1
25%	2.583	2.833	2.585	2.627	2.714	2.721	2.682	2.6	2.703	2.862	2.919	2.333
50%	3.333	3.556	3.333	3.514	3.457	3.521	3.455	3.417	3.538	3.579	3.627	3.154
75%	3.85	4	3.857	4	4	4	4	3.917	4	4	4	3.667
max	4.895	4.917	4.909	4.917	4.4	4.923	4.667	4.917	4.923	4.933	4.2	5

Str No.	25	26	27	28	29	30	31	32	33	34		
ranking	3	26	1	2	10	9	17	14	16	8		
count	66000	66000	66000	66000	66000	66000	66000	66000	66000	66000		
mean	3.330	3.194	3.368	3.349	3.264	3.267	3.246	3.256	3.248	3.277		
std	0.746	0.760	0.690	0.700	0.858	0.880	0.857	0.793	0.779	0.738		
min	0	0	0	0	0	0	0	0	0	0		
25%	2.9	2.578	2.829	2.889	2.857	2.75	2.609	2.692	2.681	2.682		
50%	3.458	3.214	3.532	3.508	3.556	3.604	3.582	3.476	3.418	3.455		
75%	4	3.794	4	4	4	4	4	4	4	4		
max	4.9	4.8	4.923	4.4	4.923	4.25	4.1	4.9	4.5	4.667		

自分との対戦有

Str No.	1	2	3	4	5	6	7	8	9	10	11	12
ranking	16	26	22	4	28	20	23	17	33	24	9	31
count	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000
mean	3.264	3.204	3.221	3.304	3.171	3.245	3.221	3.261	3.114	3.209	3.276	3.155
std	0.821	0.895	0.864	0.835	0.964	0.935	0.759	0.900	0.846	0.766	0.810	0.752
min	0	0	0	0	0	0	0	0	1	0	0	0
25%	2.681	2.667	2.667	2.769	2.75	2.909	2.654	2.743	2.4	2.643	2.695	2.545
50%	3.542	3.542	3.541	3.636	3.404	3.593	3.286	3.619	3	3.259	3.551	3.136
75%	4	4	4	4	4	4	4	4	3.870	4	4	3.609
max	4.923	4.917	4.909	4.167	4.25	4.778	4.75	4.111	5	4.75	4.333	4.818

Str No.	13	14	15	16	17	18	19	20	21	22	23	24
ranking	27	14	32	25	6	5	10	30	21	19	8	34
count	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000
mean	3.199	3.266	3.118	3.204	3.290	3.299	3.276	3.156	3.232	3.248	3.283	3.014
std	0.742	0.854	0.891	0.895	0.737	0.760	0.734	0.892	0.880	0.919	0.940	0.100
min	0	0	0	0	0	0	0	0	0	0	0	1
25%	2.540	2.860	2.6	2.667	2.729	2.75	2.685	2.625	2.739	2.9	2.974	2.333
50%	3.3	3.564	3.313	3.542	3.462	3.52	3.439	3.415	3.556	3.6	3.656	3.105
75%	3.8	4	3.846	4	4	4	4	3.910	4	4	4	3.667
max	4.895	4.917	4.909	4.917	4.4	4.923	4.667	4.917	4.923	4.933	4.2	5

Str No.	25	26	27	28	29	30	31	32	33	34		
ranking	3	29	1	2	12	7	13	15	18	11		
count	68000	68000	68000	68000	68000	68000	68000	68000	68000	68000		
mean	3.325	3.168	3.367	3.362	3.273	3.288	3.268	3.265	3.257	3.276		
std	0.745	0.767	0.695	0.698	0.852	0.875	0.854	0.790	0.775	0.734		
min	0	0	0	0	0	0	0	0	0	0		
25%	2.888	2.537	2.813	2.902	2.875	2.789	2.650	2.705	2.697	2.685		
50%	3.45	3.188	3.538	3.538	3.566	3.636	3.622	3.494	3.429	3.439		
75%	4	3.758	4	4	4	4	4	4	4	4		
max	4.9	4.8	4.923	4.4	4.923	4.25	4.1	4.9	4.5	4.667		

期数による平均利得の変化

平均利得の推移（自分との対戦無し）

凡例:
- 27 (20%)
- 28 (2T2FT)
- 19 (TFT)
- 18 (WSLS')
- 13 (CCDDDD)
- 9 (STFT)
- 8 (HIST)

縦軸: average payoff
横軸: ts_length

平均利得の推移（自分との対戦有り）

凡例:
- 27 (20%)
- 28 (2T2FT)
- 19 (TFT)
- 18 (WSLS')
- 13 (CCDDDD)
- 9 (STFT)
- 8 (HIST)

縦軸: average payoff
横軸: ts_length